

**Fuzzy Decision Support  
Applied to Machine Maintenance  
(The Appendixes in CD-ROM Disk)**

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Submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy  
at De Montfort University  
Leicester, United Kingdom

July 2012

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## **Appendix A**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of Minimum Cushion Position Factor for Forecasting the Second and the Third Weeks (1) - in CD-ROM Disk.**

The type-A and type-B forecasting methods in Figure 5.7 are employed to forecast minimum cushion position factor as following.

Figure A.1 to A.21 of Appendix A in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of minimum cushion position factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure A.1 to A.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-A forecasting method).
- Figure A.8 to A.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-B forecasting method).
- Figure A.15 to A.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

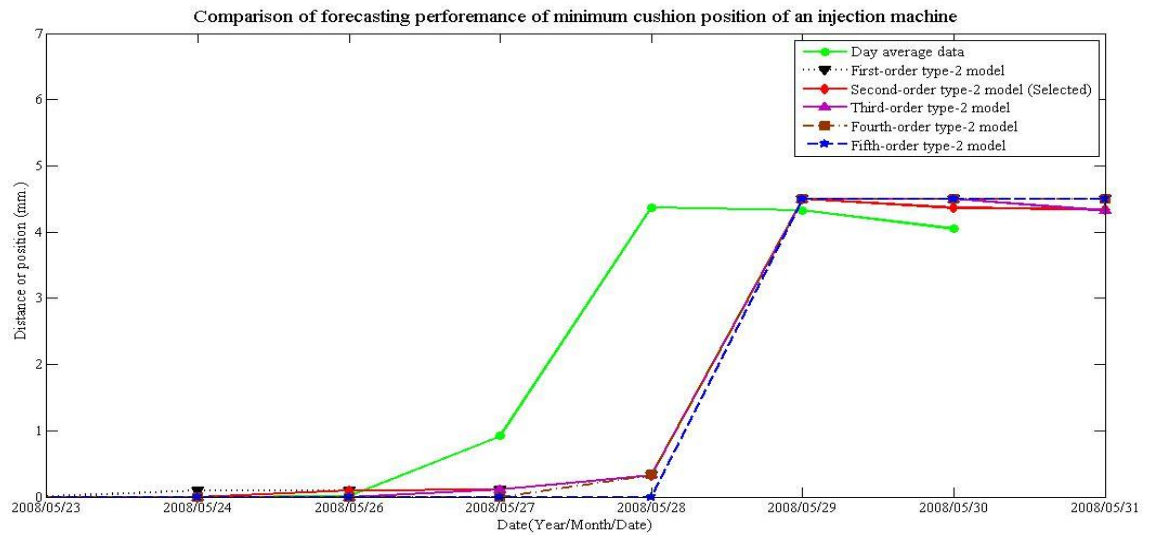


Fig. A.1. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the first to seventh days of the first week data forecast on 2008/05/31.

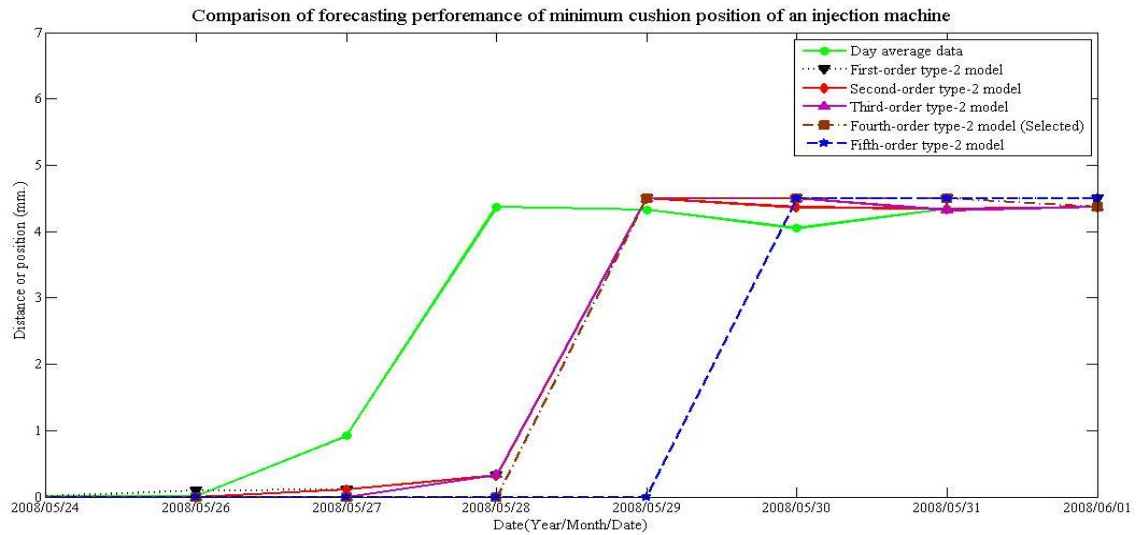


Fig. A.2. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day forecasting value of the second week forecast on 2008/06/01.

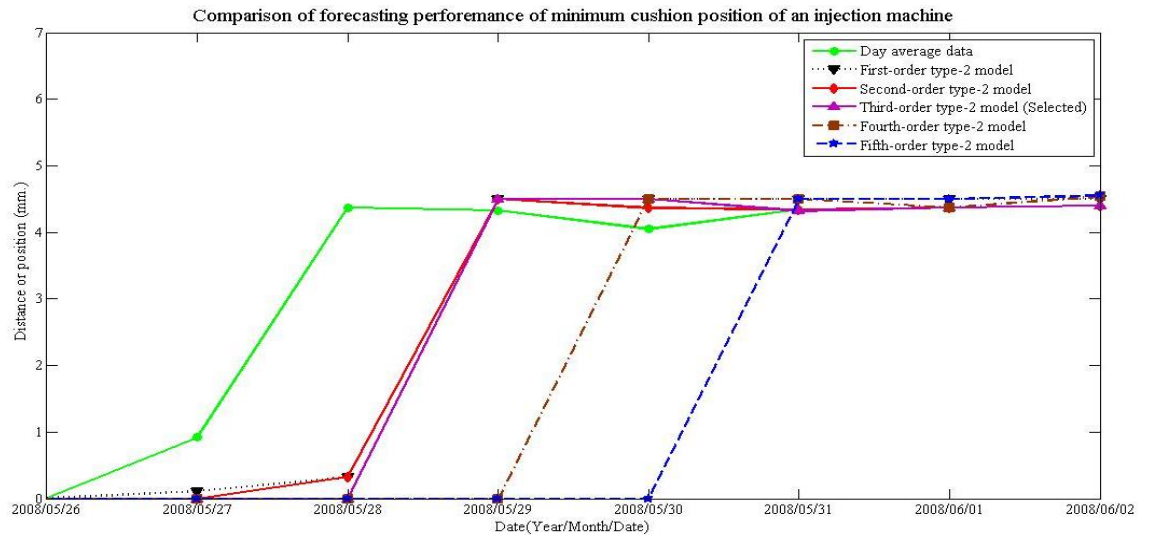


Fig. A.3. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days forecasting values of the second week forecast on 2008/06/02.

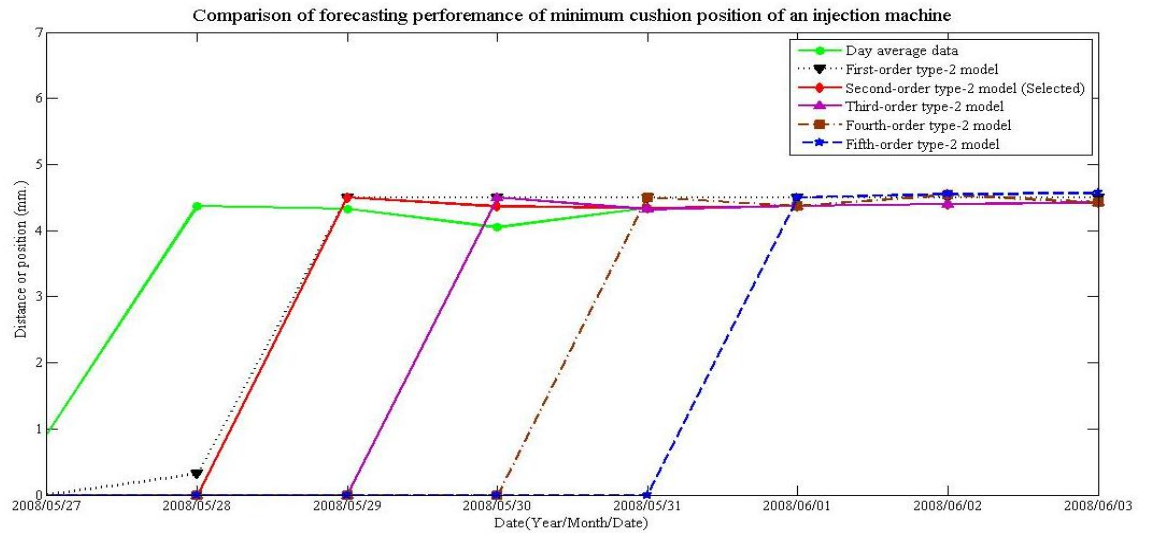


Fig. A.4. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days forecasting values of the second week forecast on 2008/06/03.

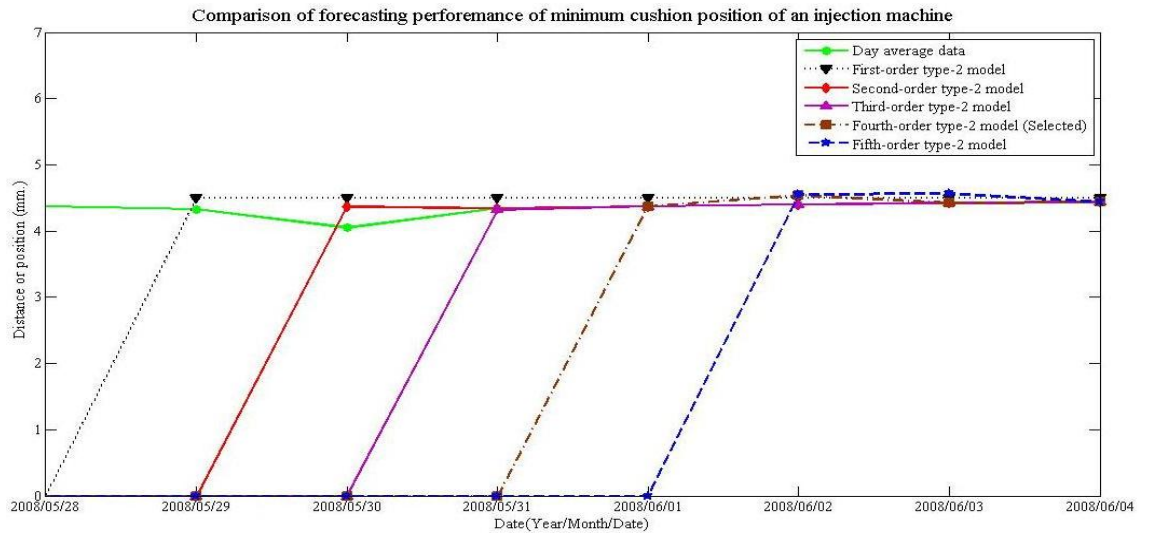


Fig. A.5. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days forecasting values of the second week forecast on 2008/06/04.

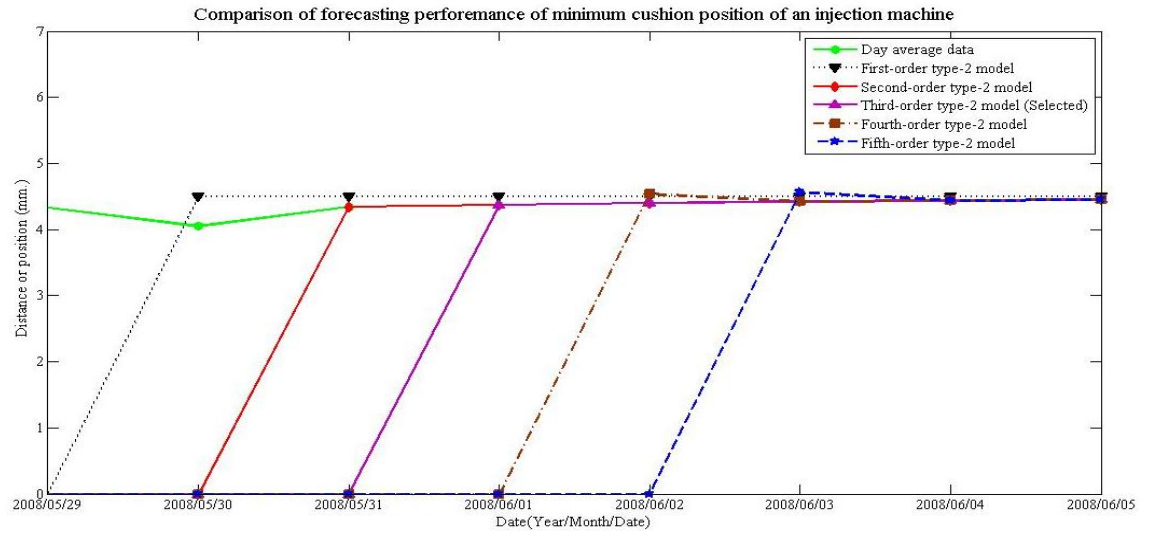


Fig. A.6. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days forecasting values of the second week forecast on 2008/06/05.

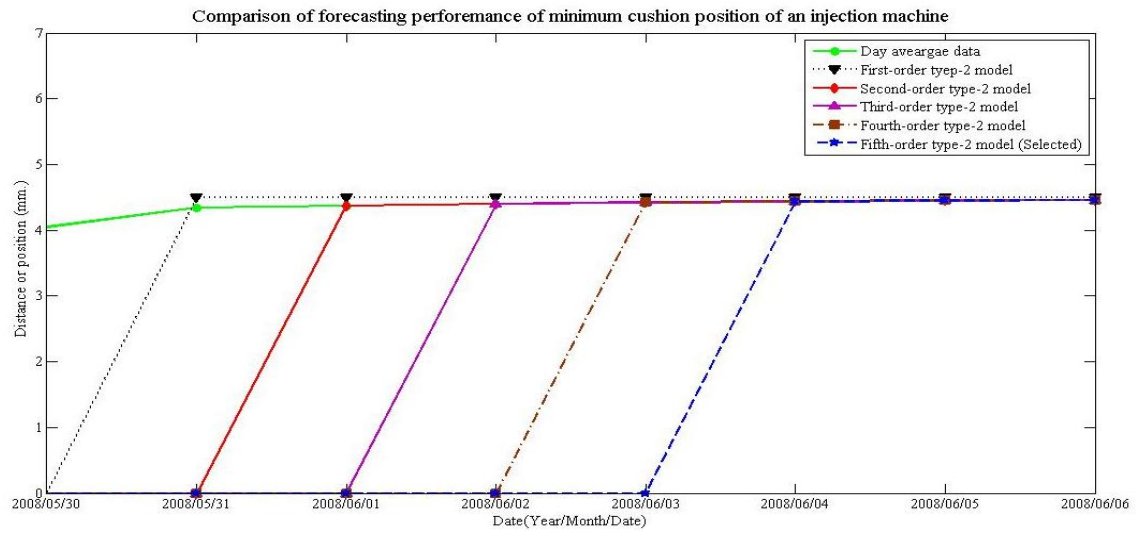


Fig. A.7. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days forecasting values of the second week forecast on 2008/06/06.

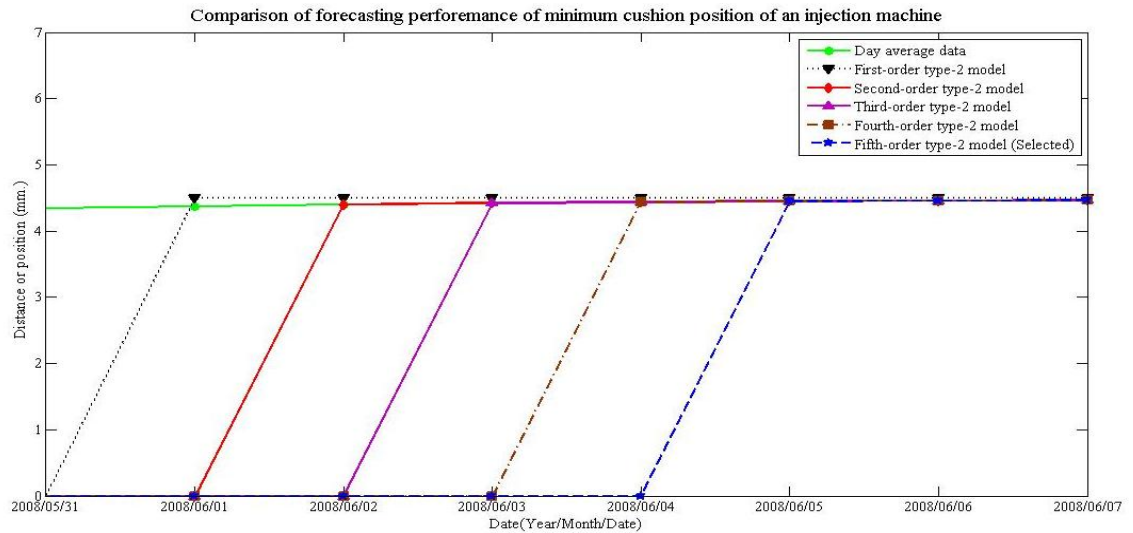


Fig. A.8. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

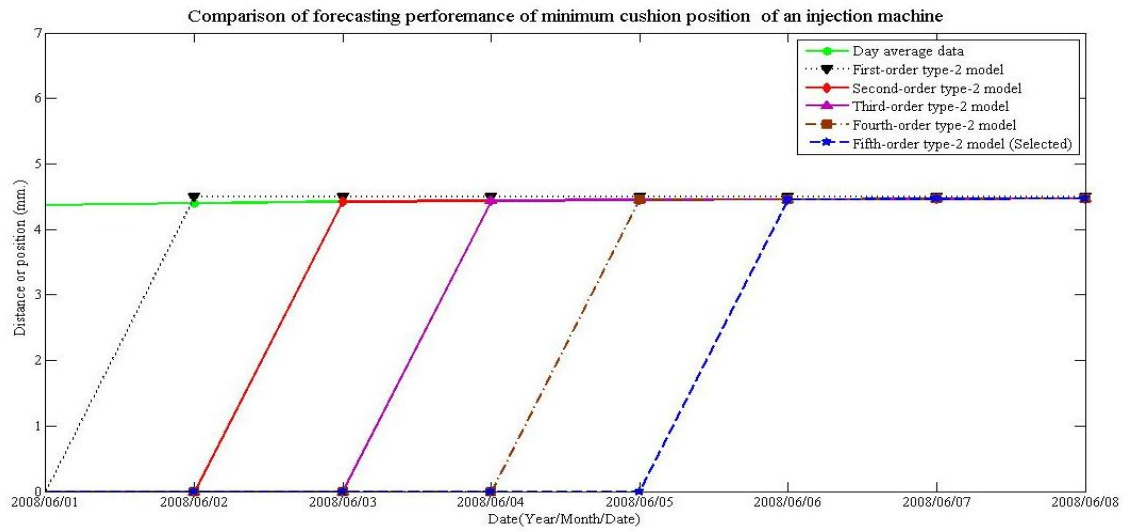


Fig. A.9. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day forecasting values of the third week forecast on 2008/06/08.

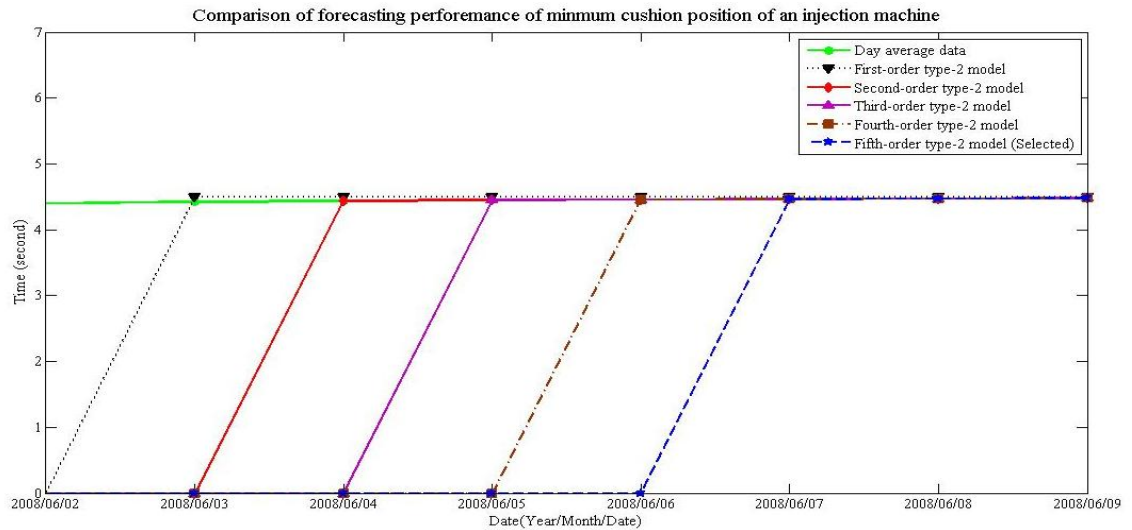


Fig. A.10. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days forecasting values of the third week forecast on 2008/06/09.

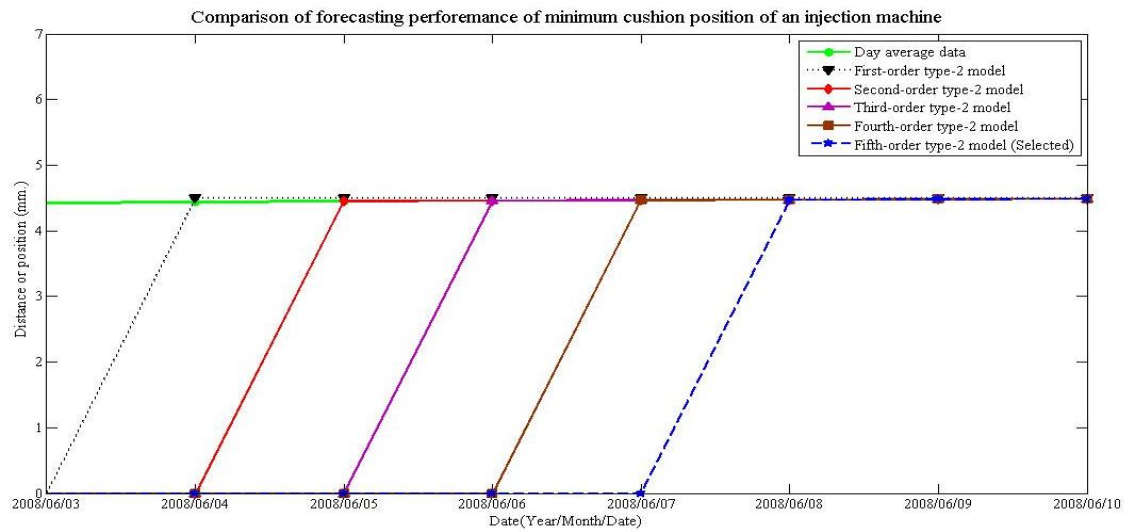


Fig. A.11. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days forecasting values of the third week forecast on 2008/06/10.

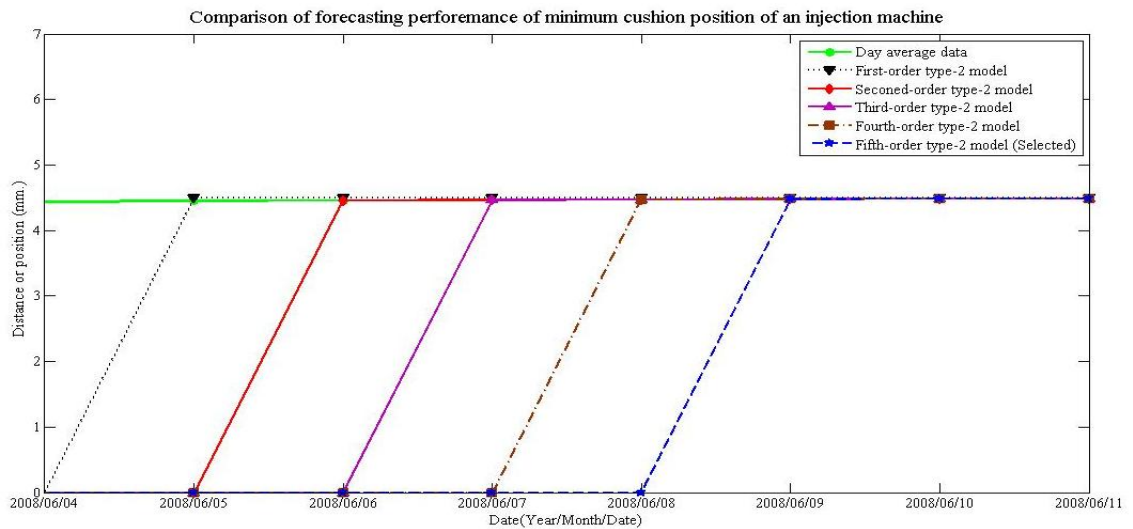


Fig. A.12. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

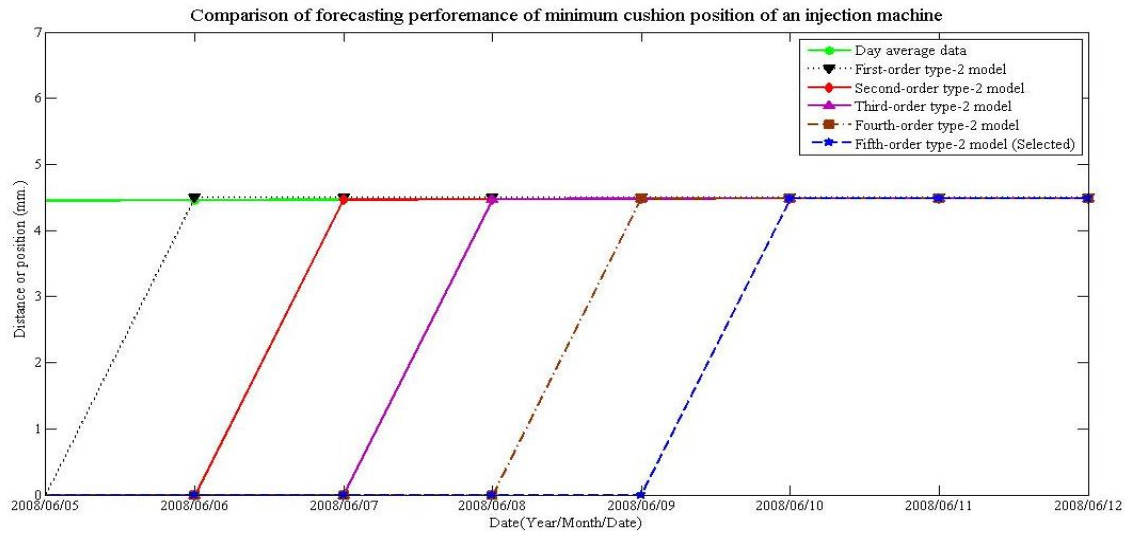


Fig. A.13. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

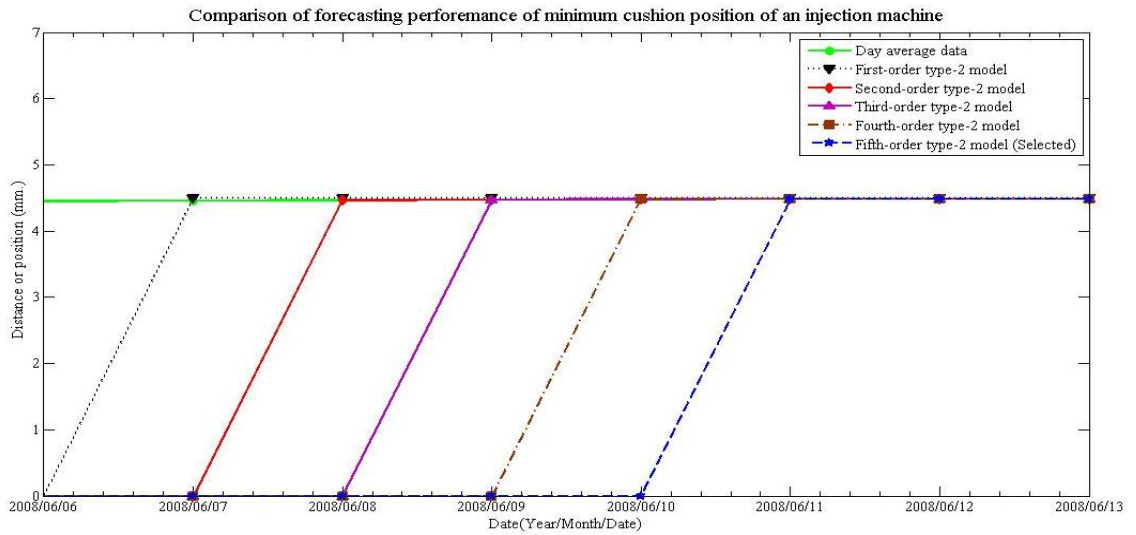


Fig. A.14. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

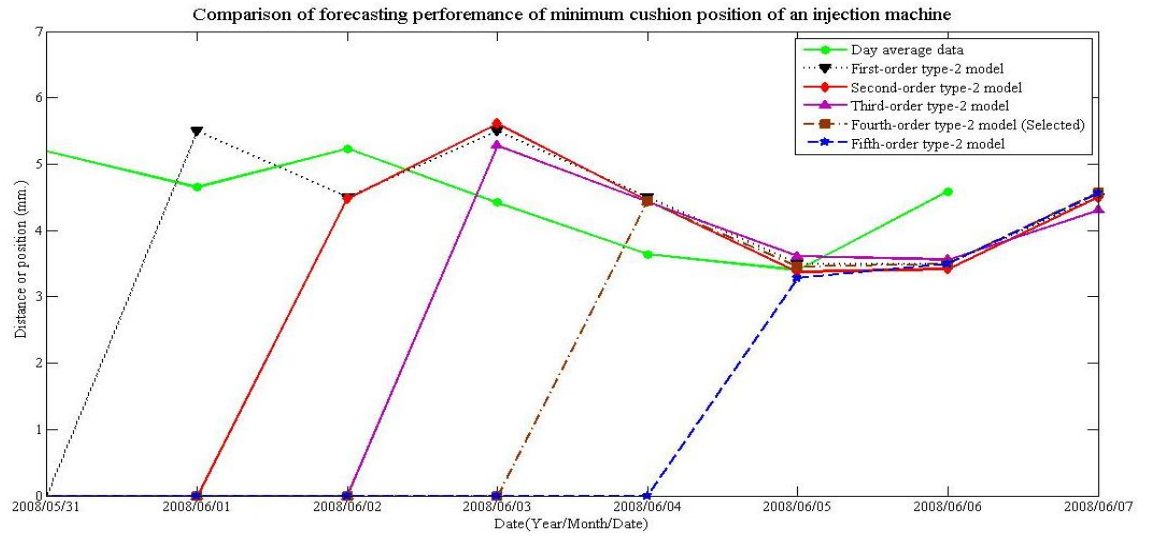


Fig. A.15. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the first to seventh days forecasting values of the second week forecast on 2008/06/07.

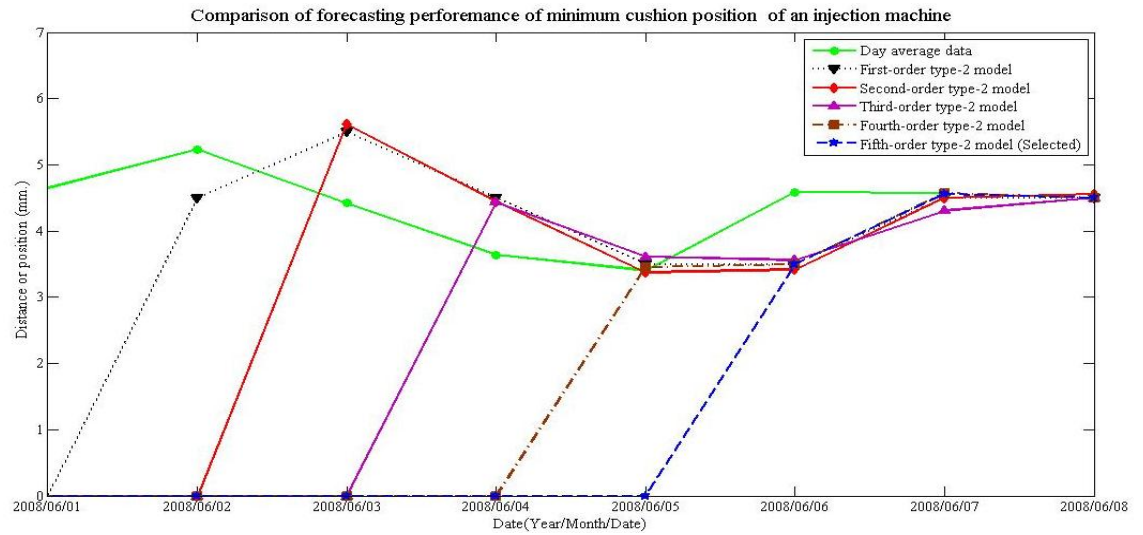


Fig. A.16. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day forecasting value of the third week forecast on 2008/06/08.

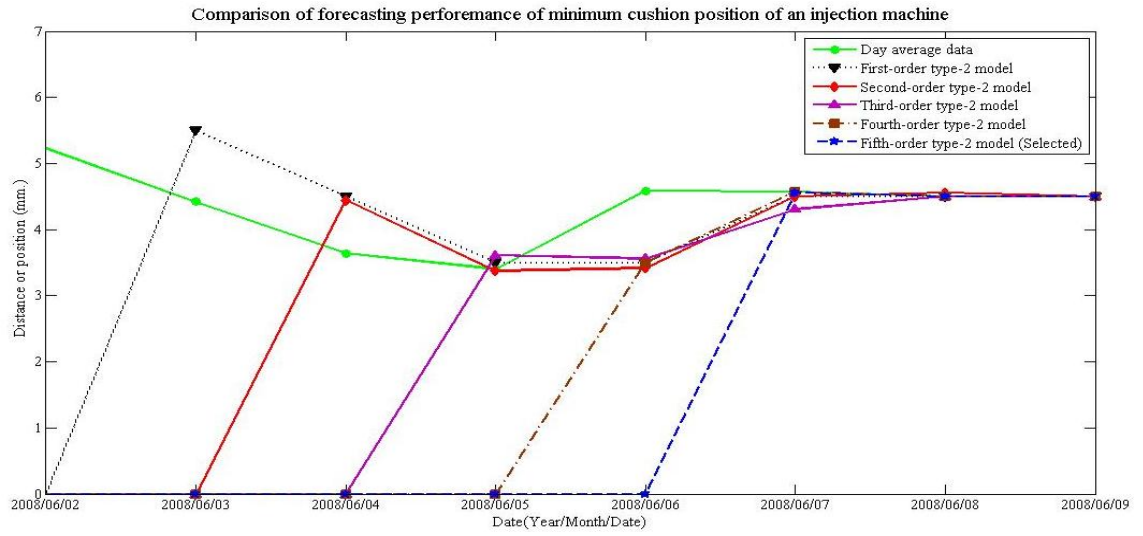


Fig. A.17. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days forecasting values of the third week forecast on 2008/06/09.

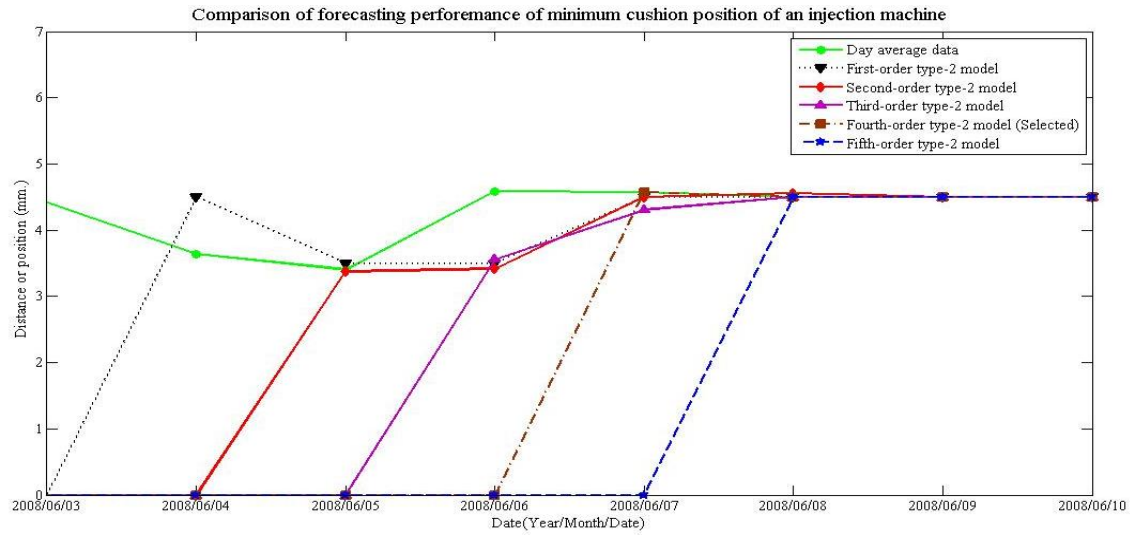


Fig. A.18. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days forecasting values of the third week forecast on 2008/06/10.

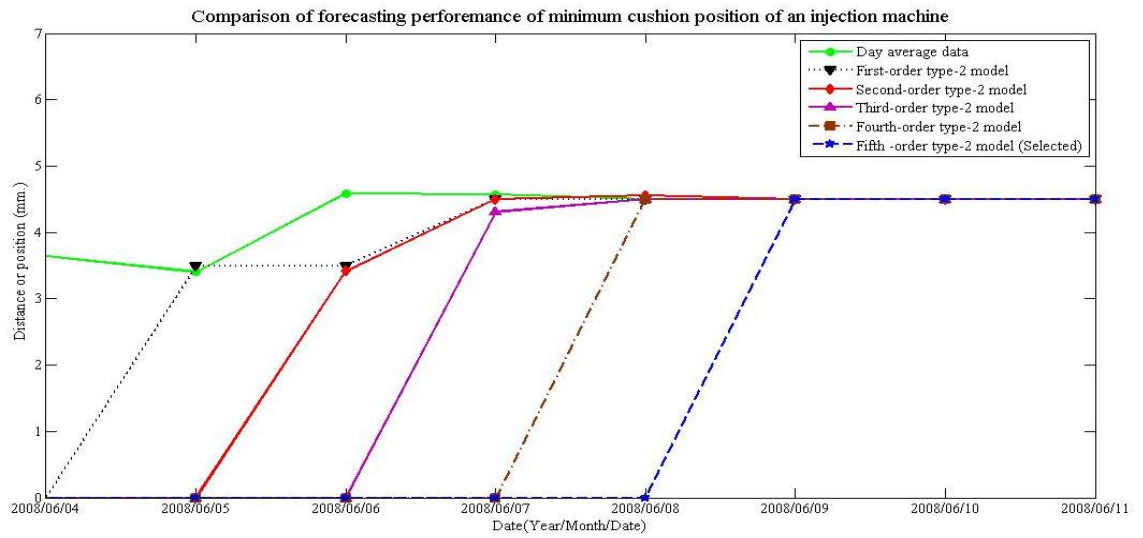


Fig. A.19. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

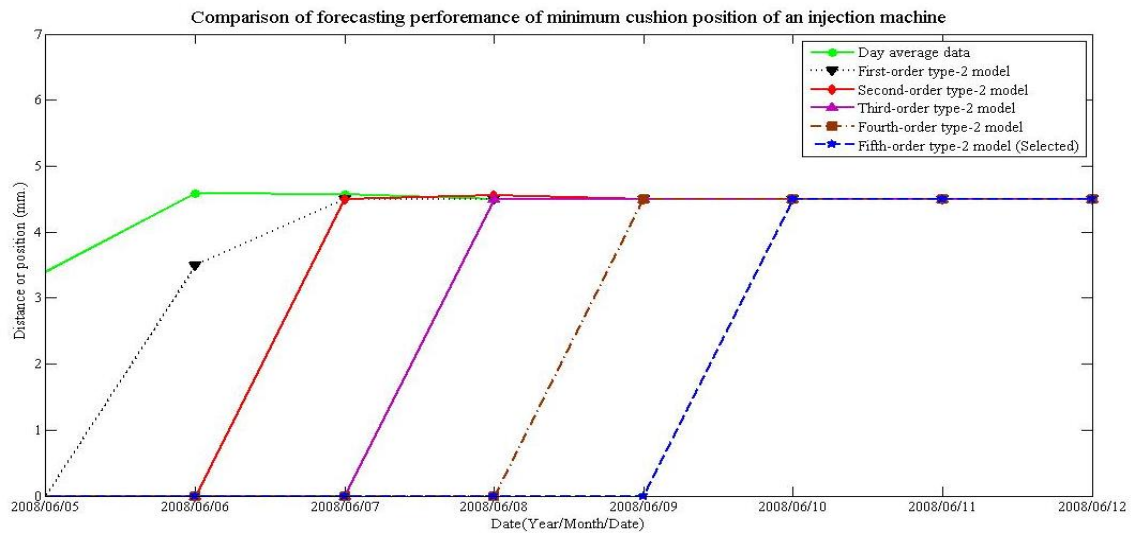


Fig. A.20. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

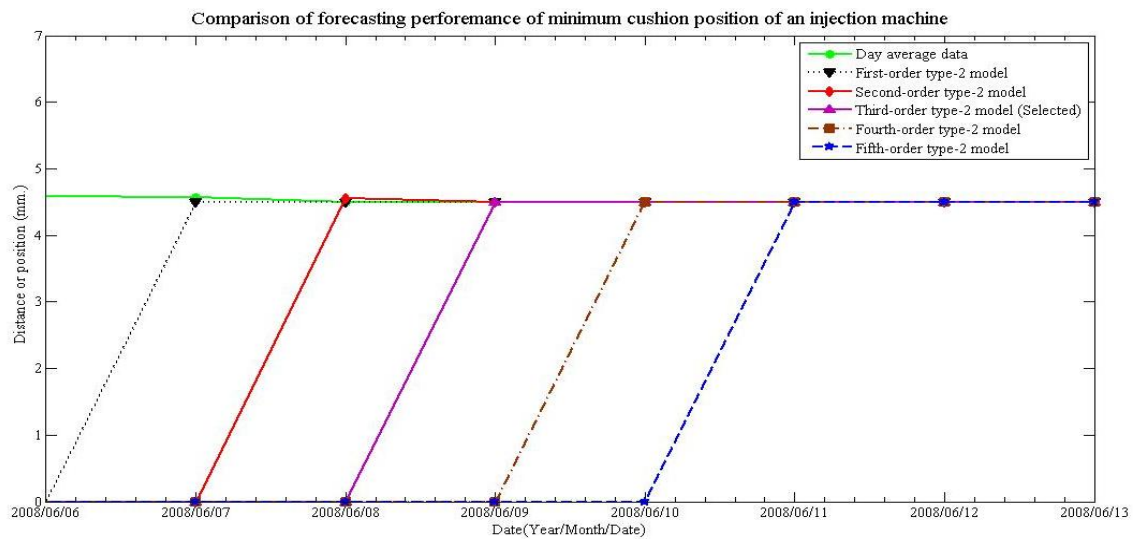


Fig. A.21. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

## Appendix B

### The Diagrams of Daily Forecasting : Using Day Average Data of a Couple Weeks of Minimum Cushion Position Factor for Forecasting - in CD-ROM Disk.

In Appendix D, Table D.1 presents the results of daily forecasting using day average data of a couple weeks of minimum cushion position factor between 2008/05/23 and 2008/05/27. The diagram of forecasting values of a couple weeks of minimum cushion position factor are illustrated in Appendix B in the accompanying CD-ROM disk in Figure B.1 to B.15 in the accompanying CD-ROM disk are as follows.

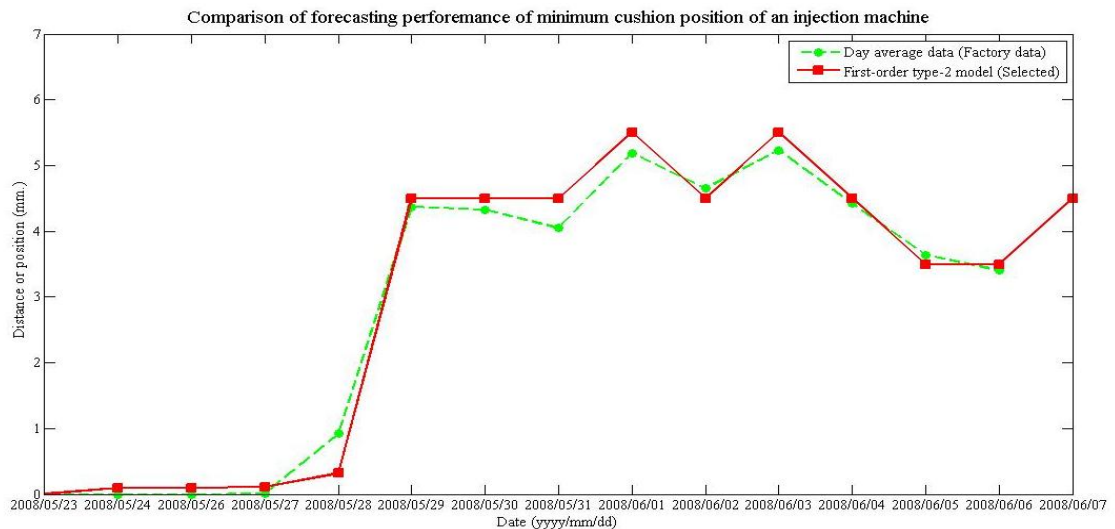


Fig. B.1. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/06.

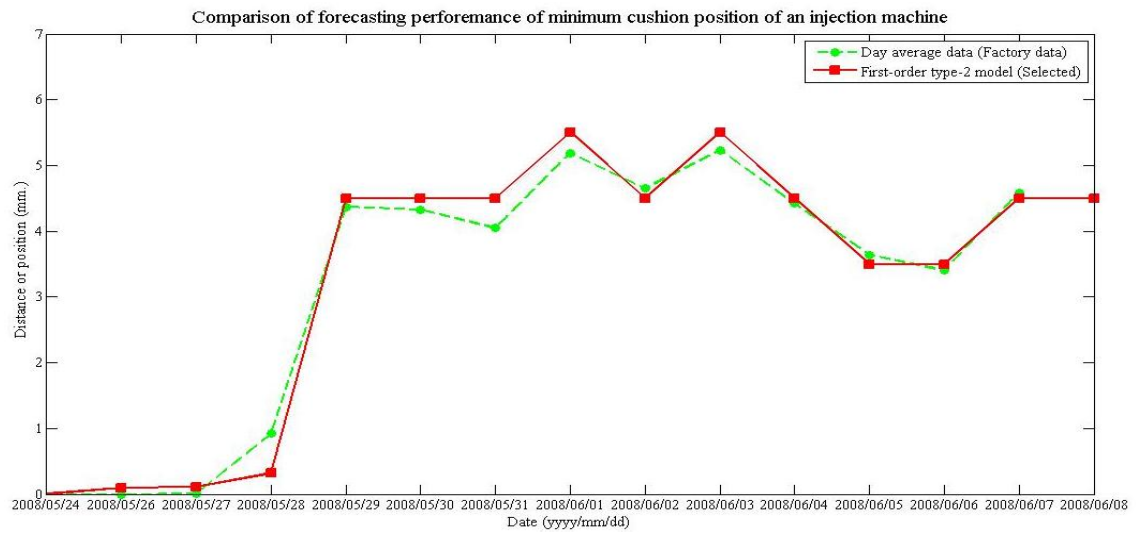


Fig. B.2. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/07.

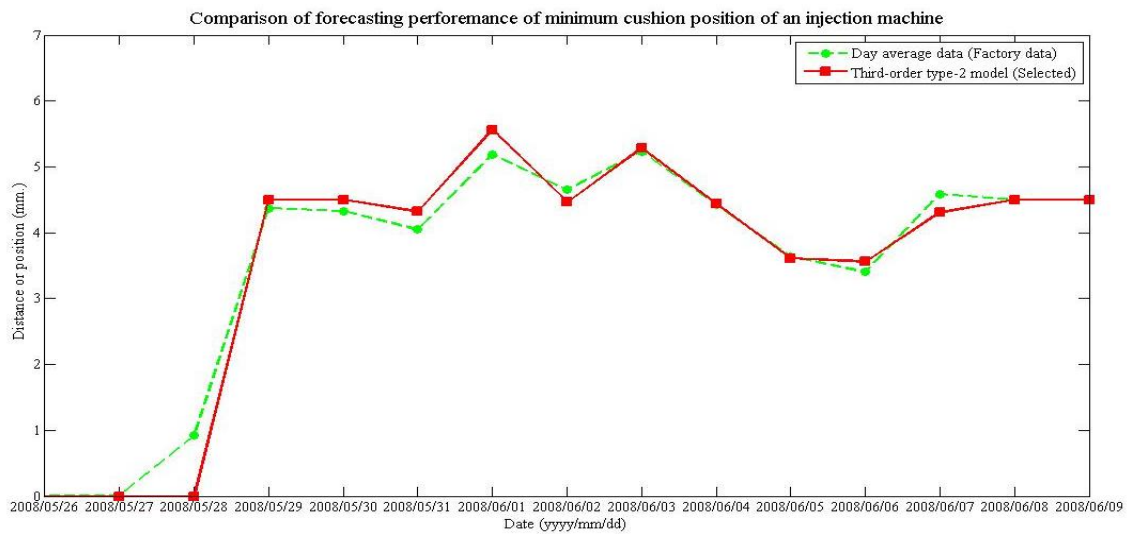


Fig. B.3. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/08.

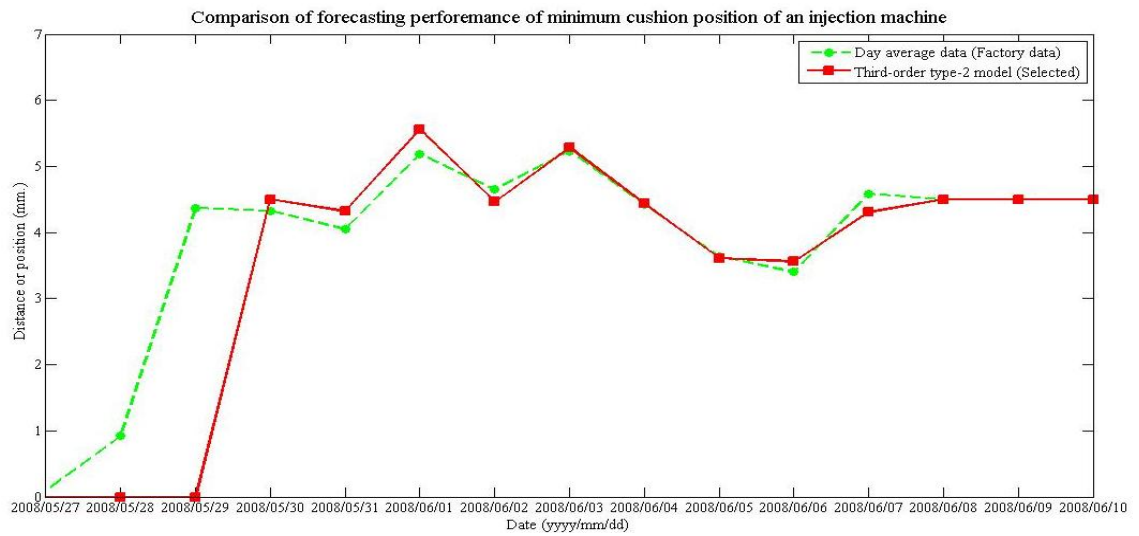


Fig. B.4. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/09.

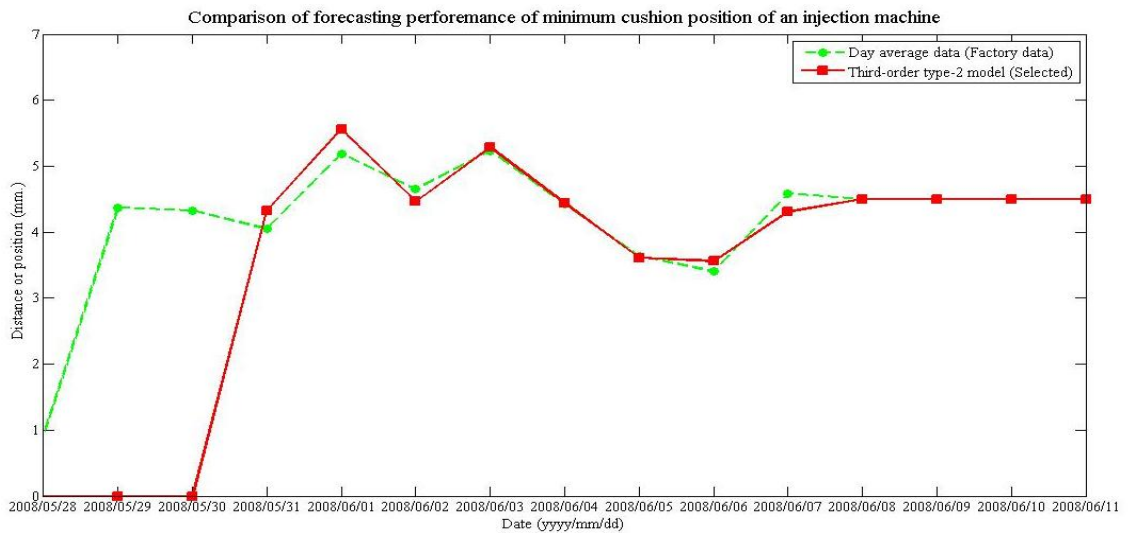


Fig. B.5. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/10.

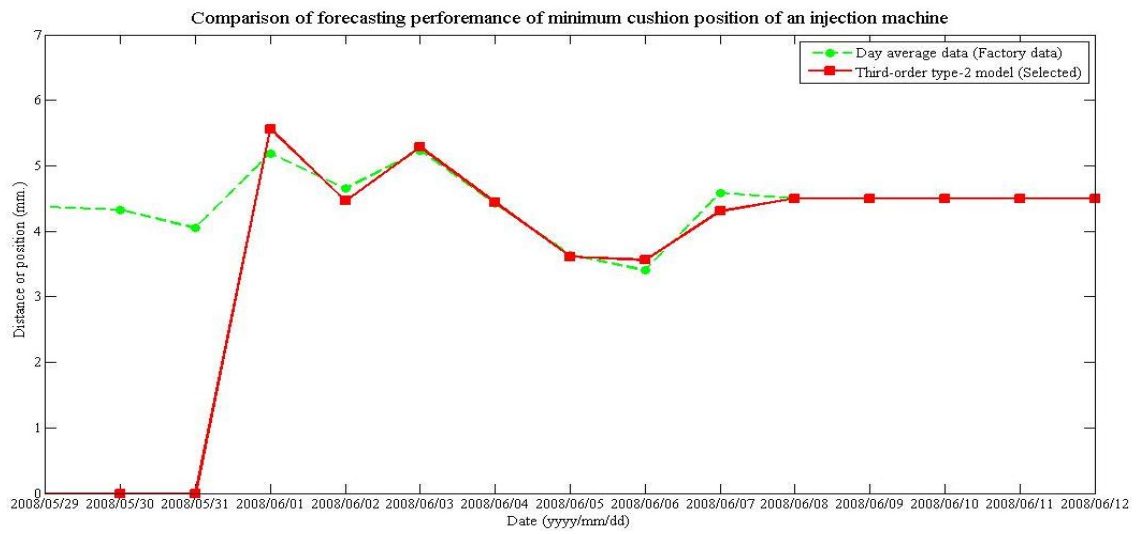


Fig. B.6. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/11.

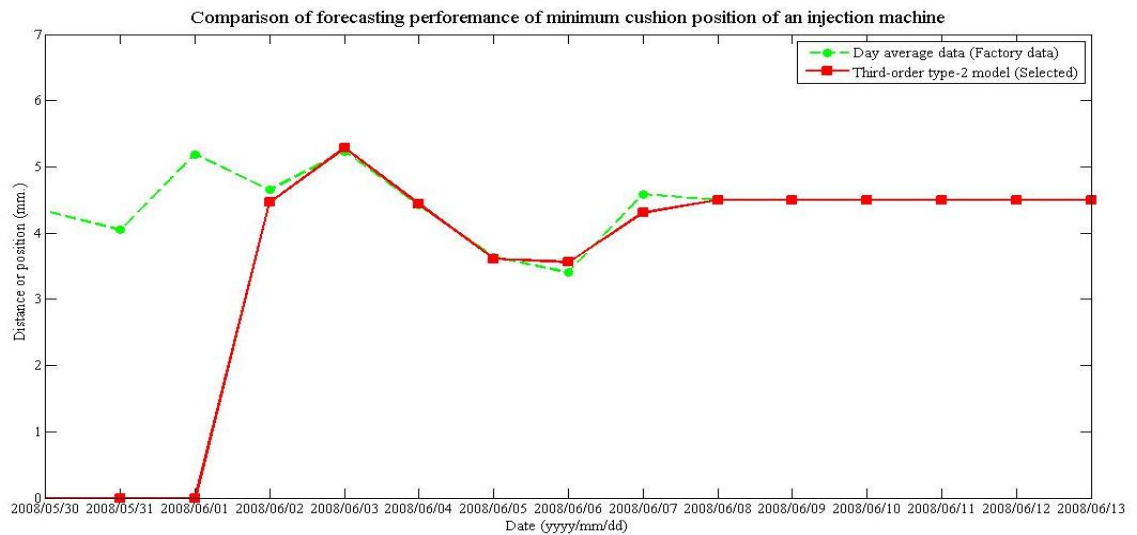


Fig. B.7. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/12.

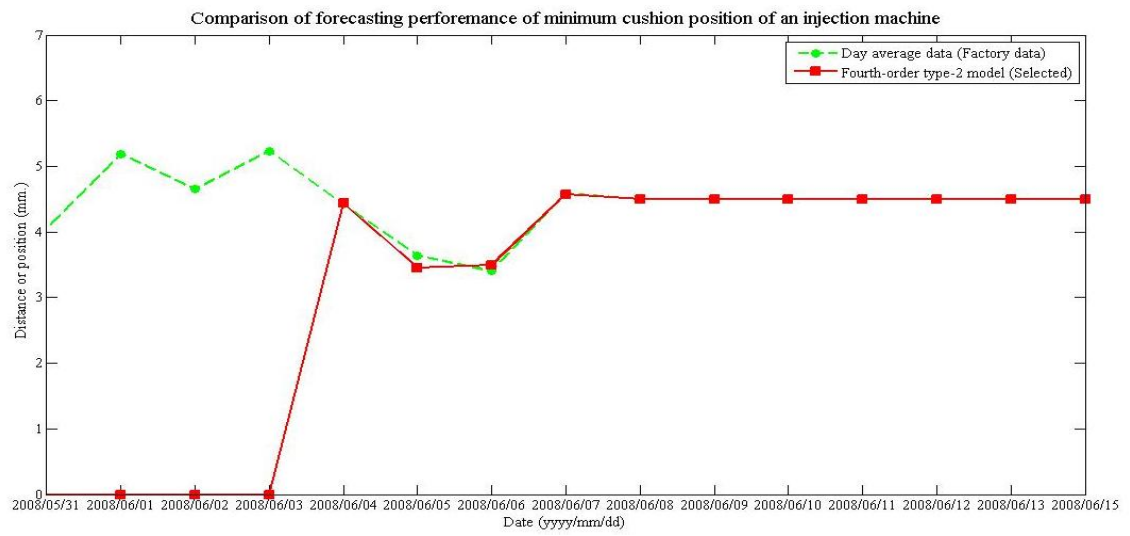


Fig. B.8. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/13.

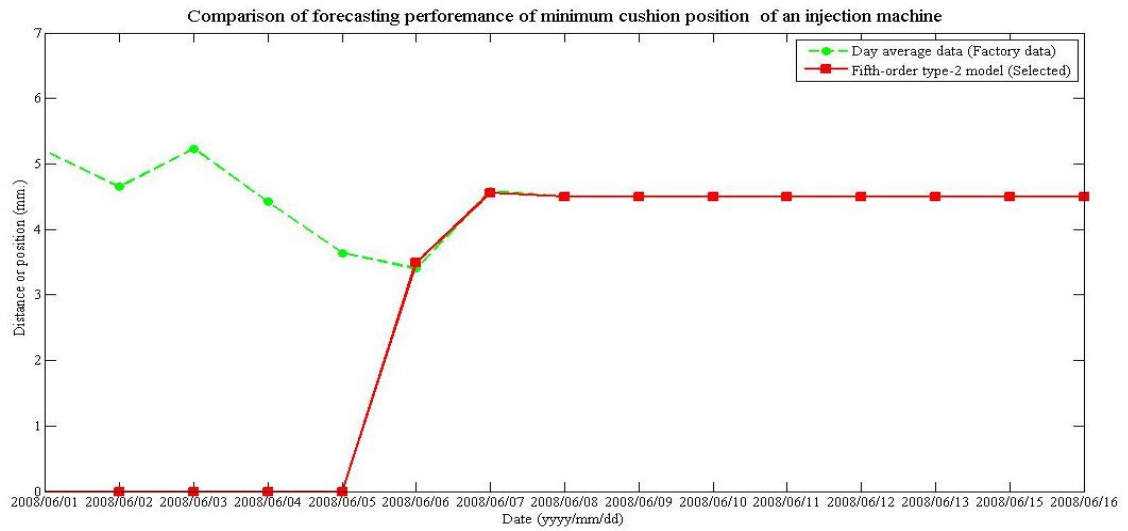


Fig. B.9. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/15.

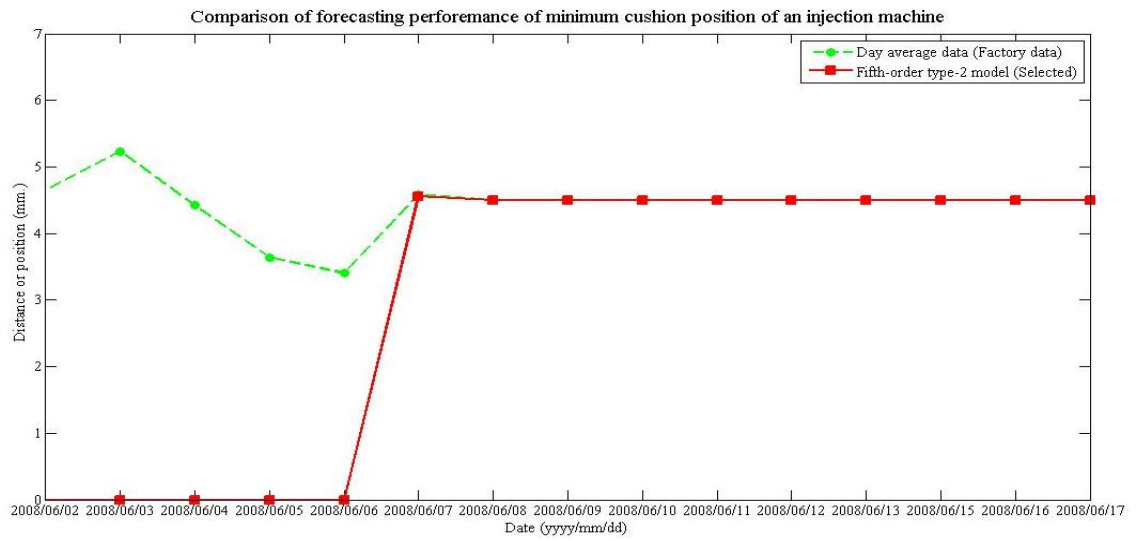


Fig. B.10. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/16.

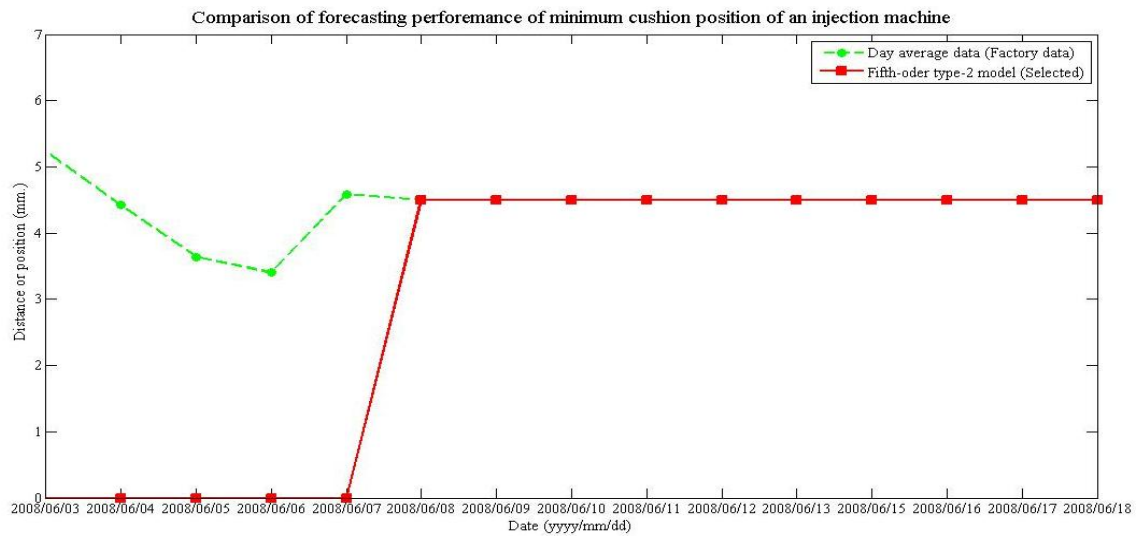


Fig. B.11. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/17.

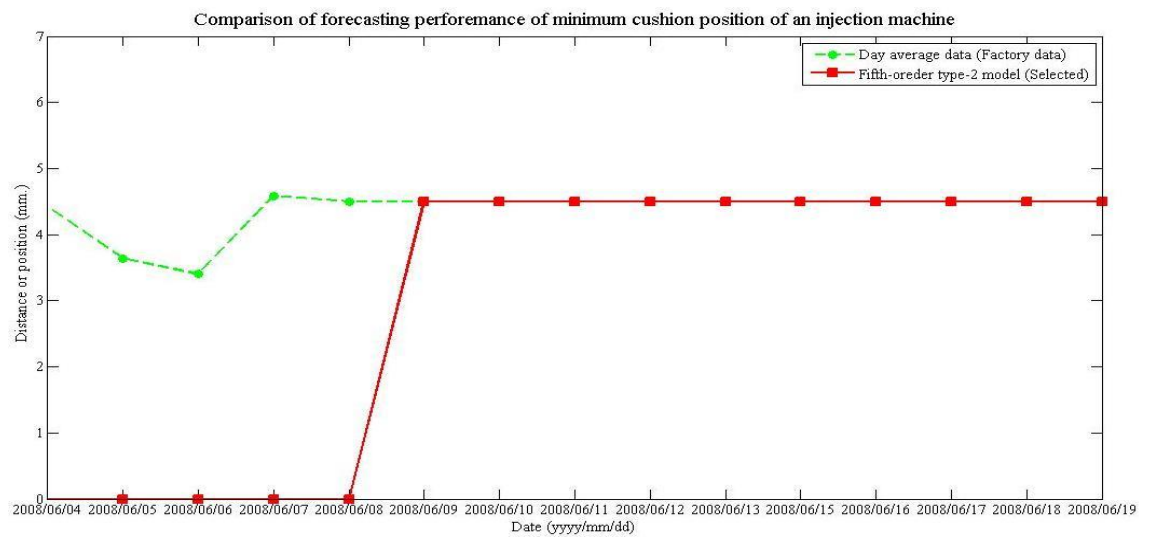


Fig. B.12. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/18.

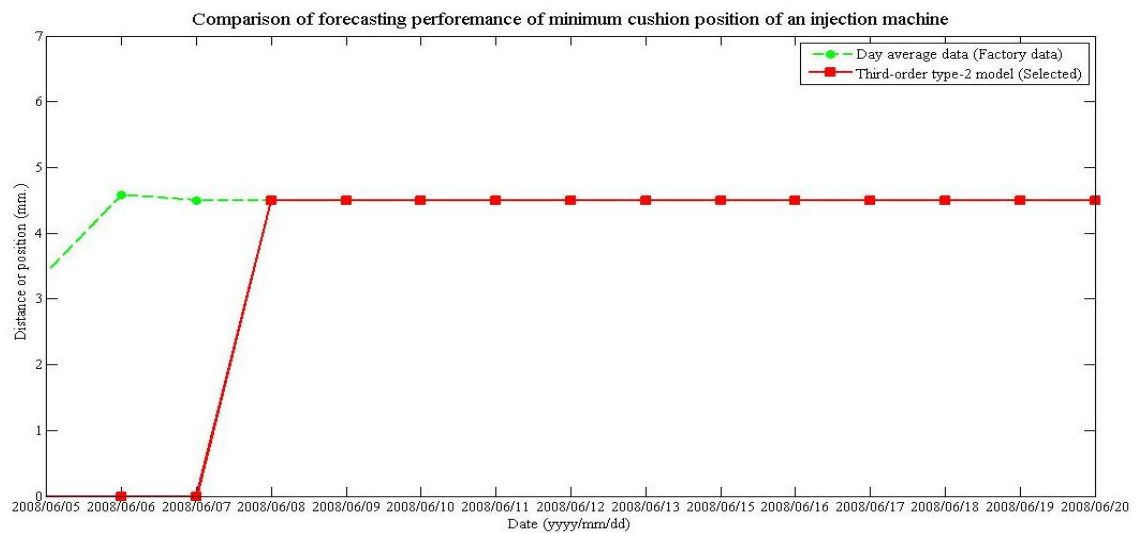


Fig. B.13. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/19.

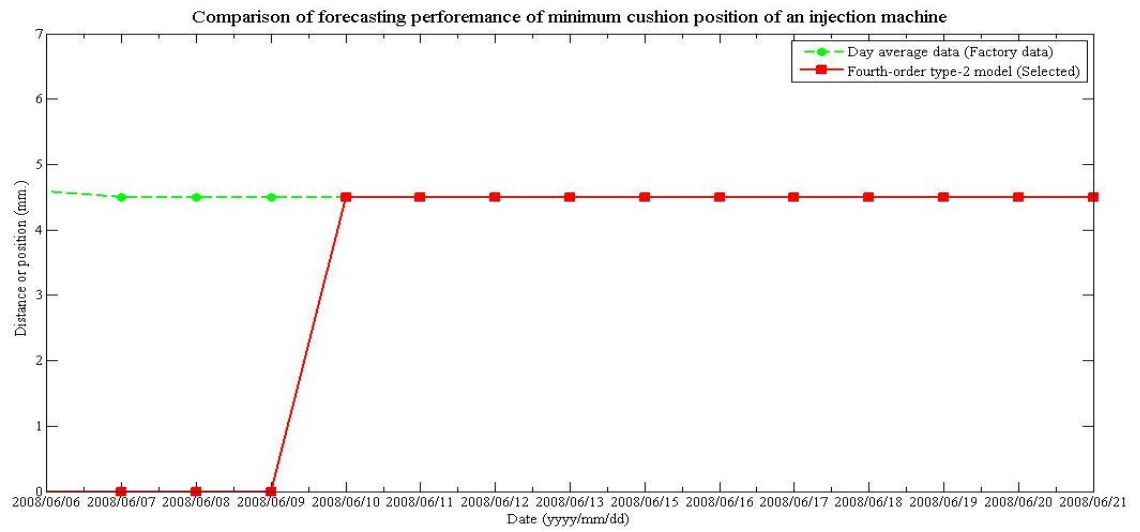


Fig. B.14. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/20.

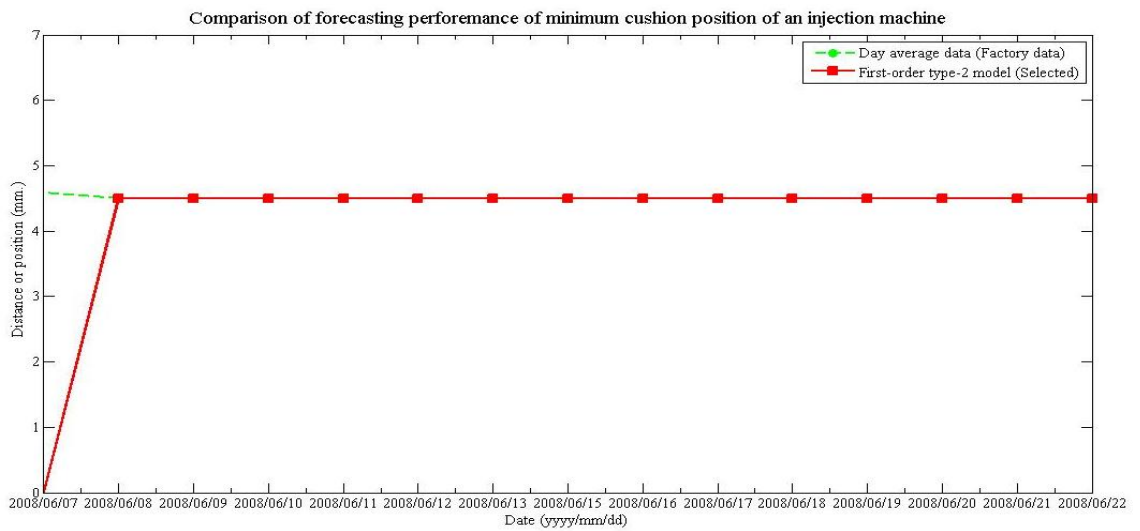


Fig. B.15. Forecasting position of minimum cushion position factor (in millimetre) as date is varies and a couple weeks data are used to forecast on 2008/06/21.

## **Appendix C**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of Filling Time Factor for Forecasting the Second and the Third Weeks (1) - in CD-ROM Disk.**

The type-A and type-B forecasting methods in Figure 5.7 are employed to forecast filling time factor as following.

Figure C.1 to C.21 of Appendix C in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of filling time factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure C.1 to C.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-A forecasting method).
- Figure C.8 to C.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-B forecasting method).
- Figure C.15 to C.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

In Appendix C in the accompanying CD-ROM disk, the second week forecasting of minimum cushion position factor using type-A forecasting method for forecasting can be found in Figure C.1 to C.7 in the accompanying CD-ROM disk as following.

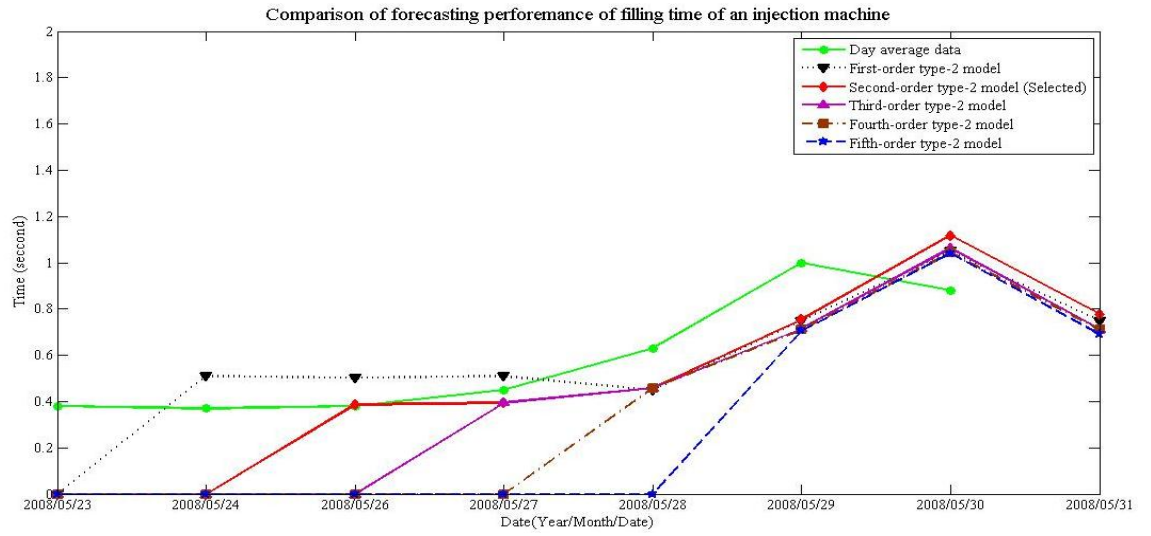


Fig. C.1. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the first to seventh days of the first week data forecast on 2008/05/31.

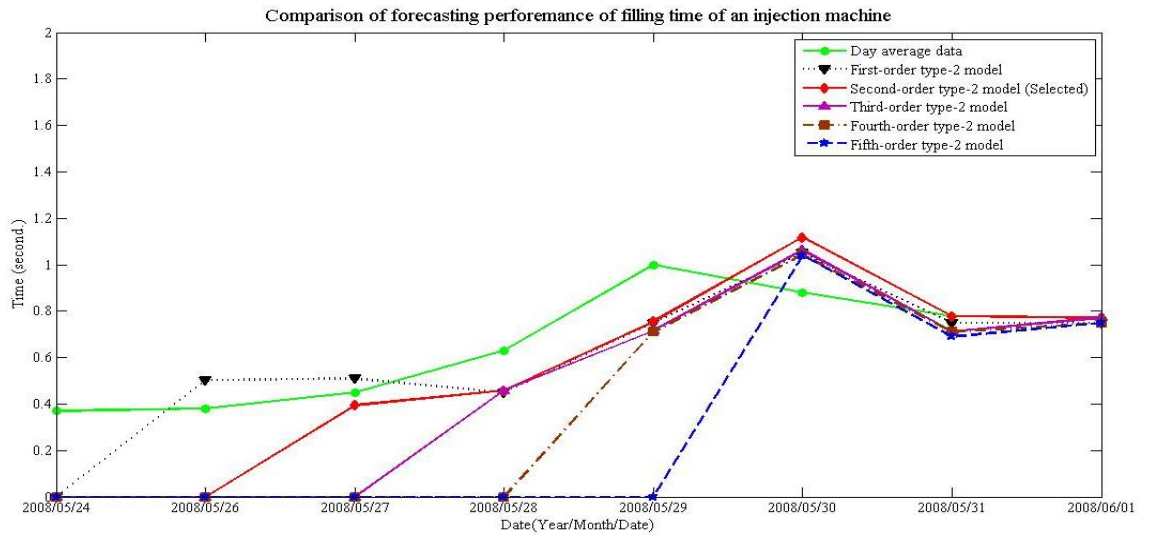


Fig. C.2. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day forecasting value of the second week forecast on 2008/06/01.

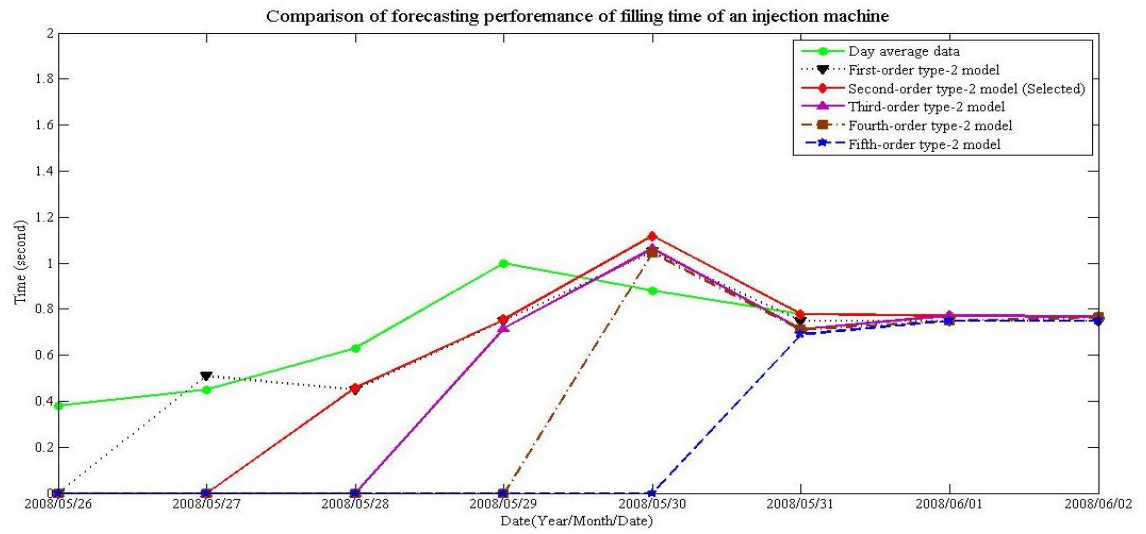


Fig. C.3. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days forecasting values of the second week forecast on 2008/06/02.

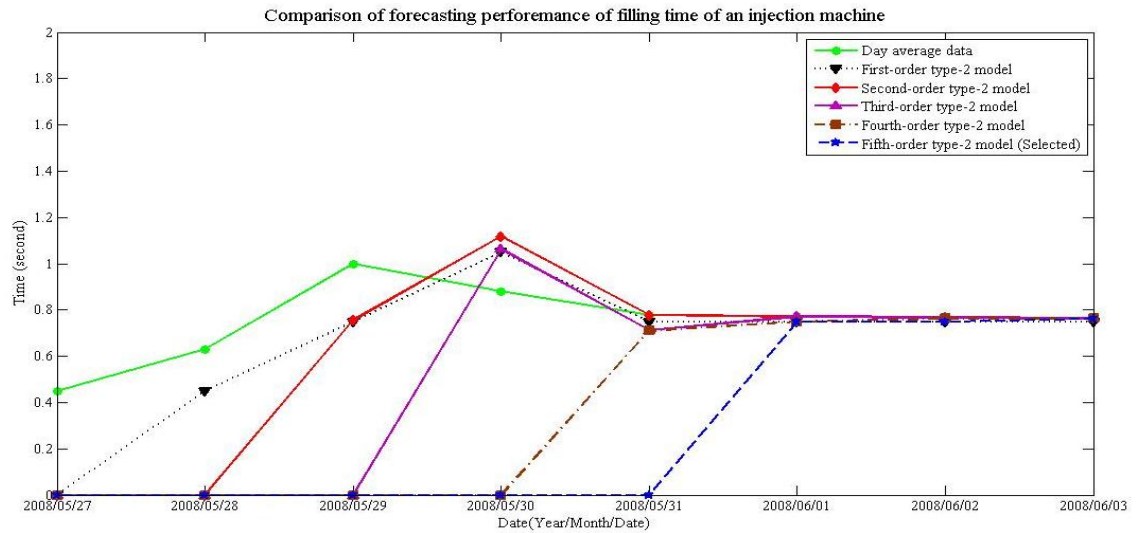


Fig. C.4. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days forecasting values of the second week forecast on 2008/06/03.

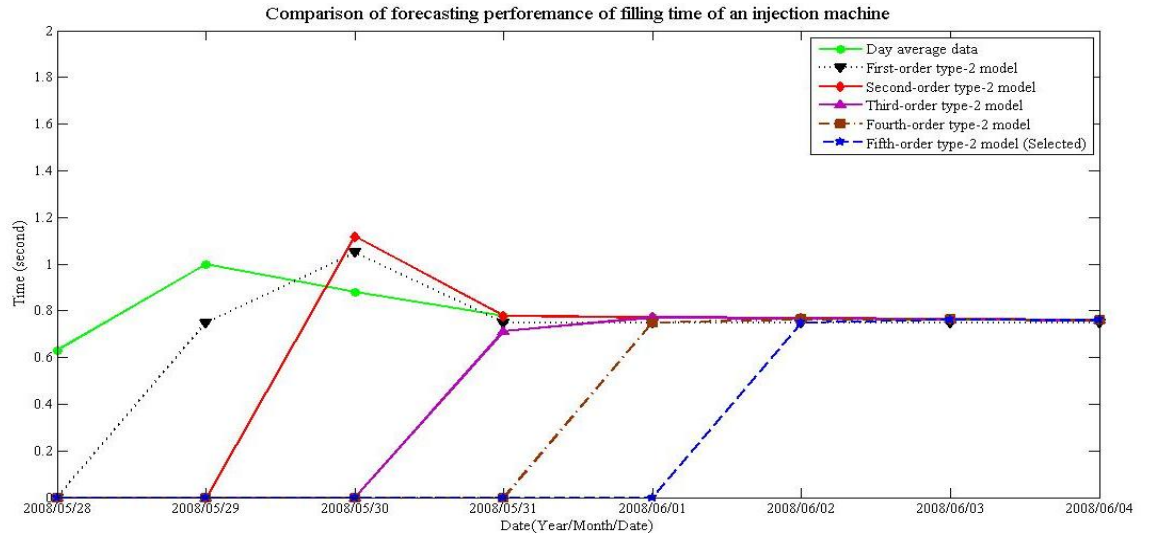


Fig. C.5. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days forecasting values of the second week forecast on 2008/06/04.

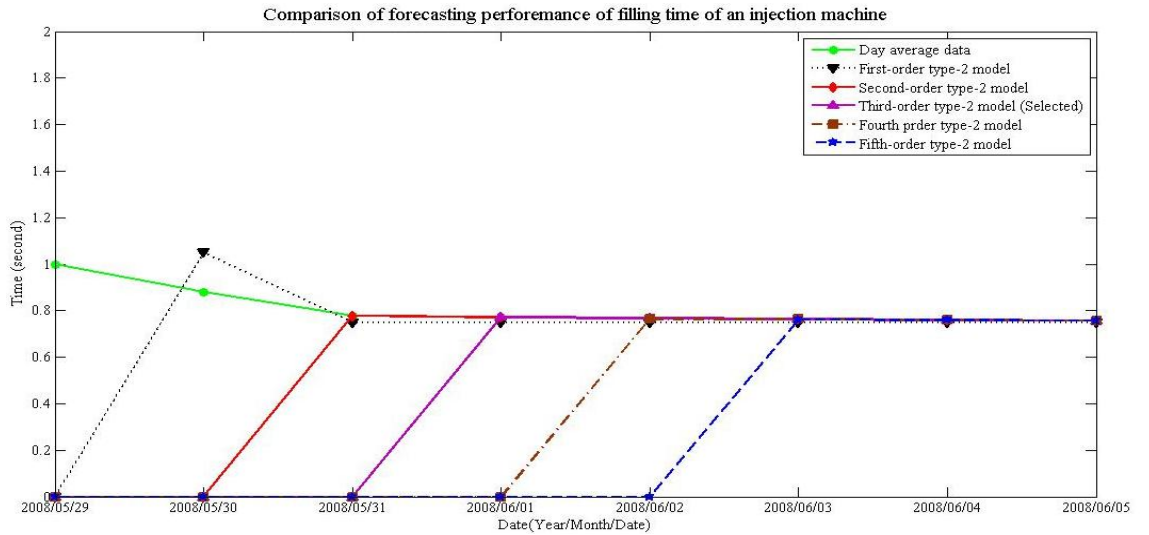


Fig. C.6. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days forecasting values of the second week forecast on 2008/06/05.

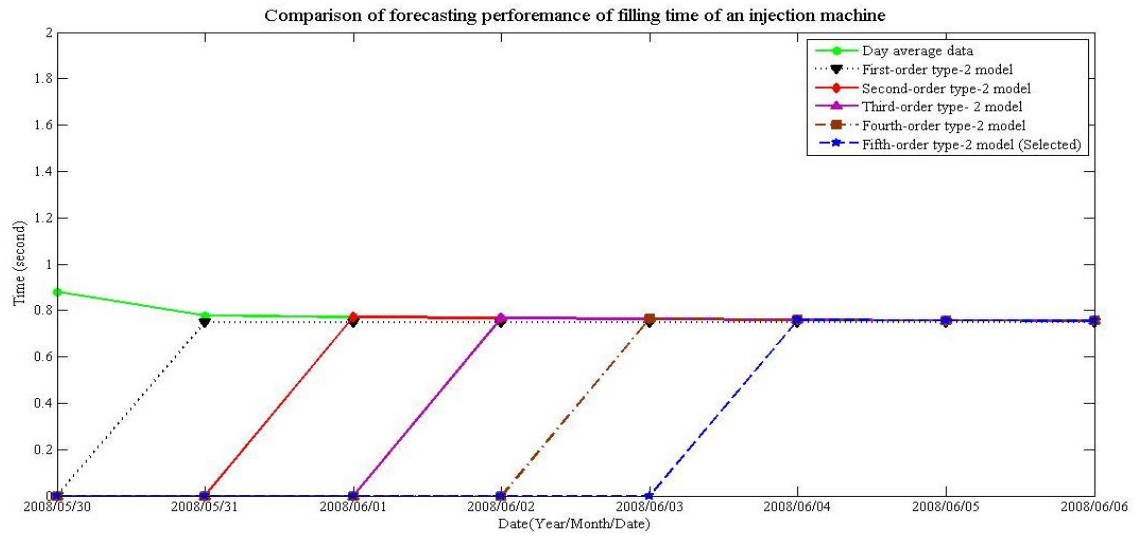


Fig. C.7. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days forecasting values of the second week forecast on 2008/06/06.

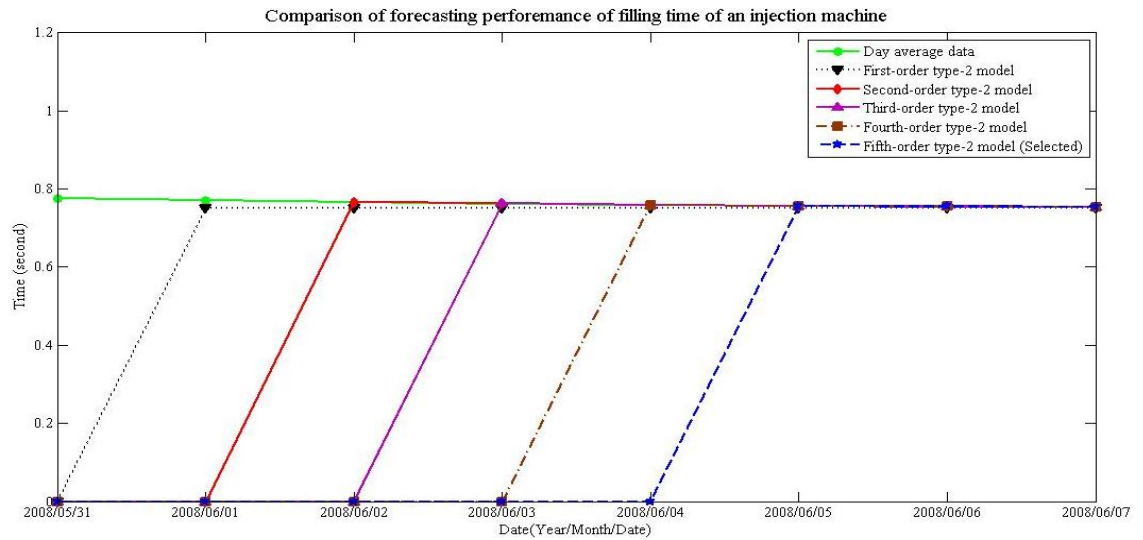


Fig. C.8. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

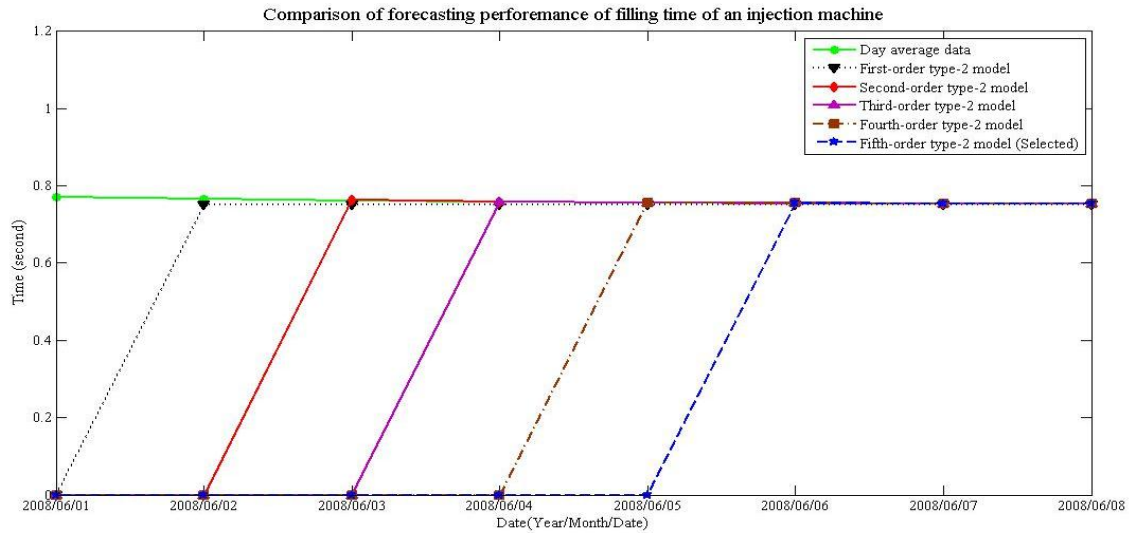


Fig. C.9. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day forecasting values of the third week forecast on 2008/06/08.

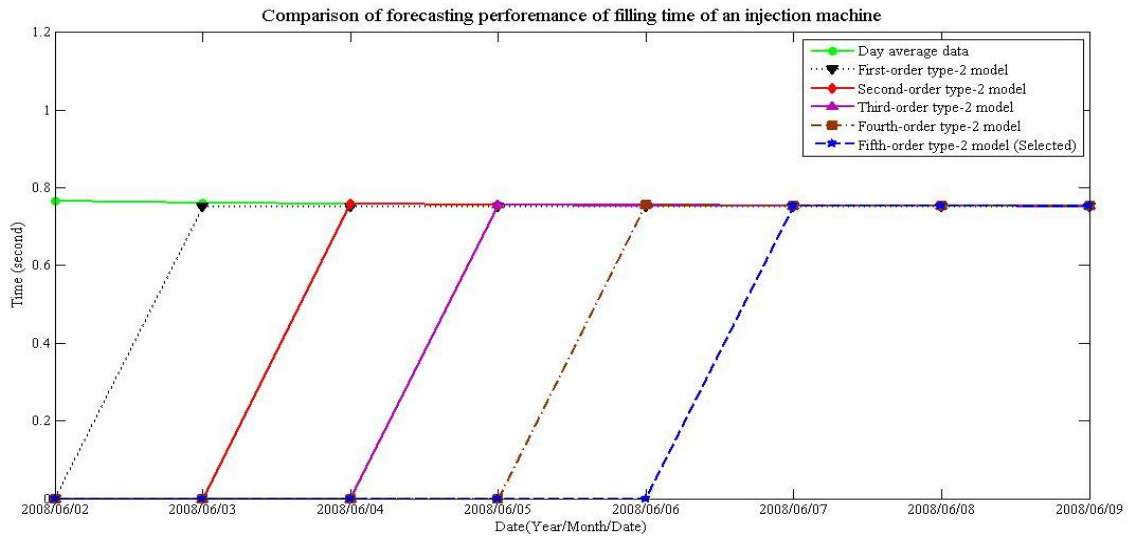


Fig. C.10. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days forecasting values of the third week forecast on 2008/06/09.

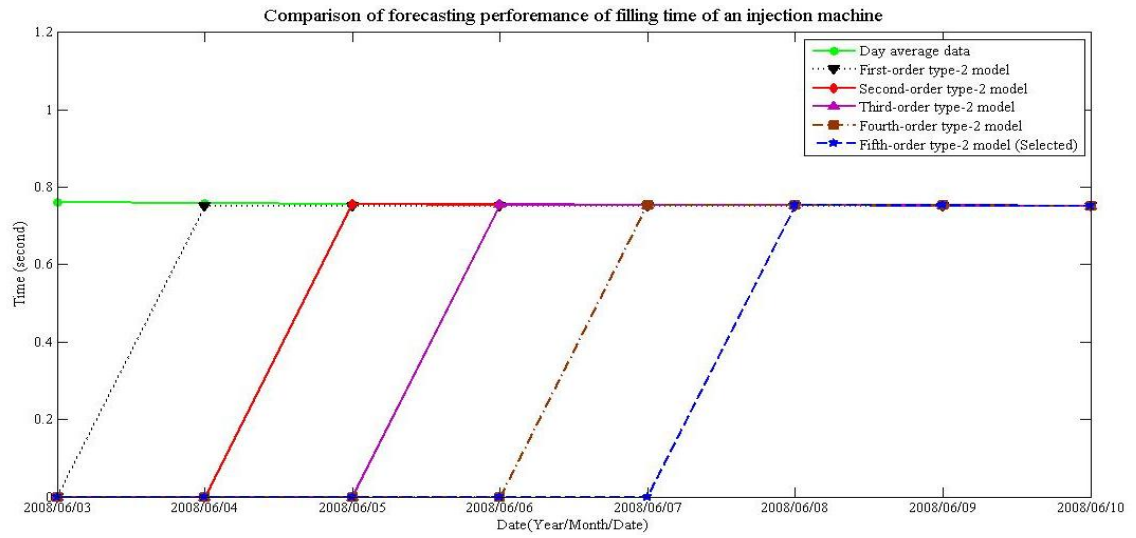


Fig. C.11. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days forecasting values of the third week forecast on 2008/06/10.

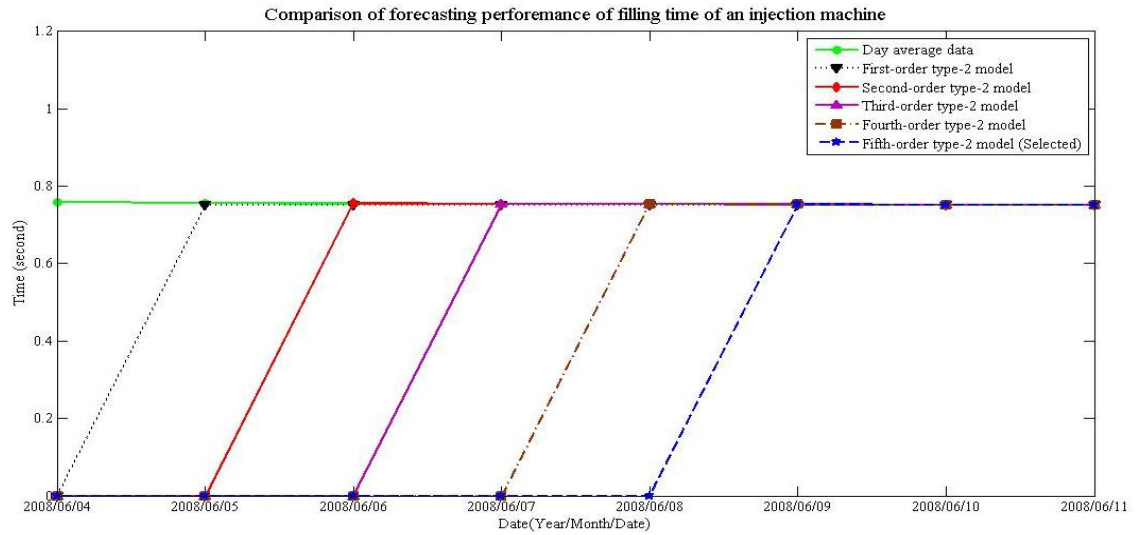


Fig. C.12. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

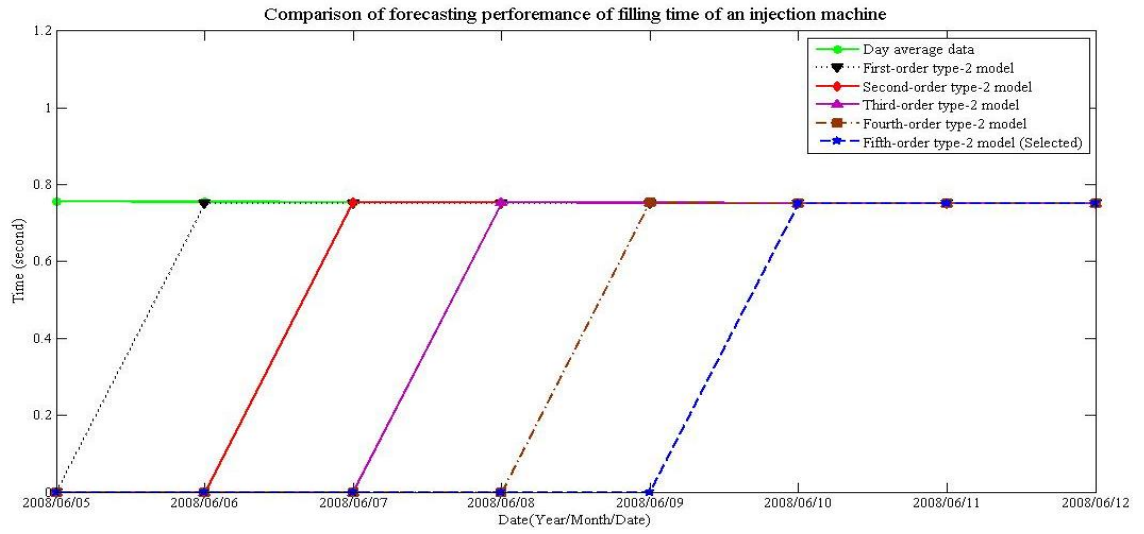


Fig. C.13. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

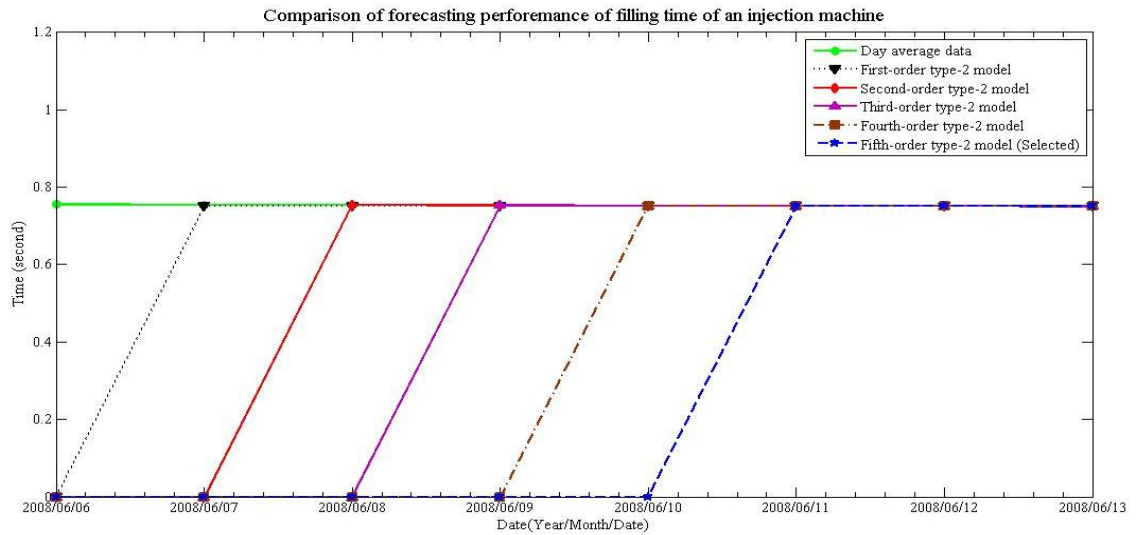


Fig. C.14. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

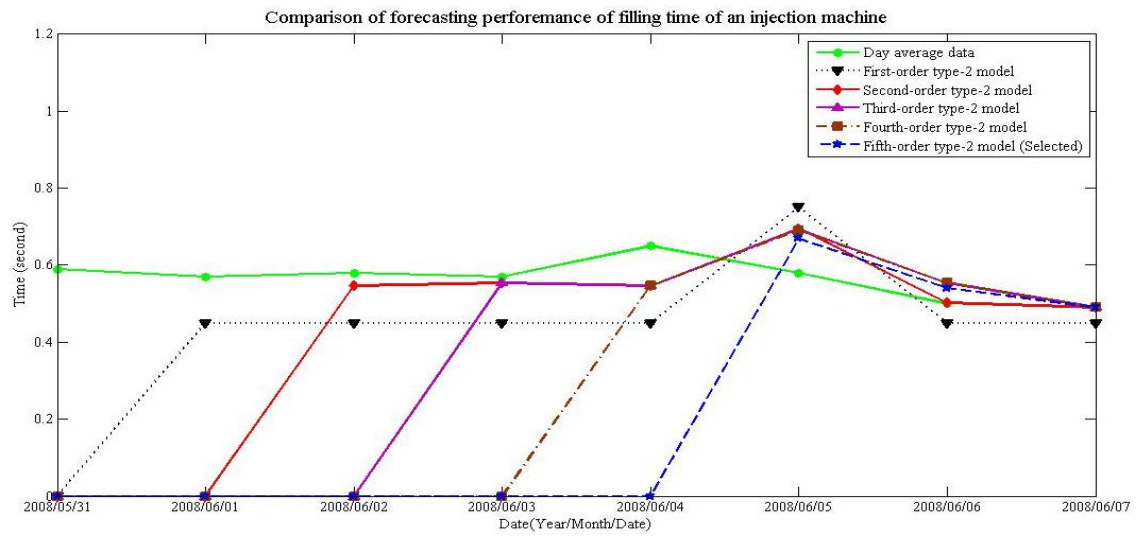


Fig. C.15. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the first to seventh days forecasting values of the second week forecast on 2008/06/07.

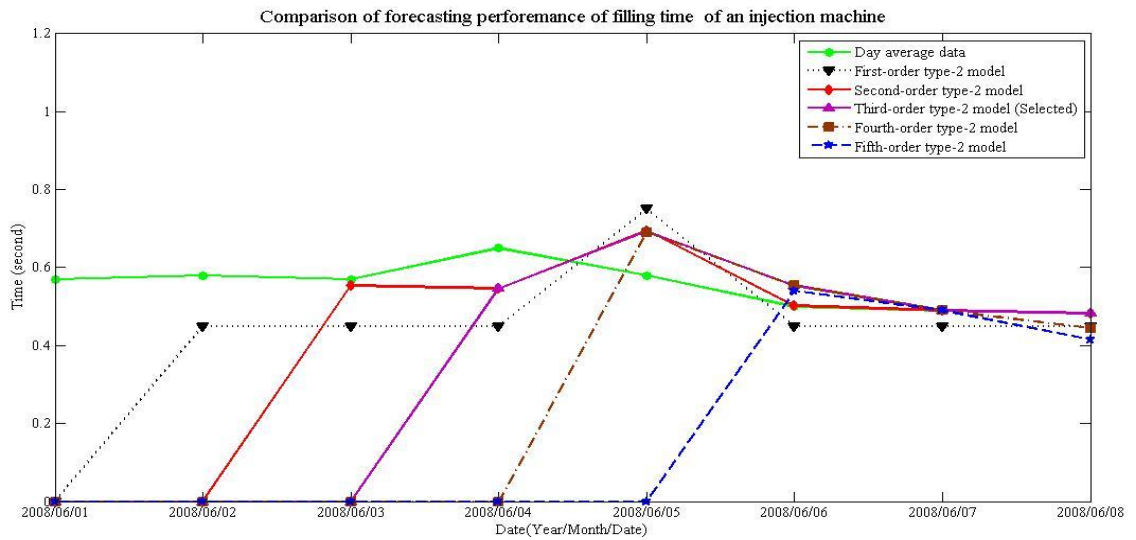


Fig. C.16. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day forecasting value of the third week forecast on 2008/06/08.

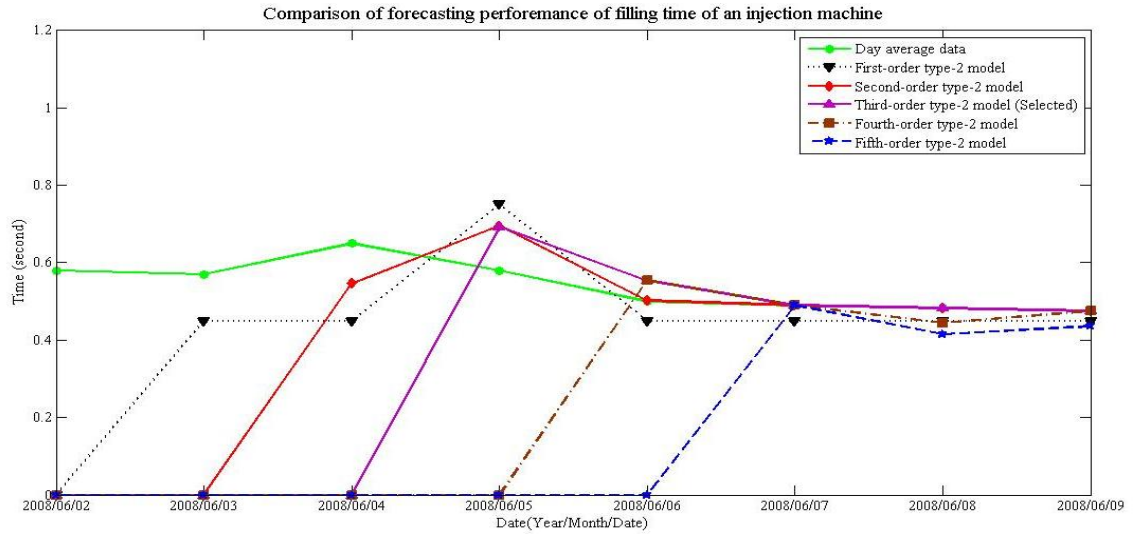


Fig. C.17. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days forecasting values of the third week forecast on 2008/06/09.

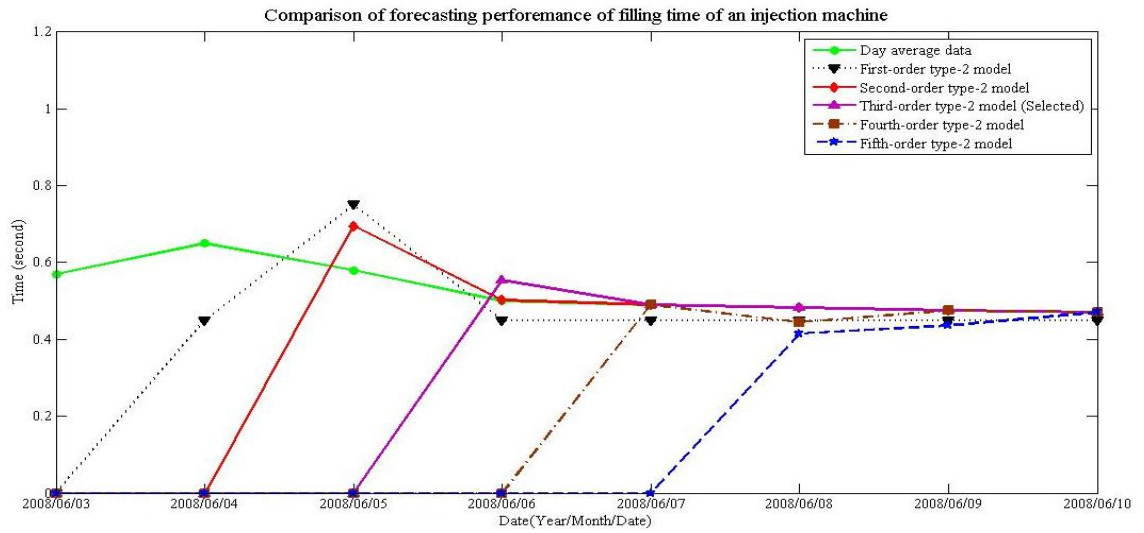


Fig. C.18. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days forecasting values of the third week forecast on 2008/06/10.

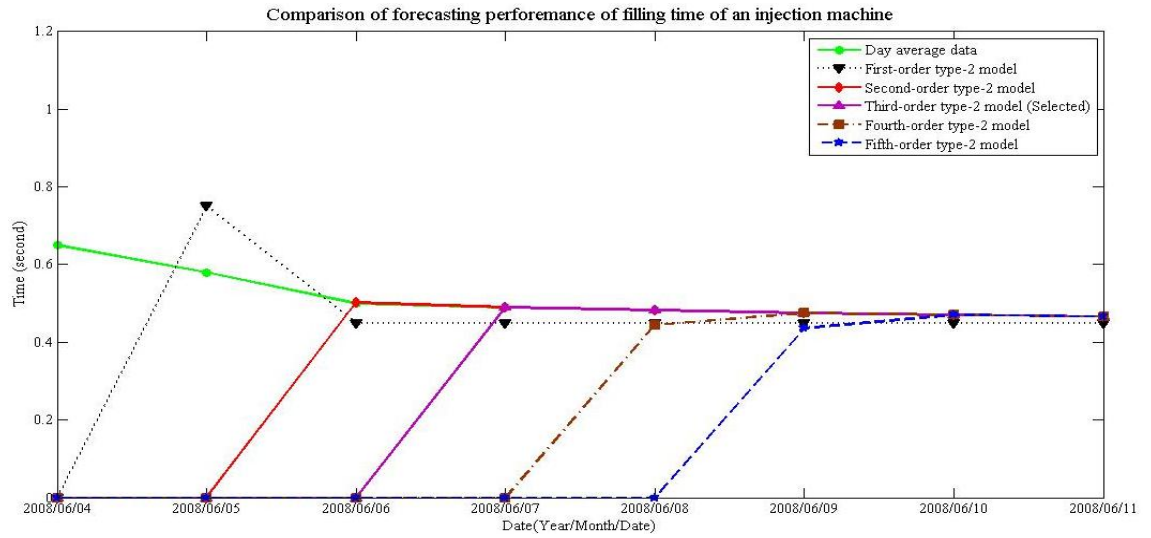


Fig. C.19. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

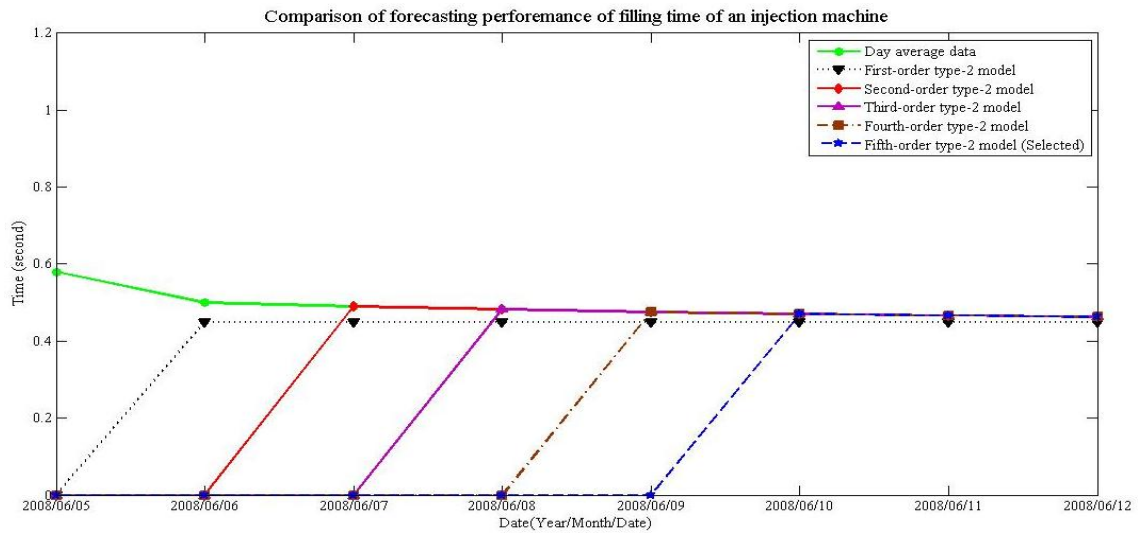


Fig. C.20. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

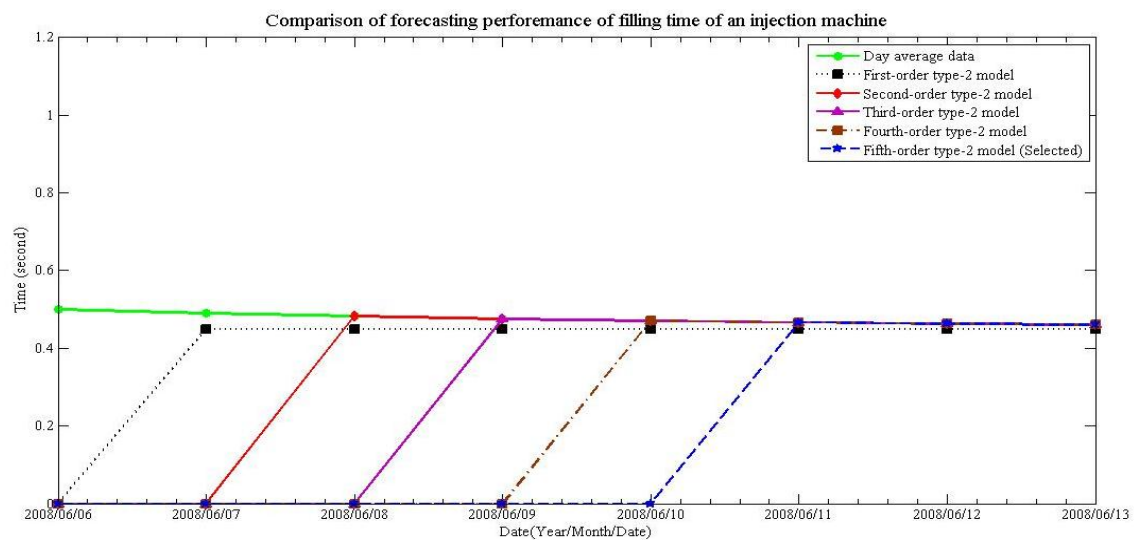


Fig. C.21. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

## Appendix D

### The Diagrams of Daily Forecasting : Using Day Average Data of a Couple Weeks of Filling Time Factor for Forecasting - in CD-ROM Disk.

Figure D.1 to D.15 in the accompanying CD-ROM disk depict the diagrams of forecasting using day average data of a couple weeks of minimum cushion position factor for daily forecasting between 2008/05/23 and 2008/06/21 as following.

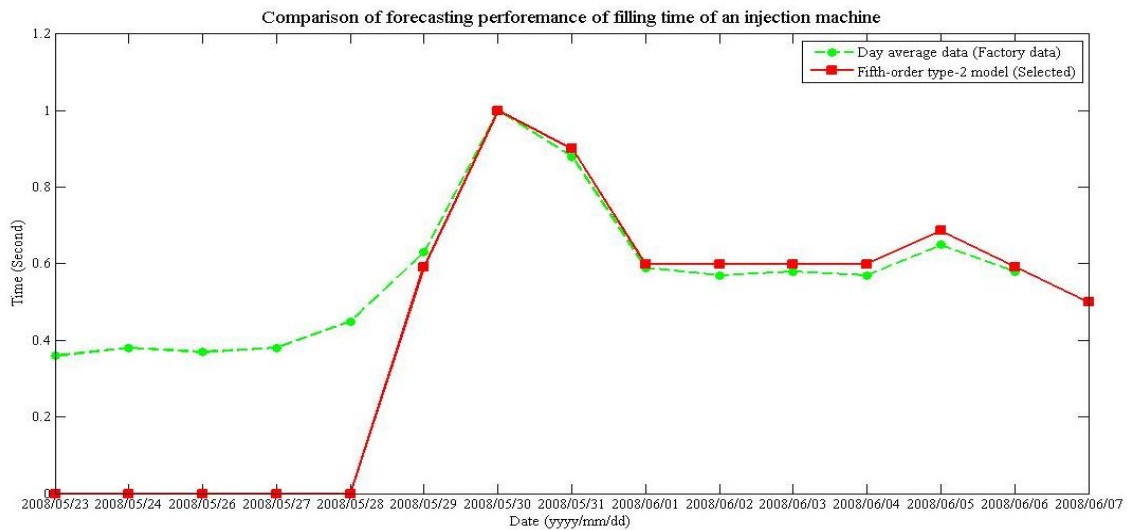


Fig. D.1. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/06.

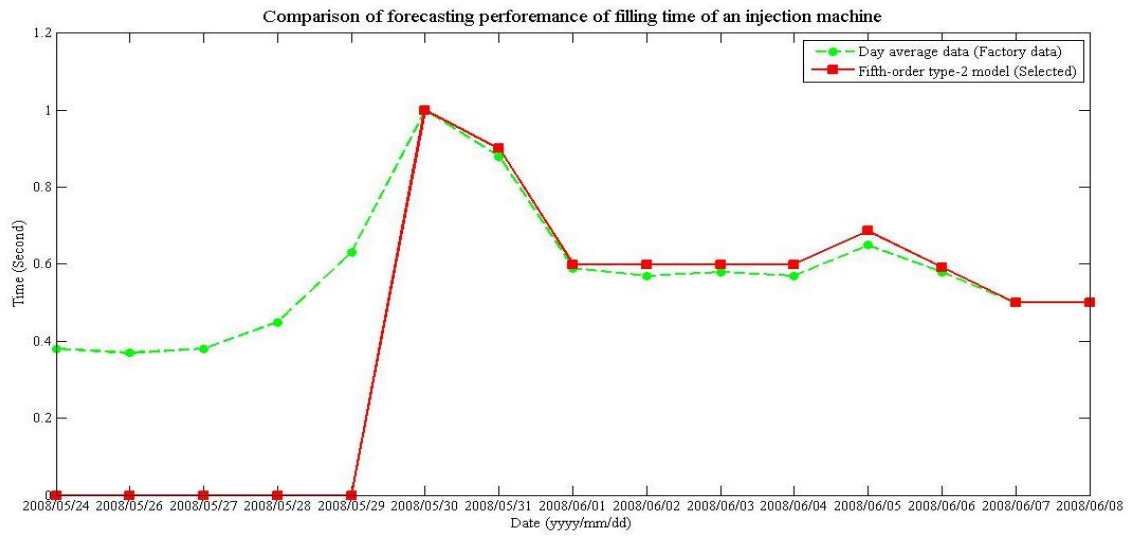


Fig. D.2. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/07.

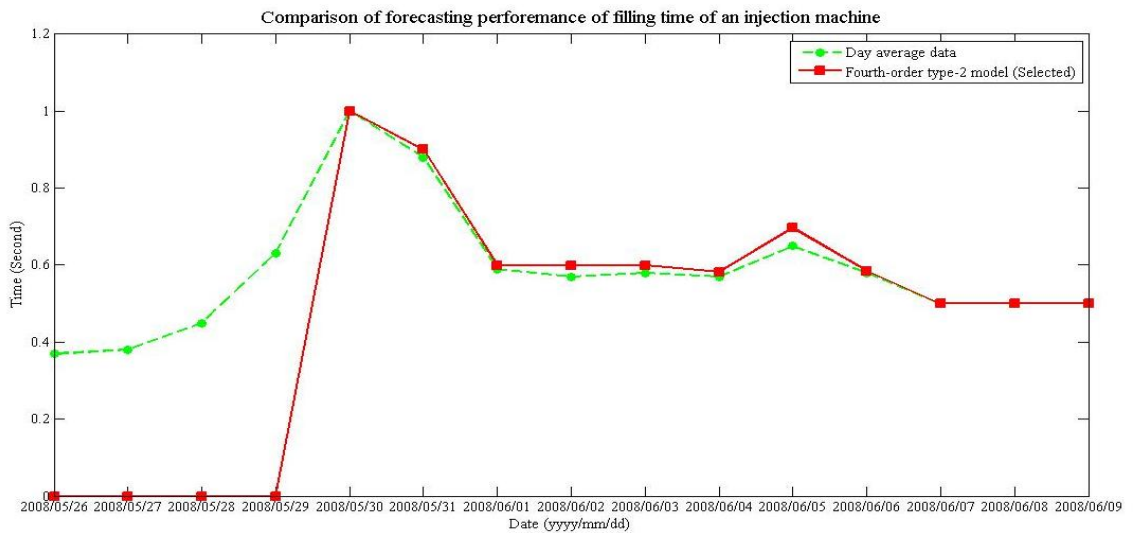


Fig. D.3. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/08.

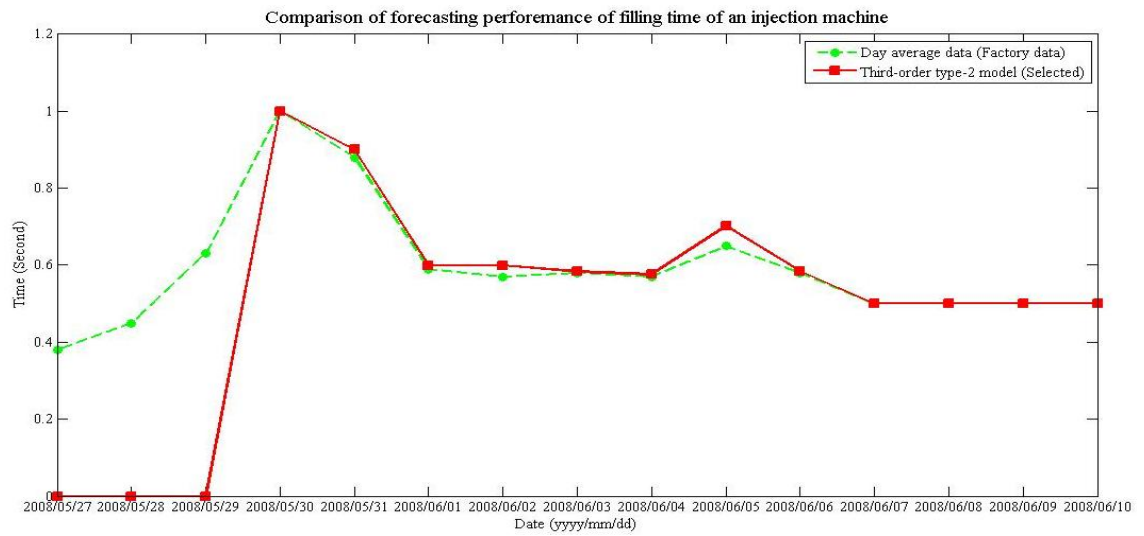


Fig. D.4. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/09.

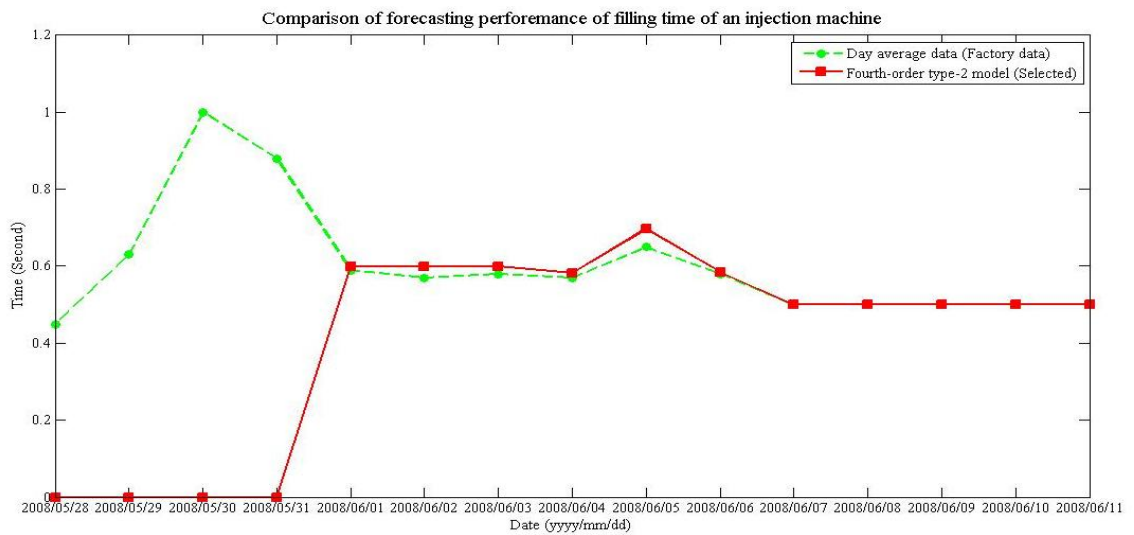


Fig. D.5. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/10.

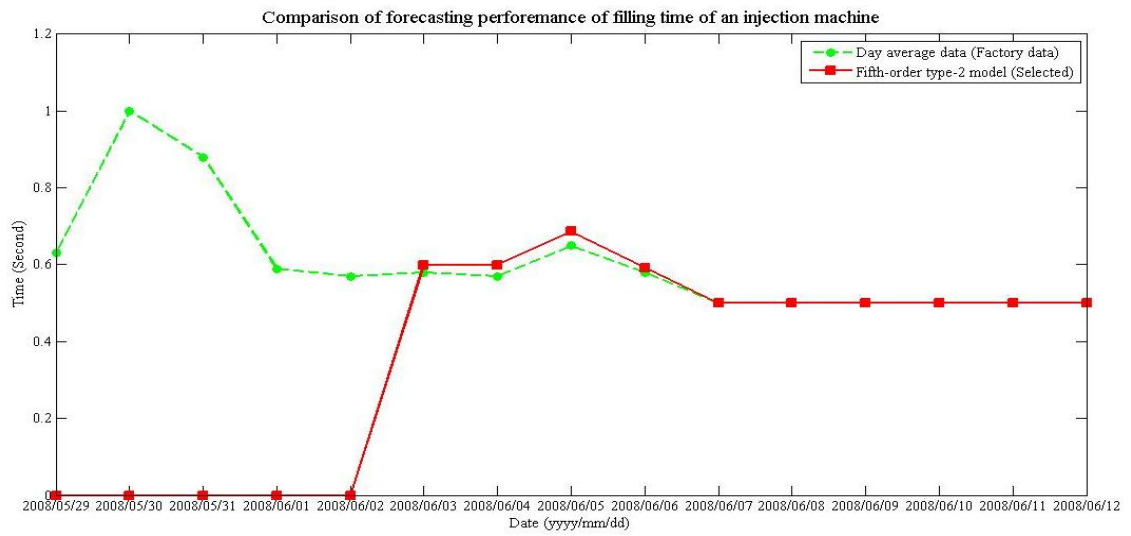


Fig. D.6. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/11.

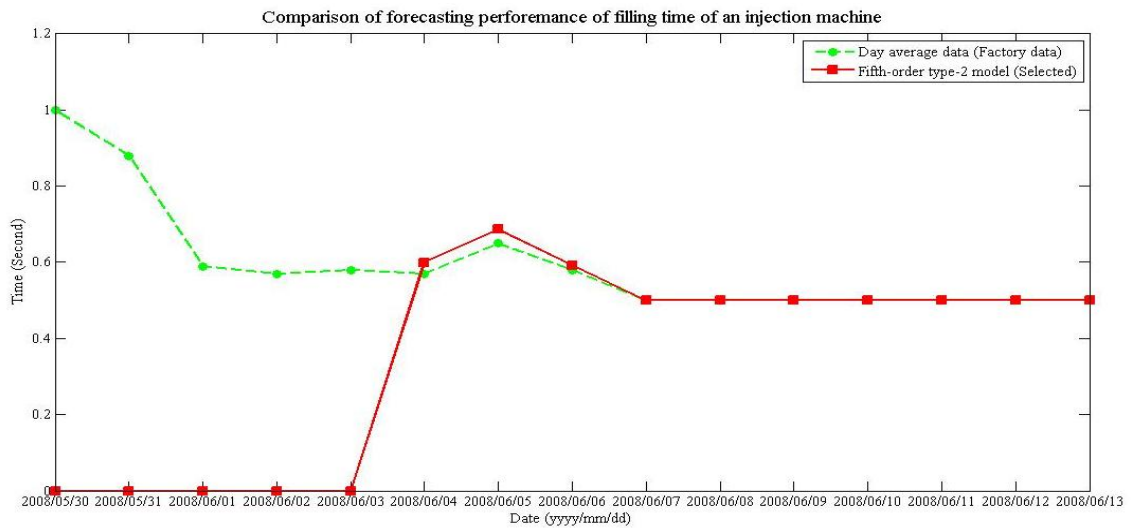


Fig. D.7. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/12.

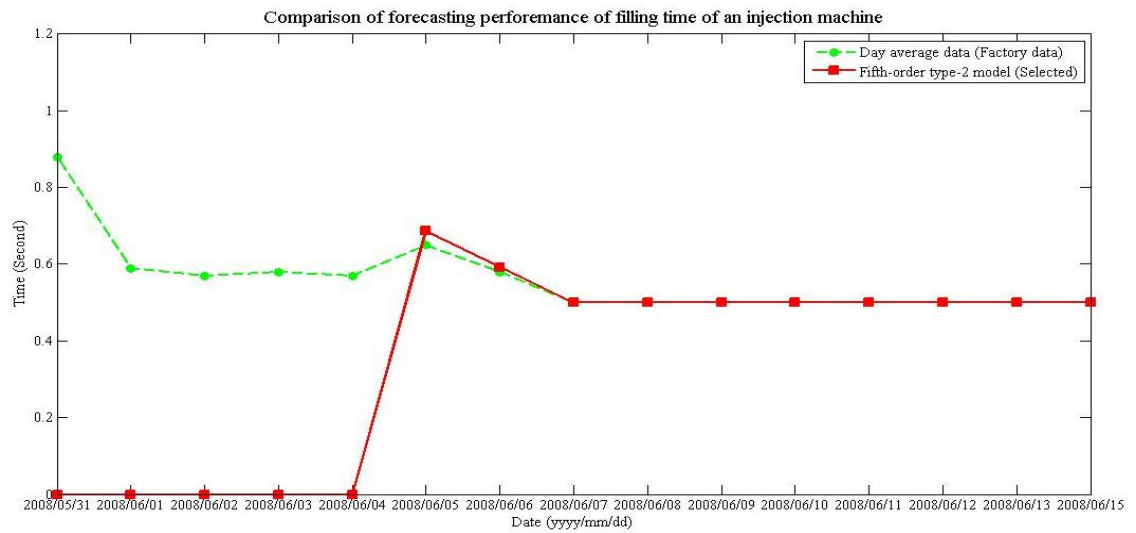


Fig. D.8. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/13.

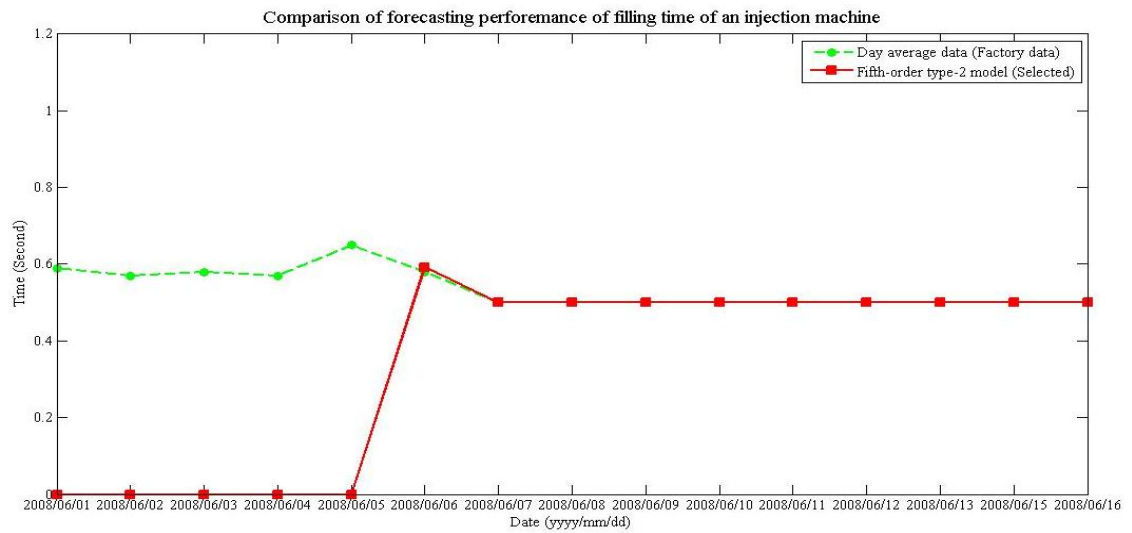


Fig. D.9. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/15.

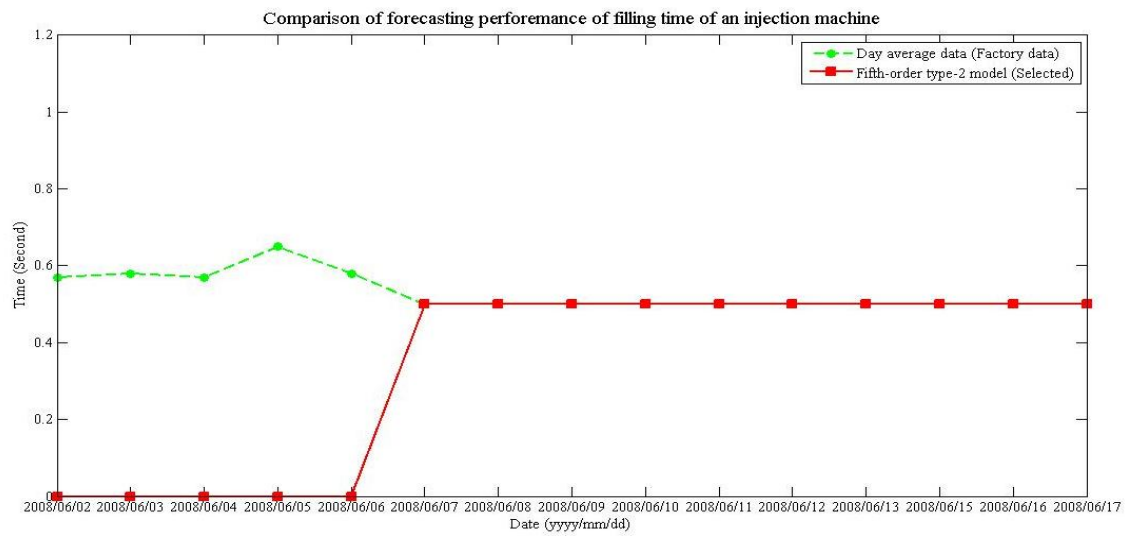


Fig. D.10. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/16.

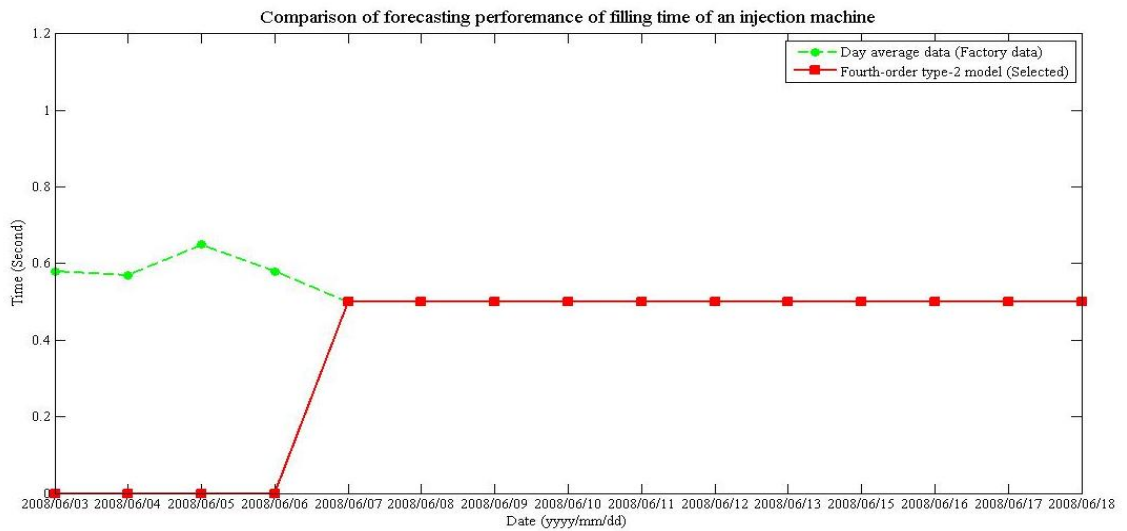


Fig. D.11. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/17.

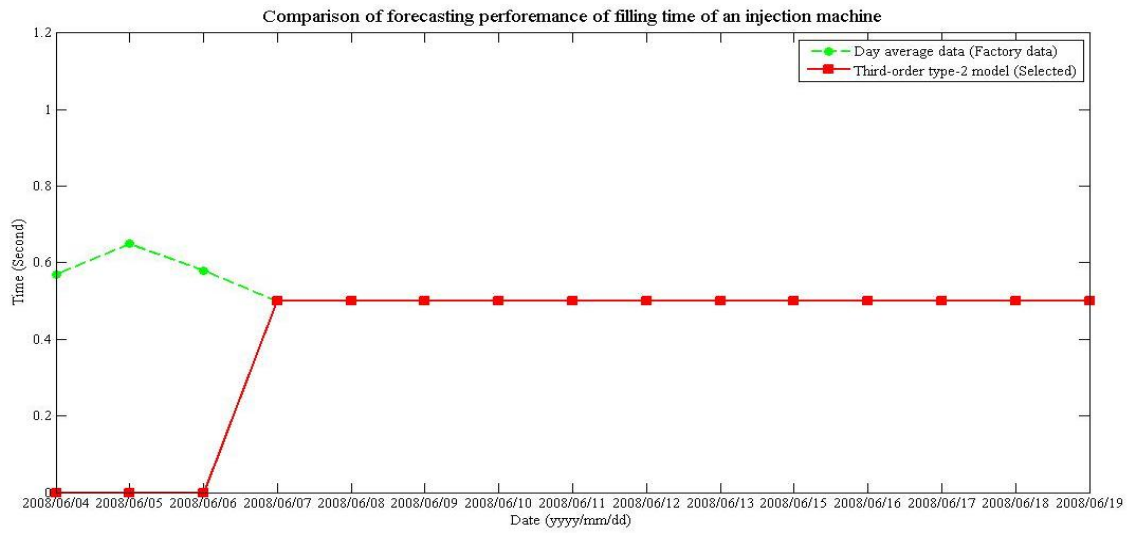


Fig. D.12. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/18.

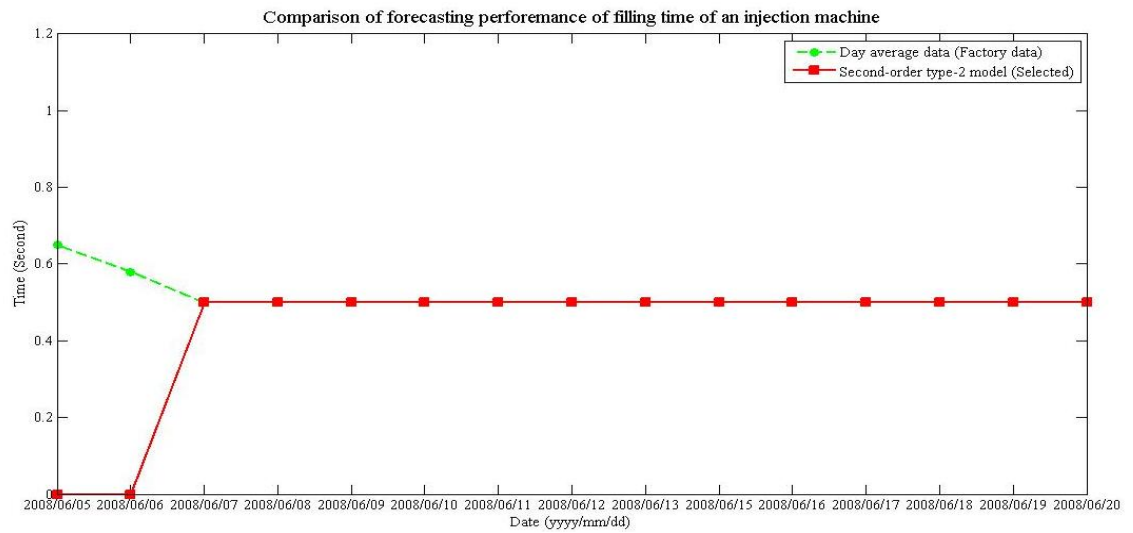


Fig. D.13. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/19.



Fig. D.14. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/20.

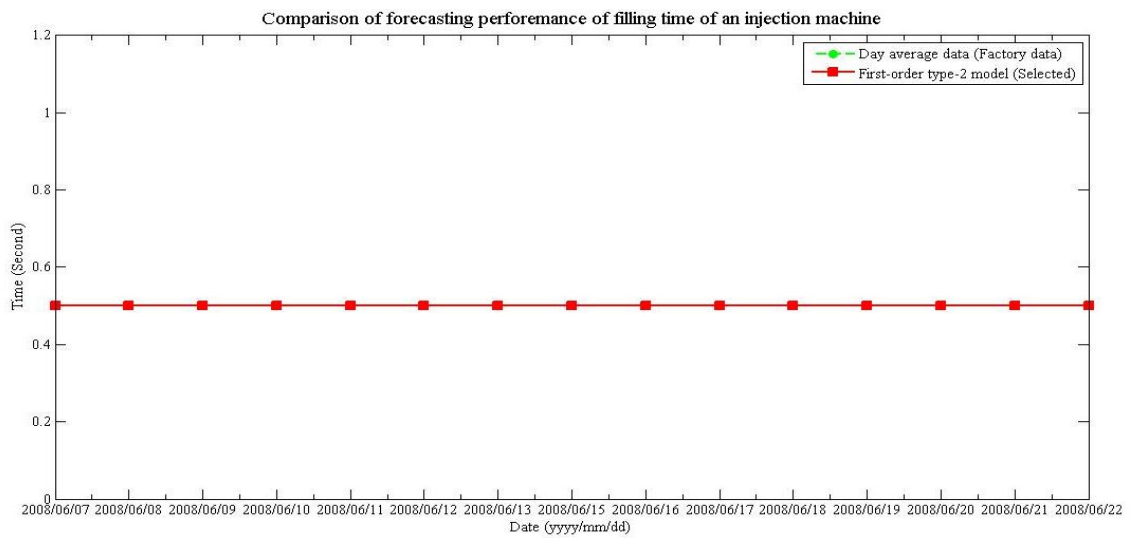


Fig. D.15. Forecasting position of filling time factor (in second) as date is varies and a couple weeks data are used to forecast on 2008/06/21.

## **Appendix E**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of Filling Peak Factor for Forecasting the Second and the Third Weeks (1) - in CD-ROM Disk.**

The type-A and type-B forecasting methods in Figure 5.7 are employed to forecast filling peak factor as following.

Figure E.1 to E.21 of Appendix E in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of filling peak factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure E.1 to E.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-A forecasting method).
- Figure E.8 to E.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-B forecasting method).
- Figure E.15 to E.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

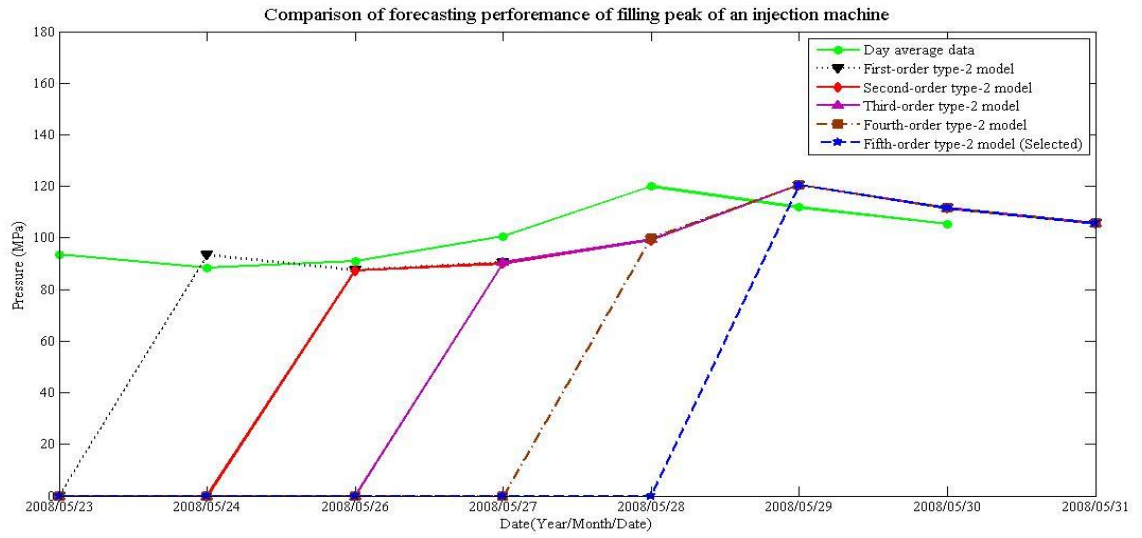


Fig. E.1. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the first to seventh days of the first week data forecast on 2008/05/31.

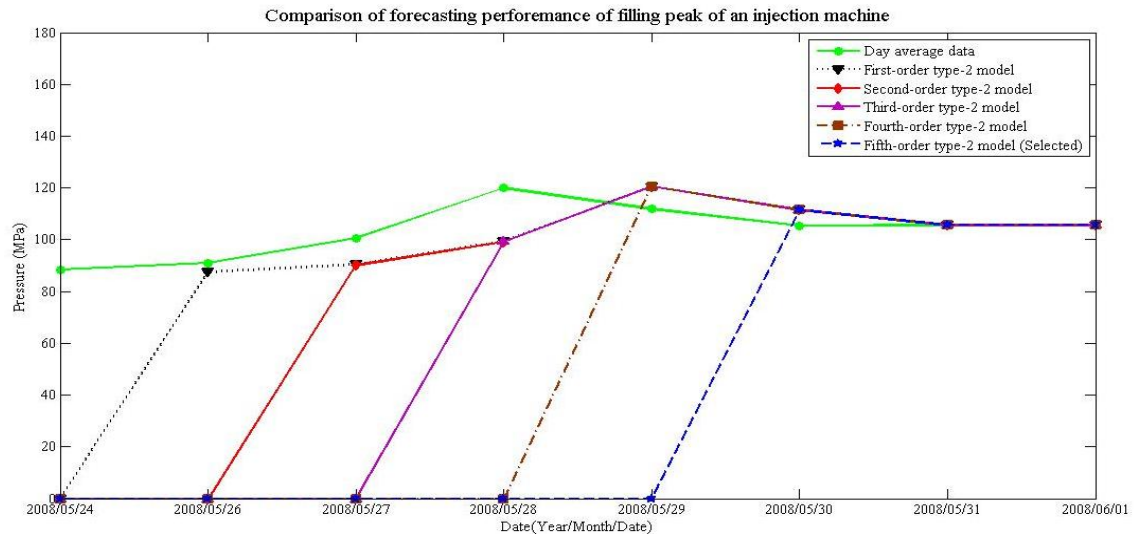


Fig. E.2. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day forecasting value of the second week forecast on 2008/06/01.

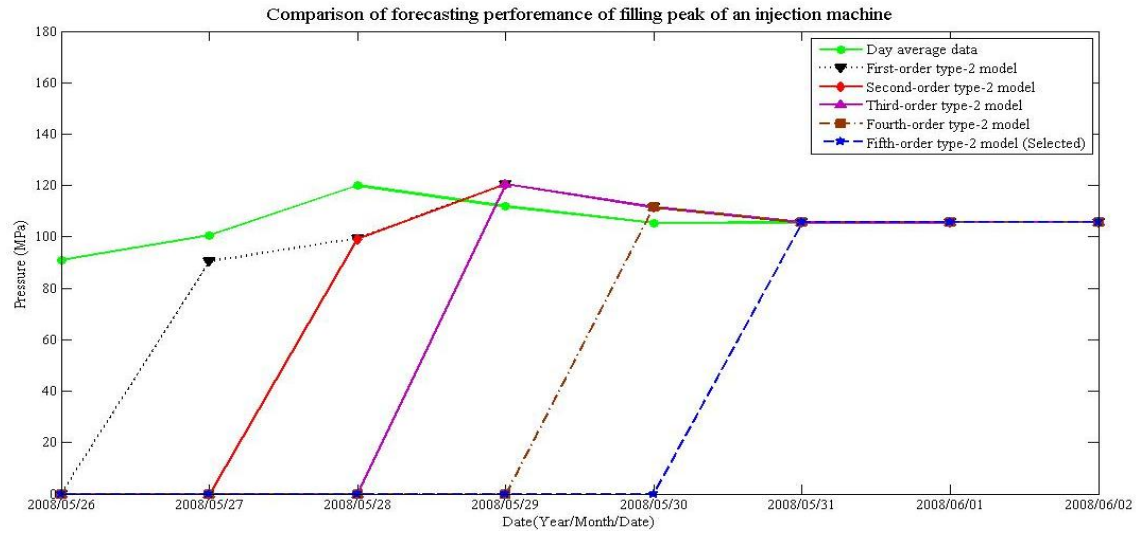


Fig. E.3. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days forecasting values of the second week forecast on 2008/06/02.

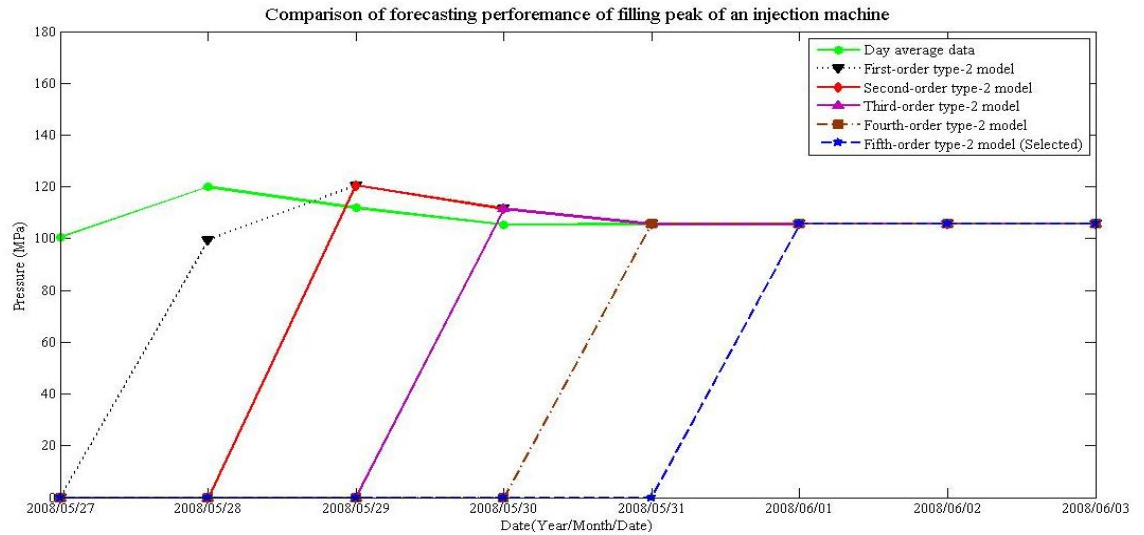


Fig. E.4. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days forecasting values of the second week forecast on 2008/06/03.

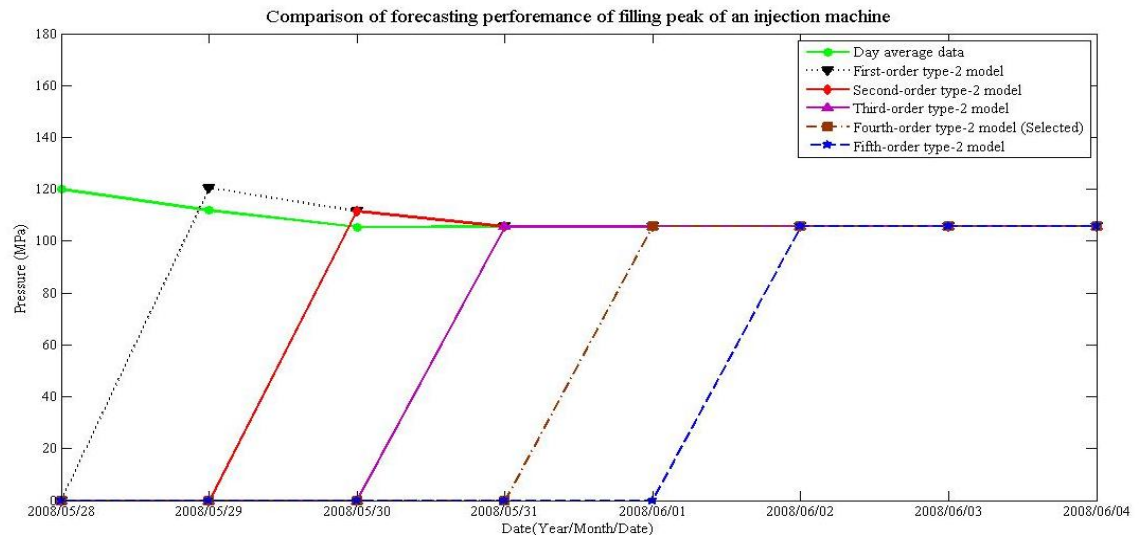


Fig. E.5. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days forecasting values of the second week forecast on 2008/06/04.

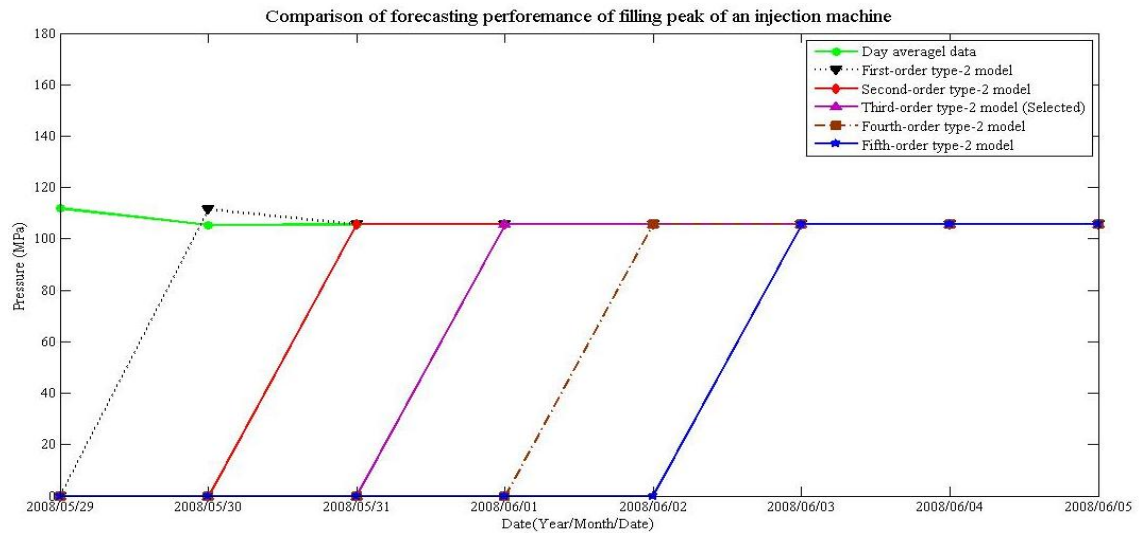


Fig. E.6. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days forecasting values of the second week forecast on 2008/06/05.

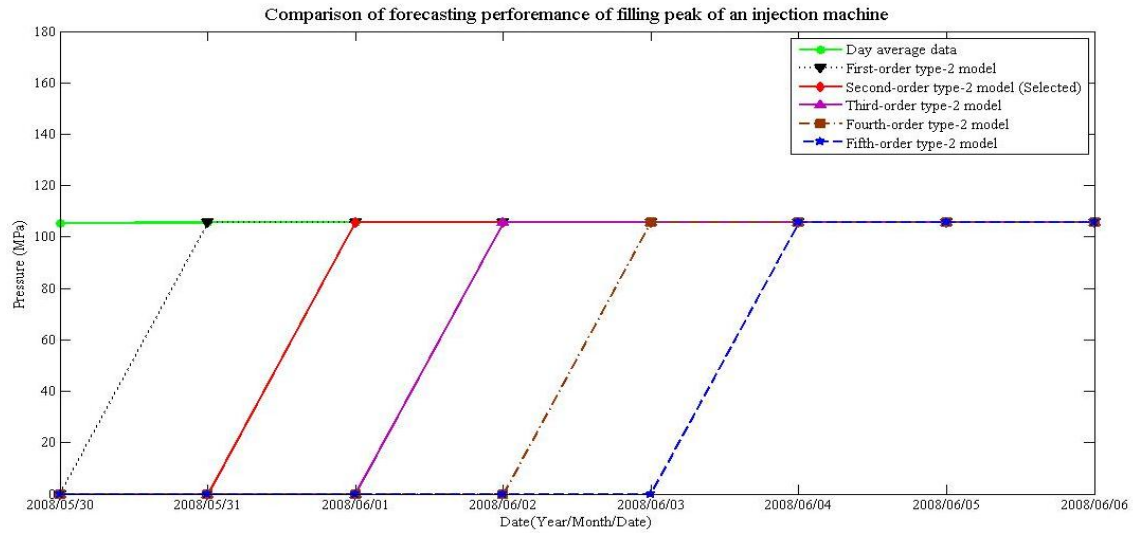


Fig. E.7. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days forecasting values of the second week forecast on 2008/06/06.

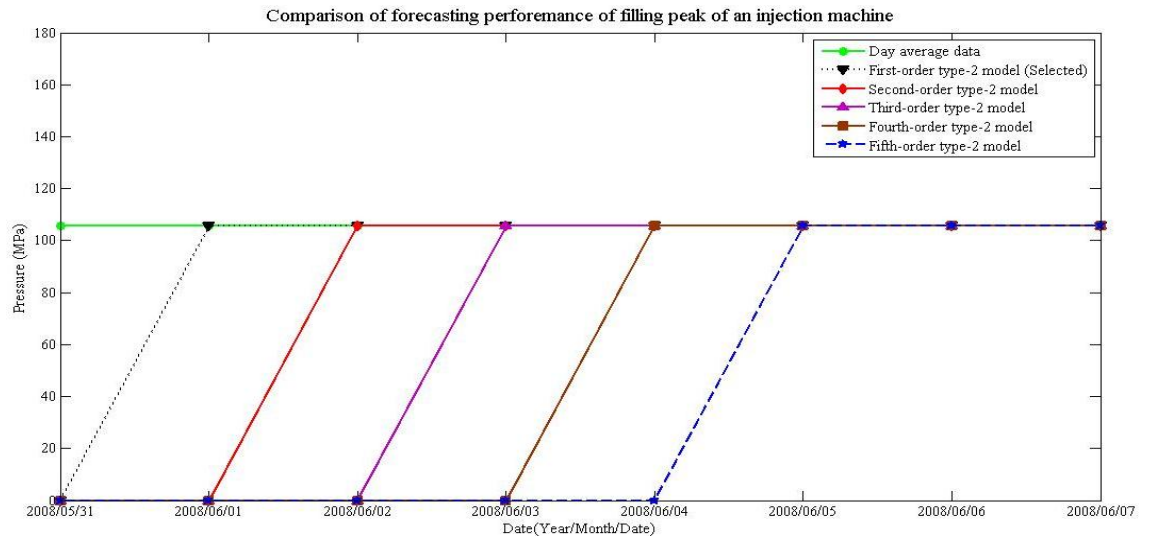


Fig. E.8. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

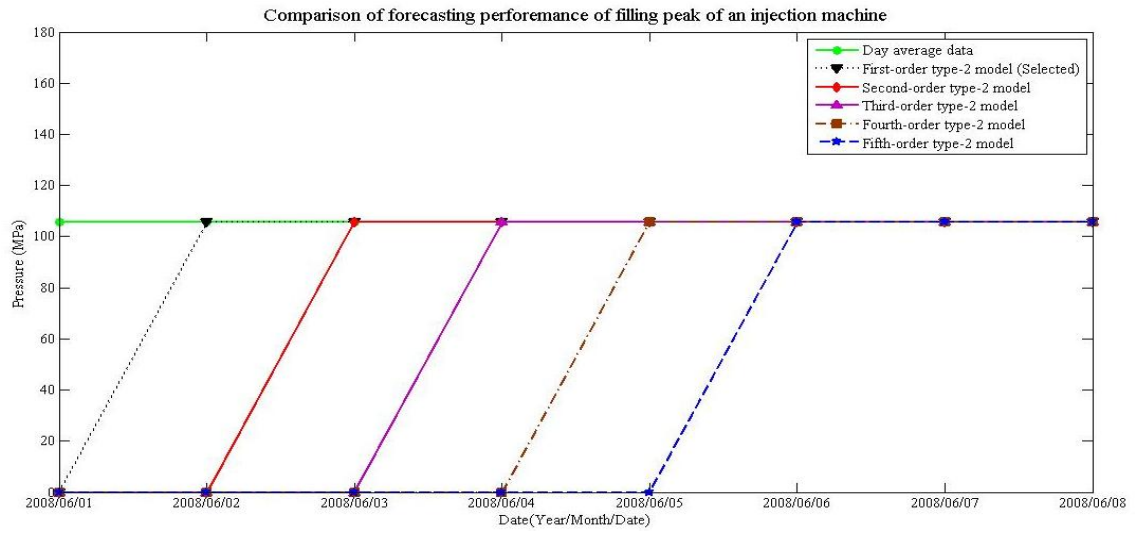


Fig. E.9. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day forecasting values of the third week forecast on 2008/06/08.

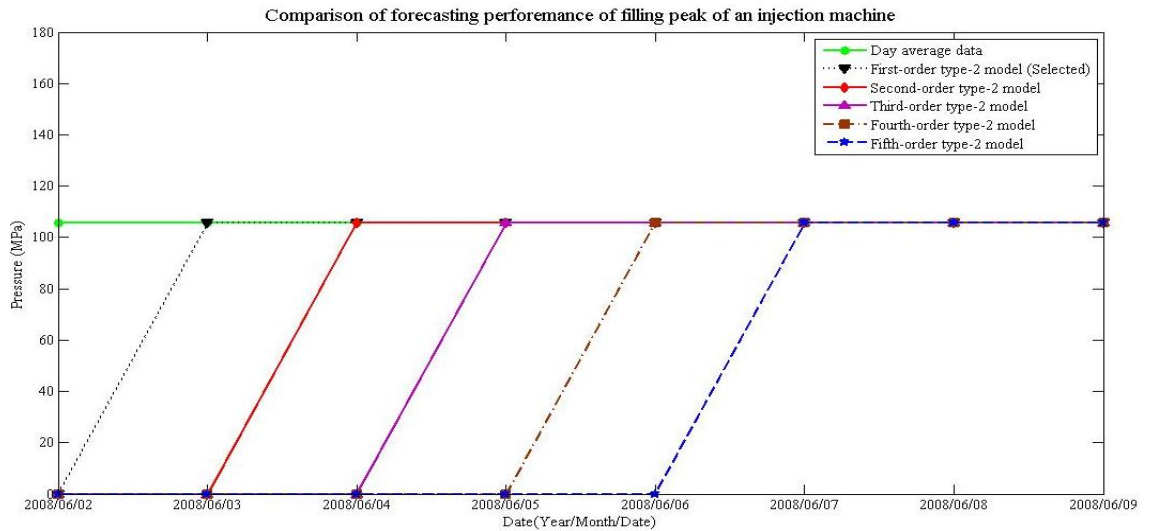


Fig. E.10. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days forecasting values of the third week forecast on 2008/06/09.

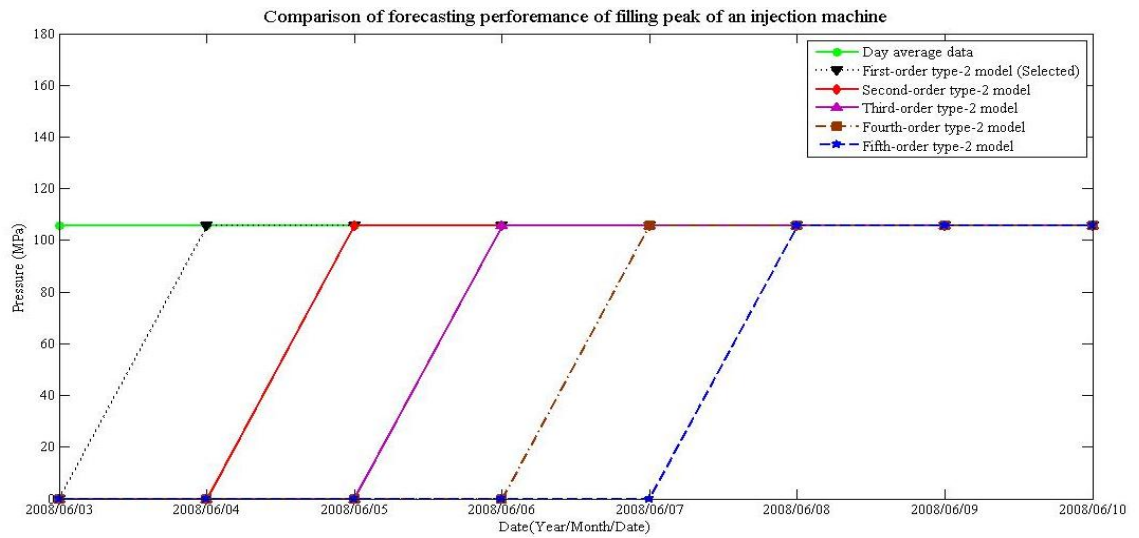


Fig. E.11. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days forecasting values of the third week forecast on 2008/06/10.

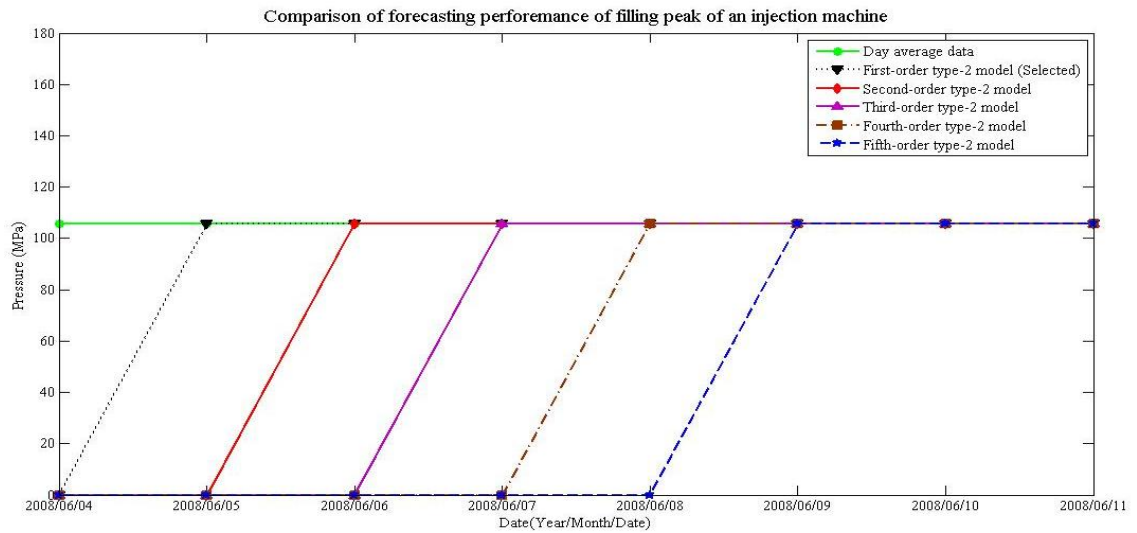


Fig. E.12. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

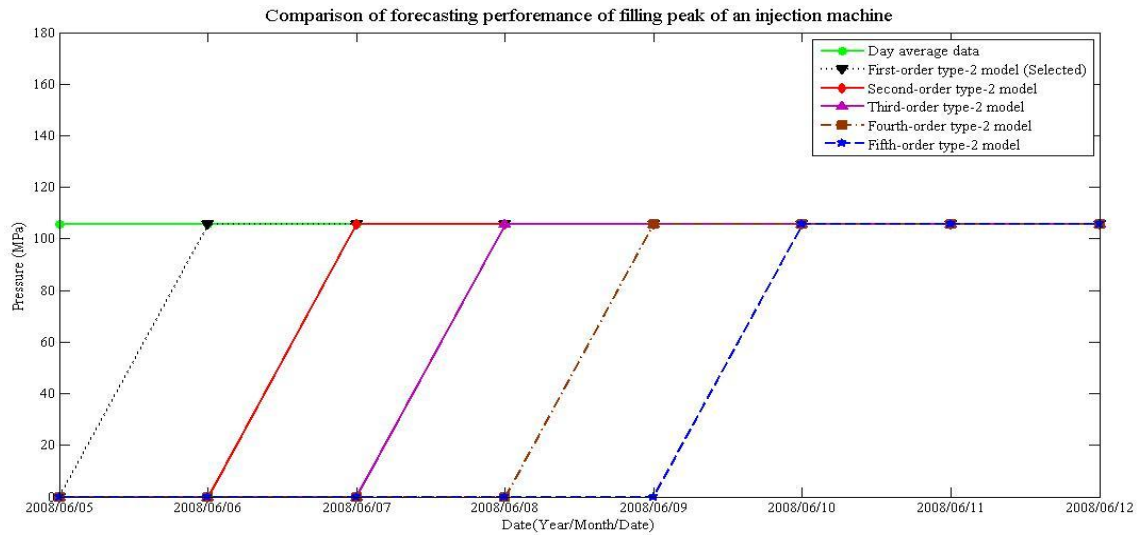


Fig. E.13. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

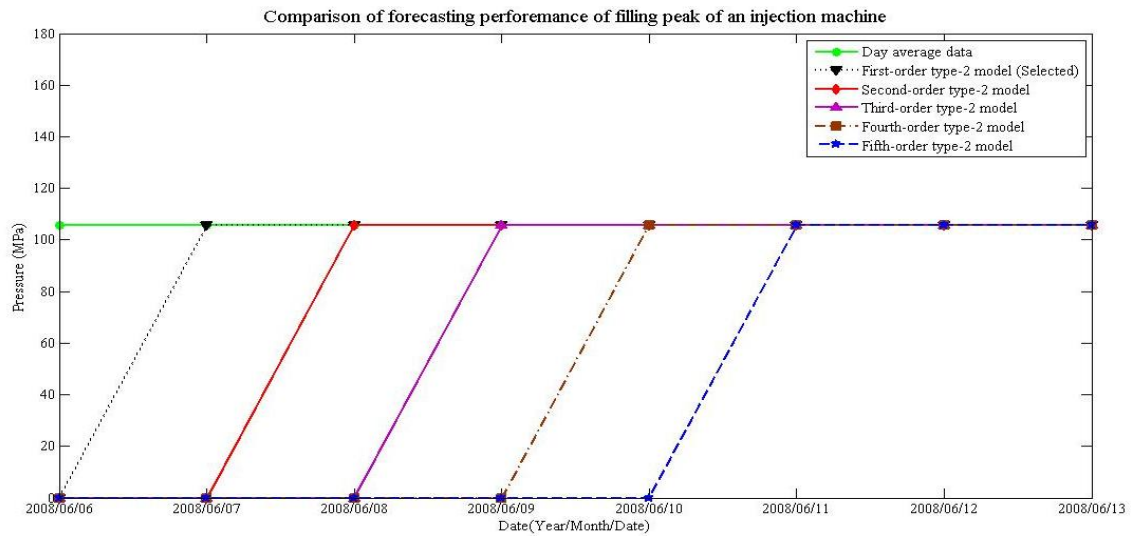


Fig. E.14. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

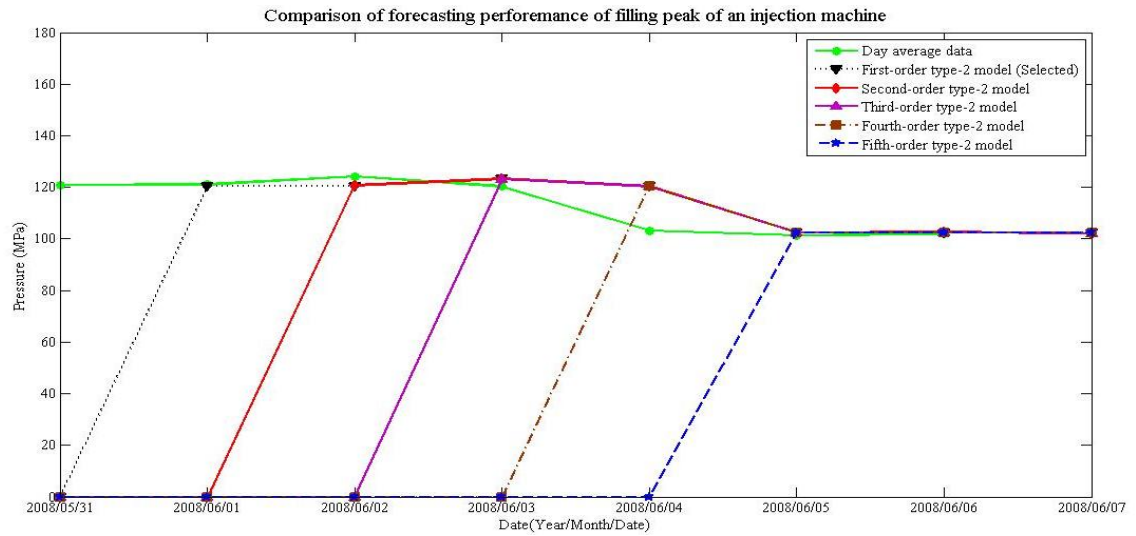


Fig. E.15. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the first to seventh days forecasting values of the second week forecast on 2008/06/07.

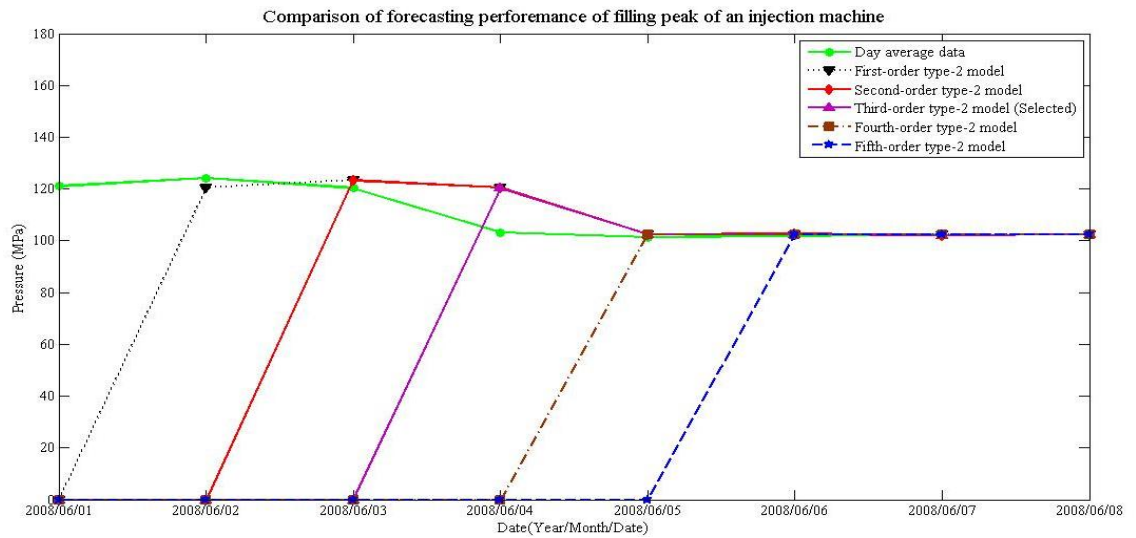


Fig. E.16. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day forecasting value of the third week forecast on 2008/06/08.

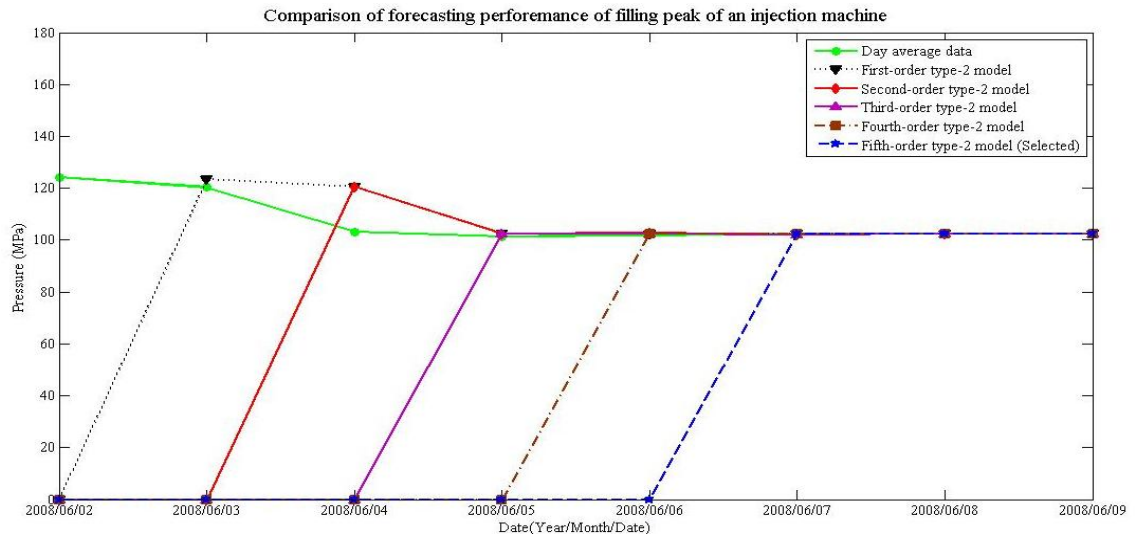


Fig. E.17. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days forecasting values of the third week forecast on 2008/06/09.

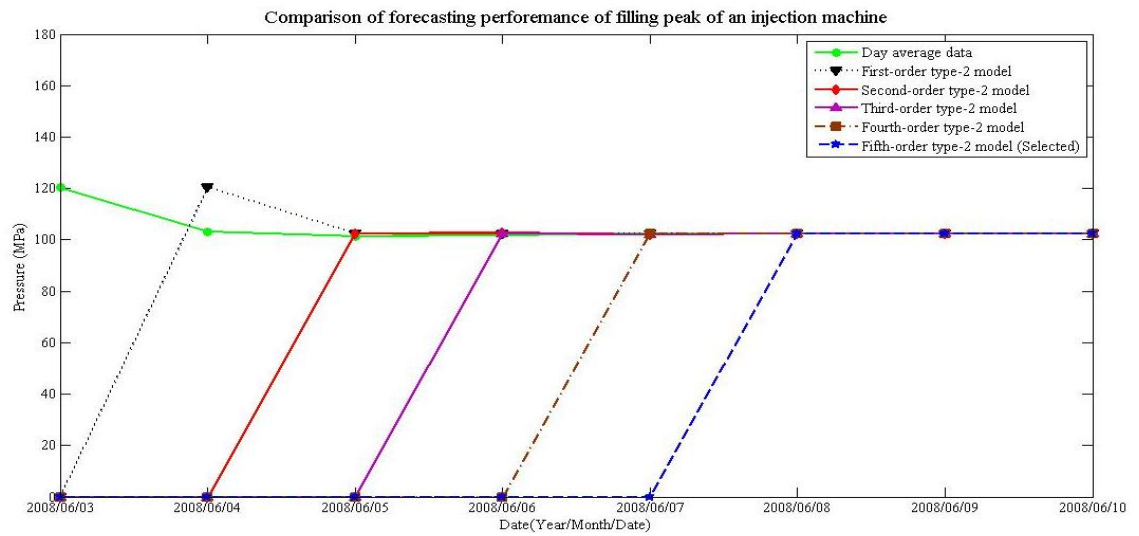


Fig. E.18. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days forecasting values of the third week forecast on 2008/06/10.

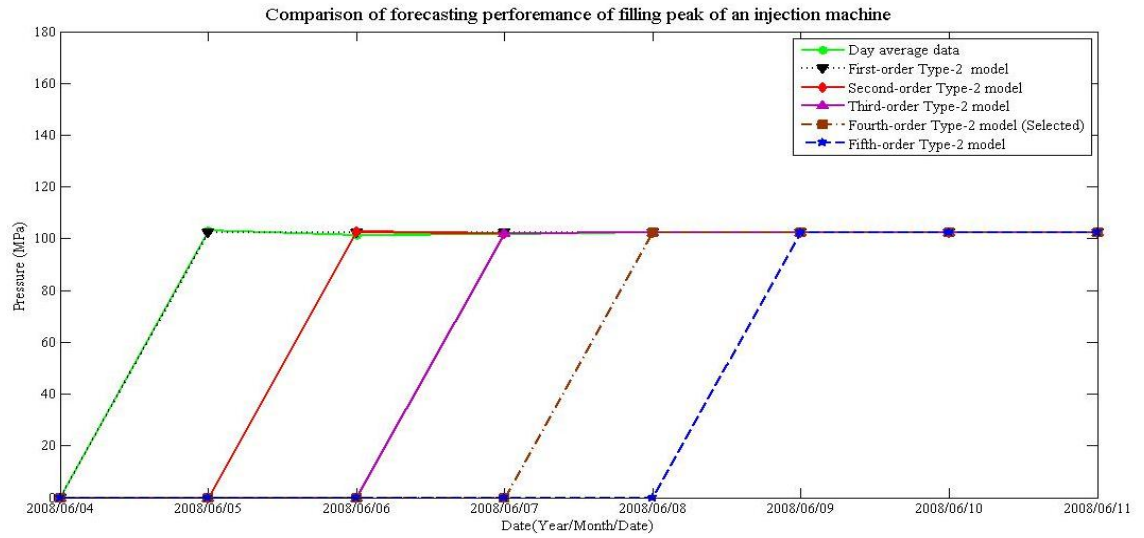


Fig. E.19. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

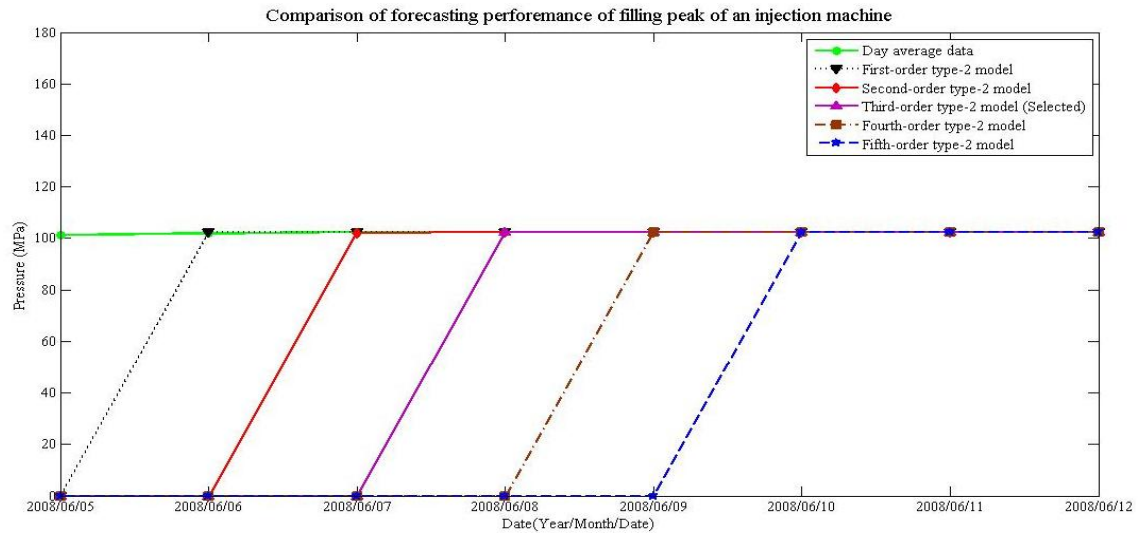


Fig. E.20. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

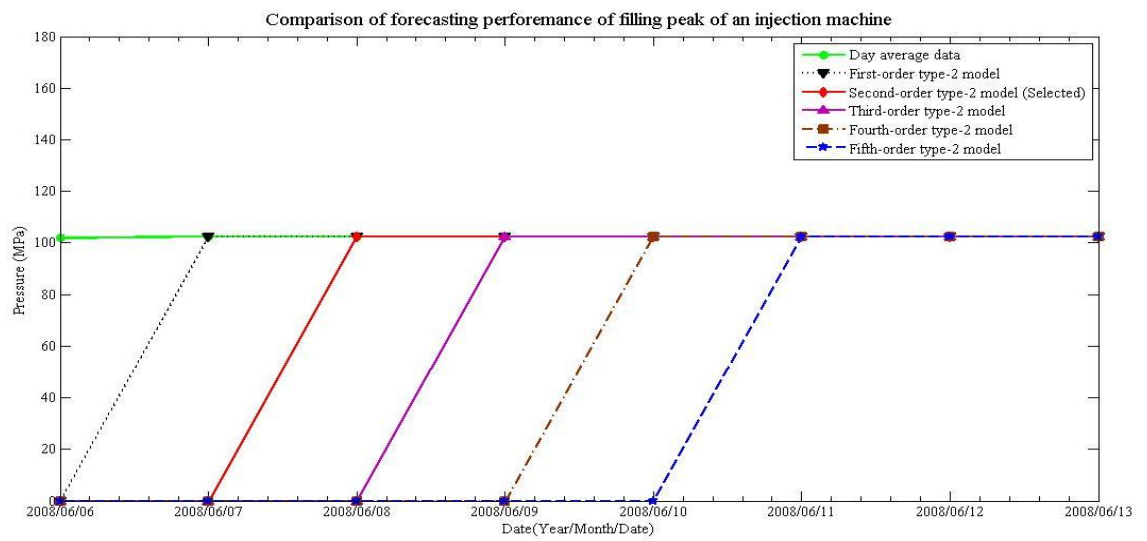


Fig. E.21. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

## Appendix F

### The Diagrams of Daily Forecasting : Using Day Average Data of a Couple Weeks of Filling Peak Factor for Forecasting - in CD-ROM Disk.

Figure F.1 to F.15 in the accompanying CD-ROM disk illustrate the diagrams of forecasting using day average data of a couple weeks of Filling Peak factor for daily forecasting between 2008/05/23 and 2008/06/21 as following.

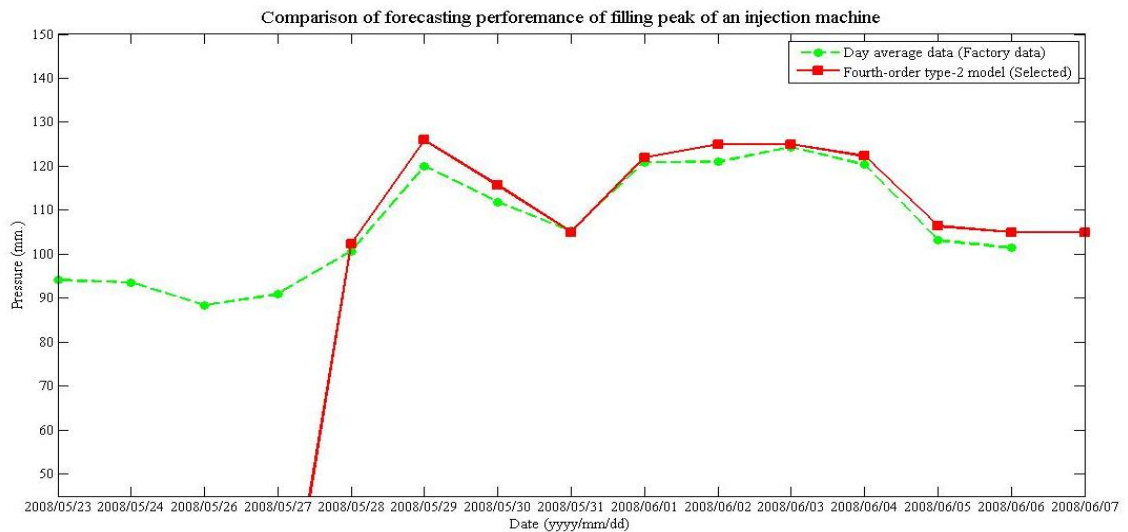


Fig. F.1. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/06 in next week.

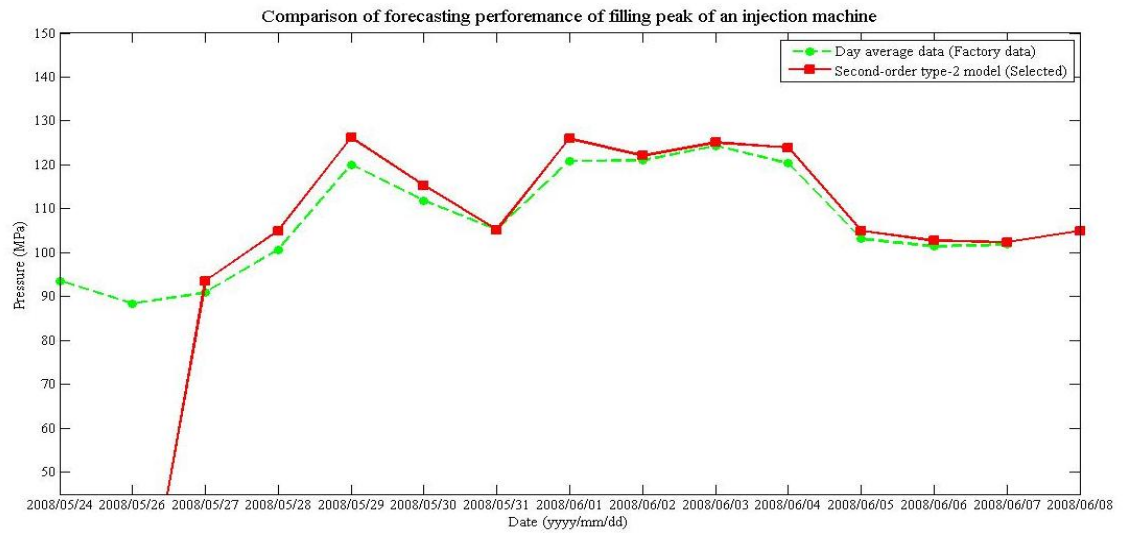


Fig. F.2. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/07 in next week.

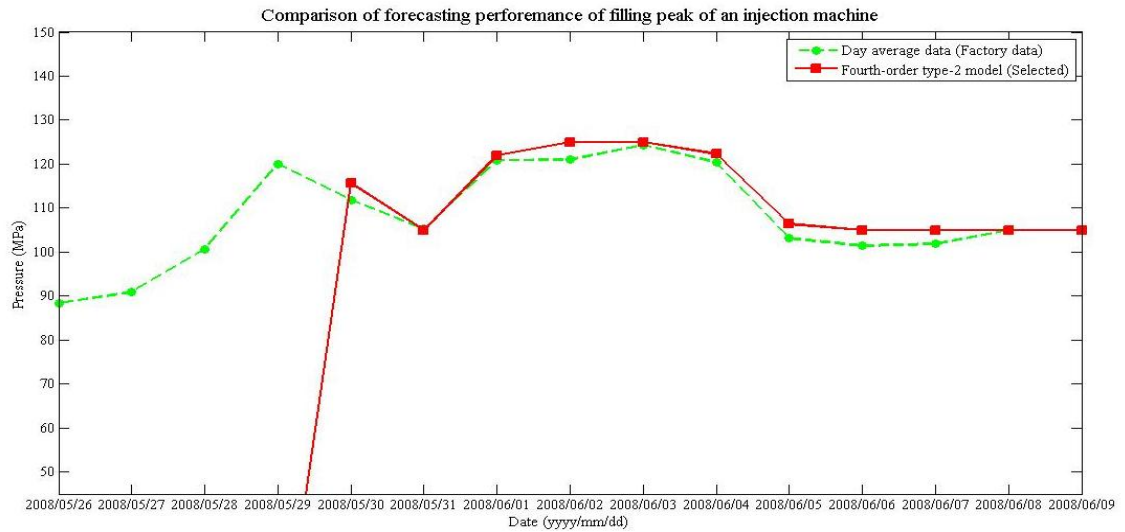


Fig. F.3. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/08 in next week.

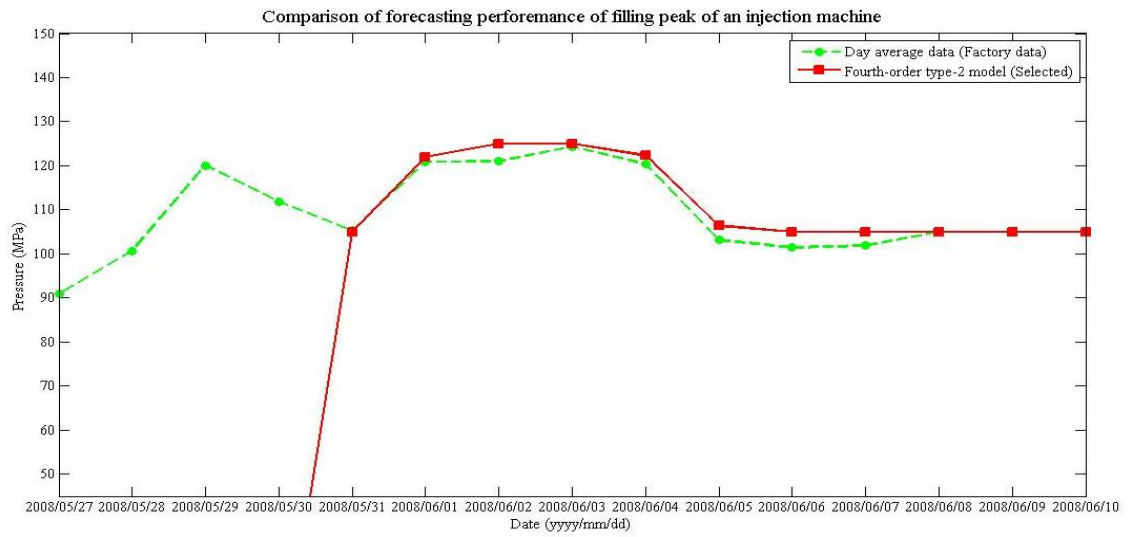


Fig. F.4. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/09 in next week.

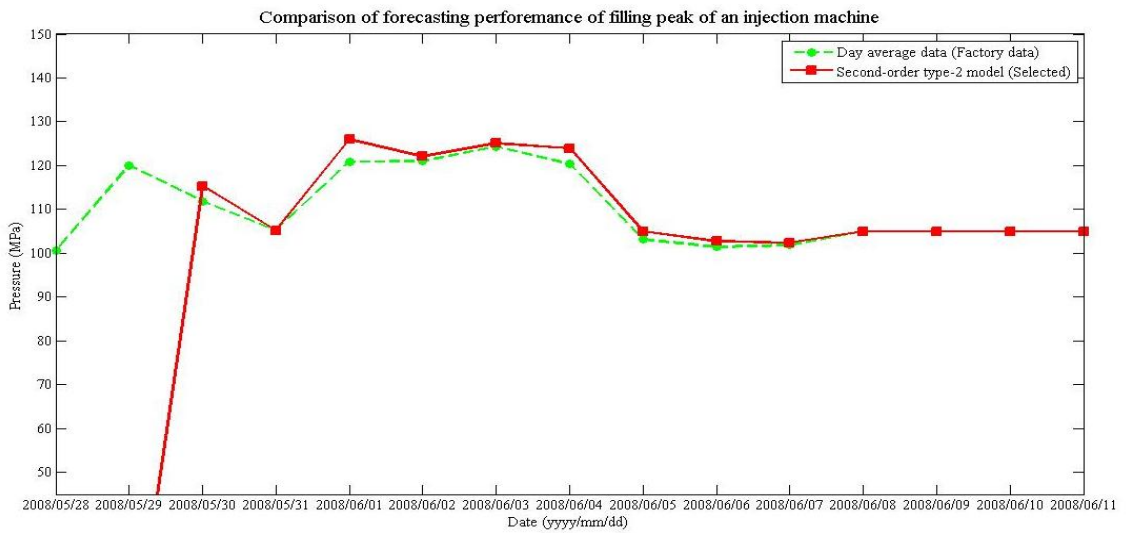


Fig. F.5. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/10 in next week.

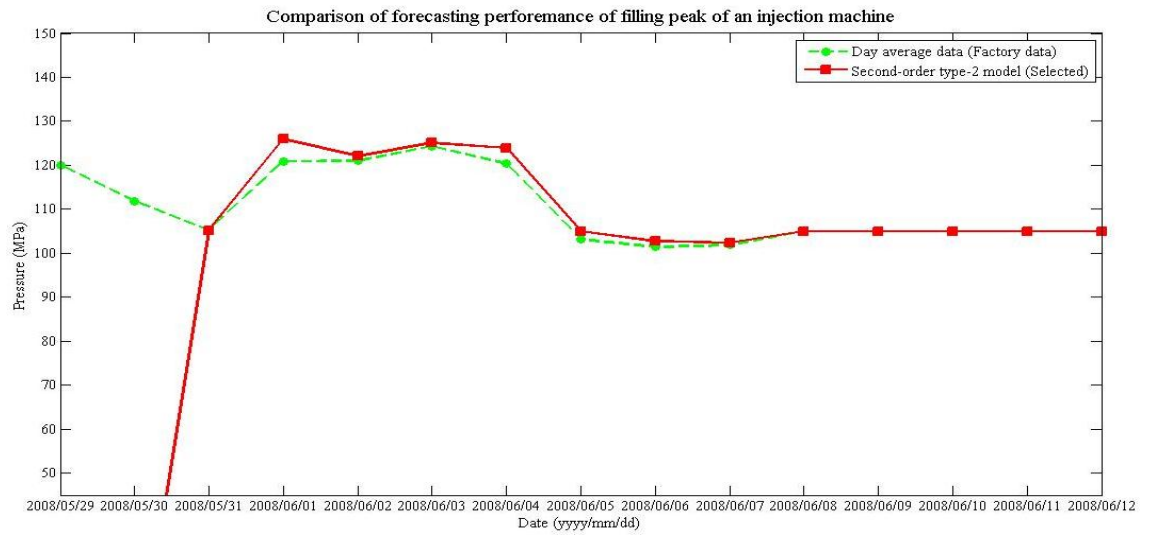


Fig. F.6. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/11 in next week.

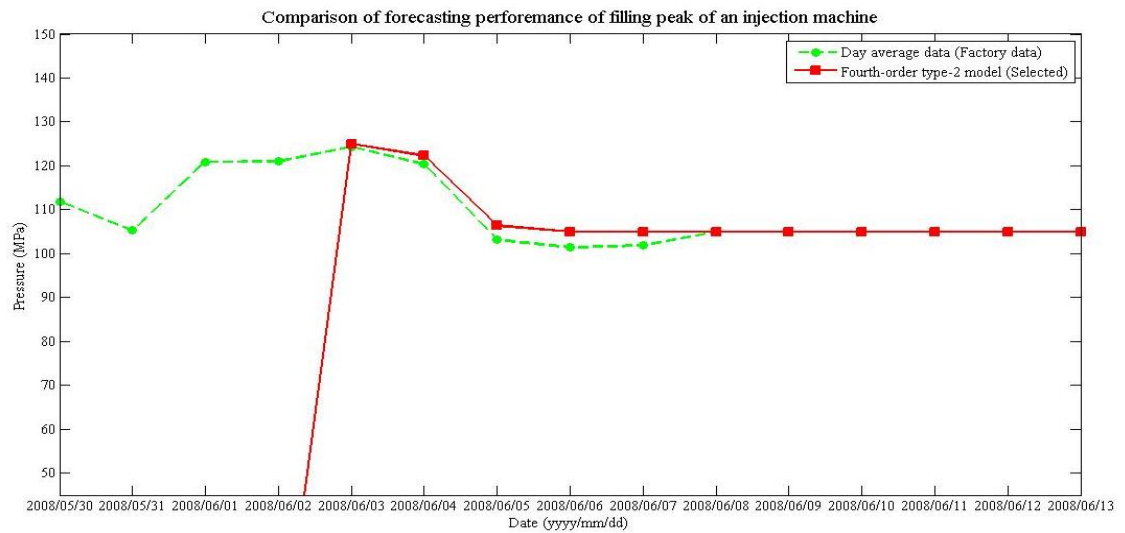


Fig. F.7. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/12 in next week.

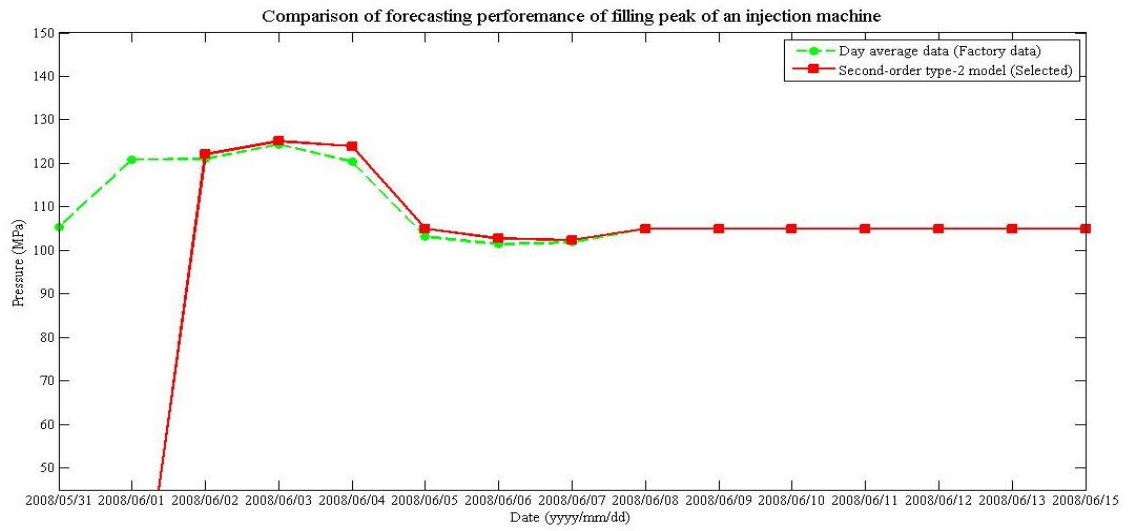


Fig. F.8. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/13 in next week.

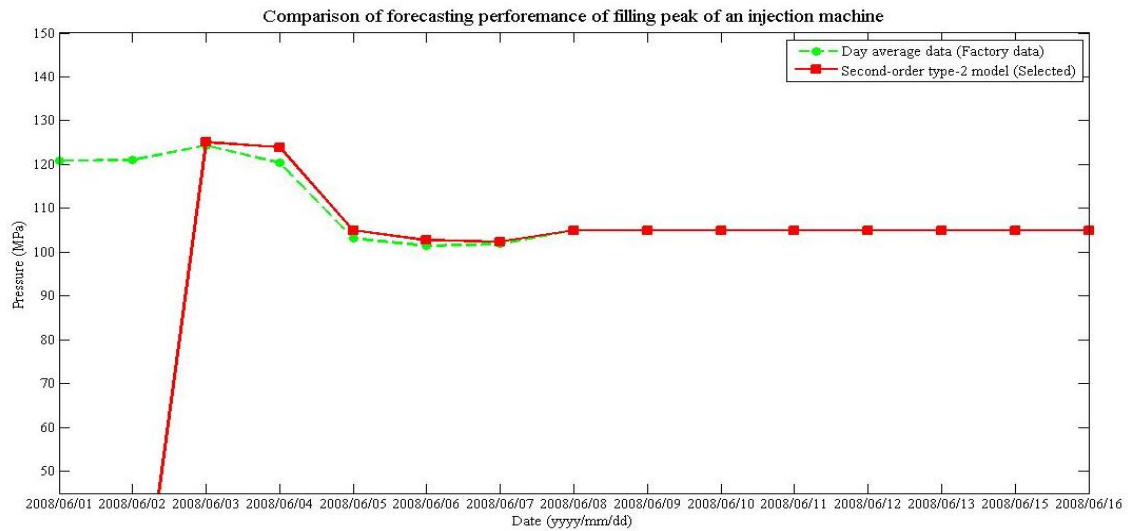


Fig. F.9. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/15 in next week.

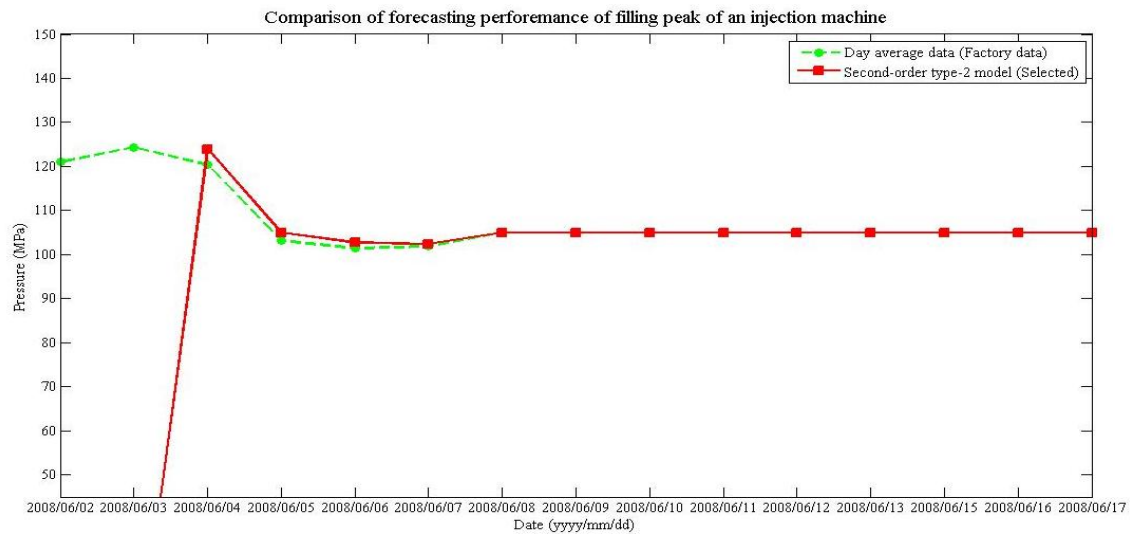


Fig. F.10. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/16 in next week.

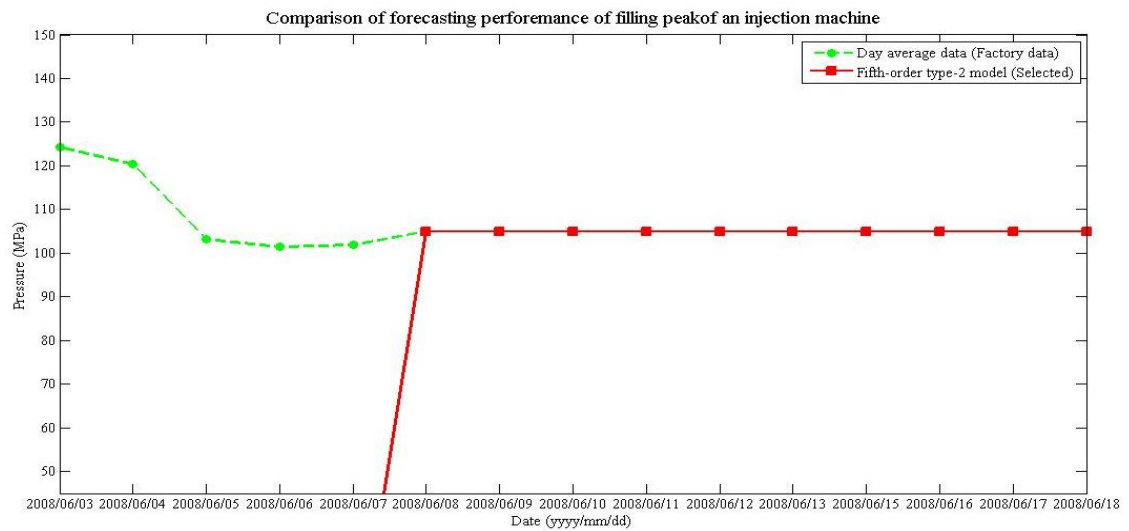


Fig. F.11. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/17 in next week.

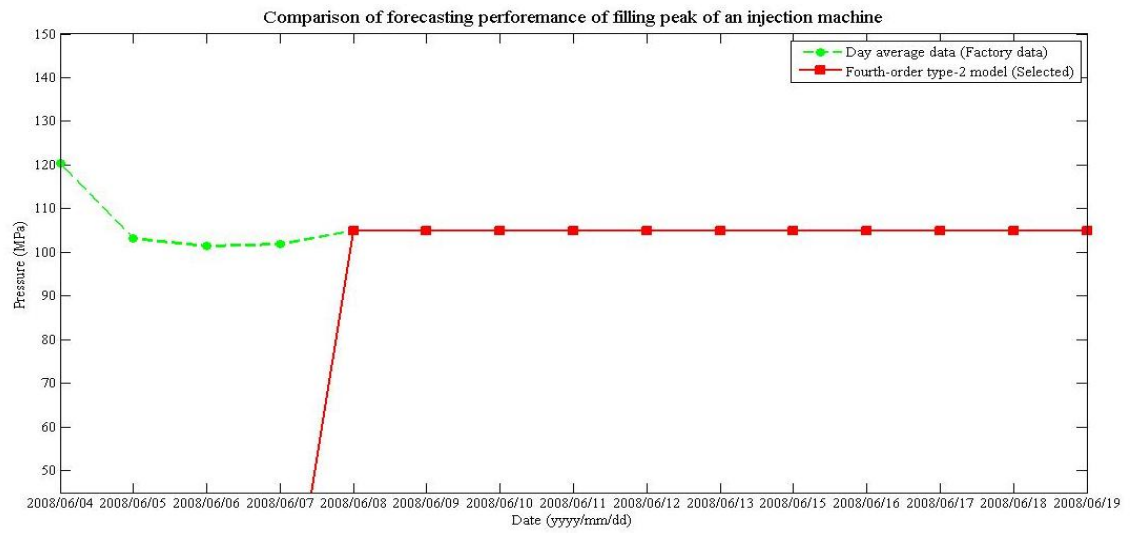


Fig. F.12. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/18 in next week.

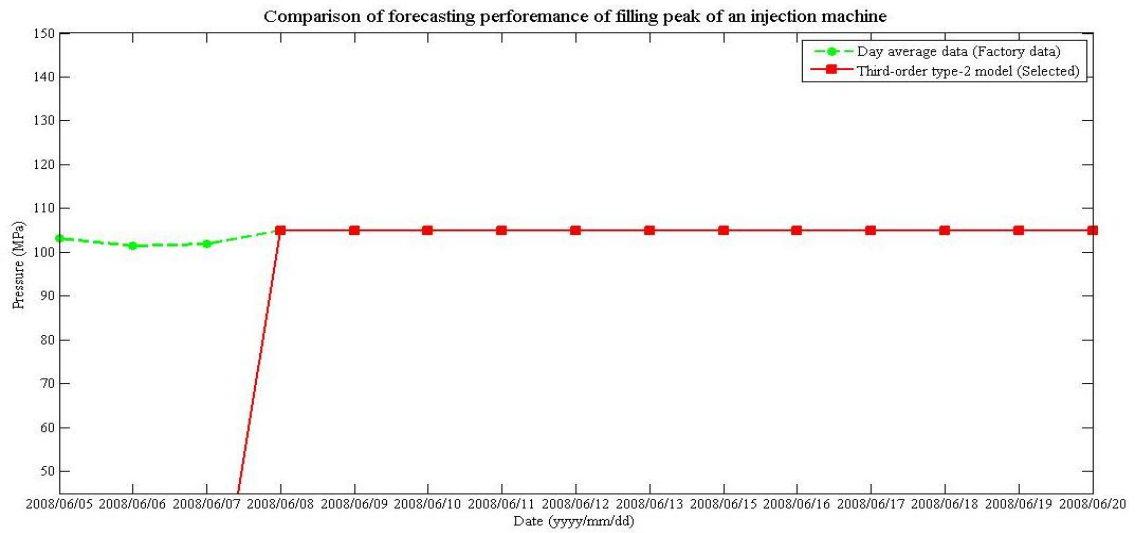


Fig. F.13. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/19 in next week.

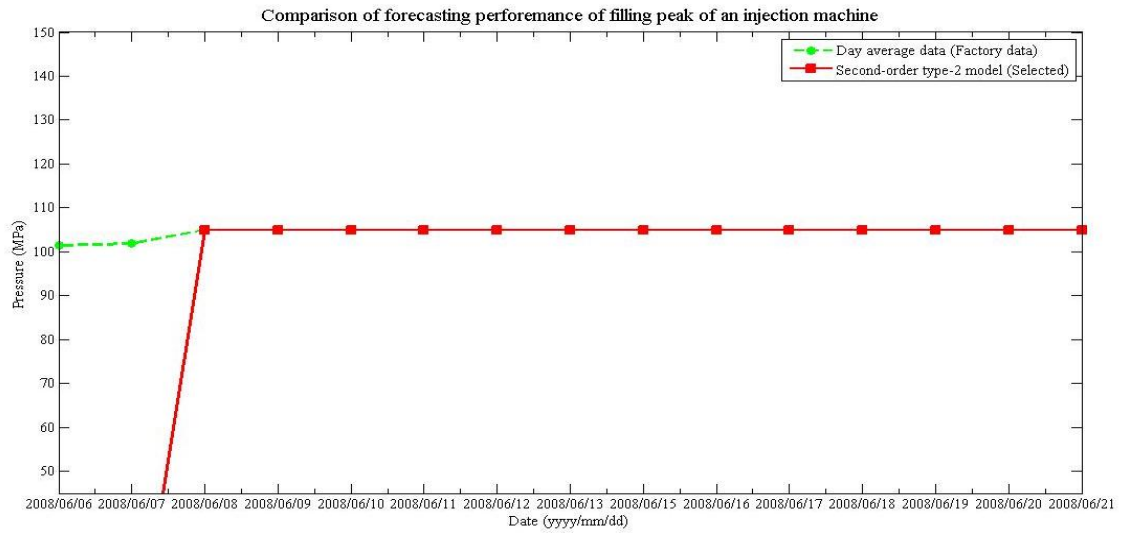


Fig. F.14. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/20 in next week.

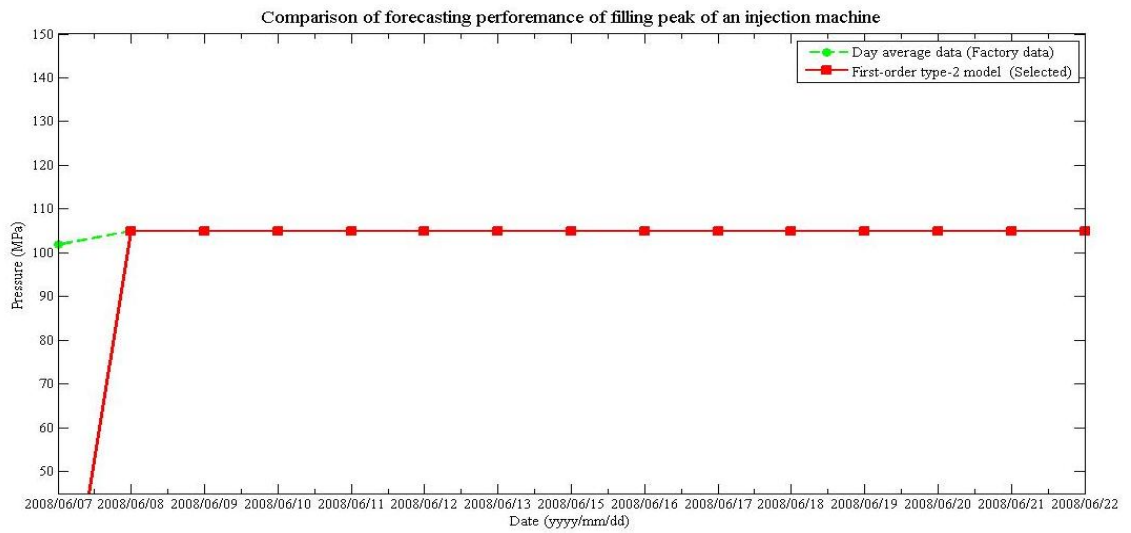


Fig. F.15. Forecasting position of filling peak factor (in MPa) for HO-T2FTS method as date is varies and a couple weeks data are used to forecast on the date: 2008/06/21 in next week.

## **Appendix G**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of V-P pressure Factor for Forecasting the Second and the Third Weeks (1) - in CD-ROM Disk.**

The type-A and type-B forecasting methods in Figure 5.7 are employed to forecast V-P pressure factor as following.

Figure G.1 to G.21 of Appendix G in the the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of V-P pressure factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure G.1 to G.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-A forecasting method).
- Figure G.8 to G.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-B forecasting method).
- Figure G.15 to G.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

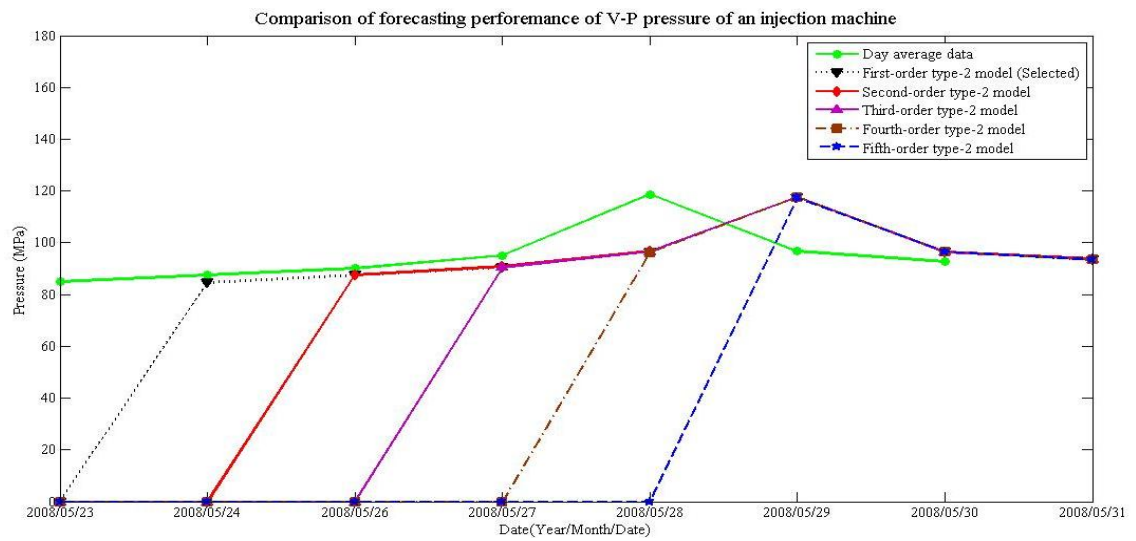


Fig. G.1. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the first to seventh days of the first week data forecast on 2008/05/31.

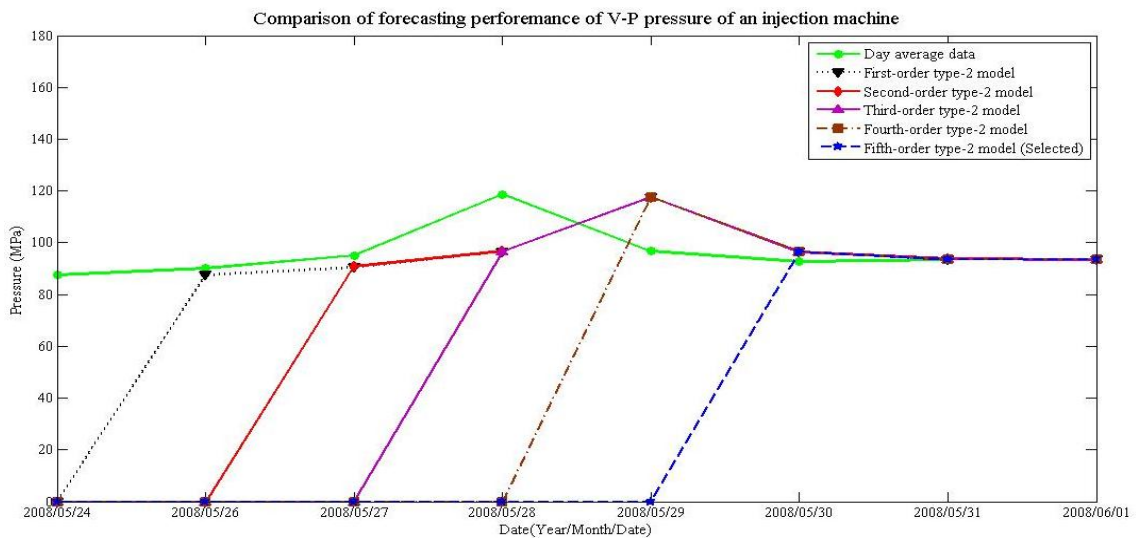


Fig. G.2. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day forecasting value of the second week forecast on 2008/06/01.

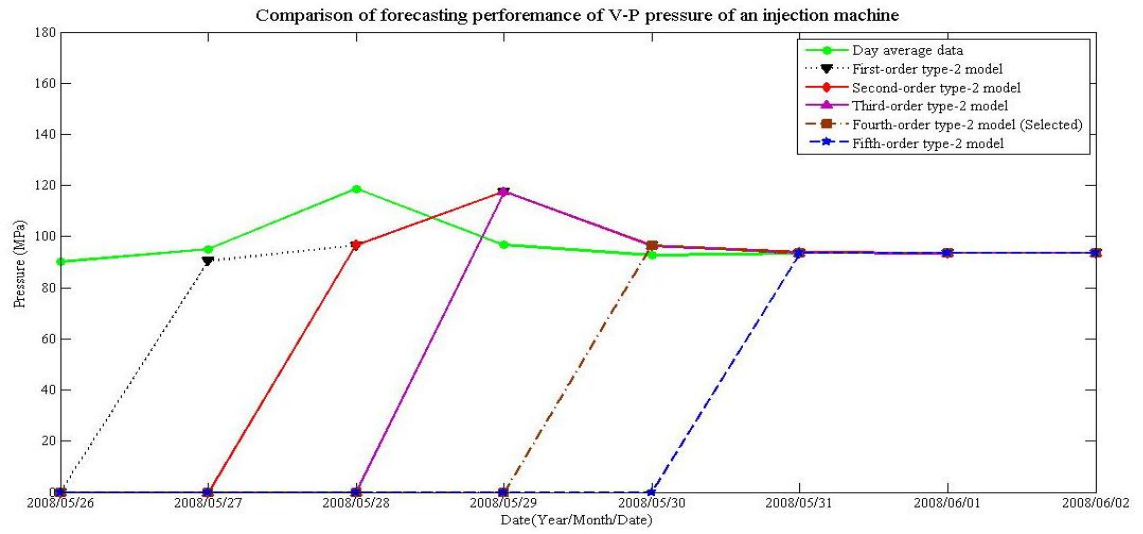


Fig. G.3. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days forecasting values of the second week forecast on 2008/06/02.

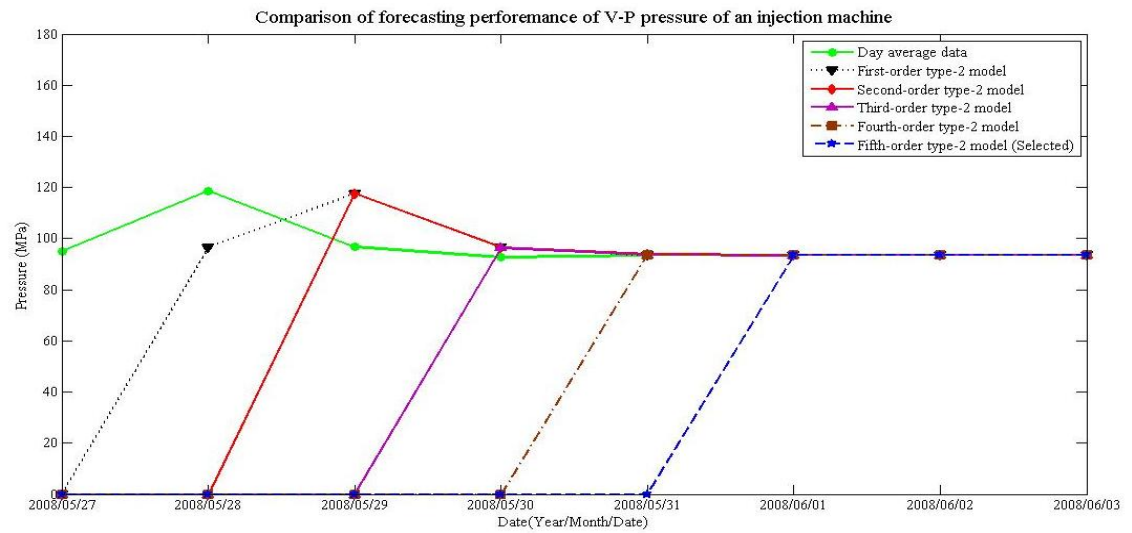


Fig. G.4. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days forecasting values of the second week forecast on 2008/06/03.

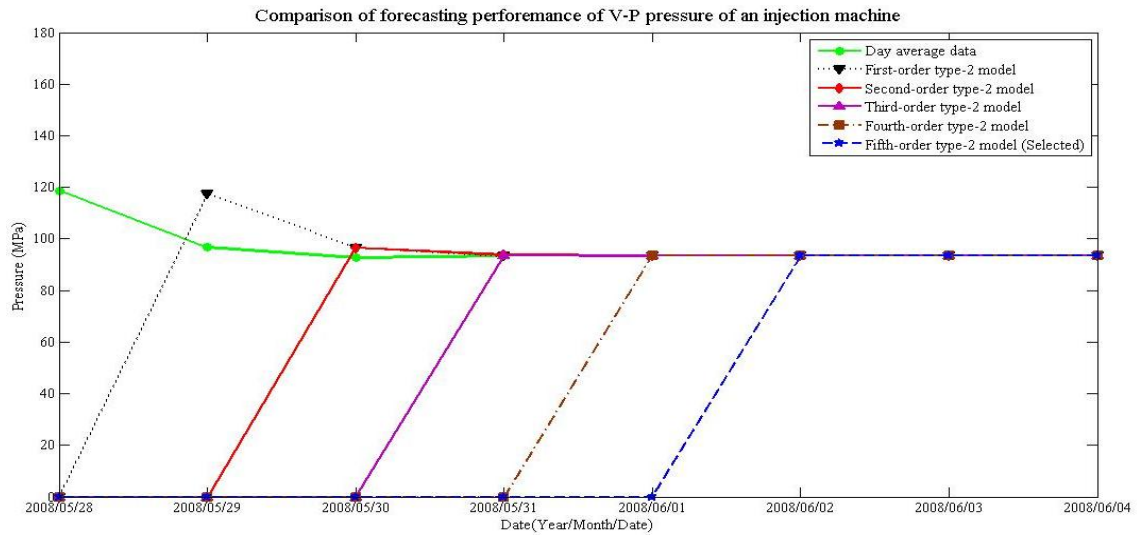


Fig. G.5. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days forecasting values of the second week forecast on 2008/06/04.

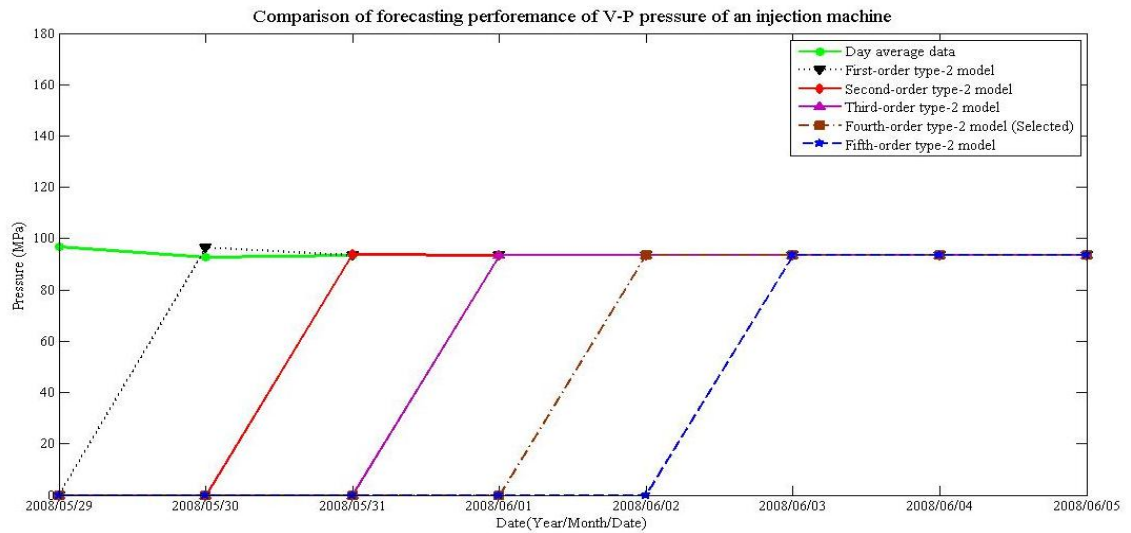


Fig. G.6. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days forecasting values of the second week forecast on 2008/06/05.

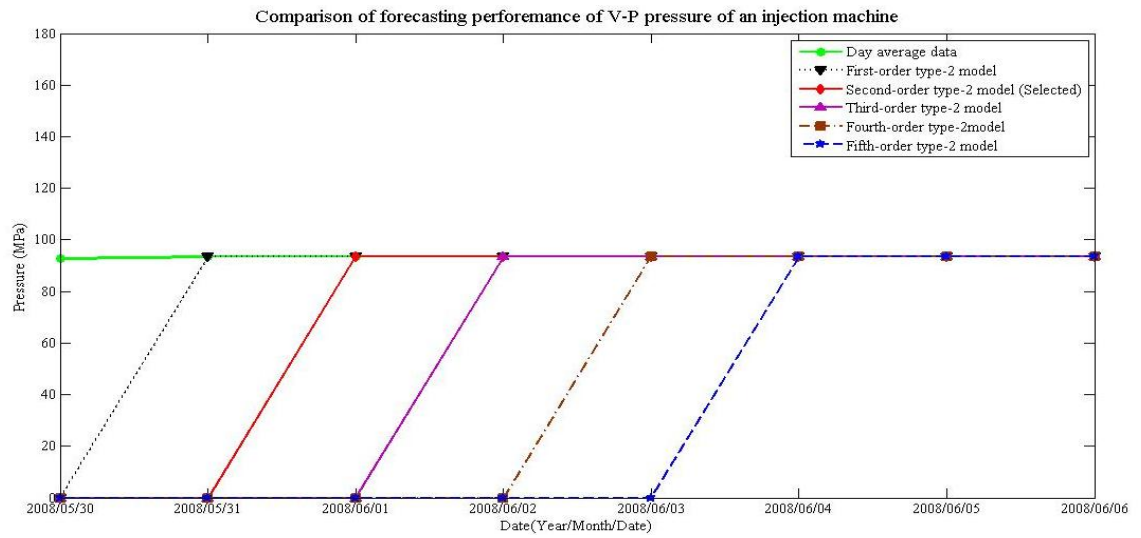


Fig. G.7. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days forecasting values of the second week forecast on 2008/06/06.

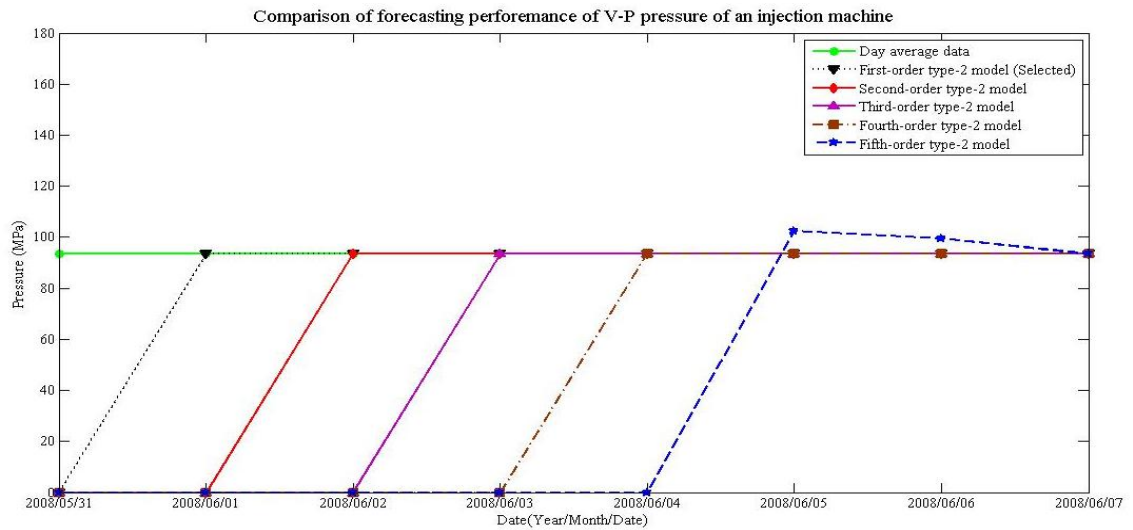


Fig. G.8. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

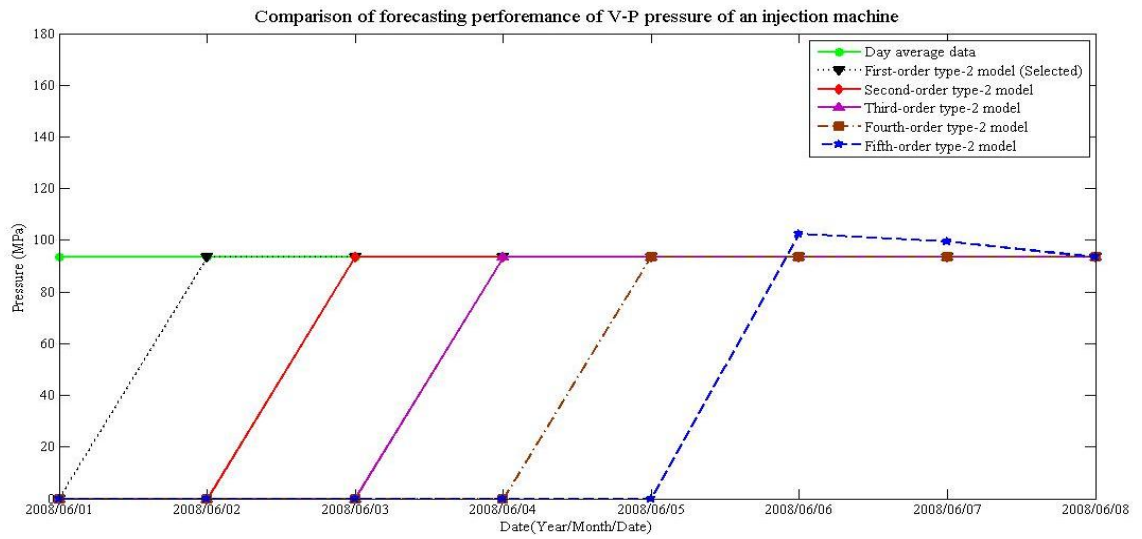


Fig. G.9. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day forecasting values of the third week forecast on 2008/06/08.

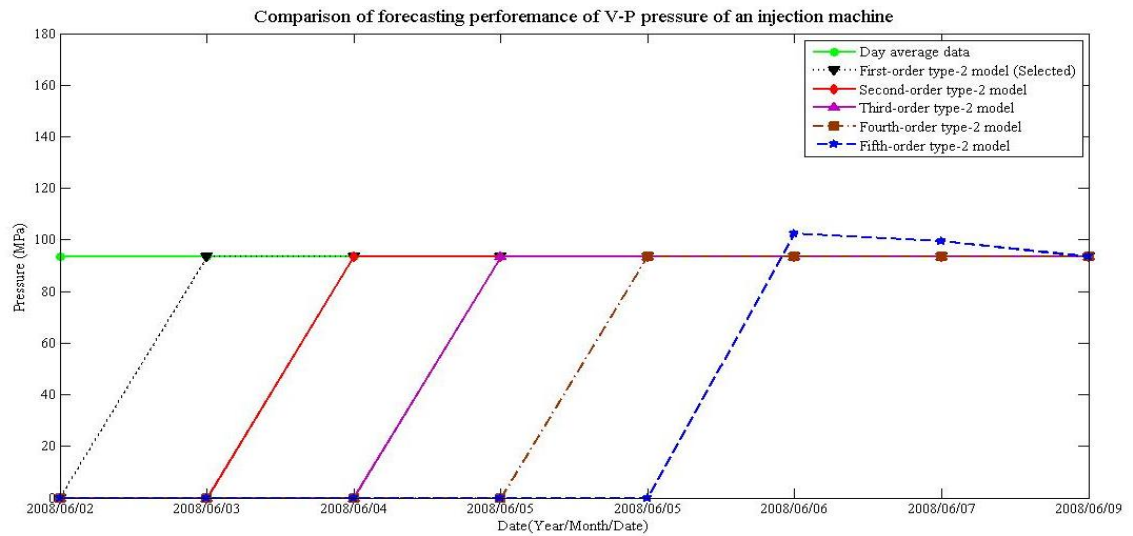


Fig. G.10. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days forecasting values of the third week forecast on 2008/06/09.

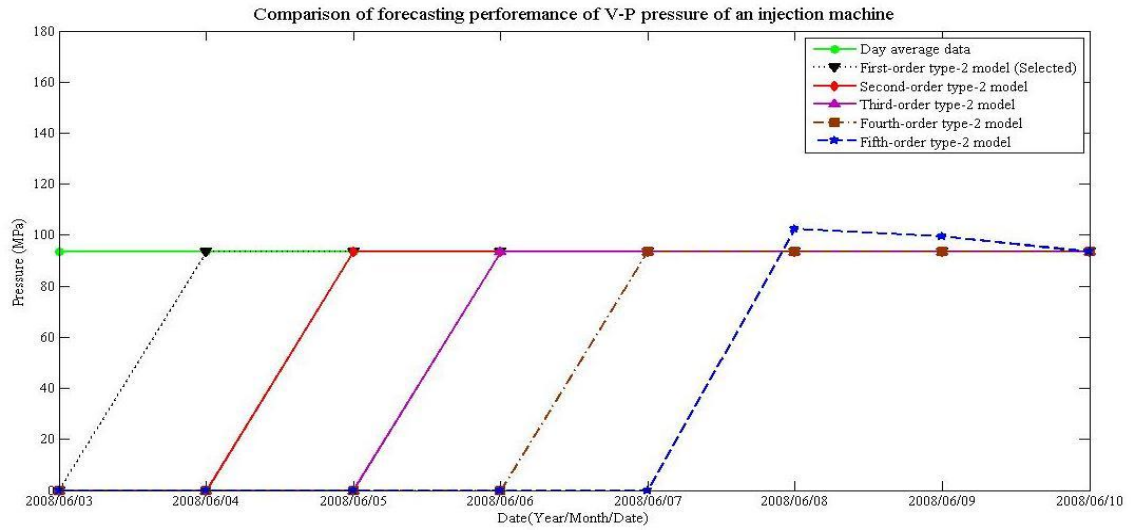


Fig. G.11. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days forecasting values of the third week forecast on 2008/06/10.

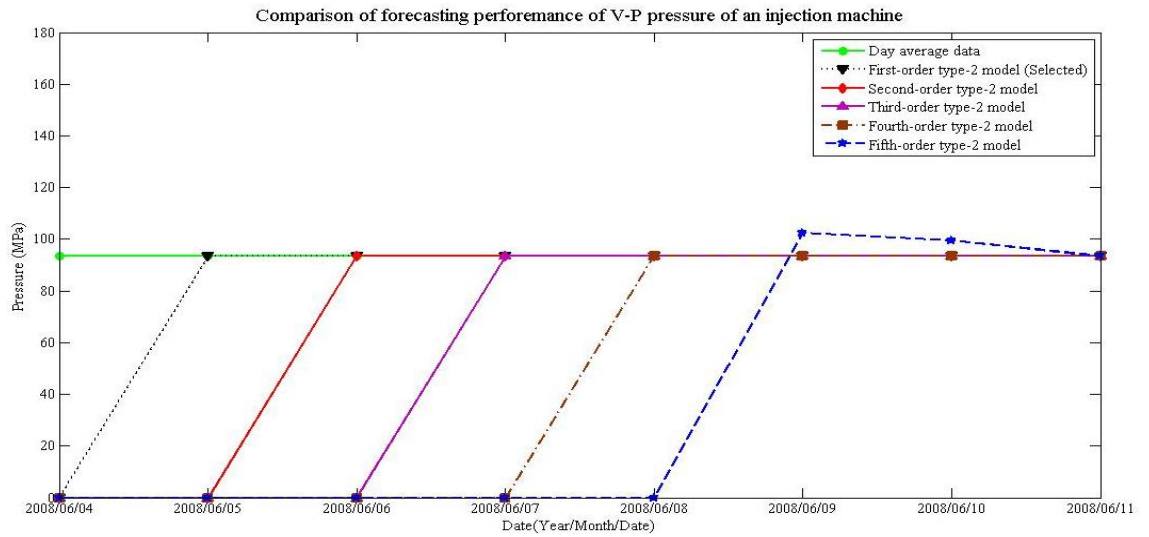


Fig. G.12. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

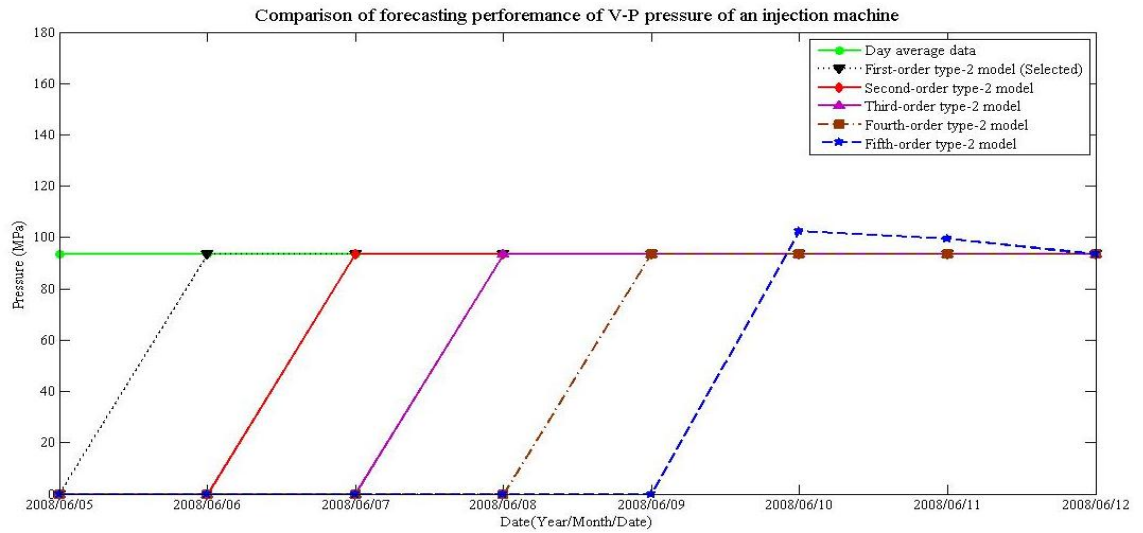


Fig. G.13. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

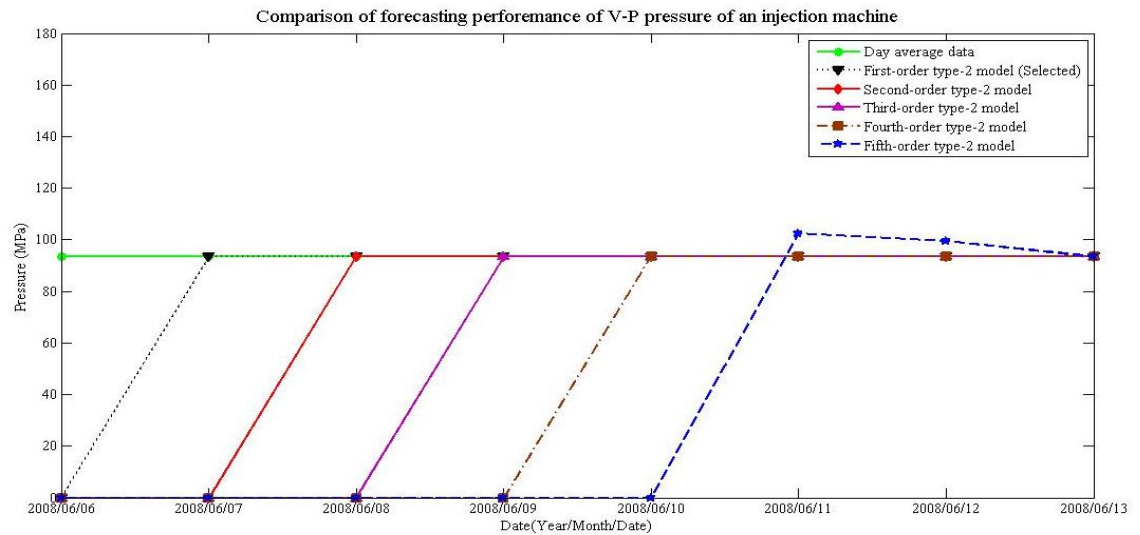


Fig. G.14. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days forecasting values of the third week forecast on 2008/06/13.

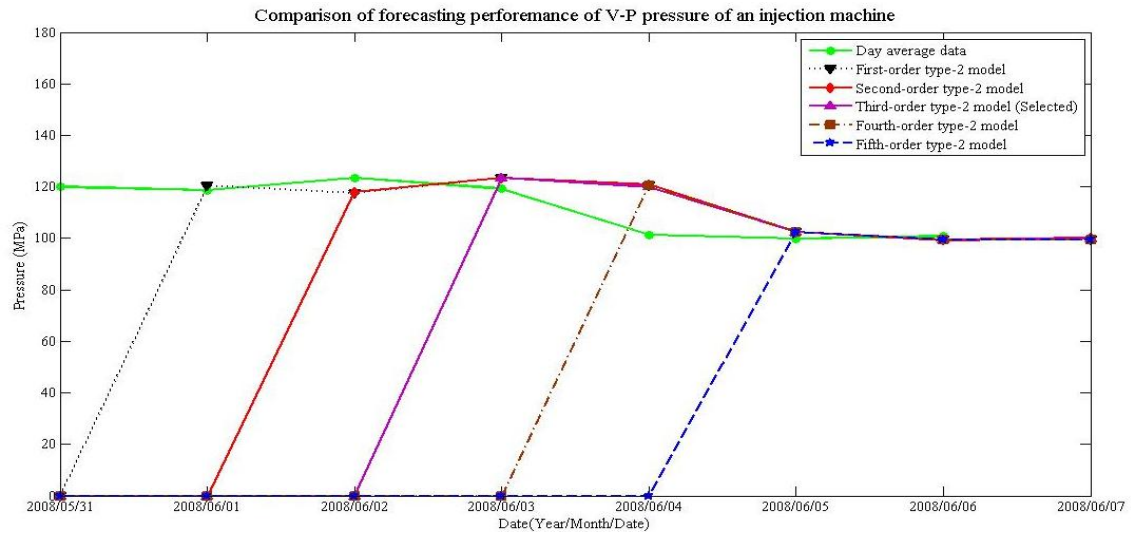


Fig. G.15. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the first to seventh days forecasting values of the second week forecast on 2008/06/07.

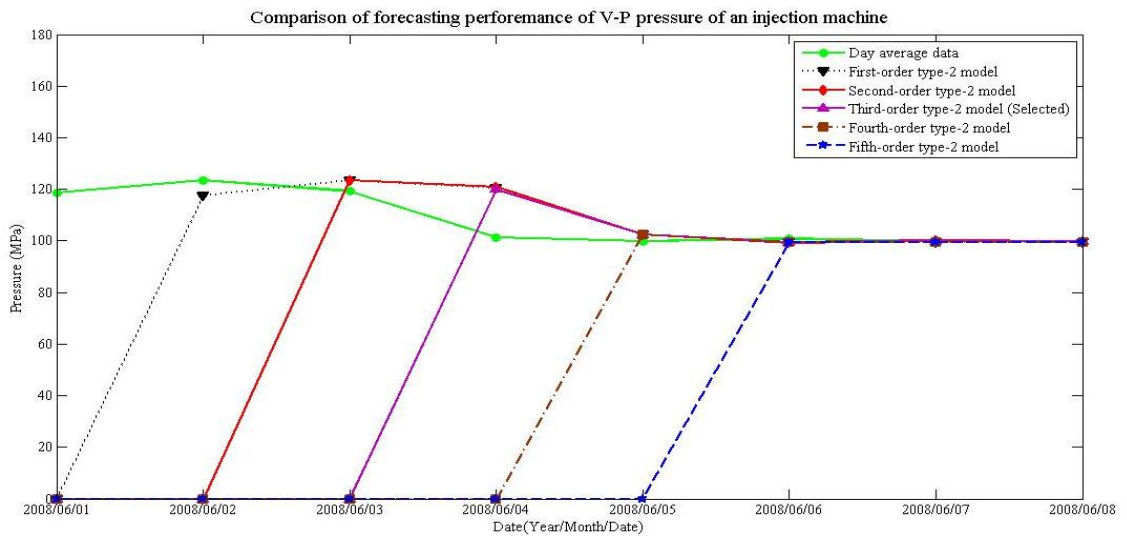


Fig. G.16. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day forecasting value of the third week forecast on 2008/06/08.

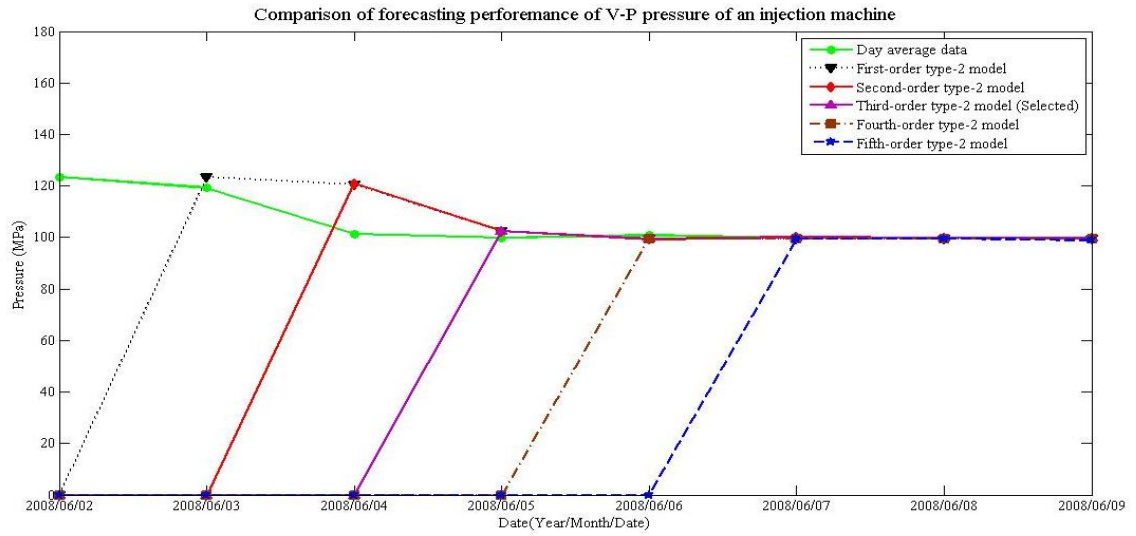


Fig. G.17. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days forecasting values of the third week forecast on 2008/06/09.

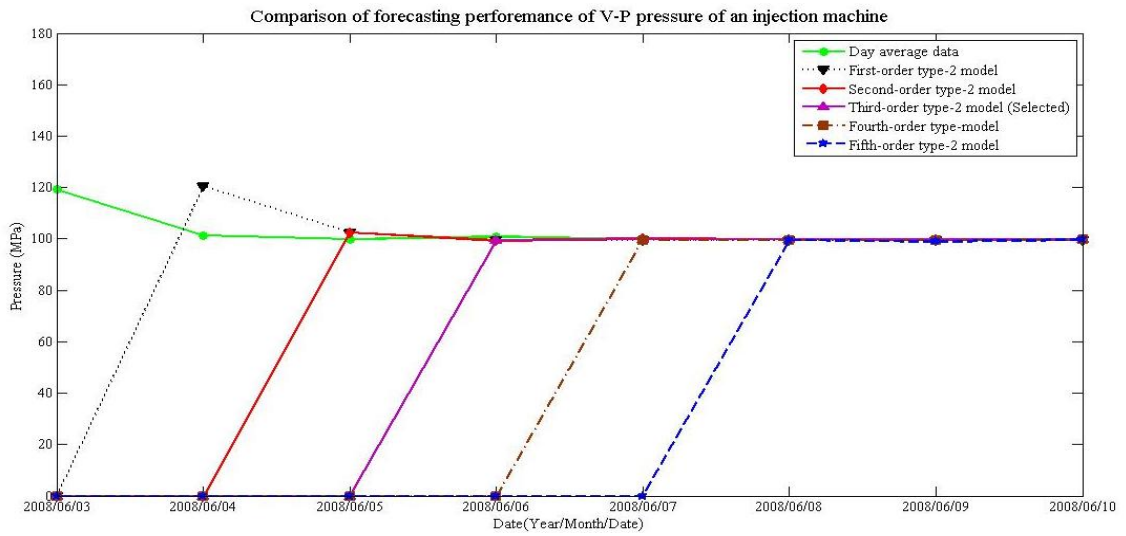


Fig. G.18. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days forecasting values of the third week forecast on 2008/06/10.

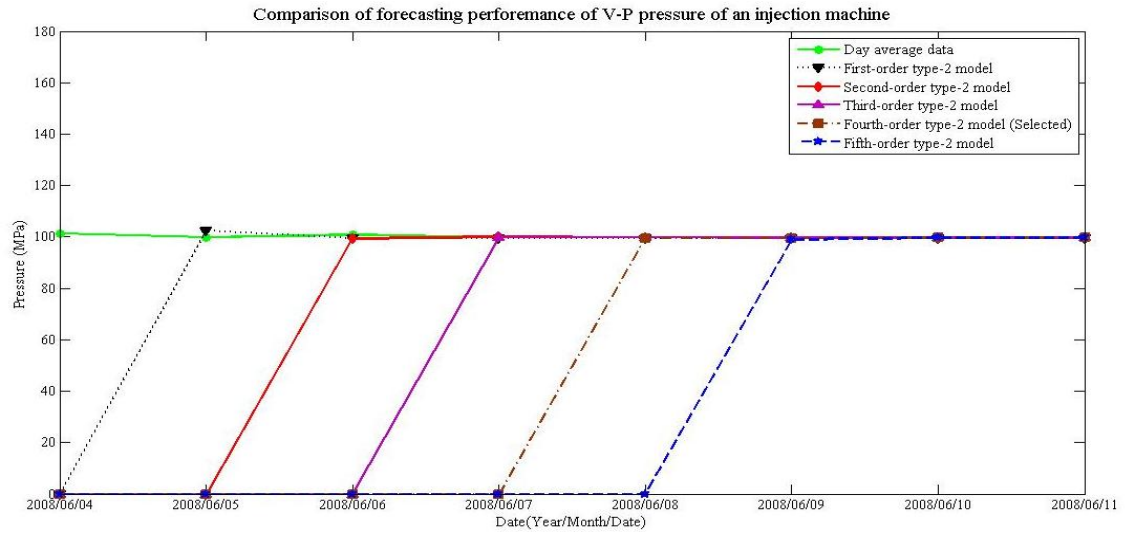


Fig. G.19. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days forecasting values of the third week forecast on 2008/06/11.

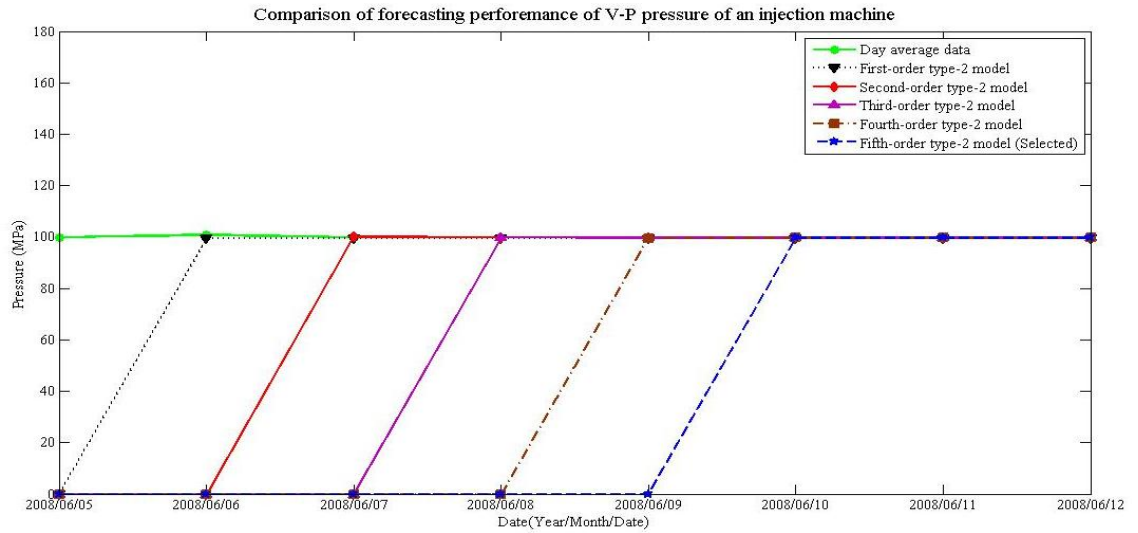


Fig. G.20. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days forecasting values of the third week forecast on 2008/06/12.

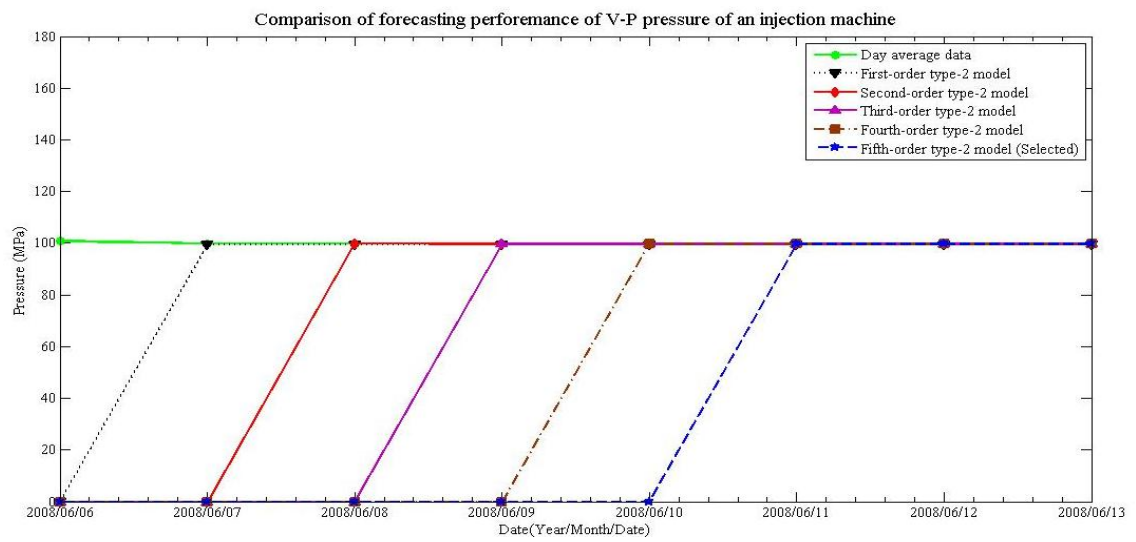


Fig. G.21. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days forecasting values of the third week forecast on 2008/06/13. 5 The seventh day forecasting value of the second week and the first to sixth days forecasting values of the third week are employed to forecast on the date: 2008/06/13 in the third week.

## Appendix H

### The Diagrams of Daily Forecasting : Using Day Average Data of a Couple Weeks of V-P Pressure Factor for Forecasting - in CD-ROM Disk.

Figure H.1 to H.15 in the accompanying CD-ROM disk depict the diagrams of forecasting using day average data of a couple weeks of V-P pressure factor for daily forecasting between 2008/05/23 and 2008/06/21 as following.

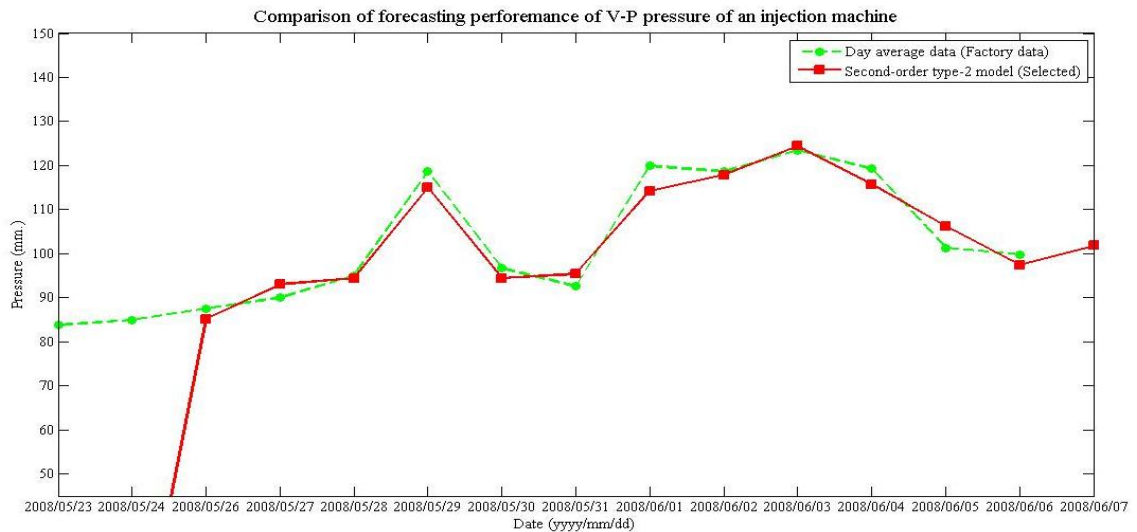


Fig. H.1. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/06.

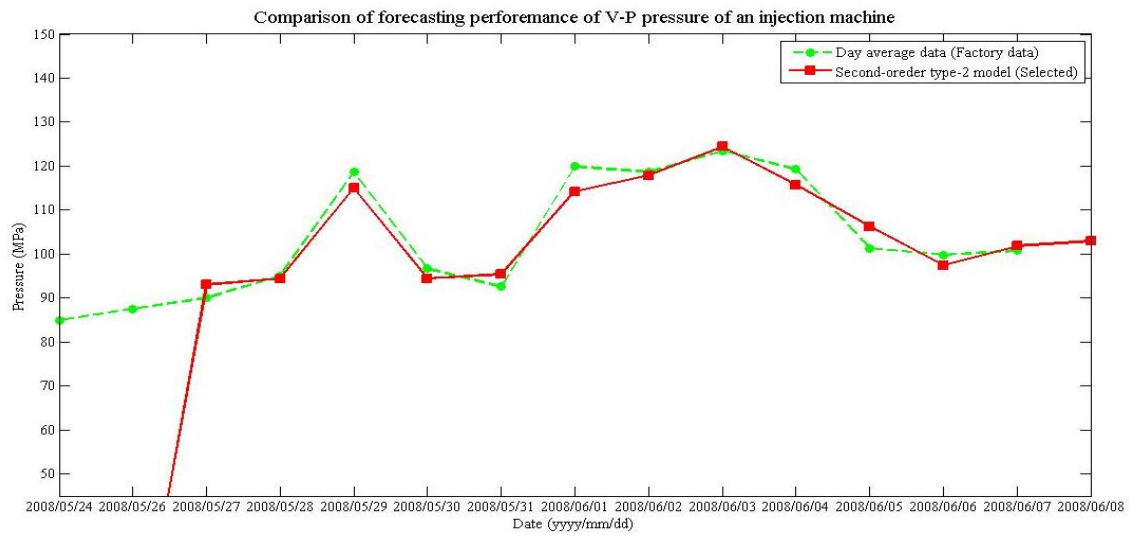


Fig. H.2. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/07.

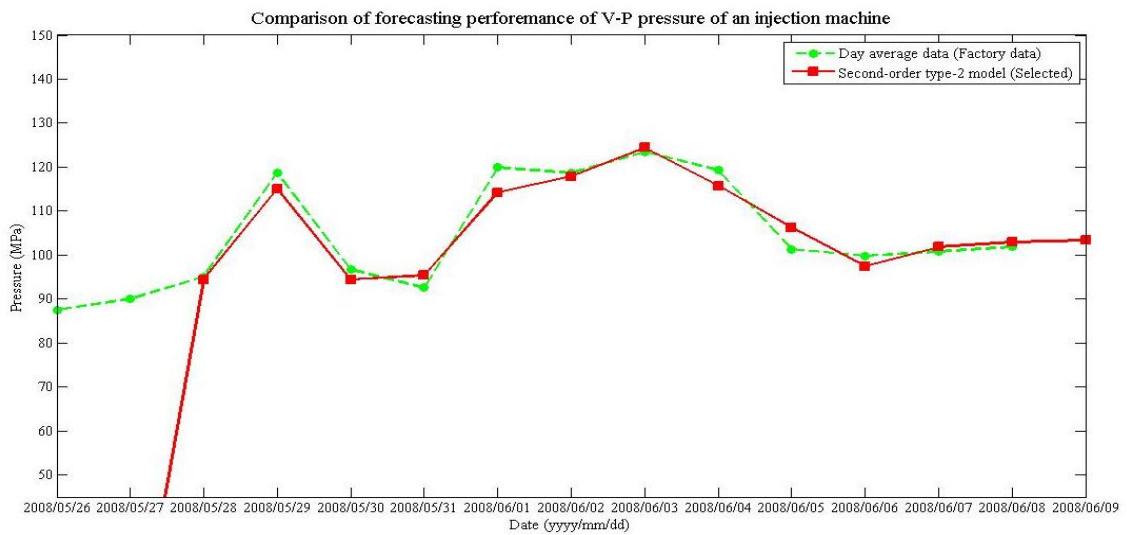


Fig. H.3. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/08.

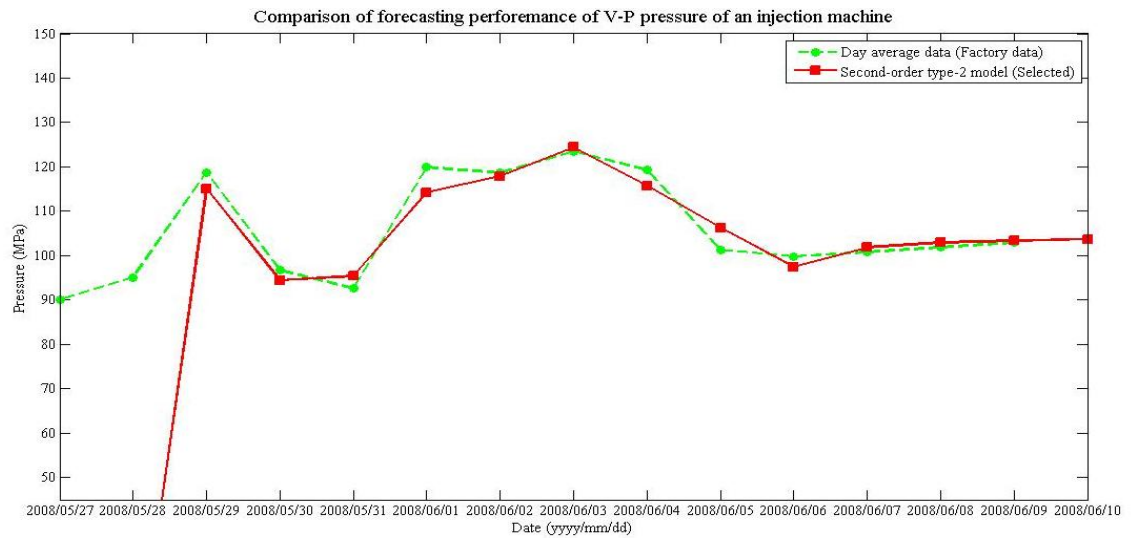


Fig. H.4. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/09.

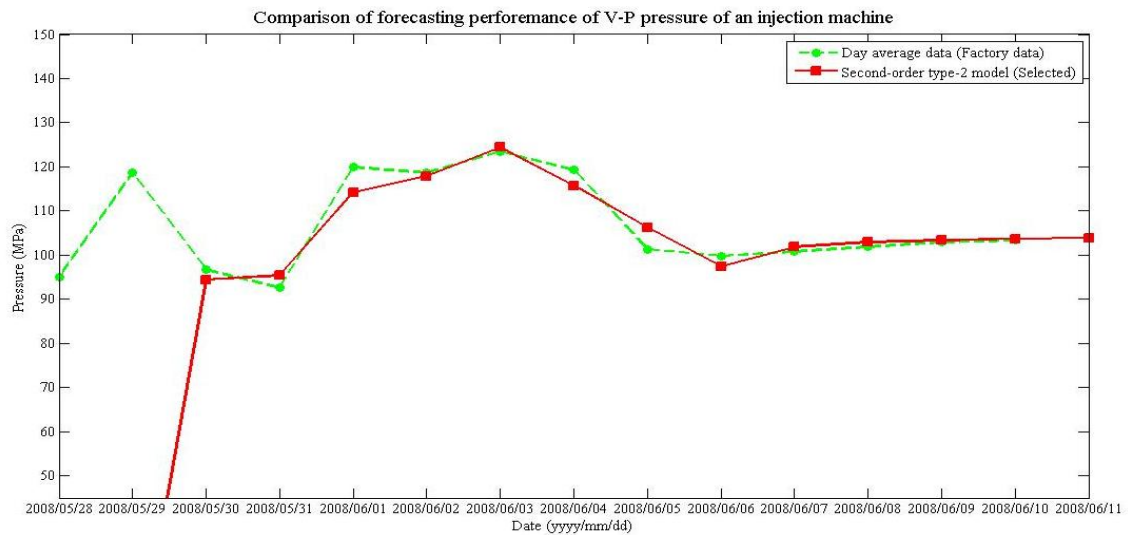


Fig. H.5. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/10.

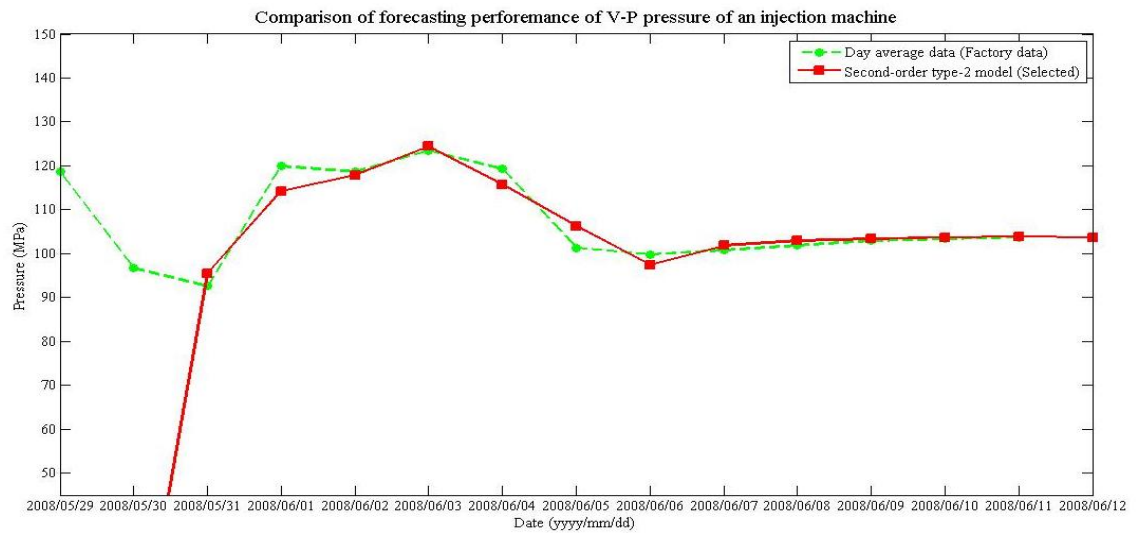


Fig. H.6. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/11.

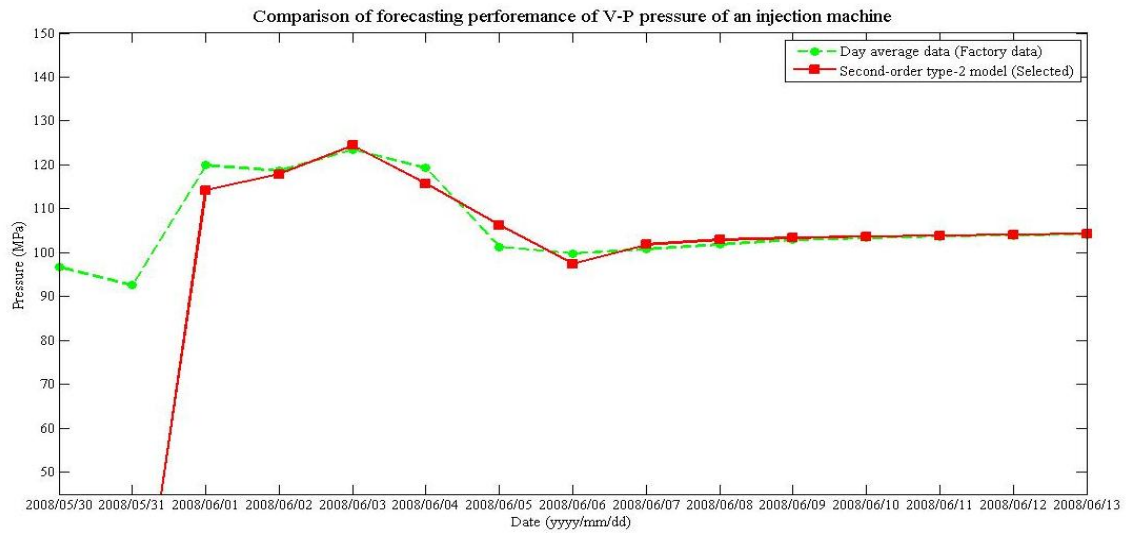


Fig. H.7. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/12.

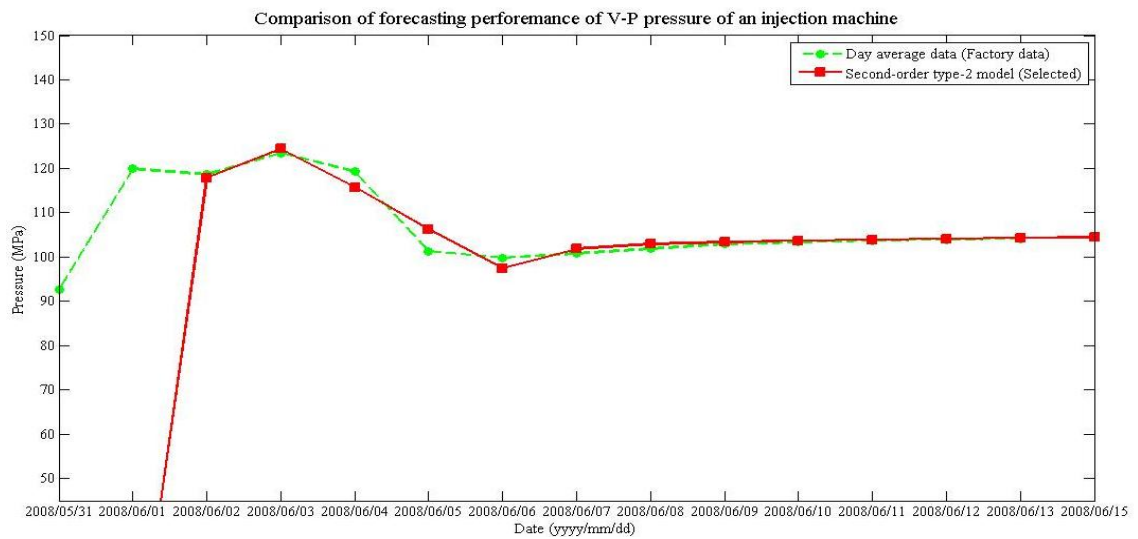


Fig. H.8. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/13.

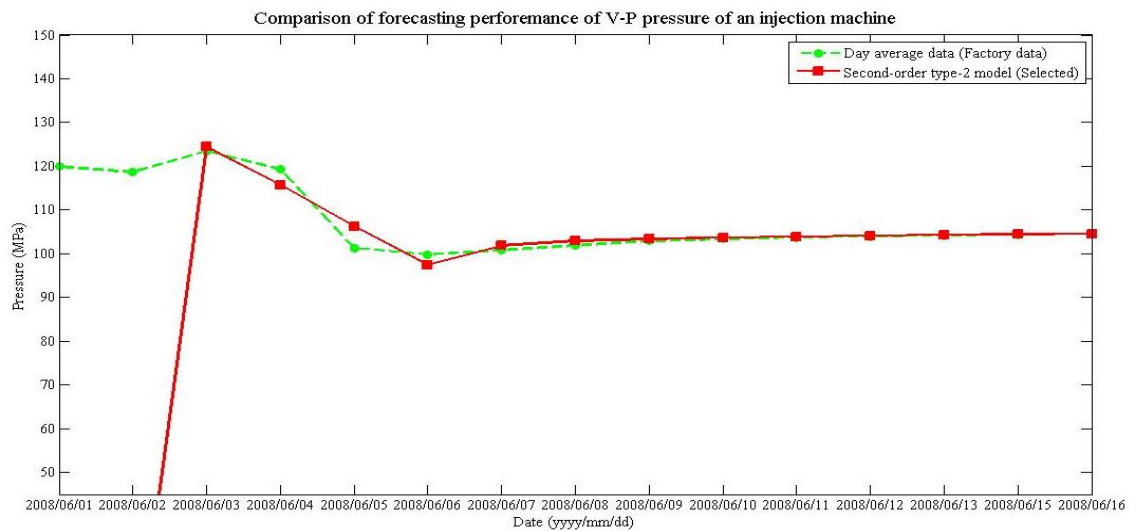


Fig. H.9. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/15.

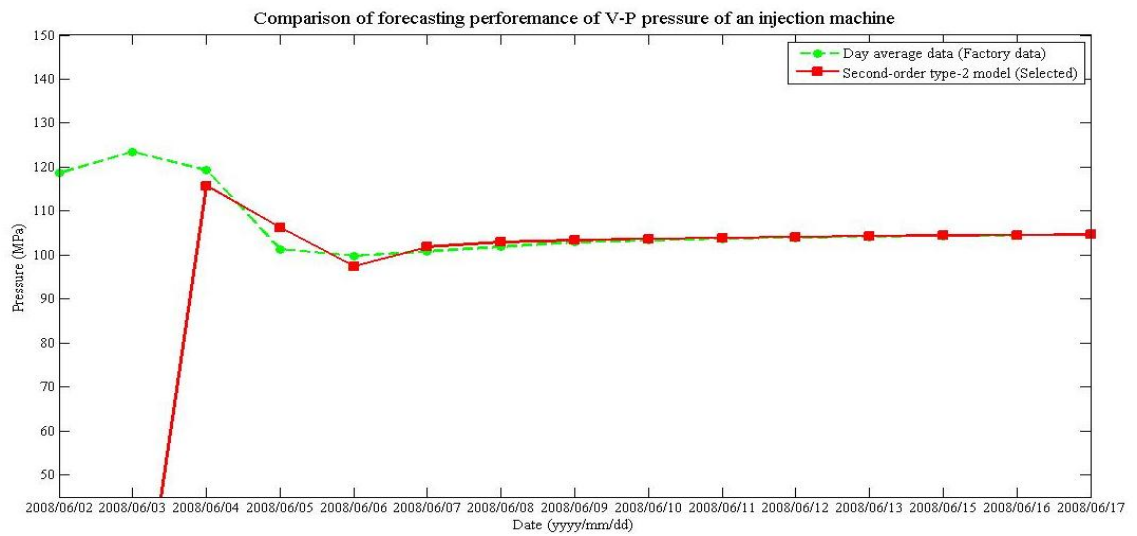


Fig. H.10. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/16.

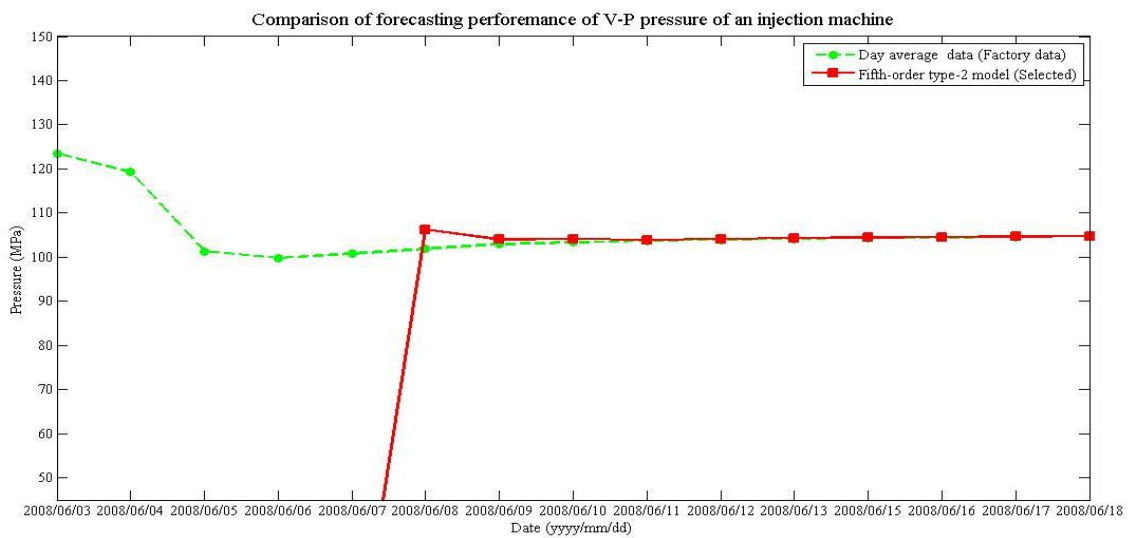


Fig. H.11. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/17.

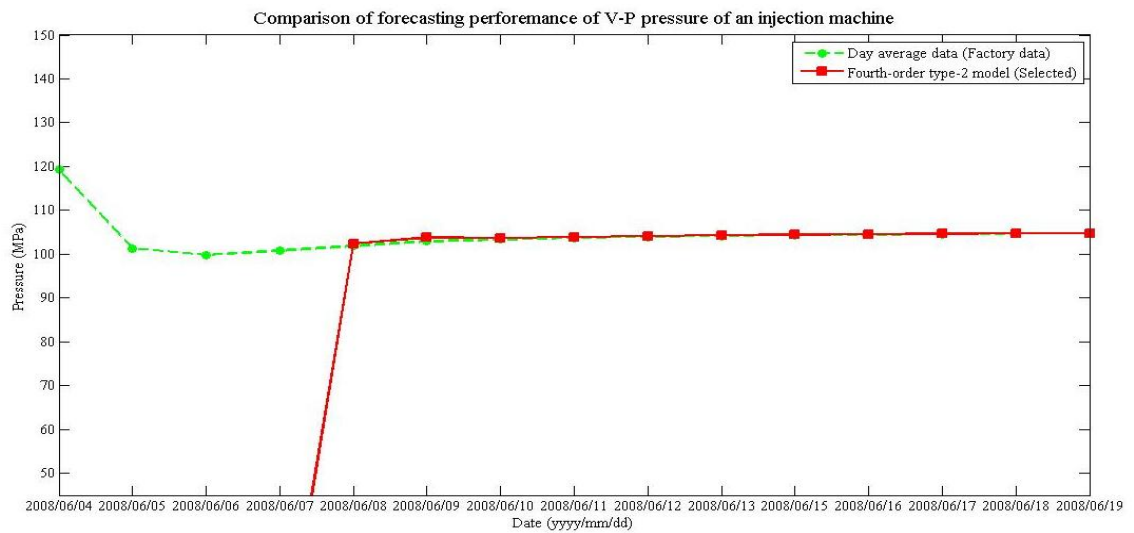


Fig. H.12. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/18.

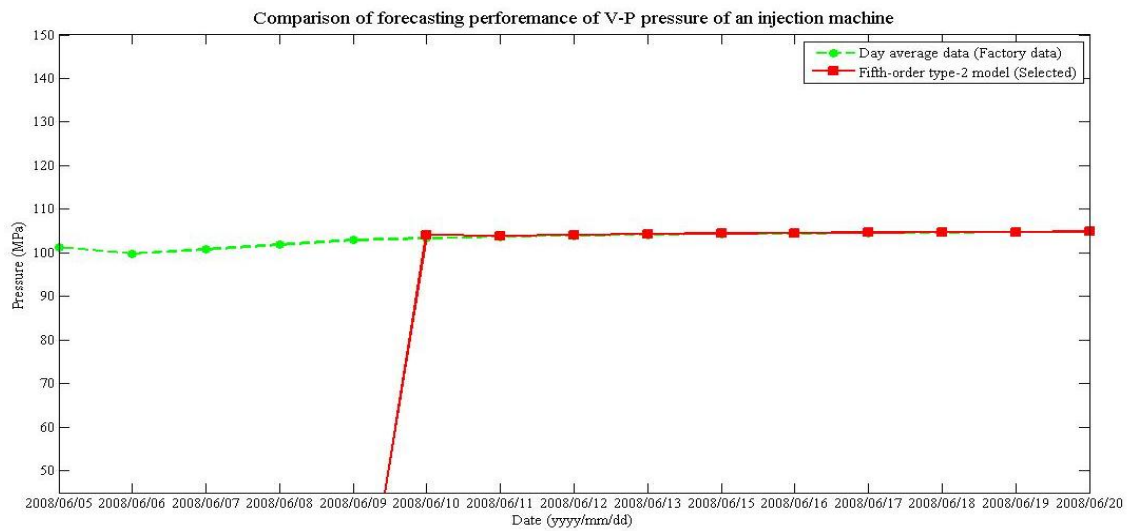


Fig. H.13. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/19.

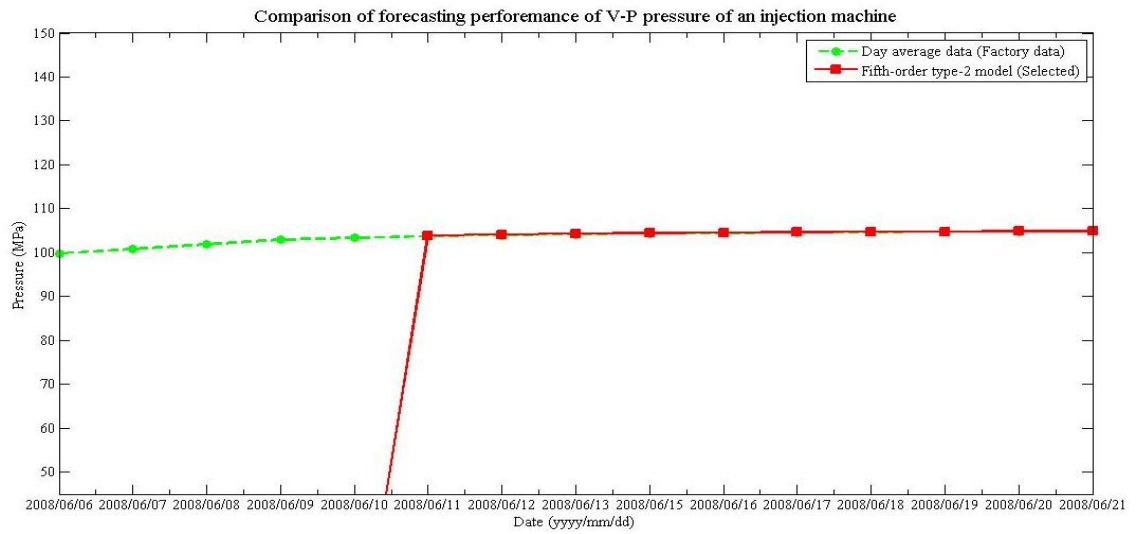


Fig. H.14. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/20.

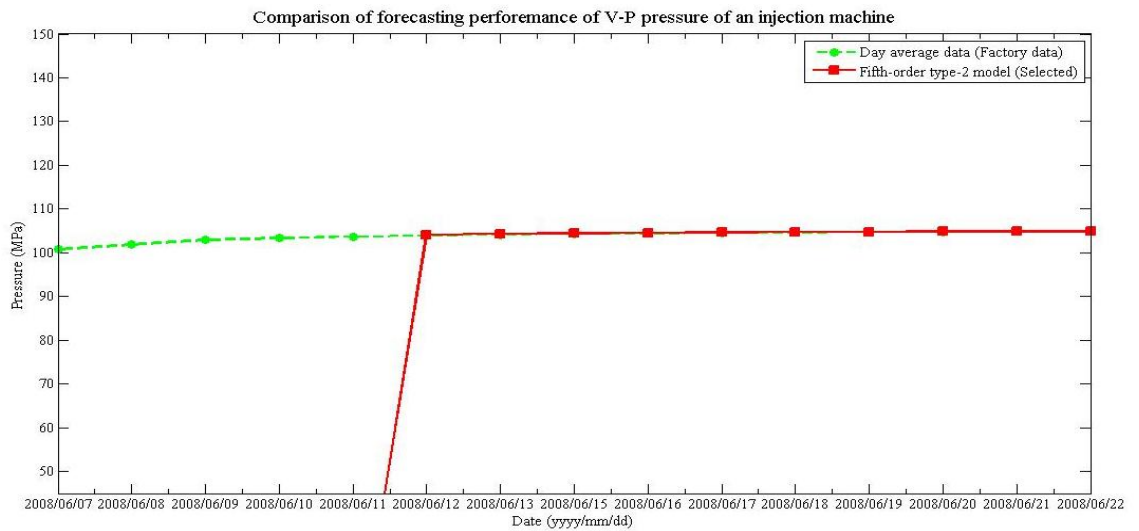


Fig. H.15. Forecasting position of V-P pressure factor (in MPa) as date is varies and a couple weeks data are used to forecast on 2008/06/21.

## **Appendix I**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of Minimum Cushion Position Factor for Forecasting the Second and the Third Weeks (2) - in CD-ROM Disk.**

The type-A forecasting method in Figure 5.7 and type-C and type-D forecasting methods in Figure 5.8 are employed to forecast minimum cushion position factor as following.

Figure I.1 to I.21 of Appendix I in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of minimum cushion position factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure I.1 to I.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-C forecasting method).
- Figure I.8 to I.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-D forecasting method).
- Figure I.15 to I.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

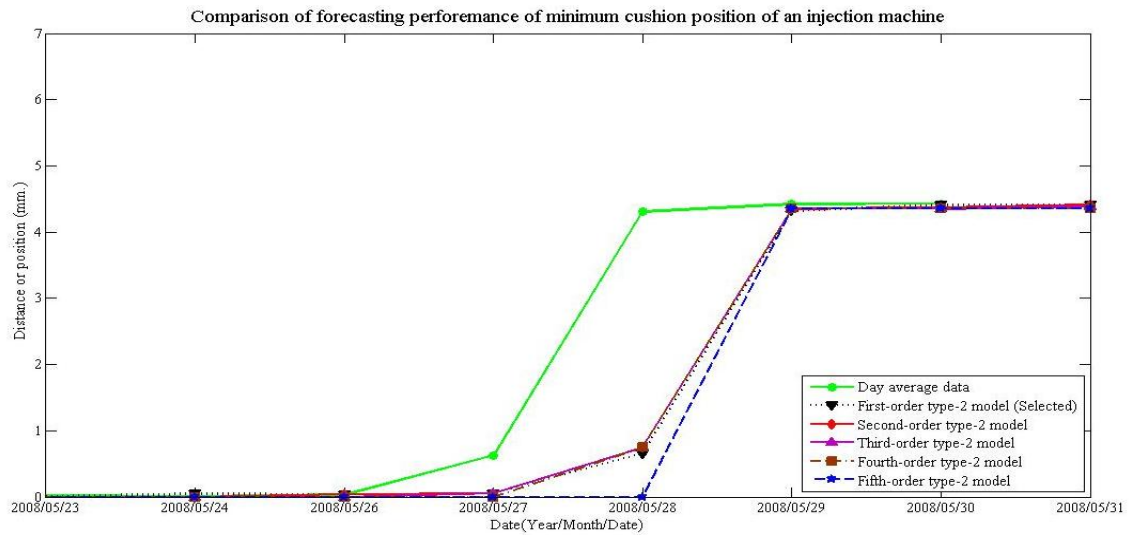


Fig. I.1. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using only the first week data forecast on 2008/05/31.

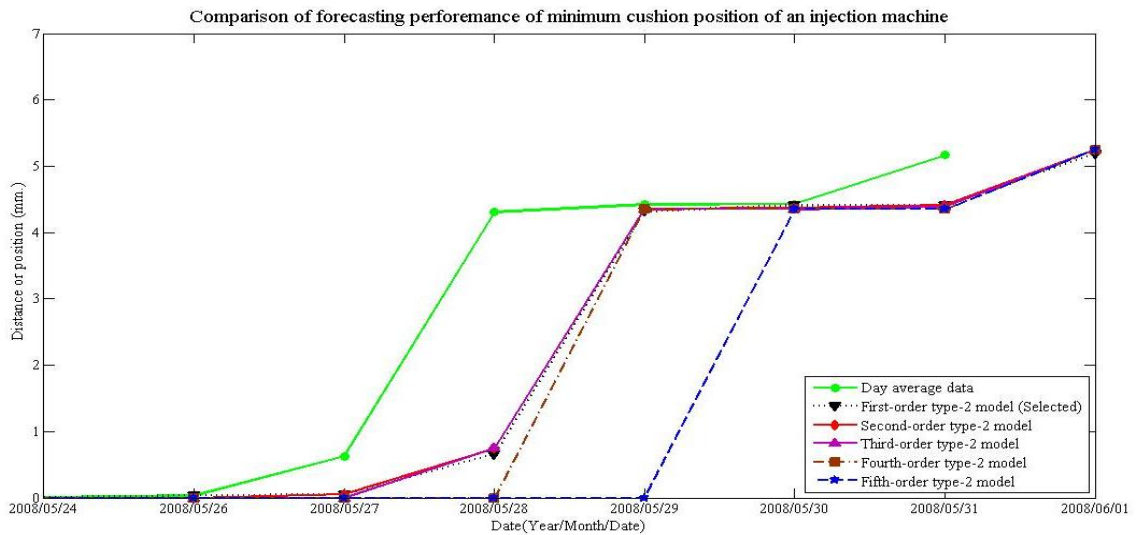


Fig. I.2. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day of the second week data forecast on 2008/06/01.

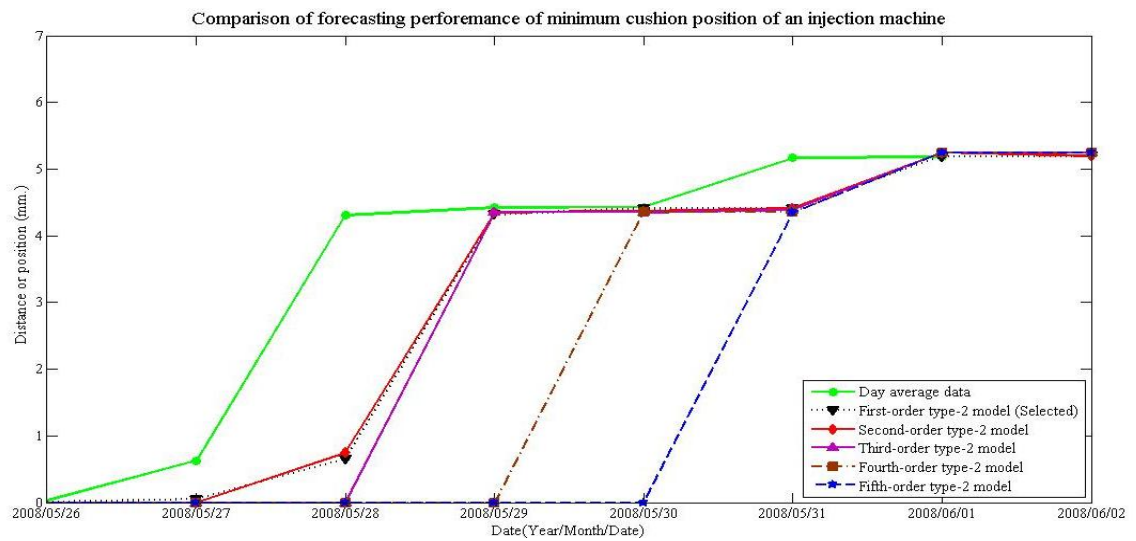


Fig. I.3. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days of the second week data forecast on 2008/06/02.

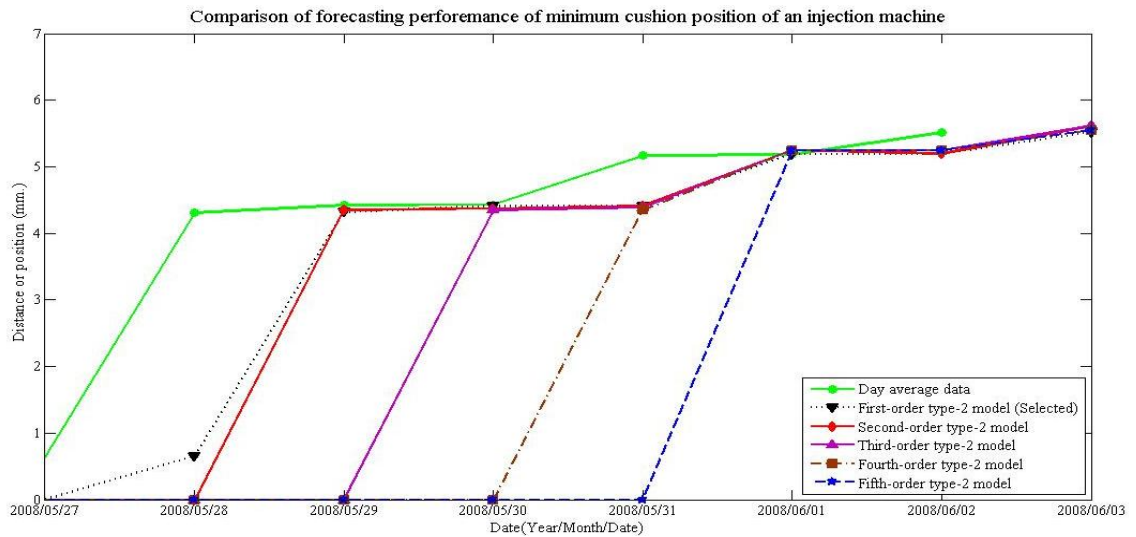


Fig. I.4. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days of the second week data forecast on 2008/06/03.

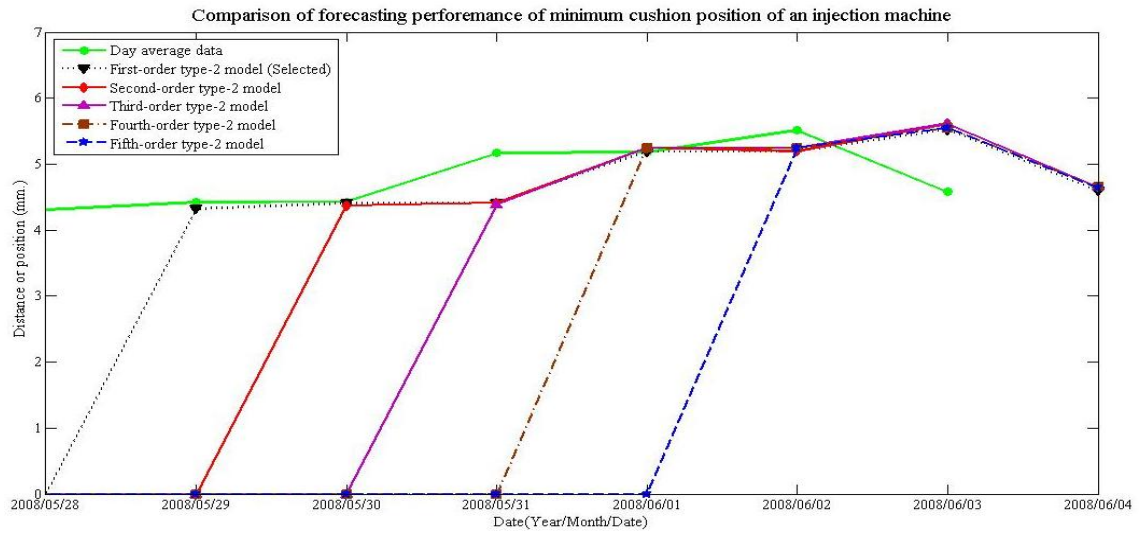


Fig. I.5. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days of the second week data forecast on 2008/06/04.

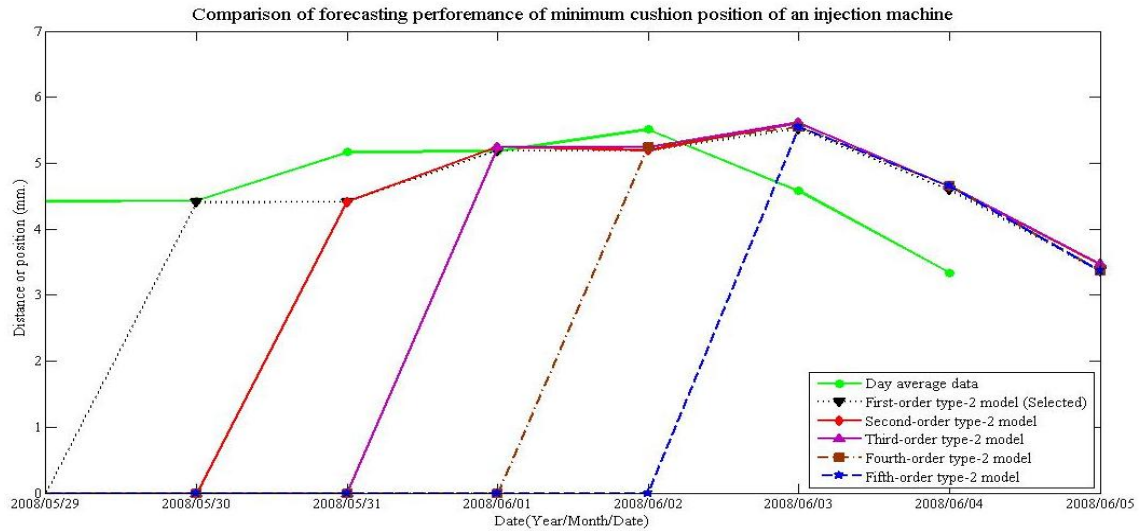


Fig. I.6. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days of the second week data forecast on 2008/06/05.

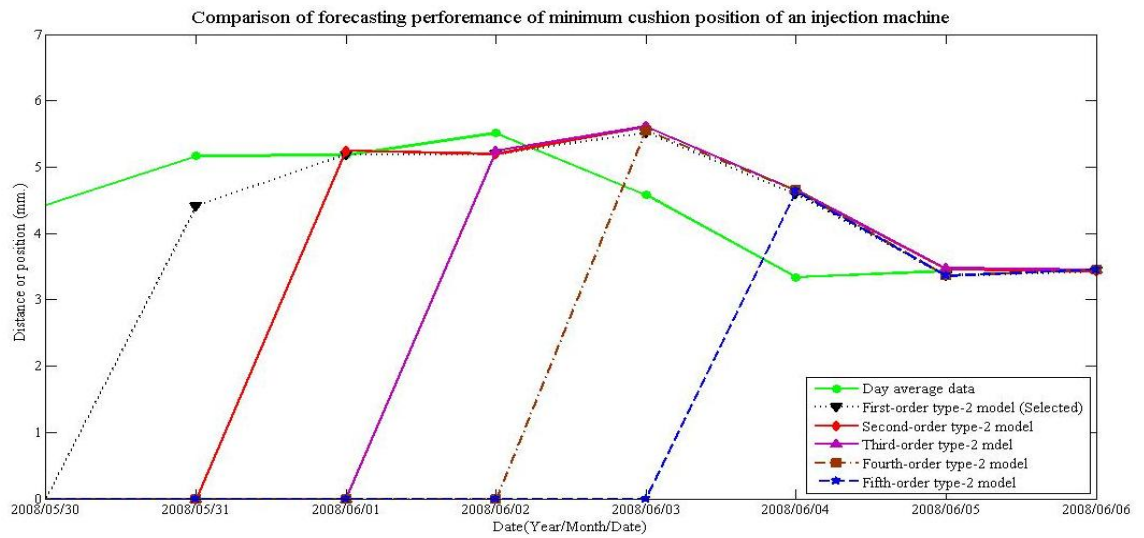


Fig. I.7. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days of the second week data forecast on 2008/06/06.

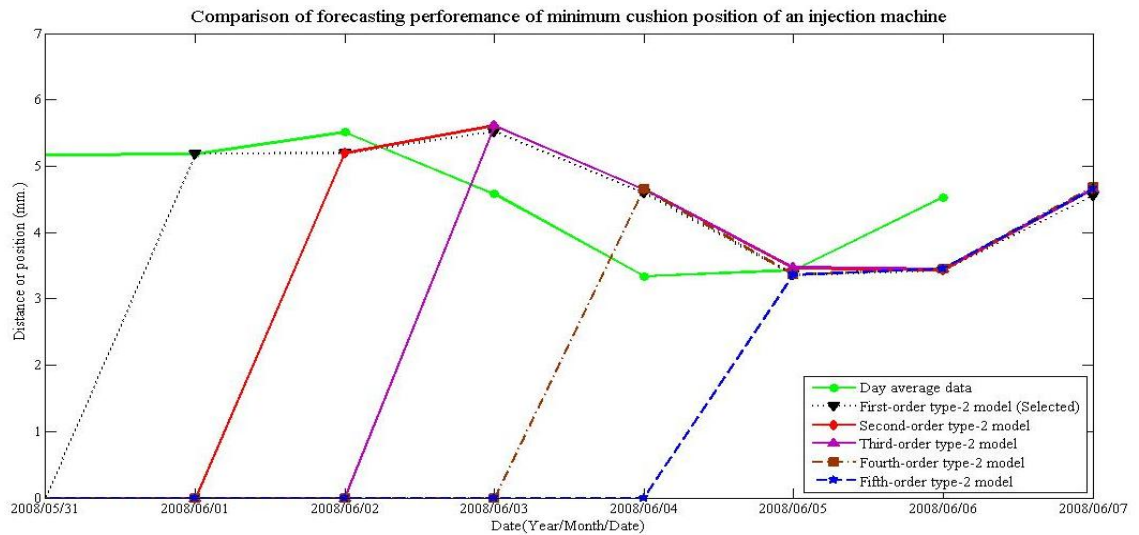


Fig. I.8. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

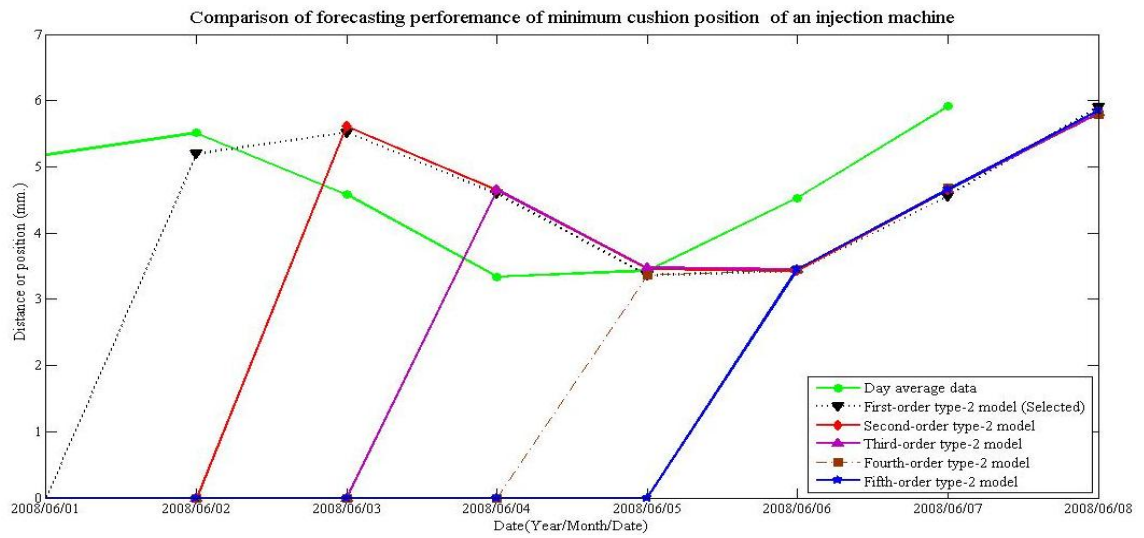


Fig. I.9. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day the third week data forecast on 2008/06/08.

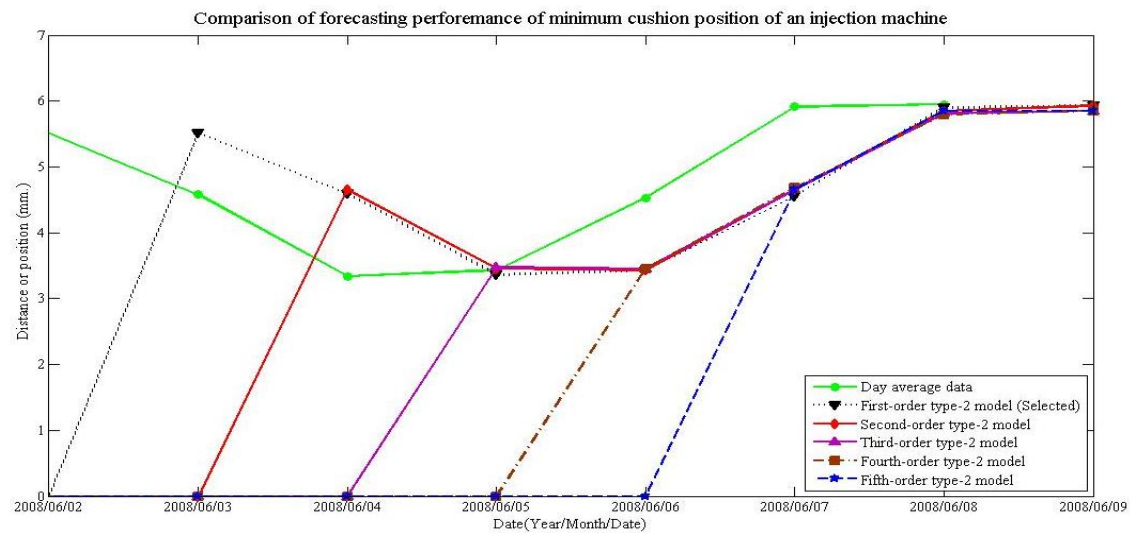


Fig. I.10. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days of the third week data forecast on 2008/06/09.

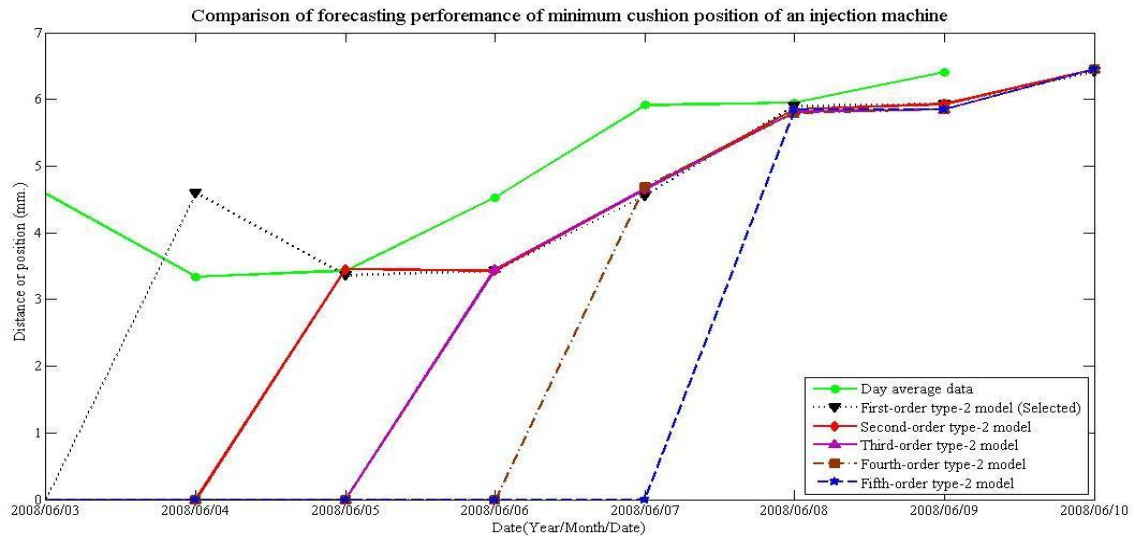


Fig. I.11. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days of the third week data forecast on 2008/06/10.

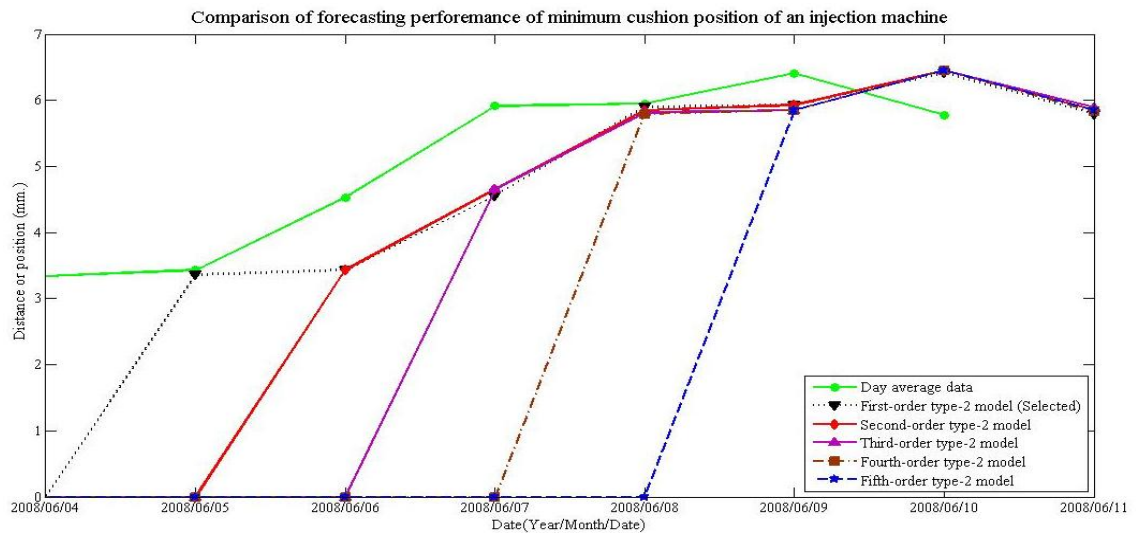


Fig. I.12. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days of the third week data forecast on 2008/06/11.

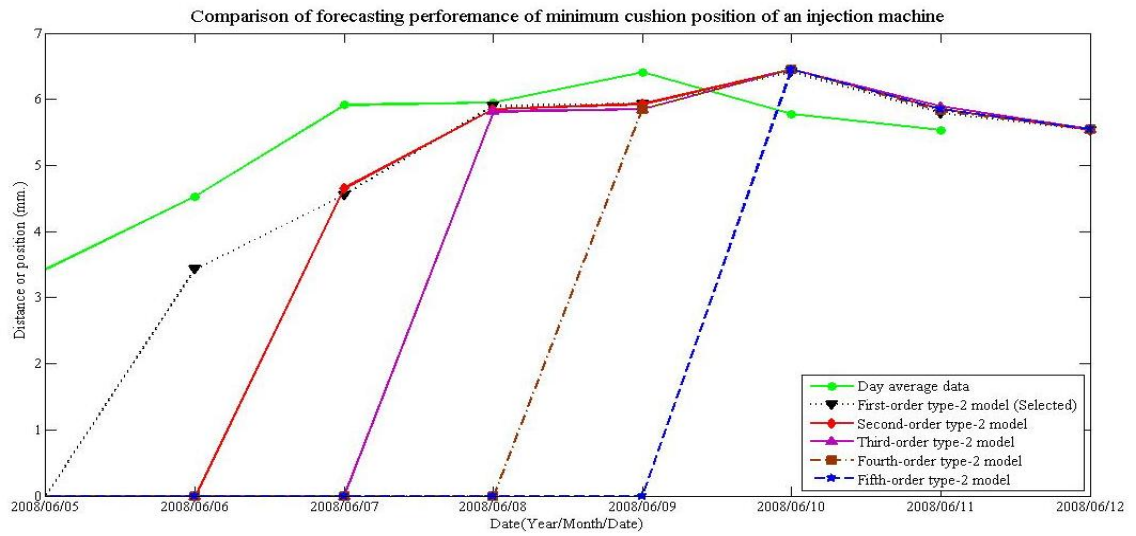


Fig. I.13. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days of the third week data forecast on 2008/06/12.

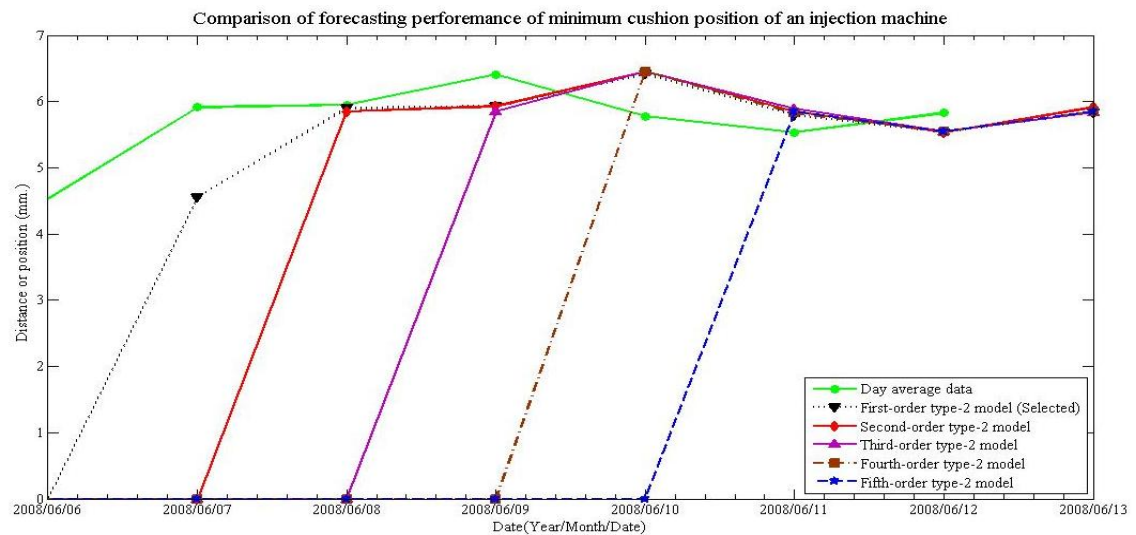


Fig. I.14. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days of the third week data forecast on 2008/06/13.

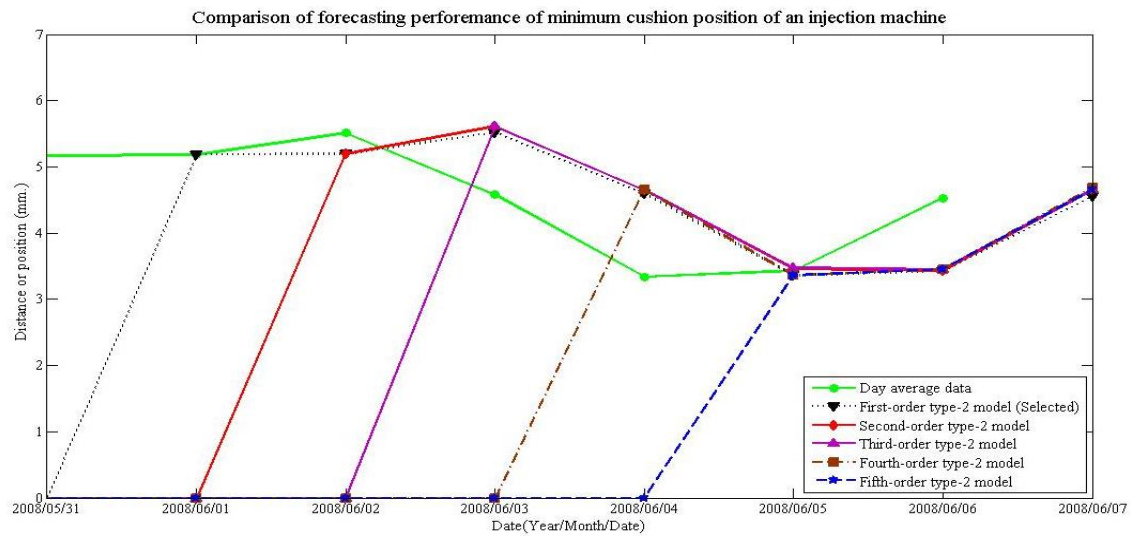


Fig. I.15. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using only the second week data forecast on 2008/06/07.

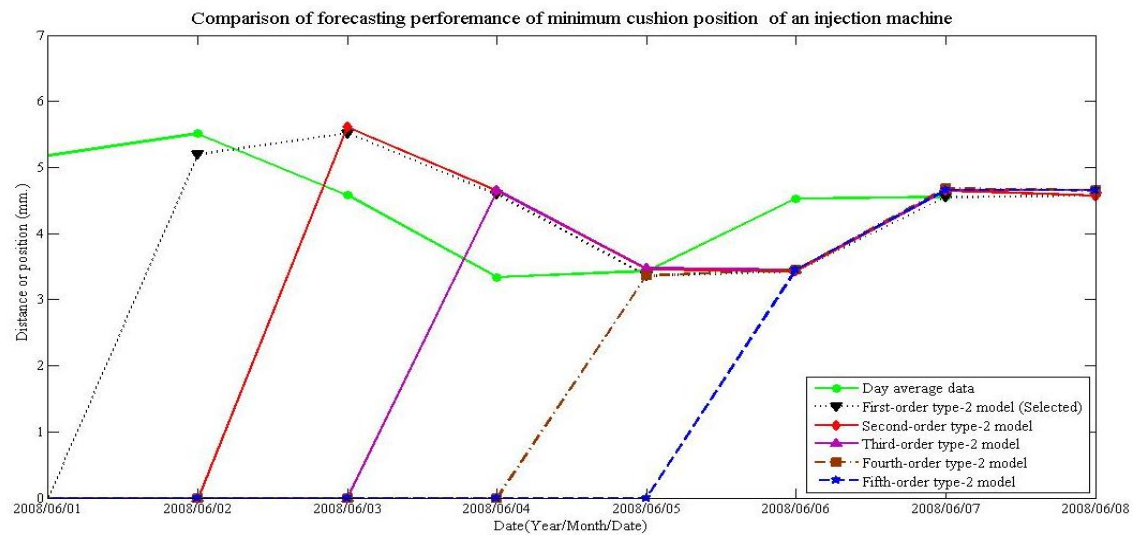


Fig. I.16. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day of the third week data forecast on 2008/06/08.

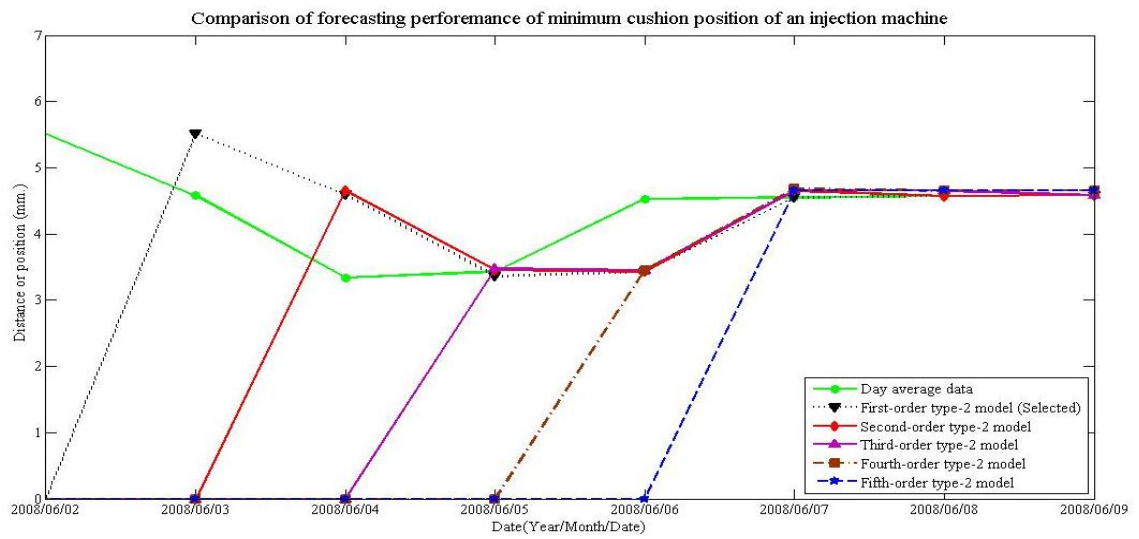


Fig. I.17. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days of the third week data forecast on 2008/06/09.

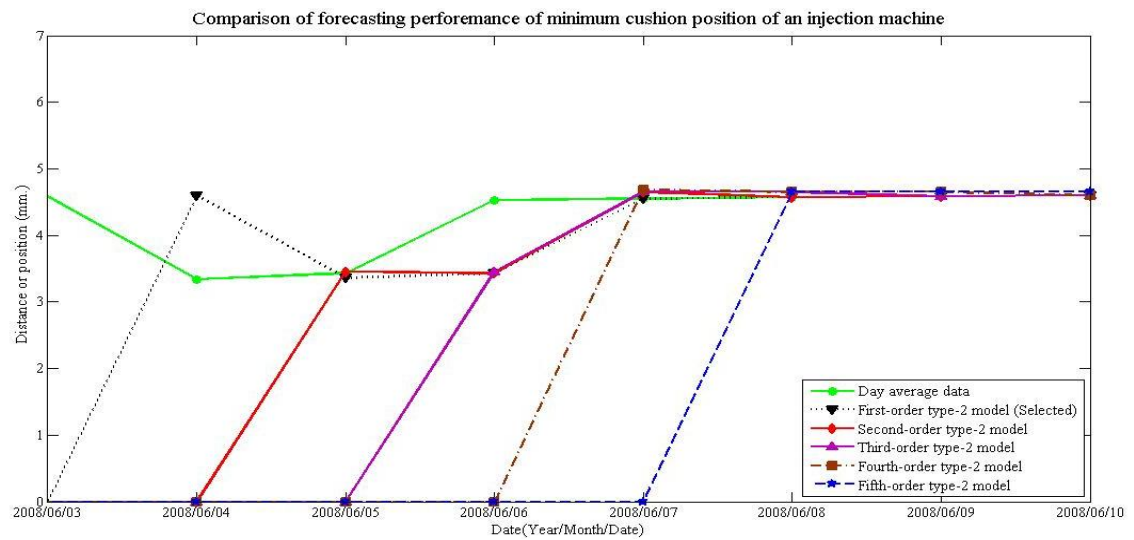


Fig. I.18. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days of the third week data forecast on 2008/06/10.

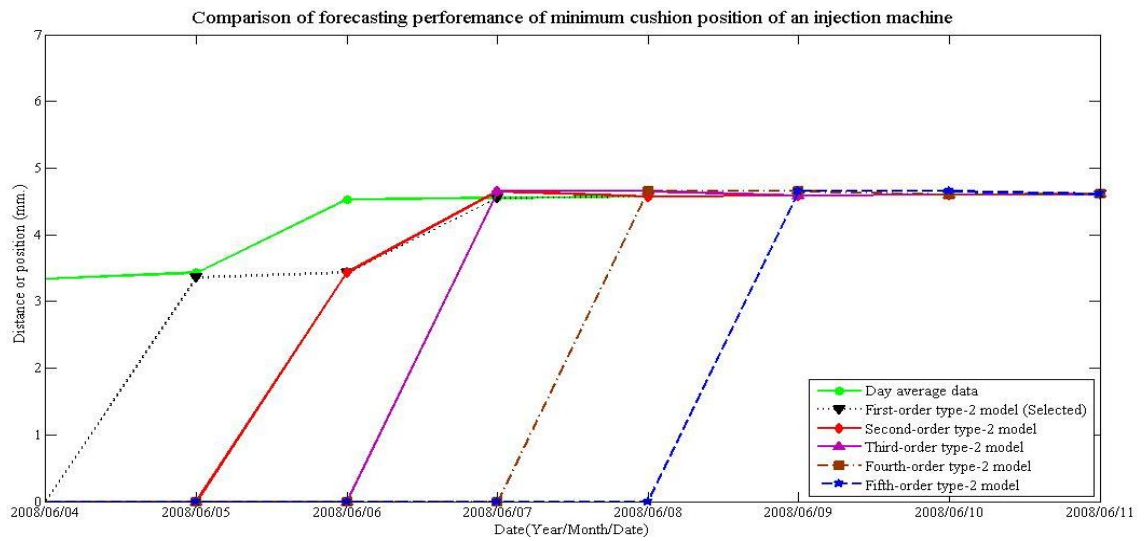


Fig. I.19. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days of the third week data forecast on 2008/06/11.

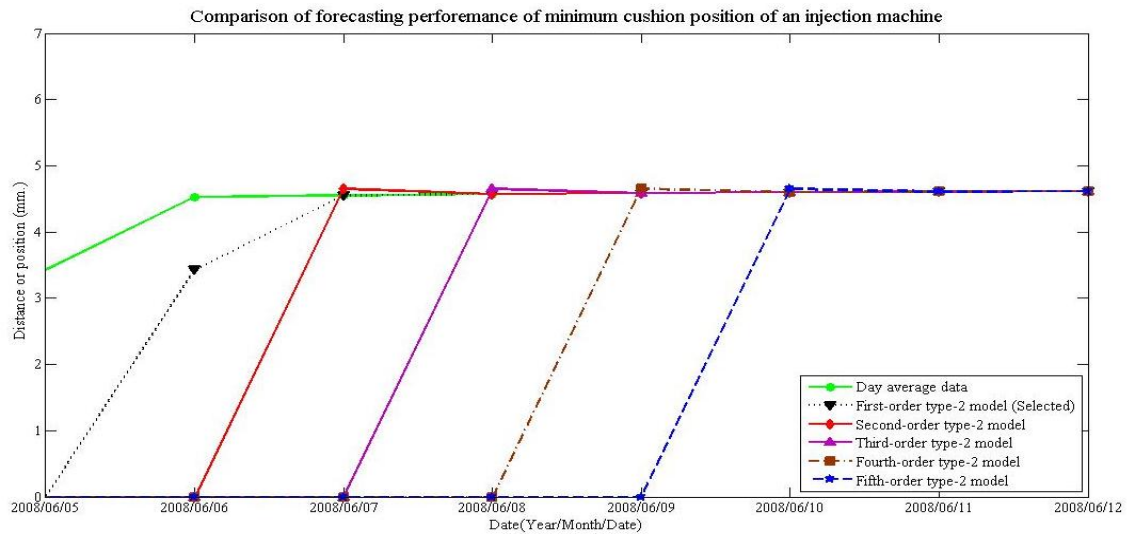


Fig. I.20. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days of the third week data forecast on 2008/06/12.

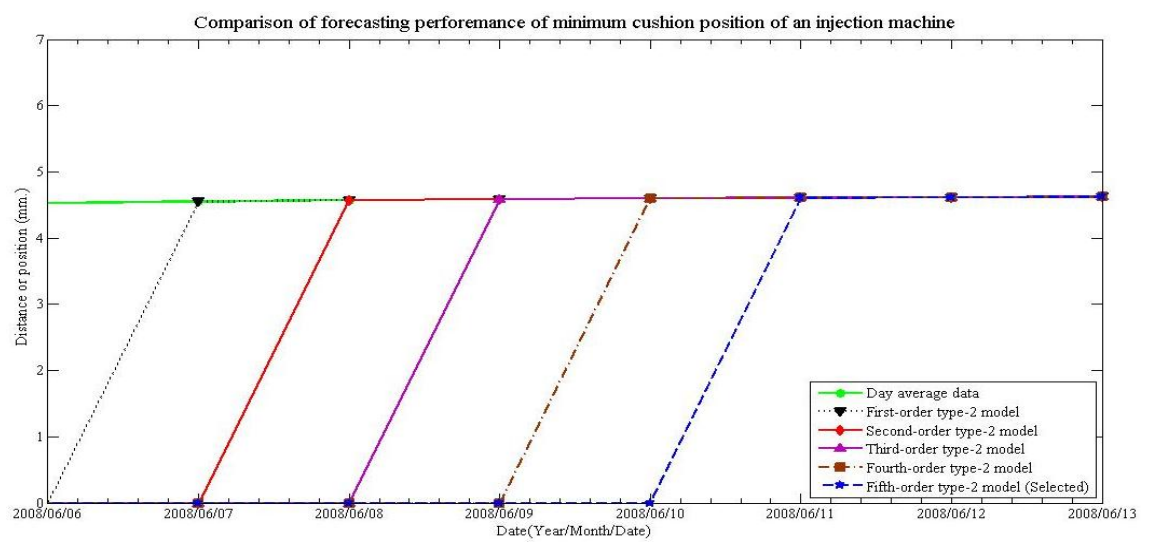


Fig. I.21. Daily forecasting of minimum cushion position for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days of the third week data forecast on 2008/06/13.

## **Appendix J**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of Filling Time Factor for Forecasting the Second and the Third Weeks (2) - in CD-ROM Disk.**

The type-A forecasting method in Figure 5.7 and type-C and type-D forecasting methods in Figure 5.8 are employed to forecast filling time factor as following.

Figure J.1 to J.21 of Appendix J in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of filling time factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure J.1 to J.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-C forecasting method).
- Figure J.8 to J.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-D forecasting method).
- Figure J.15 to J.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

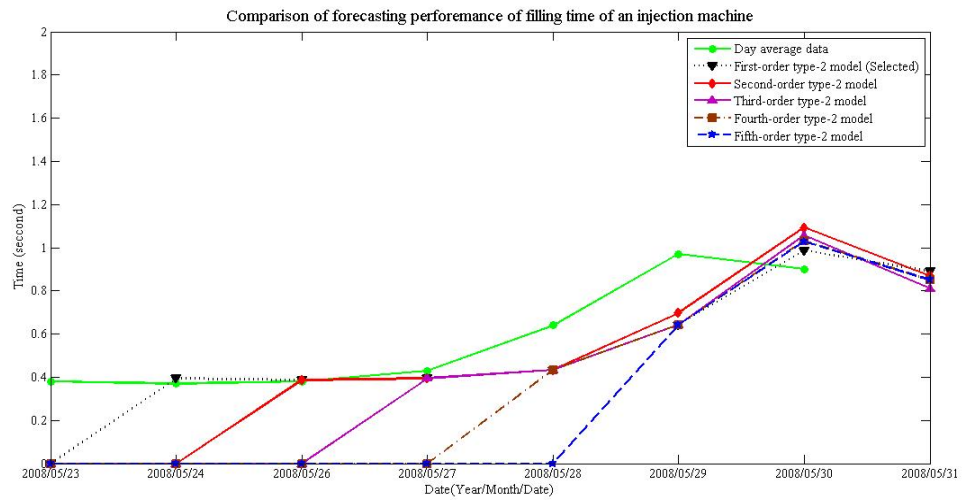


Fig. J.1. Daily forecasting of filling time for HO-T2FTS method as date is varies and using only the first week data forecast on 2008/05/31.

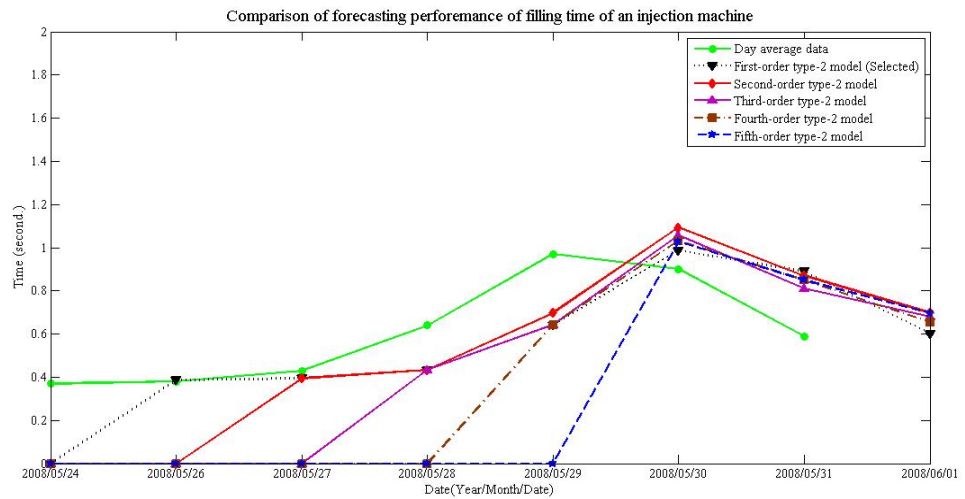


Fig. J.2. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day of the second week data forecast on 2008/06/01.

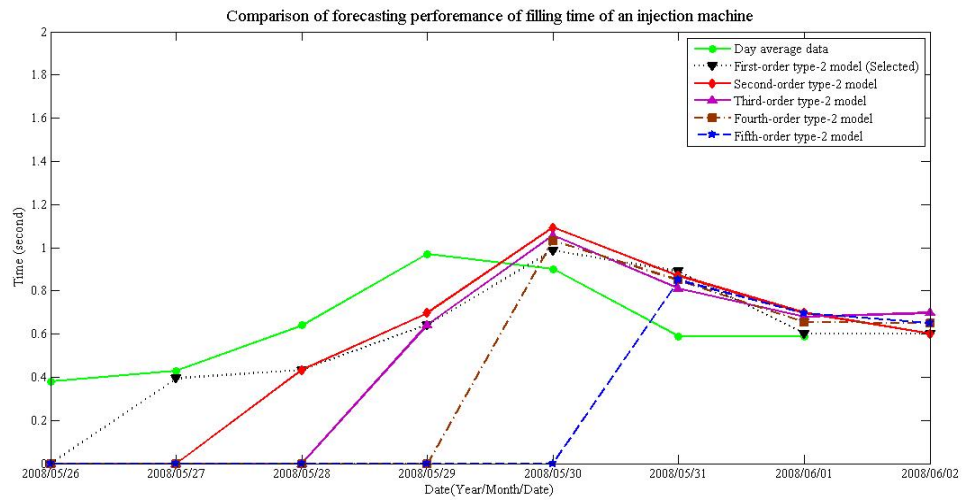


Fig. J.3. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days of the second week data forecast on 2008/06/02.

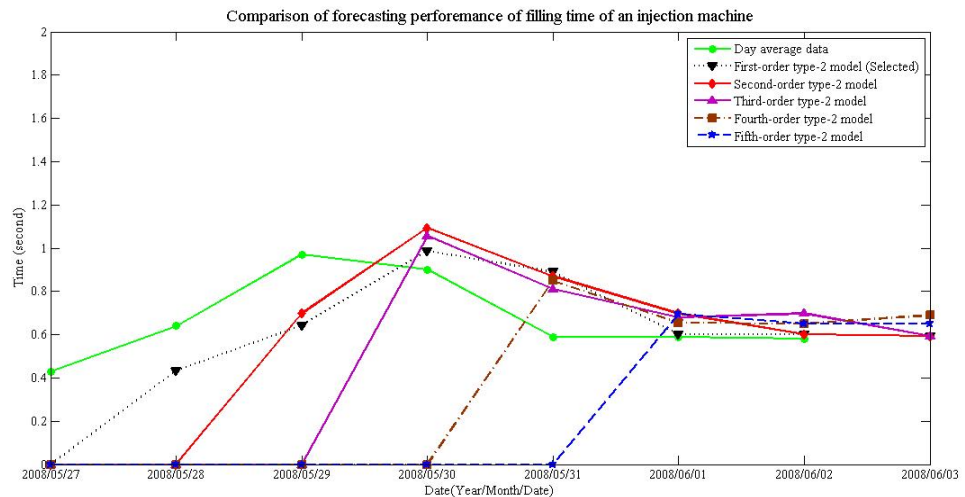


Fig. J.4. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days of the second week data forecast on 2008/06/03.

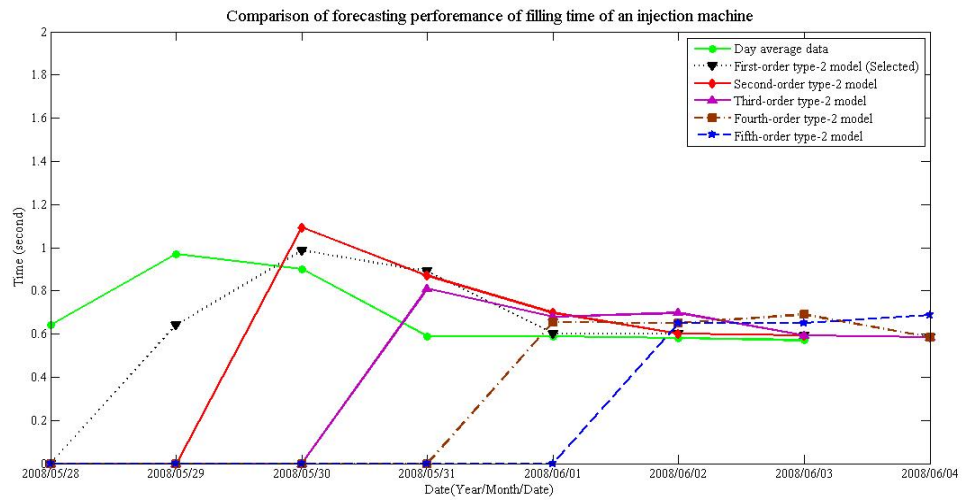


Fig. J.5. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days of the second week data forecast on 2008/06/04.

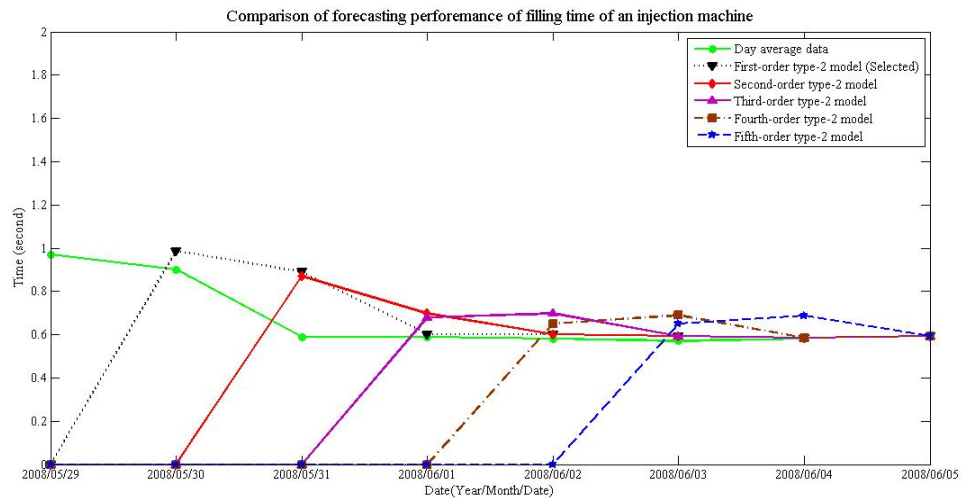


Fig. J.6. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days of the second week data forecast on 2008/06/05.

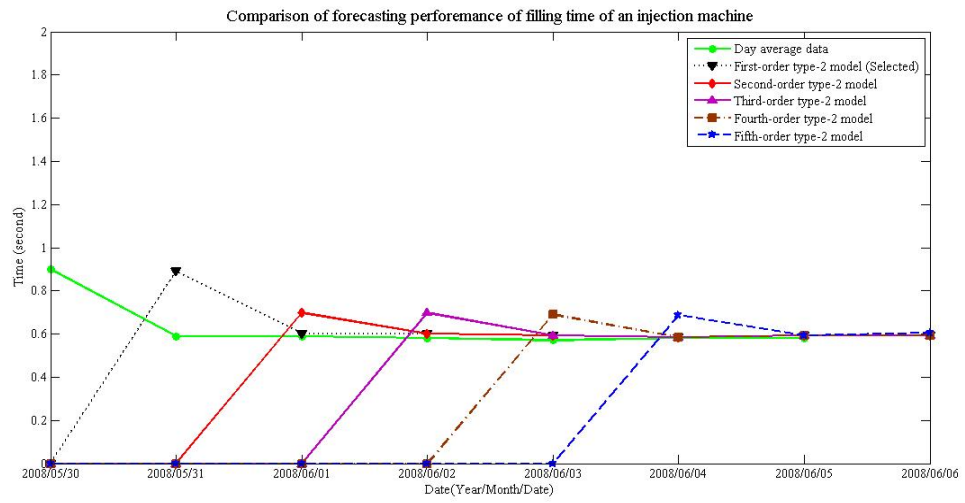


Fig. J.7. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days of the second week data forecast on 2008/06/06.

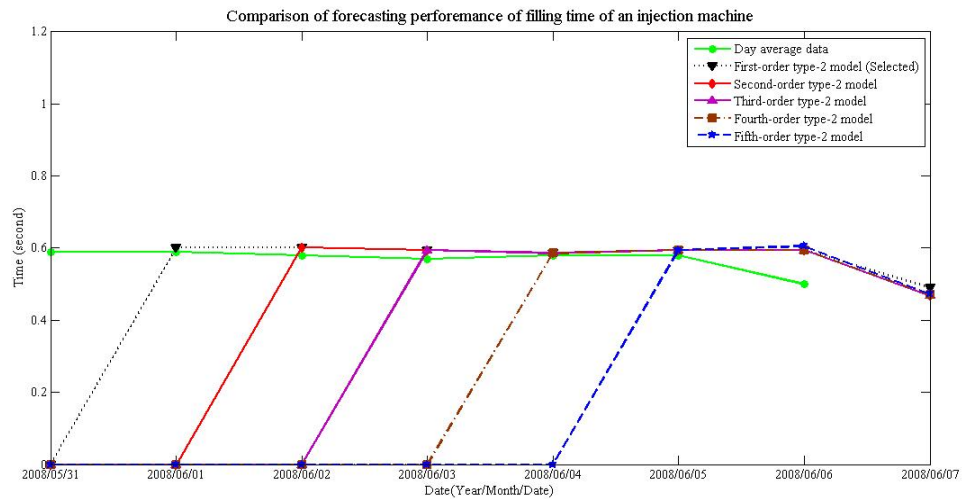


Fig. J.8. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

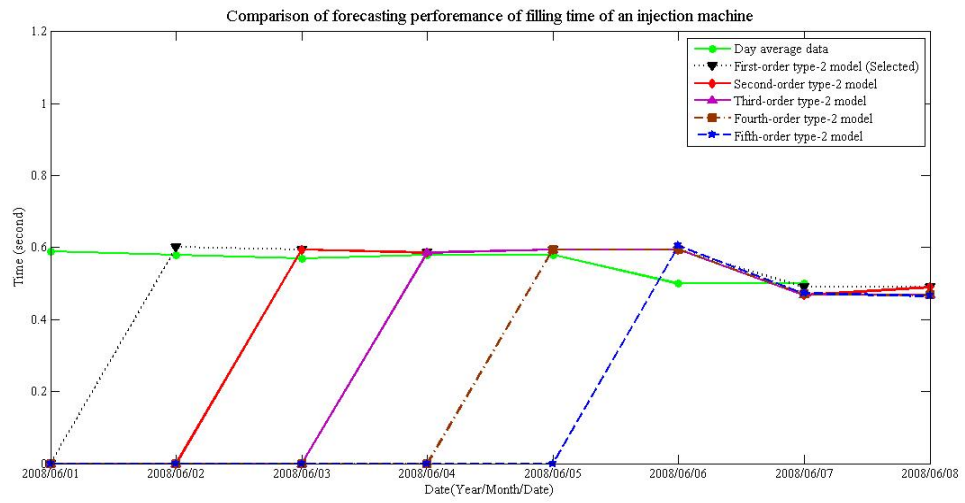


Fig. J.9. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day the third week data forecast on 2008/06/08.

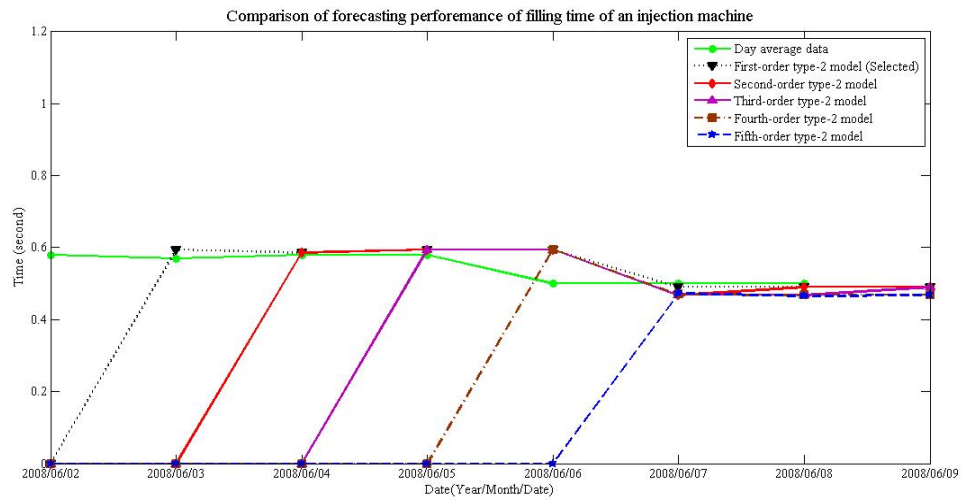


Fig. J.10. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days of the third week data forecast on 2008/06/09.

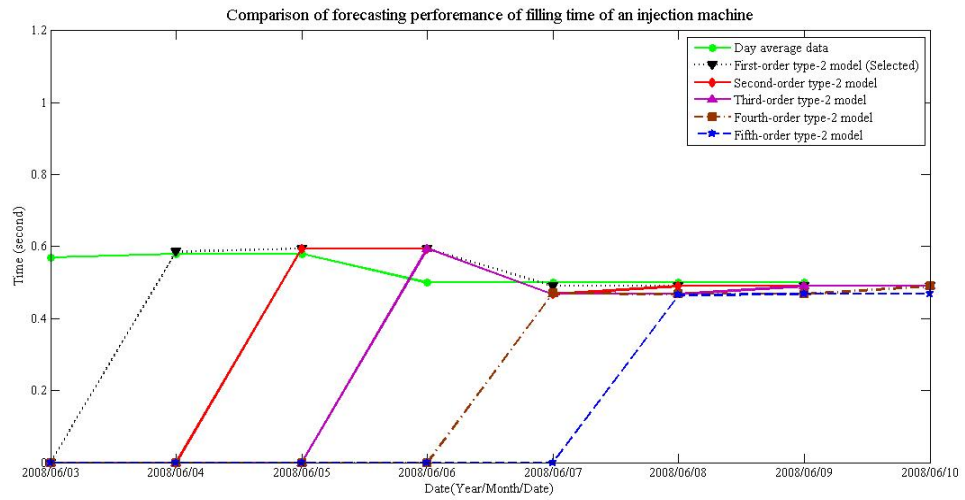


Fig. J.11. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days of the third week data forecast on 2008/06/10.

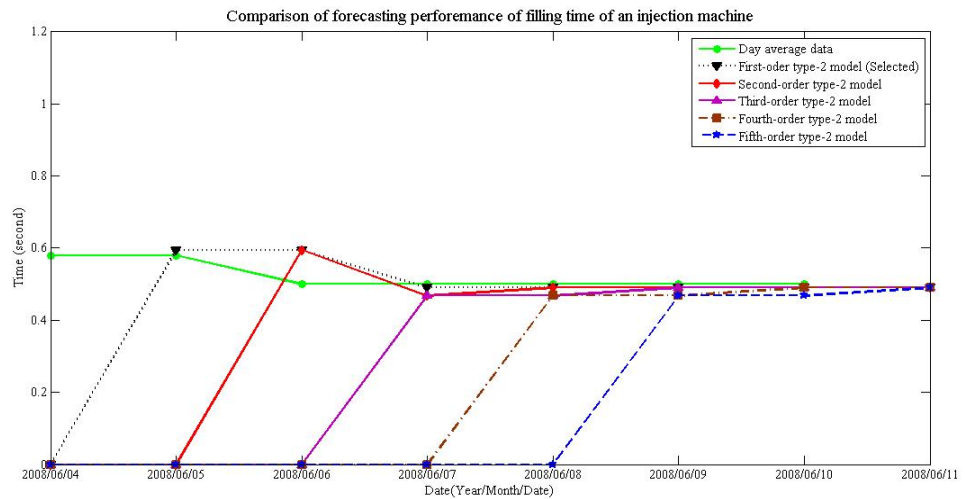


Fig. J.12. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days of the third week data forecast on 2008/06/11.

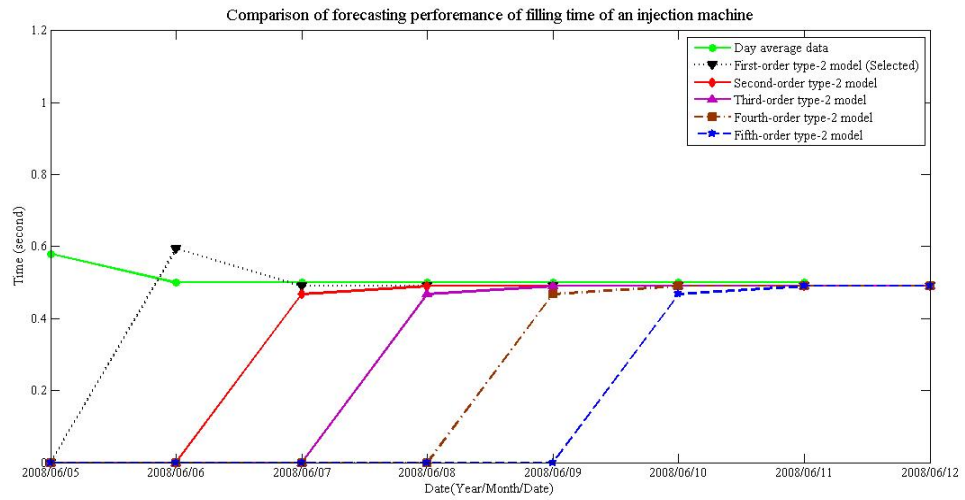


Fig. J.13. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days of the third week data forecast on 2008/06/12.

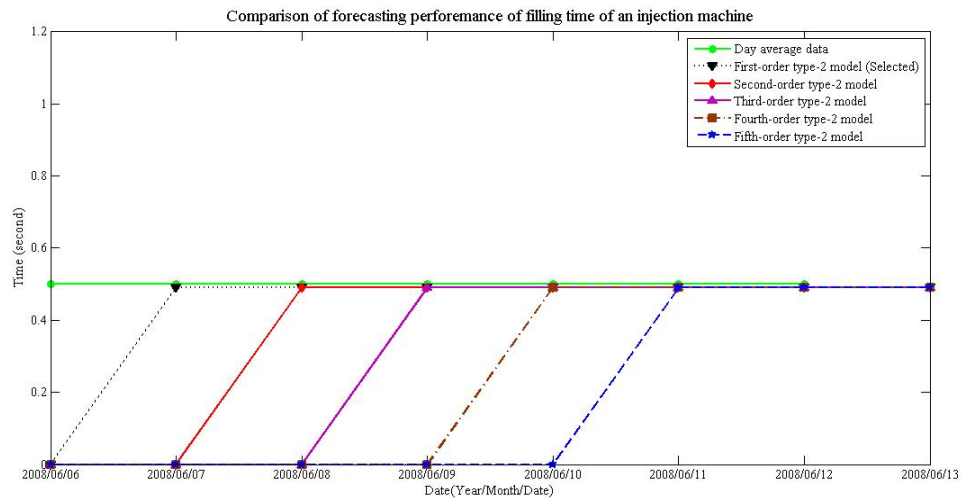


Fig. J.14. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days of the third week data forecast on 2008/06/13.

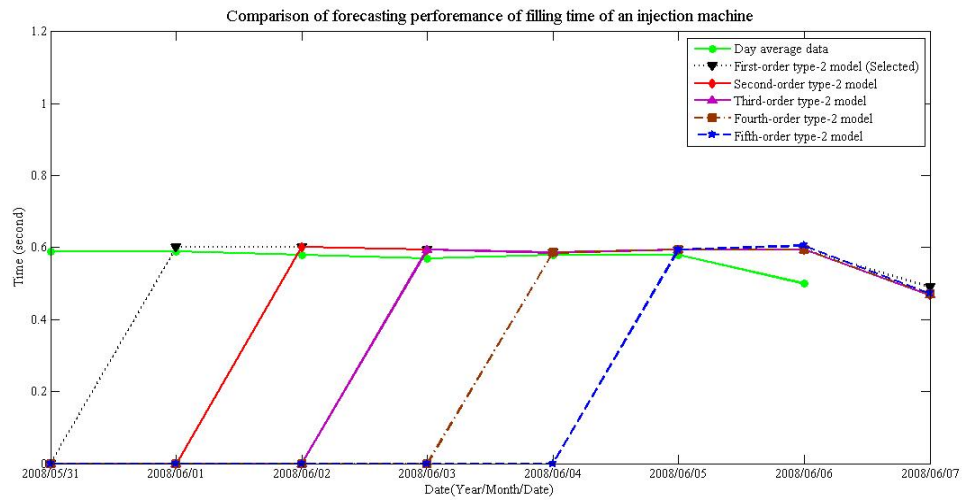


Fig. J.15. Daily forecasting of filling time for HO-T2FTS method as date is varies and using only the second week data forecast on 2008/06/07.

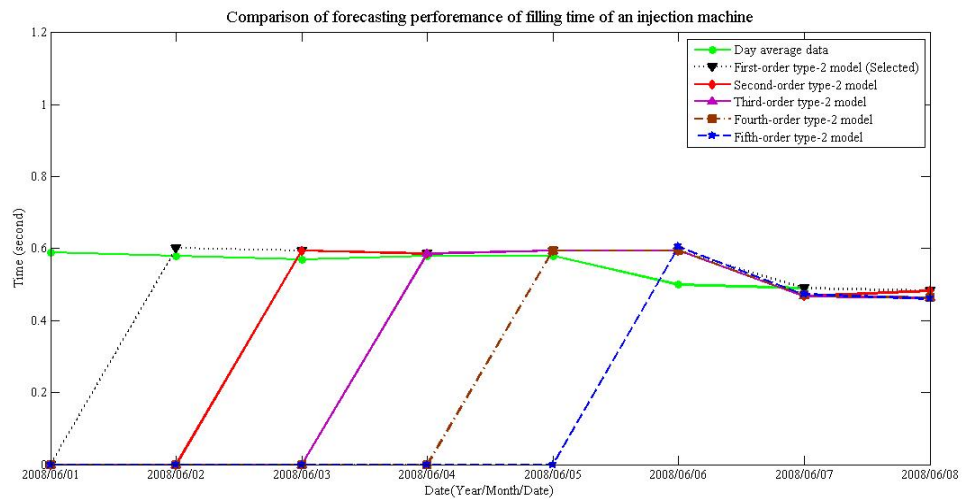


Fig. J.16. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day of the third week data forecast on 2008/06/08.

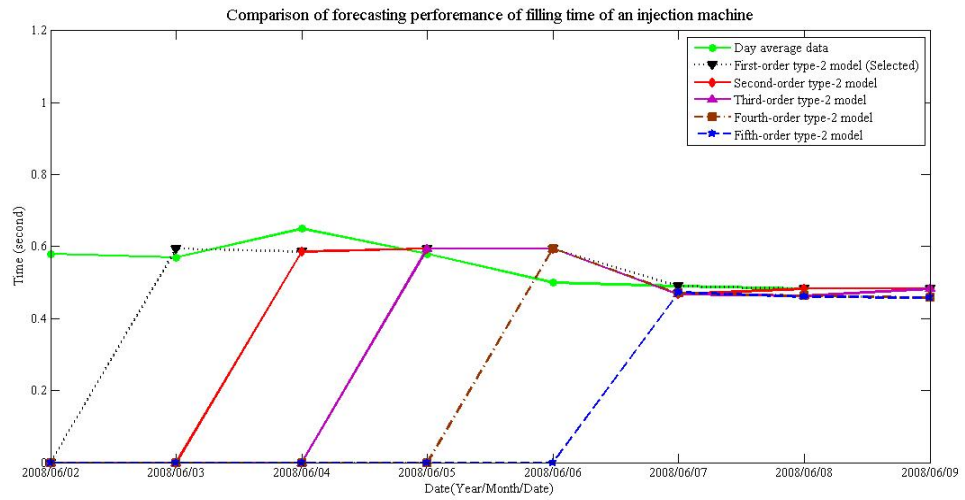


Fig. J.17. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days of the third week data forecast on 2008/06/09.

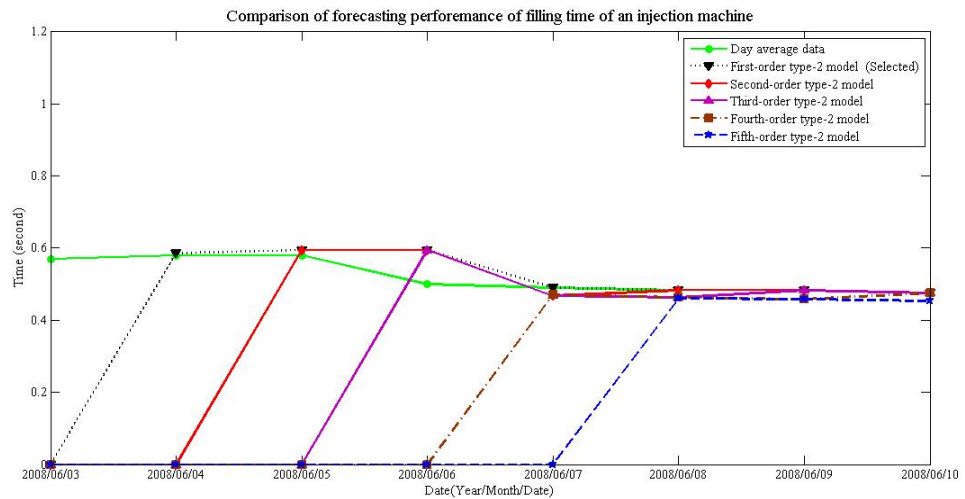


Fig. J.18. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days of the third week data forecast on 2008/06/10.

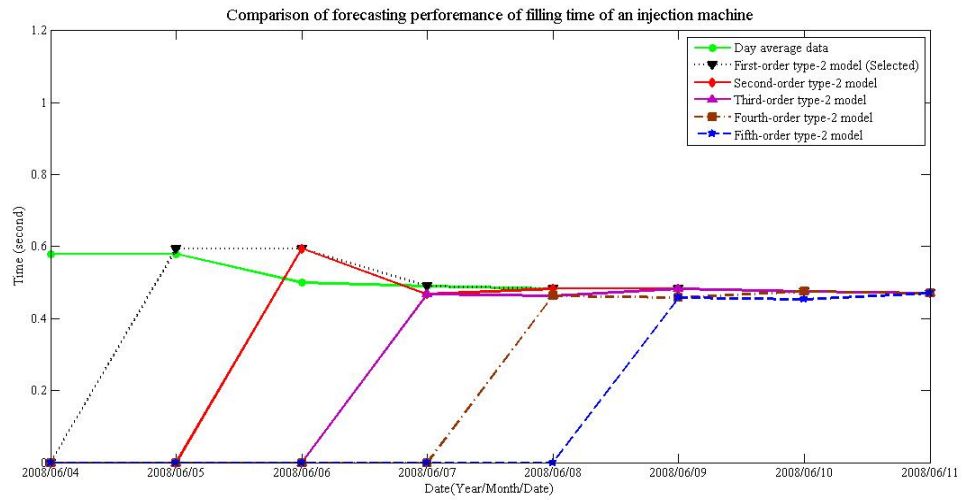


Fig. J.19. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days of the third week data forecast on 2008/06/11.

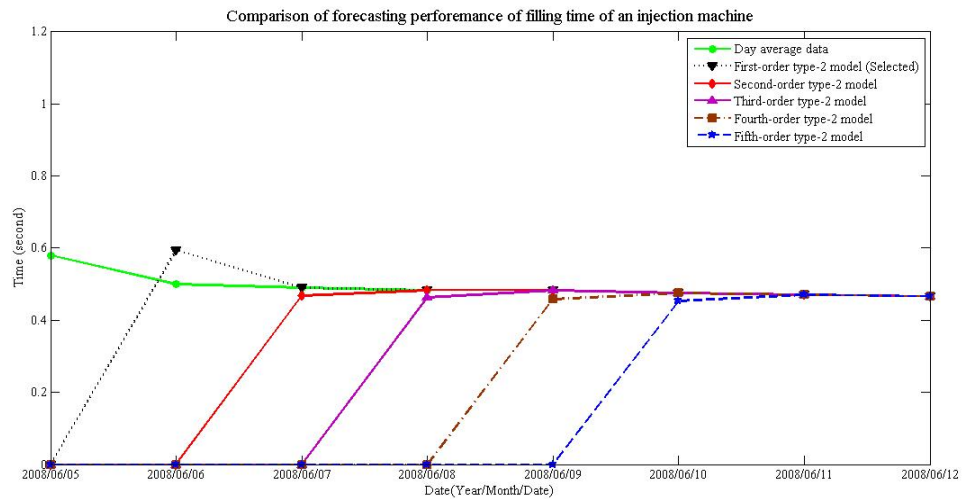


Fig. J.20. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days of the third week data forecast on 2008/06/12.

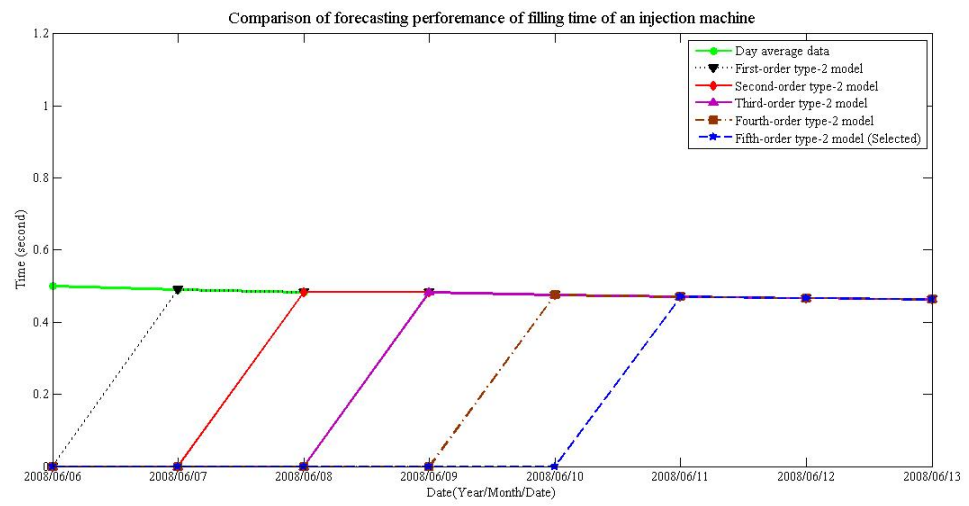


Fig. J.21. Daily forecasting of filling time for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days of the third week data forecast on 2008/06/13.

## **Appendix K**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of Filling Peak Factor for Forecasting the Second and the Third Weeks (2) - in CD-ROM Disk.**

The type-A forecasting method in Figure 5.7 and type-C and type-D forecasting methods in Figure 5.8 are employed to forecast filling peak factor as following.

Figure K.1 to K.21 of Appendix K in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of filling peak factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure K.1 to K.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-C forecasting method).
- Figure K.8 to K.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-D forecasting method).
- Figure K.15 to K.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

The forecasting results by graphs are illustrated as following.

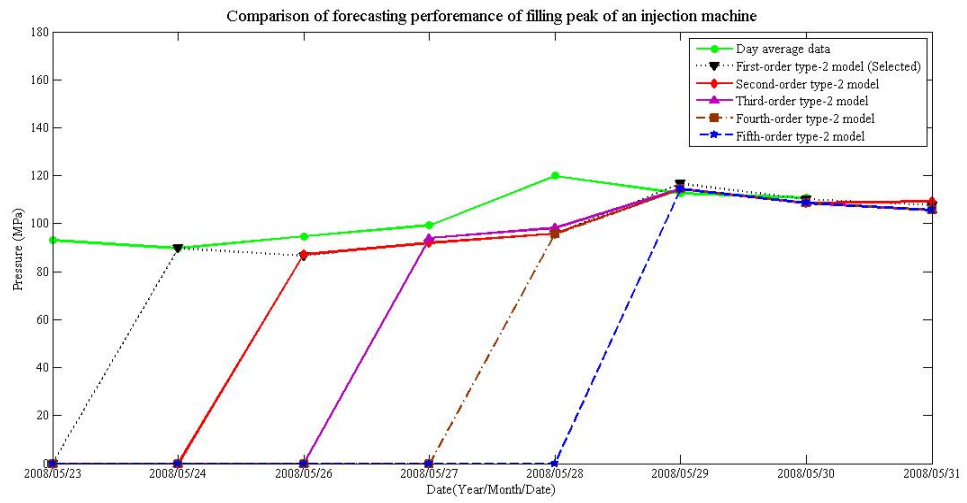


Fig. K.1. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using only the first week data forecast on 2008/05/31.

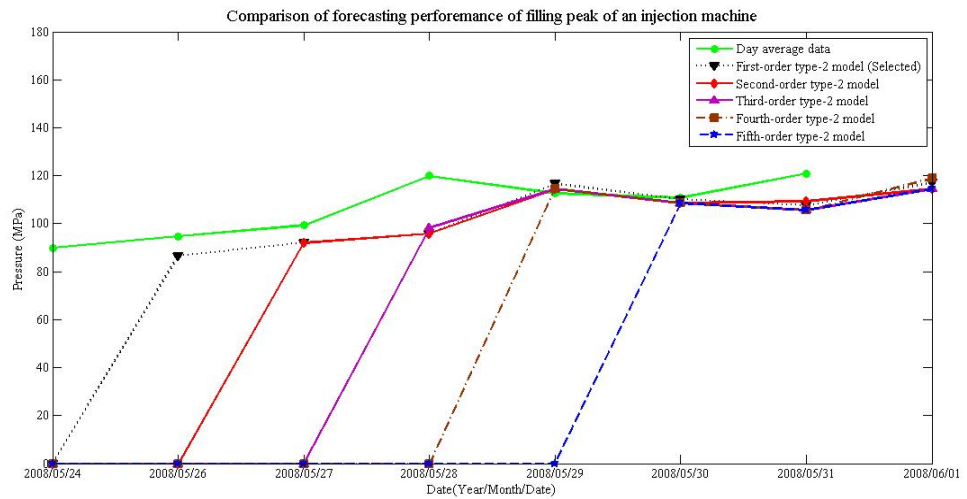


Fig. K.2. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day of the second week data forecast on 2008/06/01.

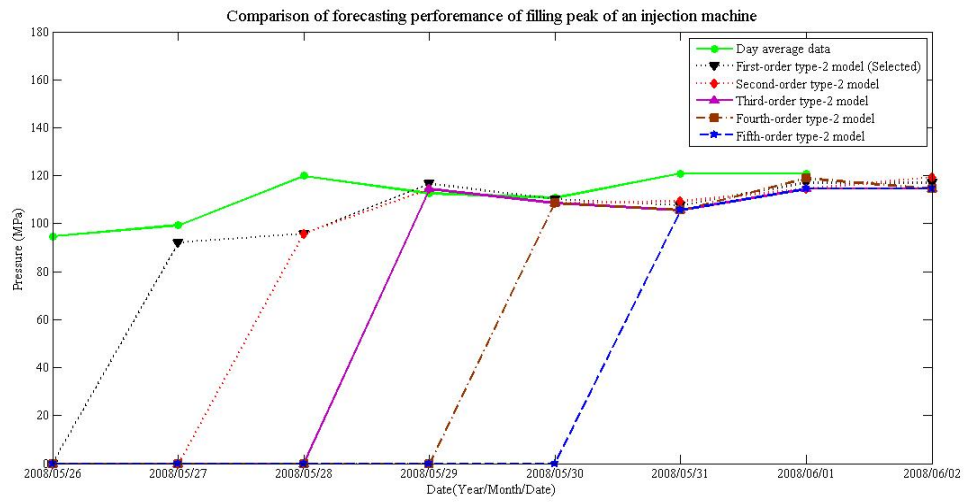


Fig. K.3. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days of the second week data forecast on 2008/06/02.

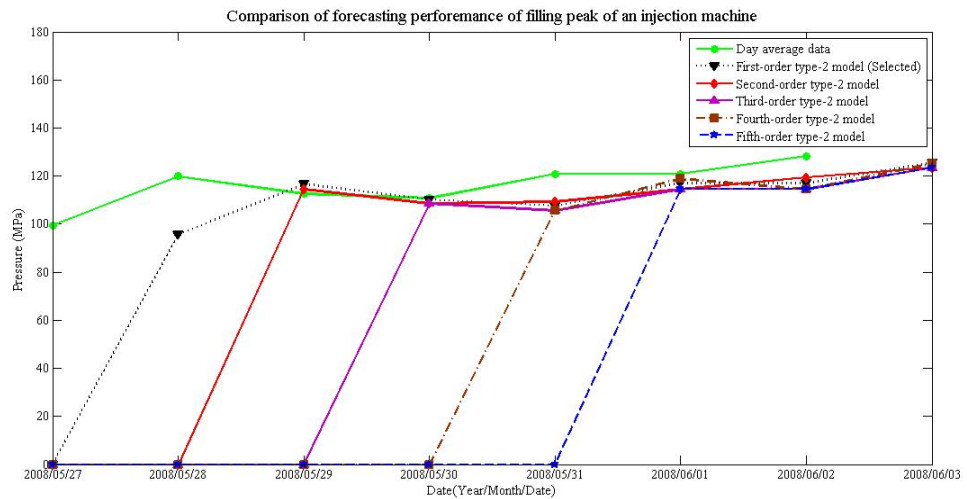


Fig. K.4. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fourth to seventh days of the first week data and the first to third days of the second week data forecast on 2008/06/03.

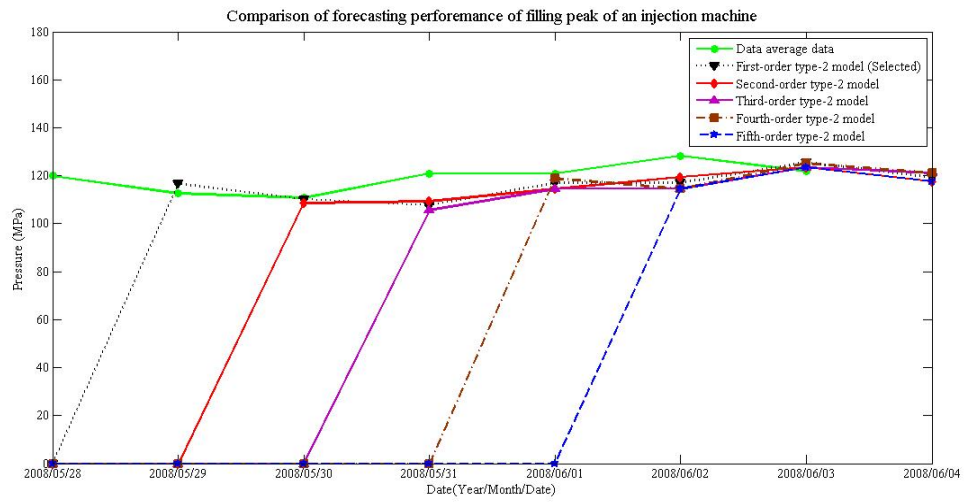


Fig. K.5. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days of the second week data forecast on 2008/06/04.

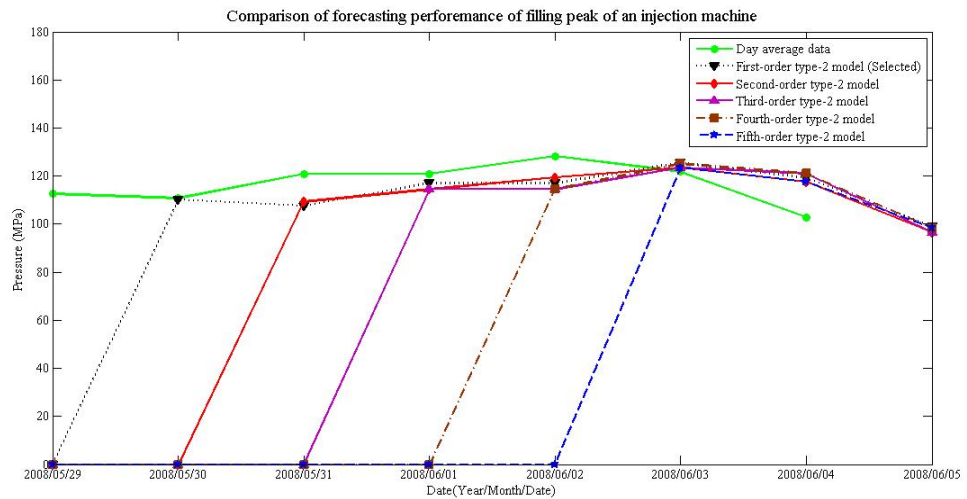


Fig. K.6. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days of the second week data forecast on 2008/06/05.

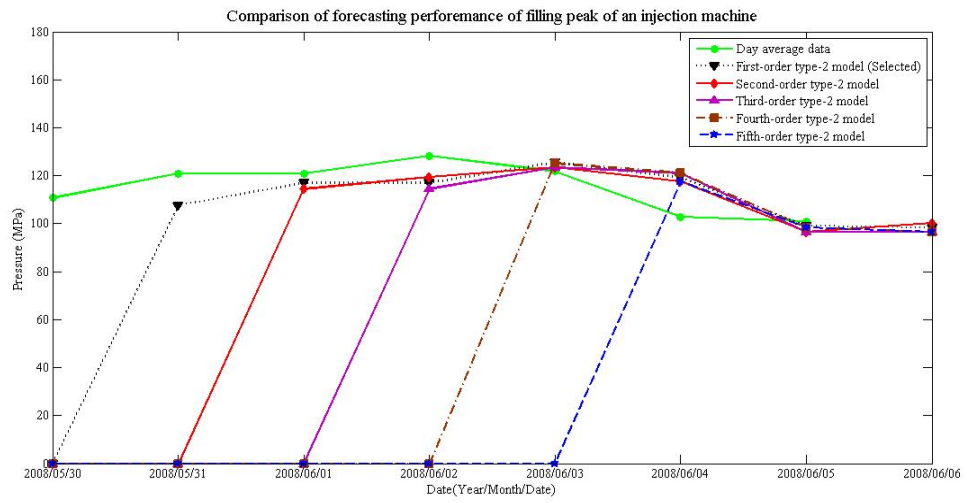


Fig. K.7. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days of the second week data forecast on 2008/06/06.

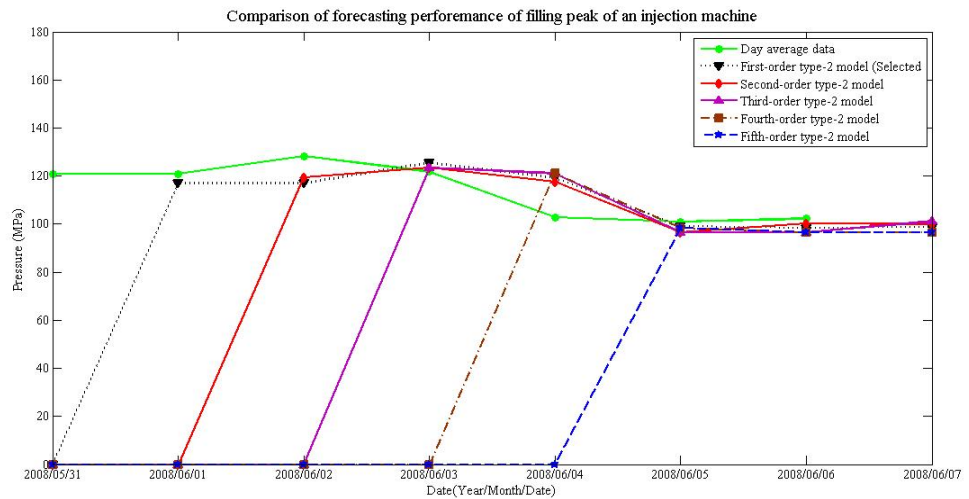


Fig. K.8. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

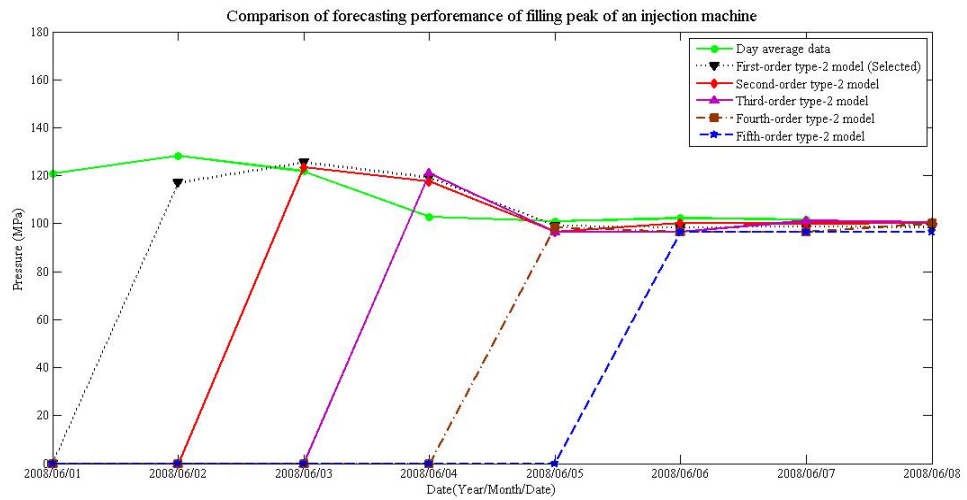


Fig. K.9. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day the third week data forecast on 2008/06/08.

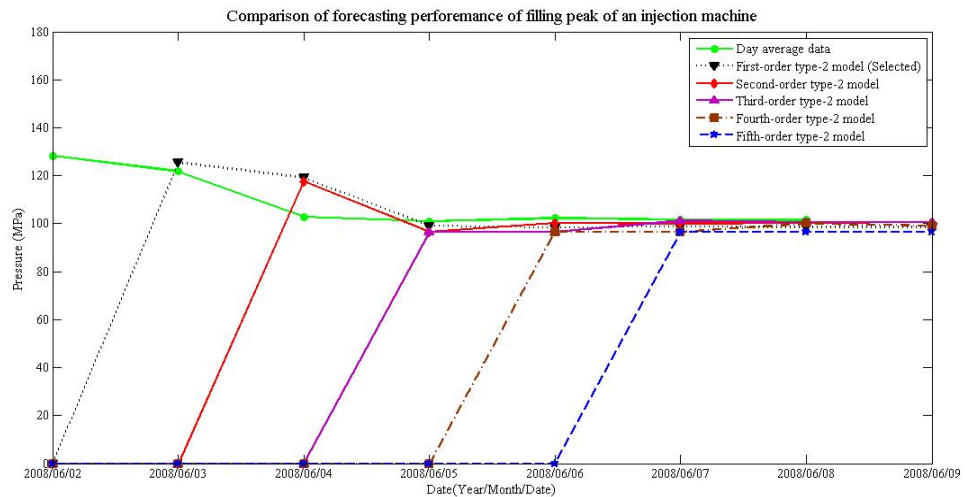


Fig. K.10. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days of the third week data forecast on 2008/06/09.

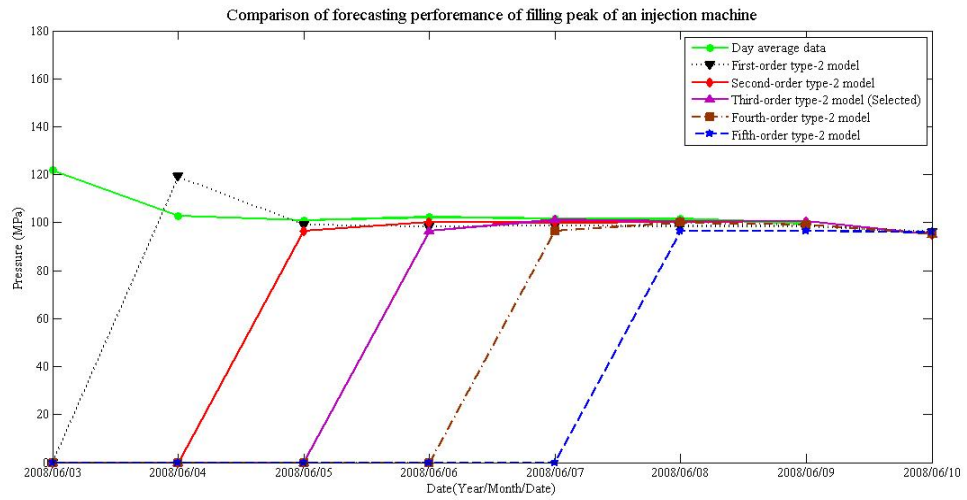


Fig. K.11. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days of the third week data forecast on 2008/06/10.

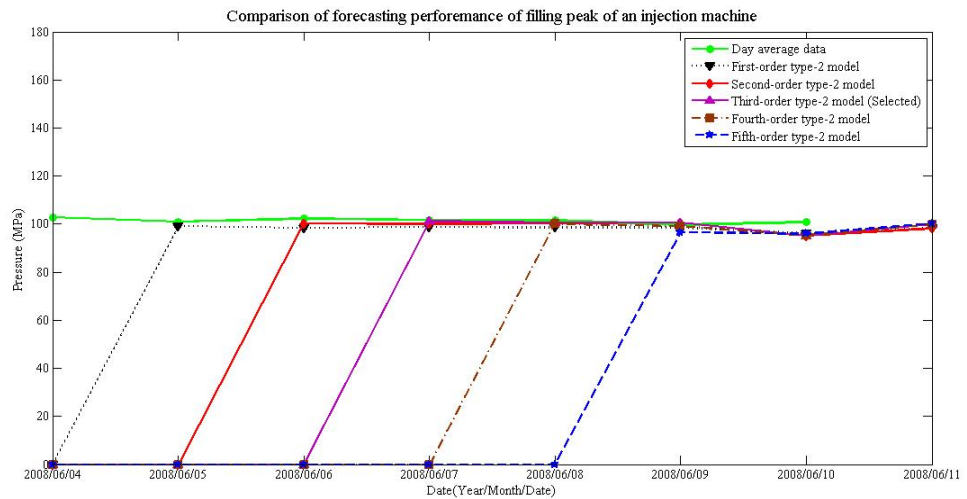


Fig. K.12. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days of the third week data forecast on 2008/06/11.

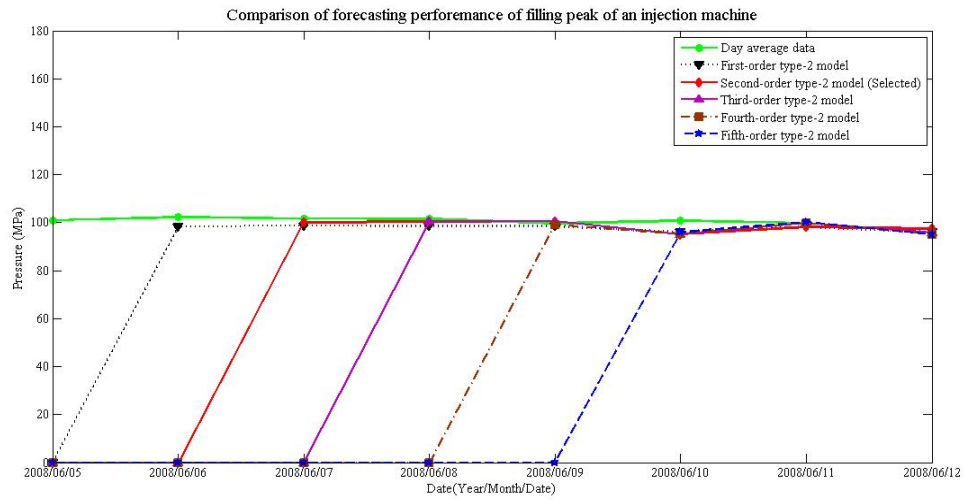


Fig. K.13. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days of the third week data forecast on 2008/06/12.

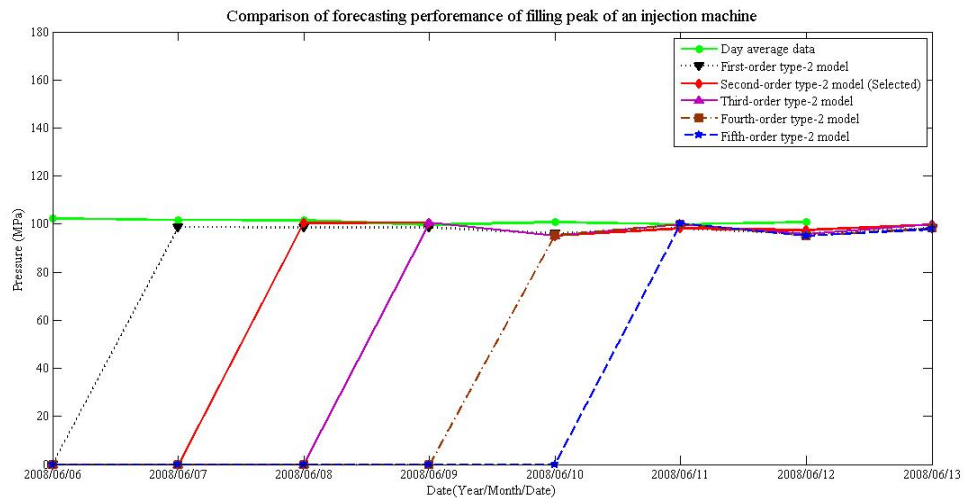


Fig. K.14. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days of the third week data forecast on 2008/06/13.

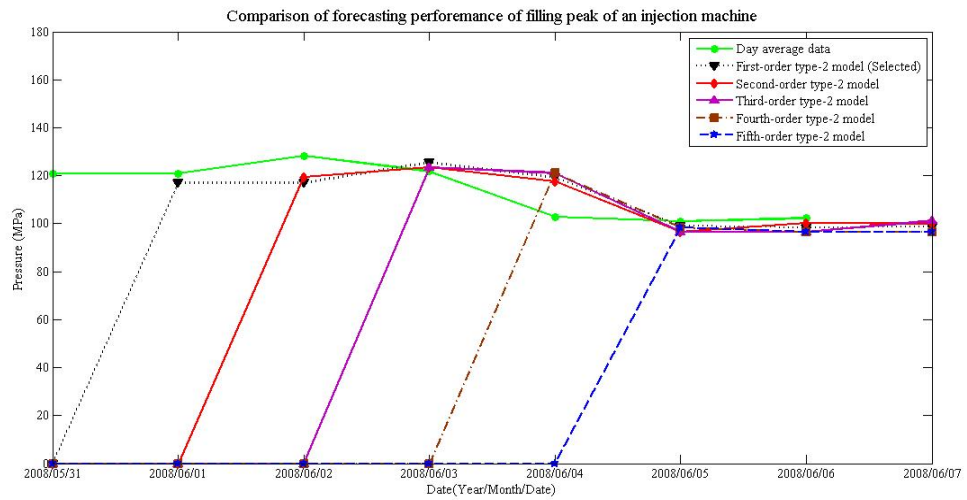


Fig. K.15. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using only the second week data forecast on 2008/06/07.

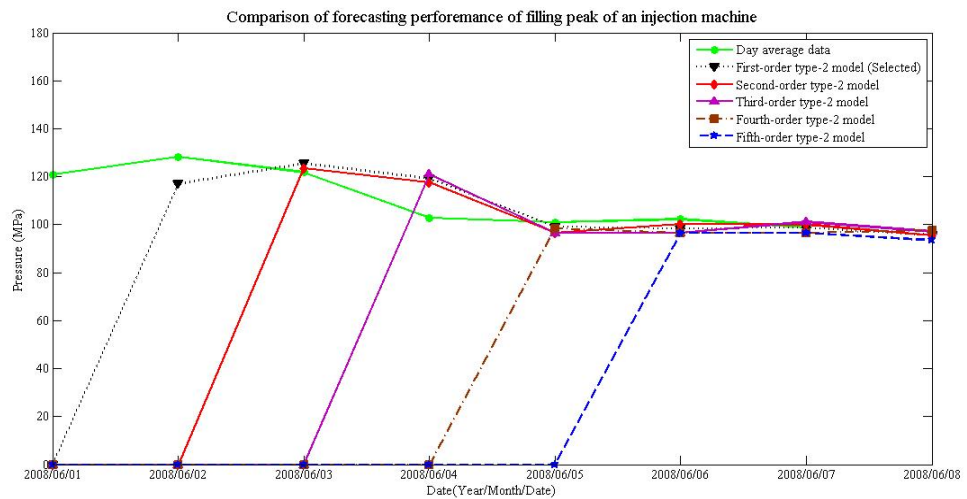


Fig. K.16. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day of the third week data forecast on 2008/06/08.

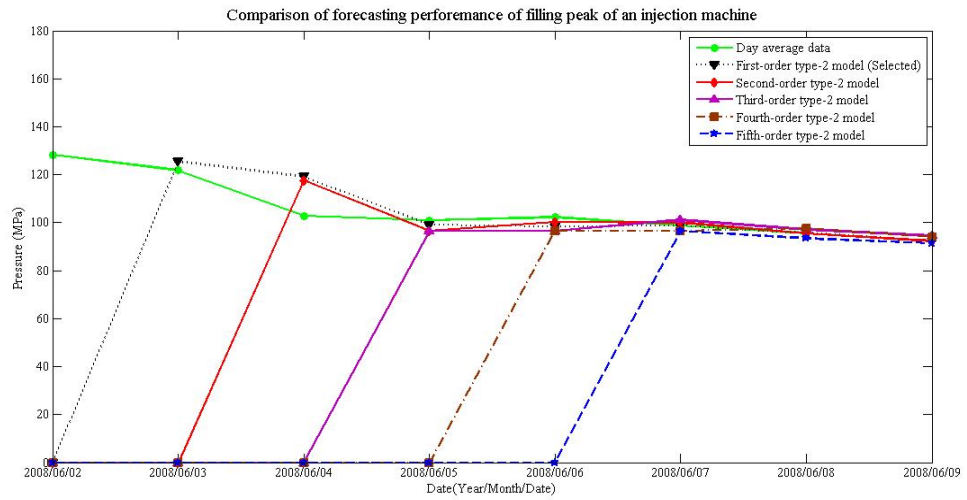


Fig. K.17. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days of the third week data forecast on 2008/06/09.

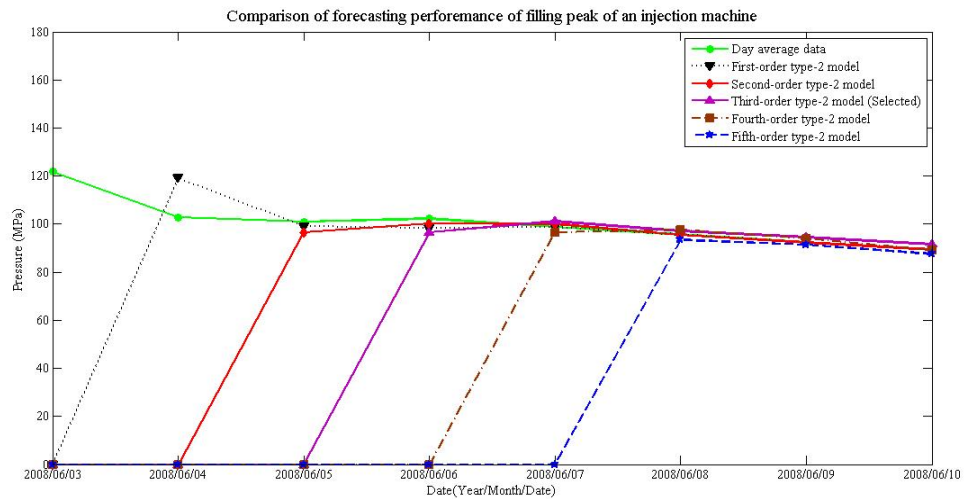


Fig. K.18. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days of the third week data forecast on 2008/06/10.

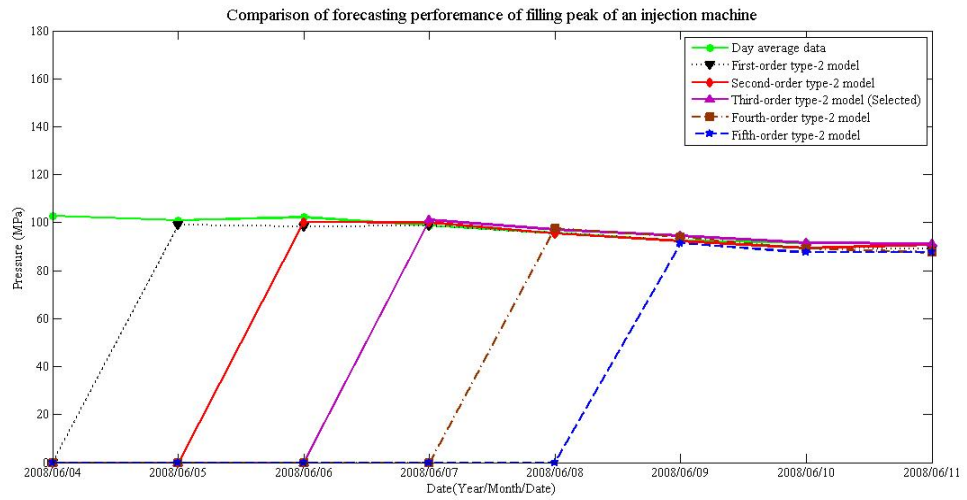


Fig. K.19. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days of the third week data forecast on 2008/06/11.

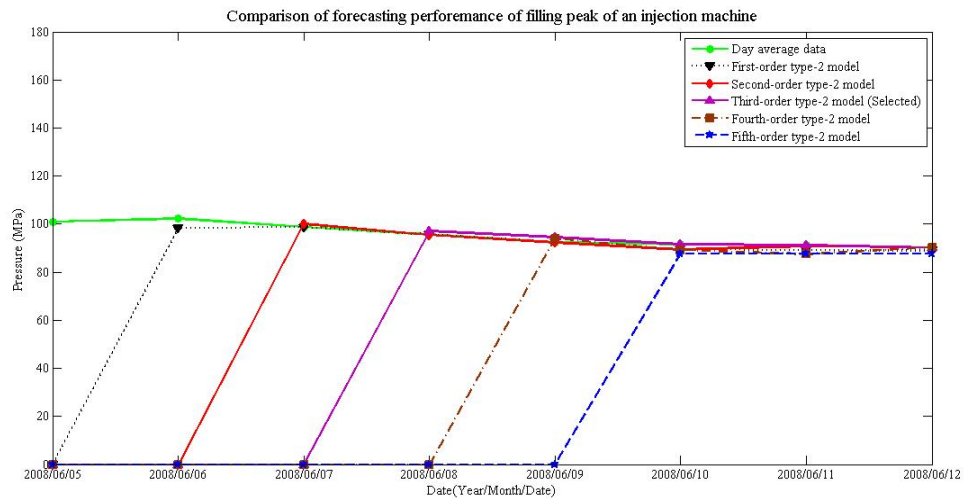


Fig. K.20. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days of the third week data forecast on 2008/06/12.

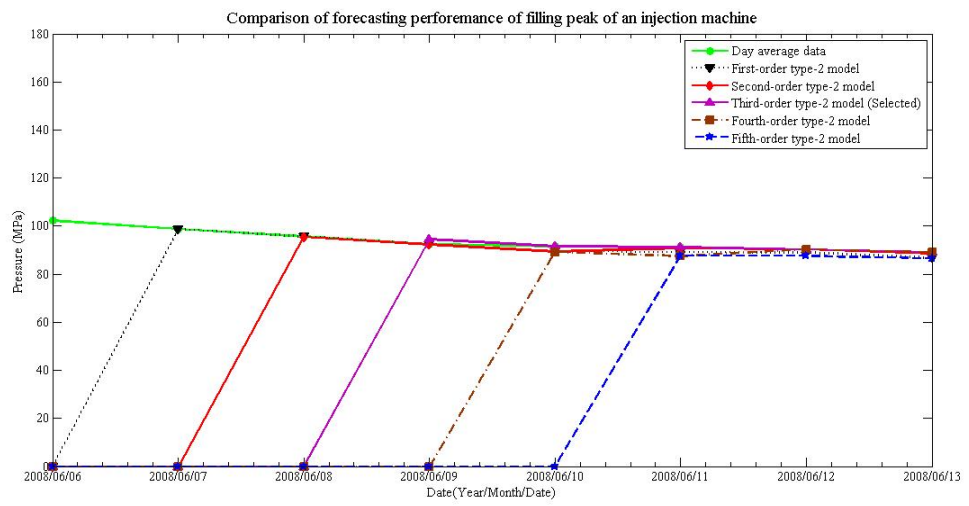


Fig. K.21. Daily forecasting of filling peak for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days of the third week data forecast on 2008/06/13.

## **Appendix L**

### **The Diagrams of Daily Forecasting : Using Day Average Data of a Week of V-P Pressure Factor for Forecasting the Second and the Third Weeks (2) - in CD-ROM Disk.**

The type-A forecasting method in Figure 5.7 and type-C and type-D forecasting methods in Figure 5.8 are employed to forecast V-P pressure factor as following.

Figure L.1 to L.21 of Appendix L in the accompanying CD-ROM disk illustrate the diagrams of daily forecasting using day average data (factory data) of a week of V-P pressure factor between 2008/05/23 and 2008/06/13, which are split into three groups as listed.

- Figure L.1 to L.7 in the accompanying CD-ROM disk illustrate diagrams of forecasting for the second week between 2008/05/23 and 2008/06/06 using the first week data and some forecasting values of the second week (type-C forecasting method).
- Figure L.8 to L.14 in the accompanying CD-ROM disk show diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using the second week data and some forecasting values of the third week (type-D forecasting method).
- Figure L.15 to L.21 in the accompanying CD-ROM disk depict diagrams of forecasting for the third week between 2008/06/07 and 2008/06/13 using forecasting values of the second week and some forecasting values of the third week (type-A forecasting method).

The forecasting results by graphs are illustrated as following.

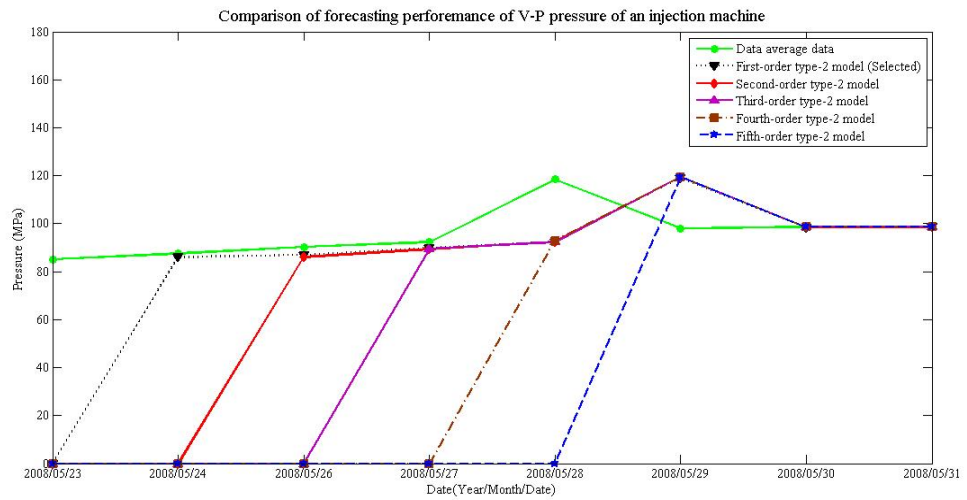


Fig. L.1. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using only the first week data forecast on 2008/05/31.

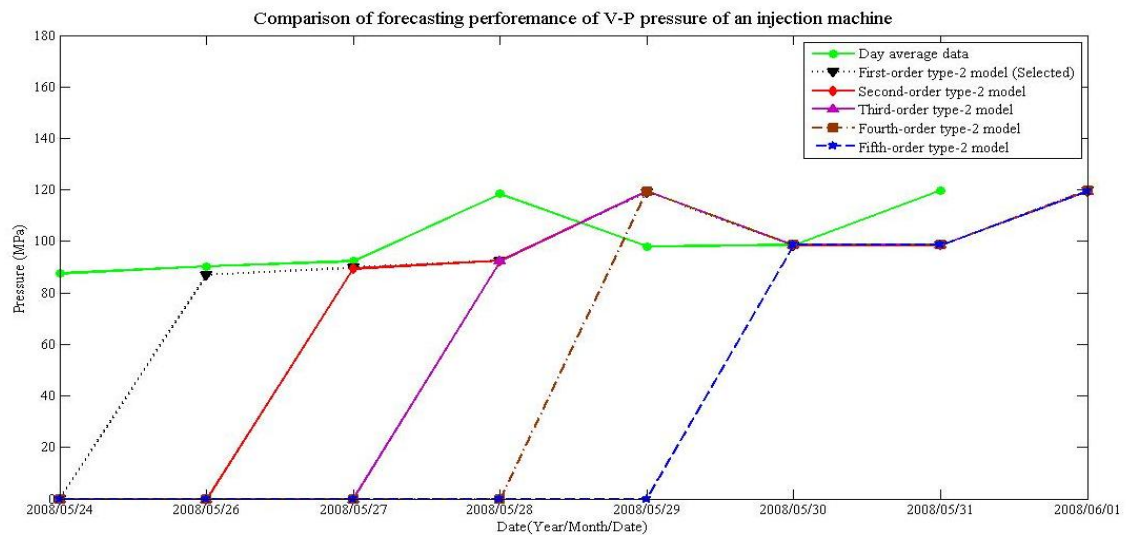


Fig. L.2. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the second to seventh days of the first week data and the first day of the second week data forecast on 2008/06/01.

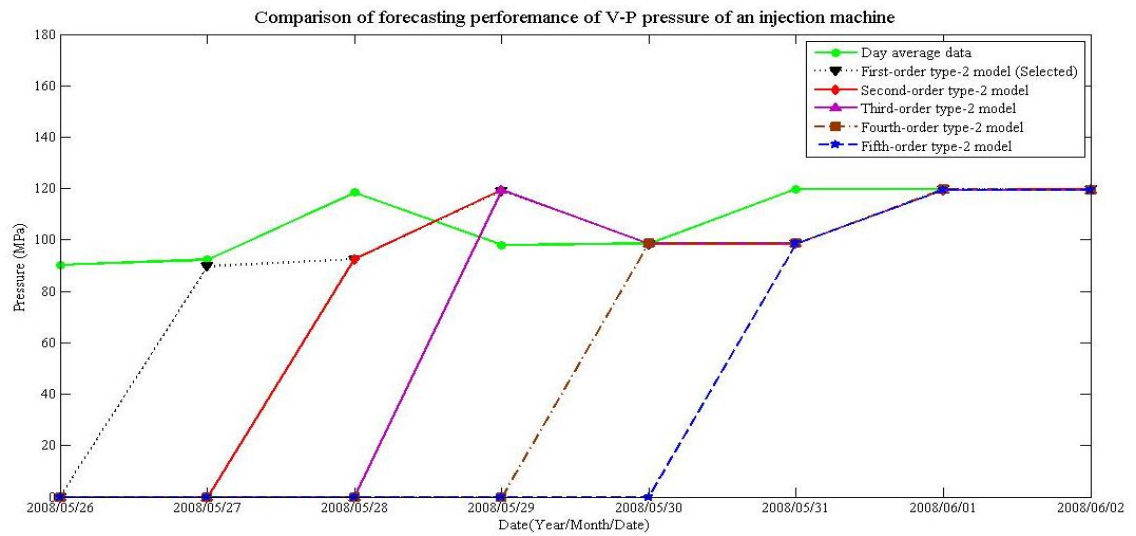


Fig. L.3. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the third to seventh days of the first week data and the first to second days of the second week data forecast on 2008/06/02.

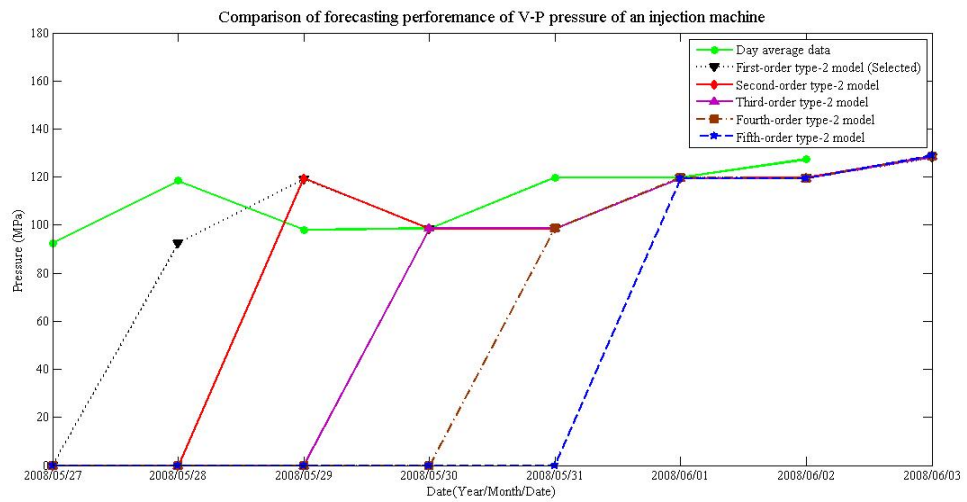


Fig. L.4. Forecasting position of V-P pressure factor for HO-T2FTS method as date is varies and using one week data for day-by-day forecasting. The fourth to seventh days of the first week data and the first to third days of the second week data are employed to forecast on the date: 2008/06/03 in the second week.

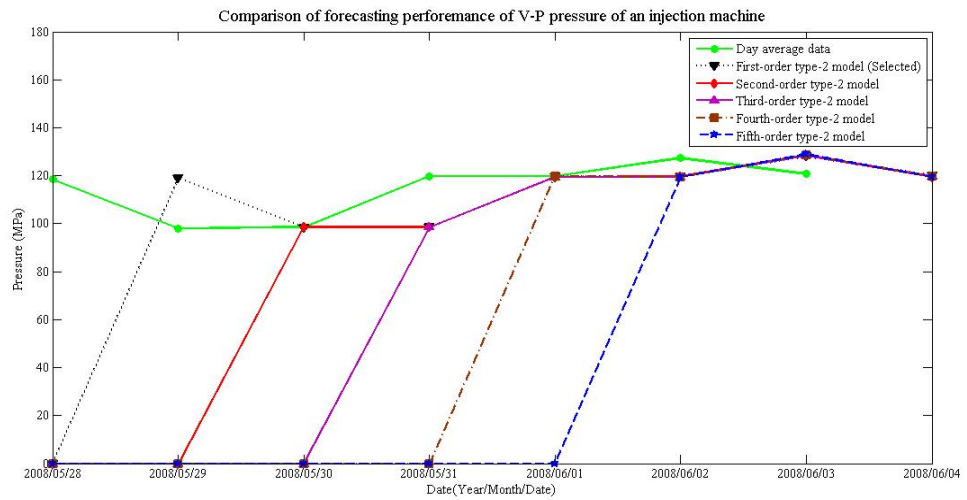


Fig. L.5. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fifth to seventh days of the first week data and the first to fourth days of the second week data forecast on 2008/06/04.

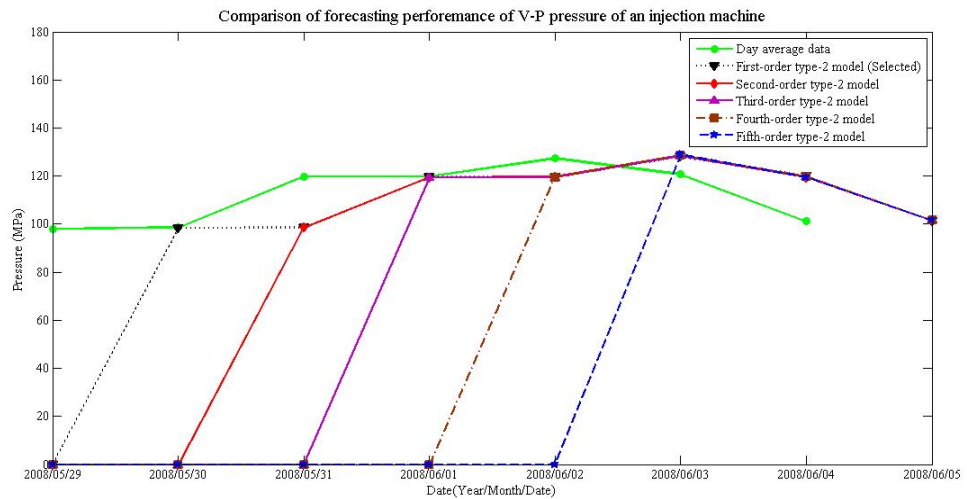


Fig. L.6. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the sixth to seventh days of the first week data and the first to fifth days of the second week data forecast on 2008/06/05.

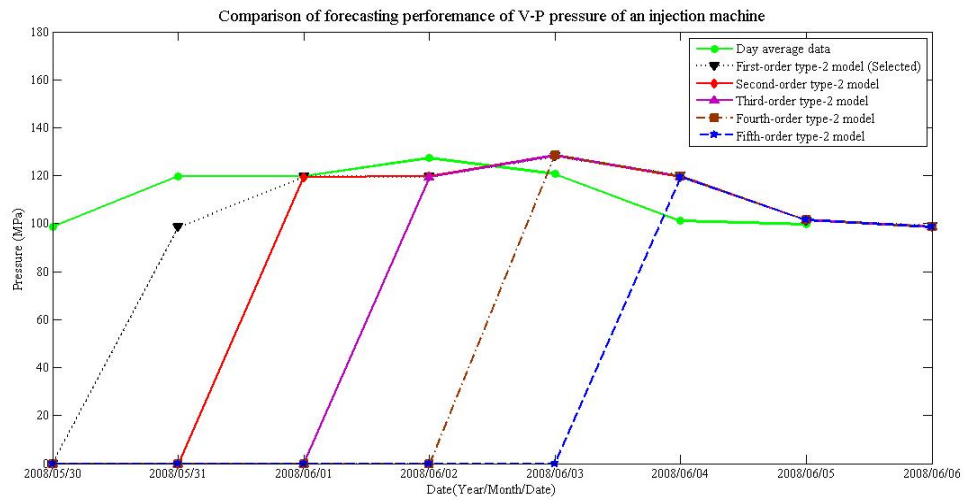


Fig. L.7. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the seventh day of the first week data and the first to sixth days of the second week data forecast on 2008/06/06.

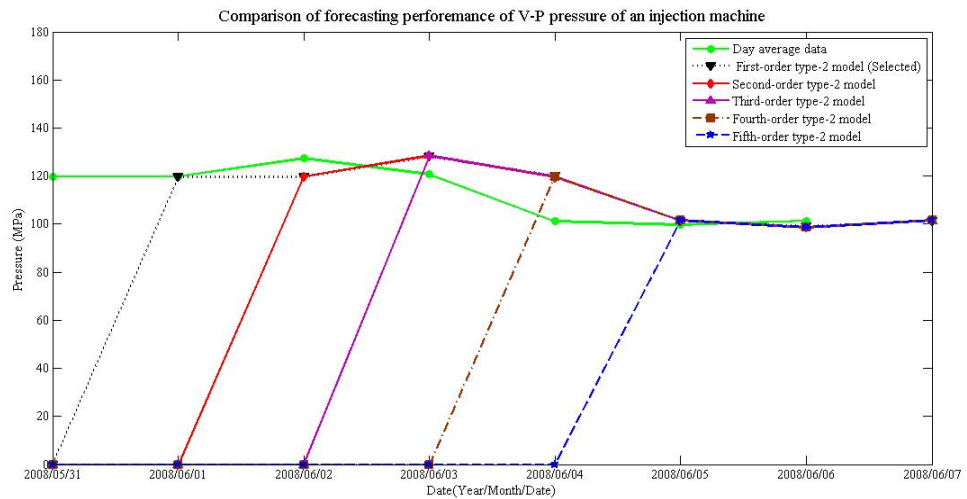


Fig. L.8. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the first to seventh days of the second week data forecast on 2008/06/07.

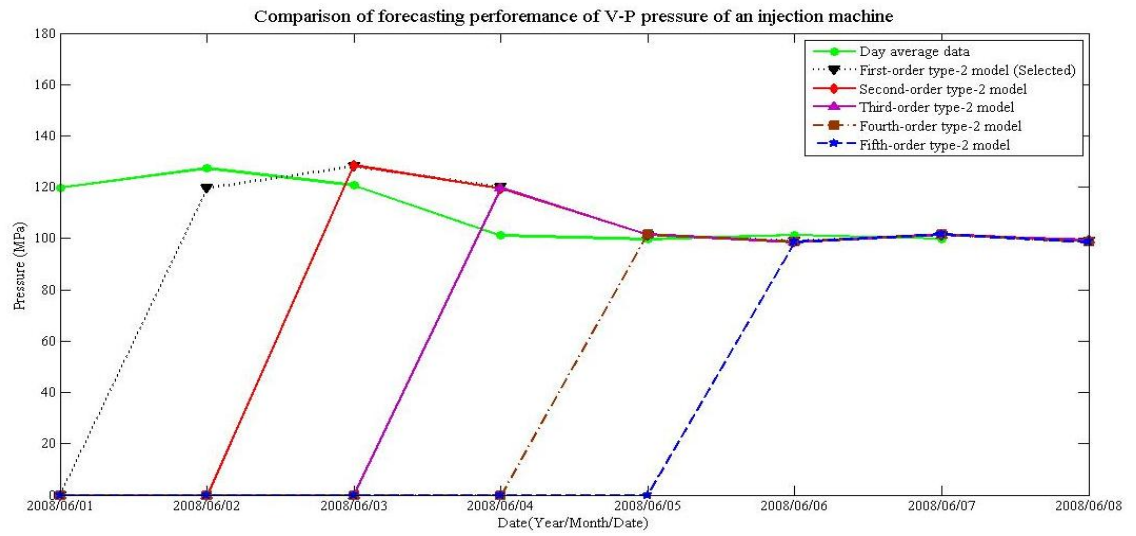


Fig. L.9. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the second to seventh days forecasting values of the second week and the first day the third week data forecast on 2008/06/08.

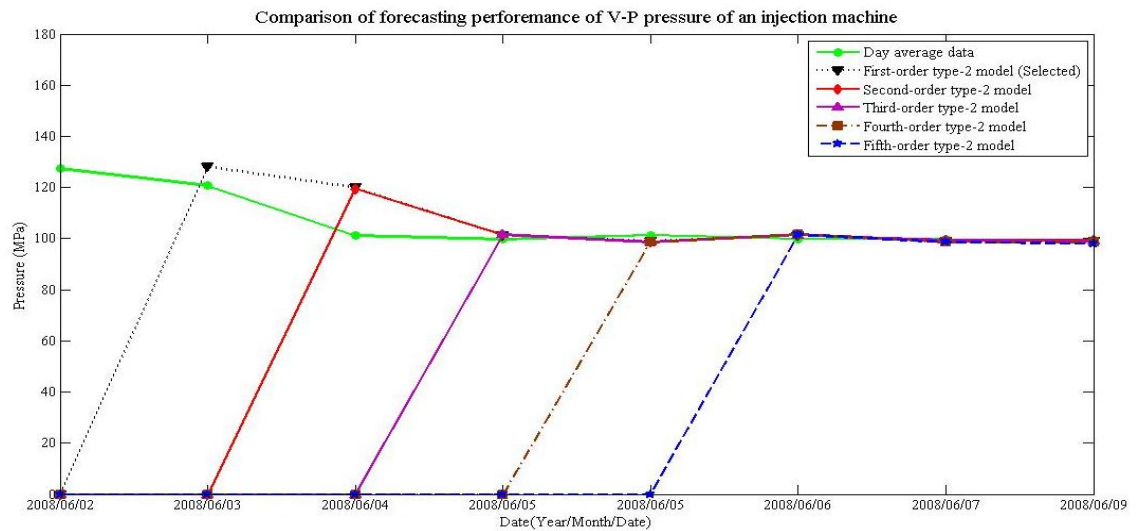


Fig. L.10. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the third to seventh days forecasting values of the second week and the first to second days of the third week data forecast on 2008/06/09.

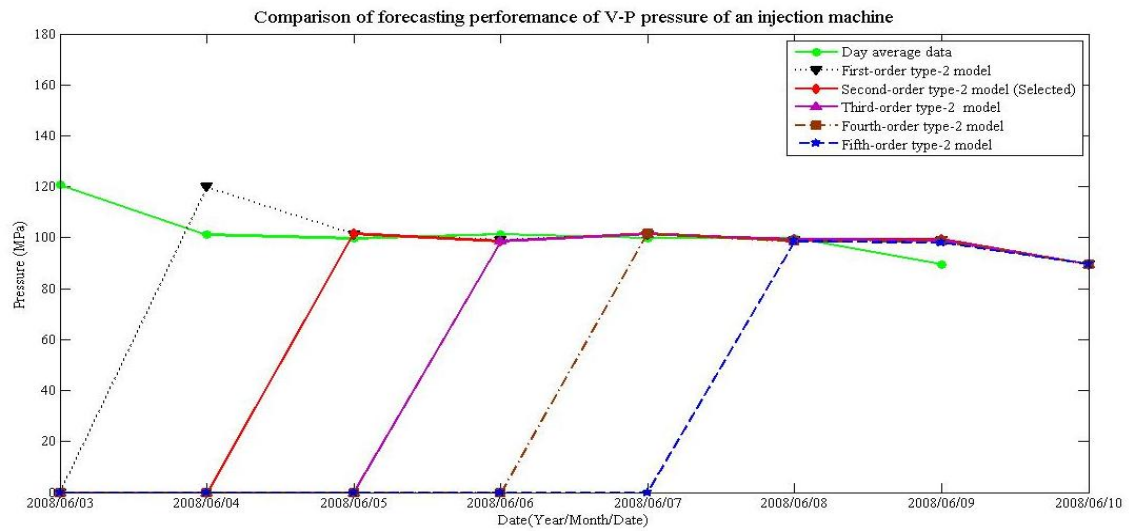


Fig. L.11. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fourth to seventh days forecasting values of the second week and the first to third days of the third week data forecast on 2008/06/10.

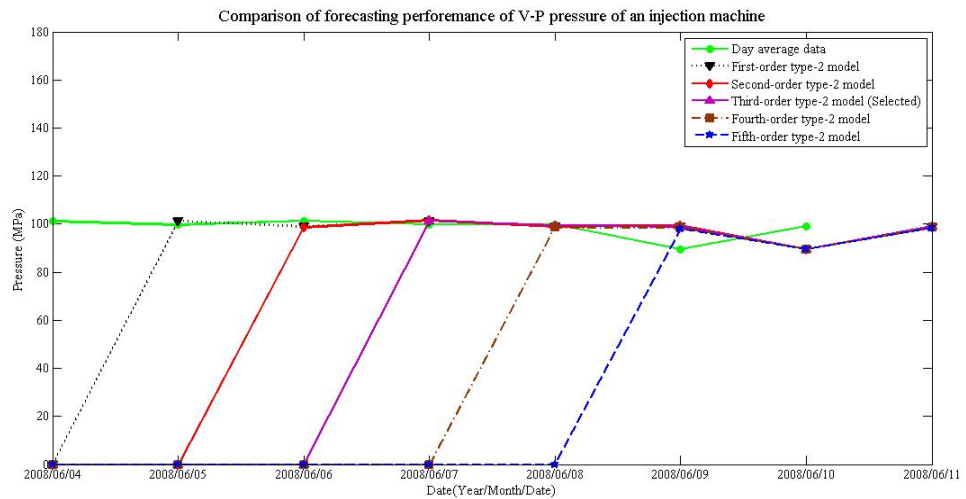


Fig. L.12. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fifth to seventh days forecasting values of the second week and the first to fourth days of the third week data forecast on 2008/06/11.

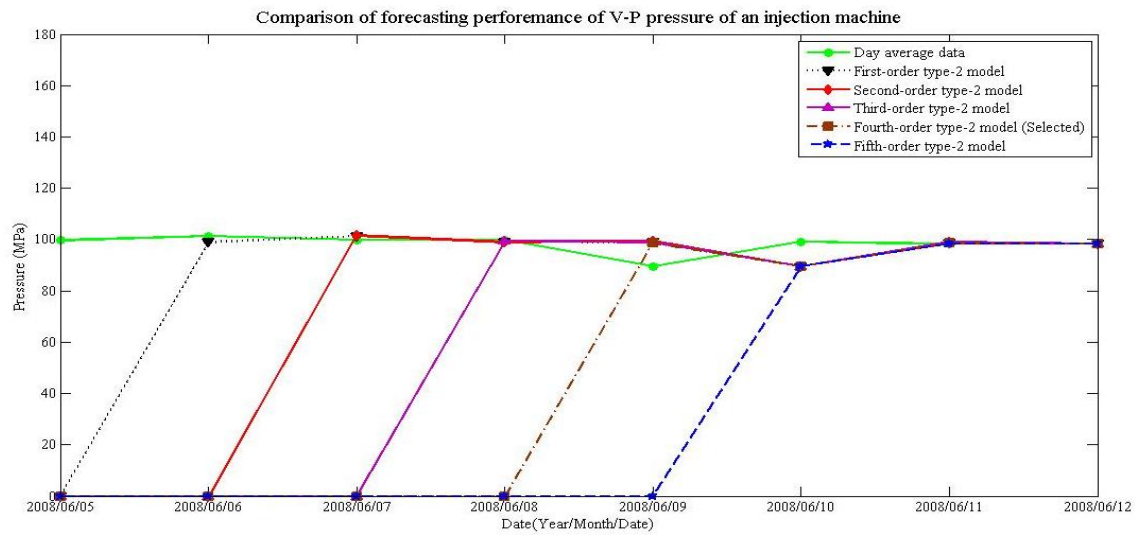


Fig. L.13. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the sixth to seventh days forecasting values of the second week and the first to fifth days of the third week data forecast on 2008/06/12.

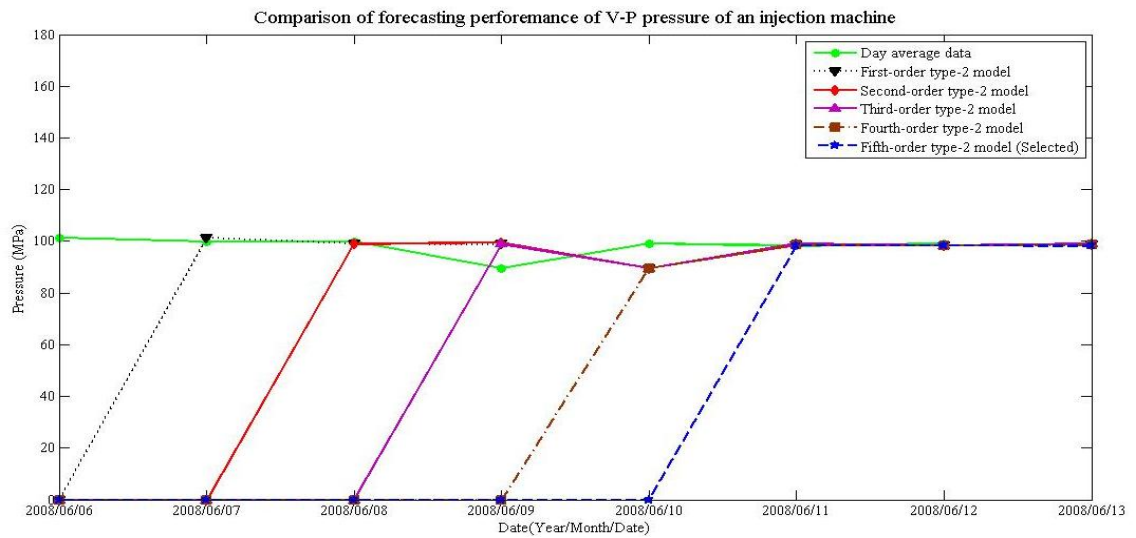


Fig. L.14. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the seventh day forecasting value of the second week and the first to sixth days of the third week data forecast on 2008/06/13.

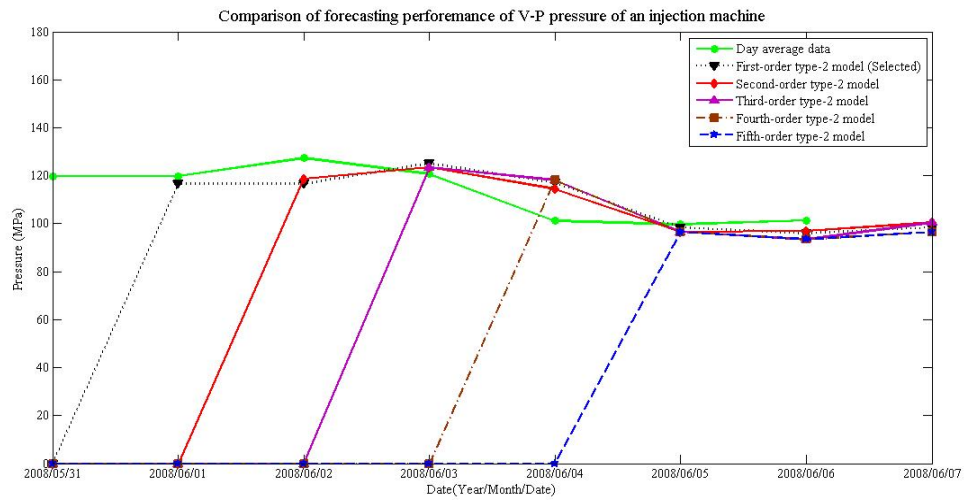


Fig. L.15. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using only the second week data forecast on 2008/06/07.

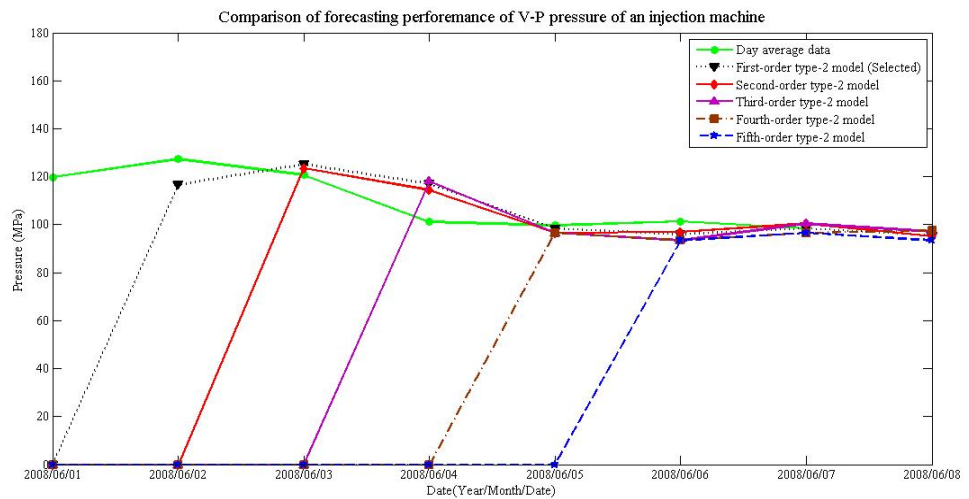


Fig. L.16. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the second to seventh days of the second week data and the first day of the third week data forecast on 2008/06/08.

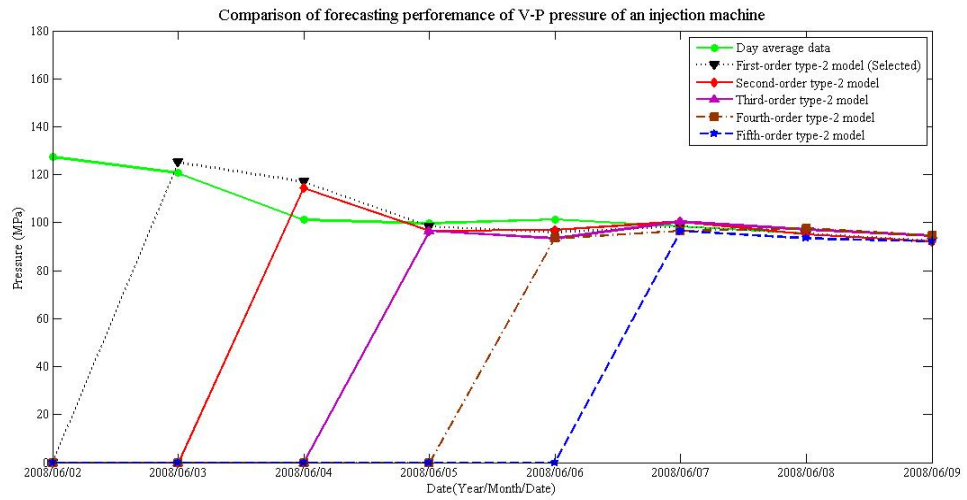


Fig. L.17. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the third to seventh days of the second week data and the first to second days of the third week data forecast on 2008/06/09.

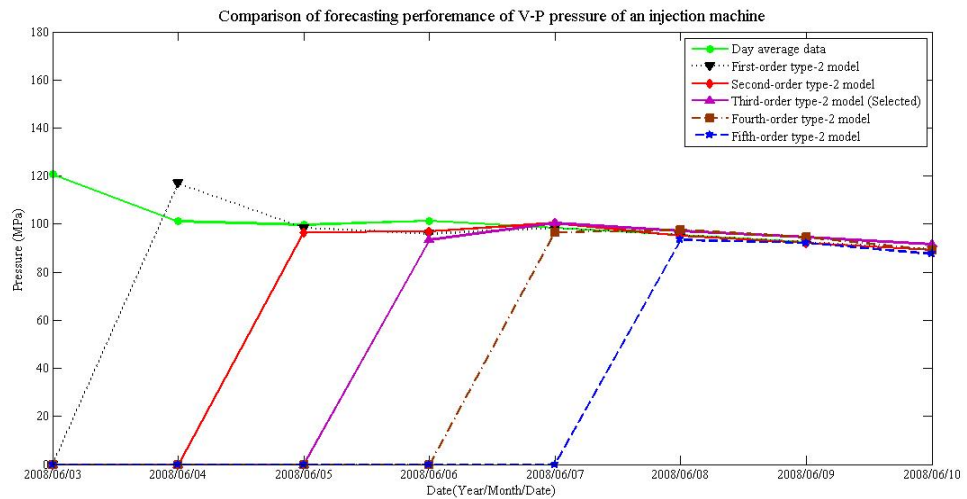


Fig. L.18. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fourth to seventh days of the second week data and the first to third days of the third week data forecast on 2008/06/10.

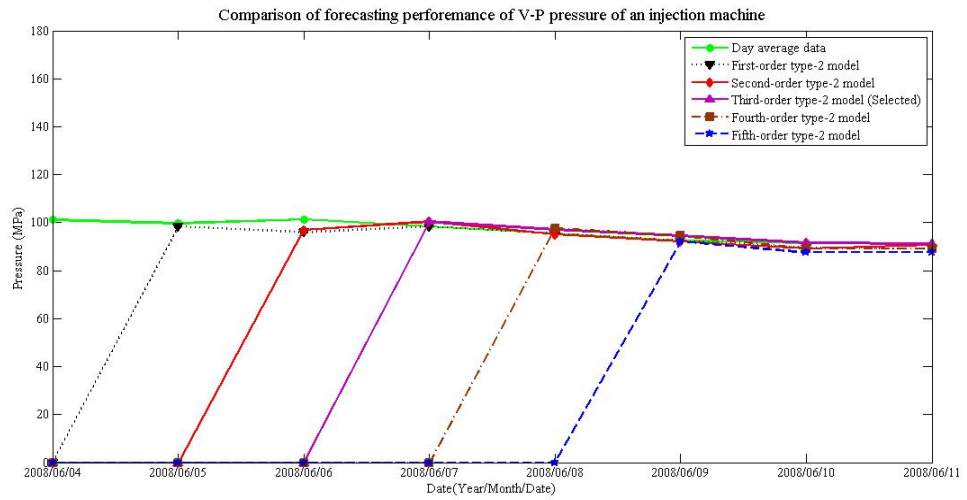


Fig. L.19. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the fifth to seventh days of the second week data and the first to fourth days of the third week data forecast on 2008/06/11.

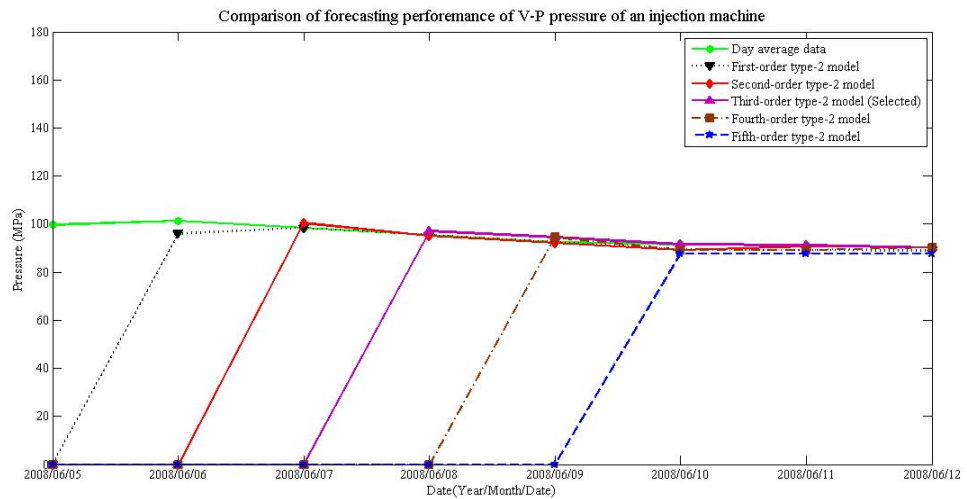


Fig. L.20. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the sixth to seventh days of the second week data and the first to fifth days of the third week data forecast on 2008/06/12.

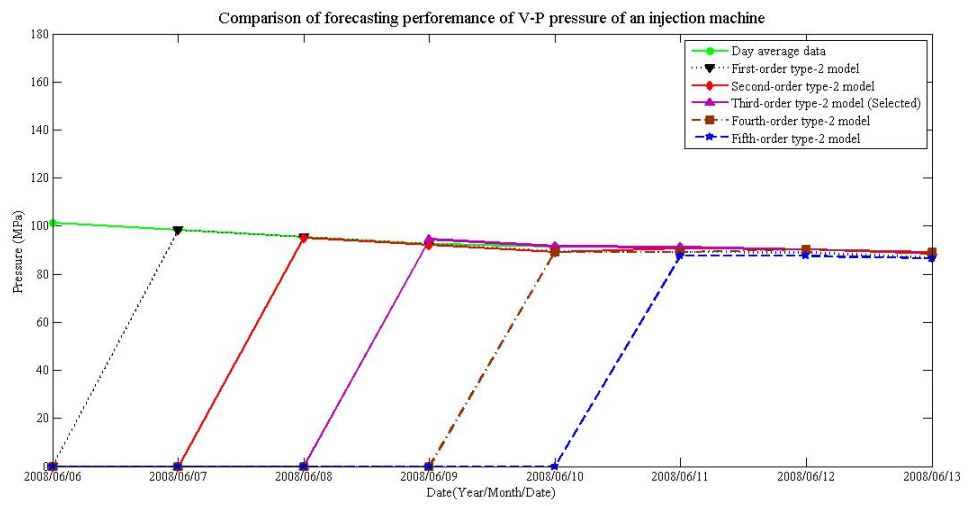


Fig. L.21. Daily forecasting of V-P pressure for HO-T2FTS method as date is varies and using the seventh day of the second week data and the first to sixth days of the third week data forecast on 2008/06/13.

## **Appendix M**

### **Comparing Forecasting Values and Prediction of Machine Status : Week 8 to Week 22.**

The remaining factors such as filling time, filling peak and V-P pressure are forecasted between the eight to the twenty-second week. The results of forecasting for the remaining factors in figure M.1 and M.2 in the accompanying CD-ROM disk are described as follows.

In Chapter 5, figure 5.15 depicts the third week of forecasting on (Monday) 2008/06/02, the forecasting values of minimum cushion position and filling time factors are at about 5.194 mm and 0.602 second, respectively. The forecasting values of minimum cushion position factor are in the standard criteria interval between 2.5 and 5.5 mm and the filling time factor is also in the standard criteria interval between 0.4 and 0.8 second. The forecasting values of filling peak and V-P pressure factors are at about 120.820 MPa and 119.908 MPa, respectively. The forecasting value of filling peak factor exceeds the standard criterion interval between 80 and 110 MPa (see figure 5.18) and V-P pressure forecasting value also exceeds the standard criteria interval between 85 and 100 MPa (see figure 5.19). The occurrence of the problem of filling peak and V-P pressure factors need to maintain the machine within 1-2 working days due to a little bit high pressure. When considering the status of machine equipment, its status is unacceptable (“UAC”) status. The “D4” position has partial failure status and it is still awaiting for preparing on 2008/06/03. The partial failure of “D6” position of machine equipment was still waiting for maintenance on 2008/06/04 due to waiting for new seal ring. This case demonstrates also do smooth match between the two algorithms.

In figure 5.15, The forecasting values of the fourth week on Tuesday 2008/06/03 of minimum cushion position and filling time factors are at about 5.518 mm (see figure 5.17) and 0.594 second (see figure 5.17), respectively. In figure 5.16 illustrates the forecasting value of minimum cushion

Date	Minimum cushion position	Forecasting values			Predicting status of each position of machine equipment												Overall Status
		Filling time	Filling peak	V-P pressure	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11		
week8:																	
Saturday 2008/05/31	4.414	0.890	110.836	98.812	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	PAF	UAC	
Sunday 2008/06/01	5.186	0.602	120.788	119.996	NOP	NOP	NOP	PAF	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/02	5.194	0.602	120.820	119.908	NOP	NOP	NOP	PAF	NOP	PAF	NOP	PAF	NOP	NOP	NOP	UAC	
Tuesday 2008/06/03	5.518	0.594	128.532	127.228	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/04	4.594	0.586	121.580	120.660	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/05	3.362	0.594	102.788	101.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	ACT	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
week9:																	
Sunday 2008/06/01	5.186	0.602	120.788	119.996	NOP	NOP	NOP	PAF	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/02	5.194	0.602	120.820	119.908	NOP	NOP	NOP	PAF	NOP	PAF	NOP	PAF	NOP	NOP	NOP	UAC	
Tuesday 2008/06/03	5.518	0.594	128.532	127.228	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/04	4.594	0.586	121.580	120.660	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/05	3.362	0.594	102.788	101.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	ACT	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
week10:																	
Monday 2008/06/02	5.194	0.602	120.820	119.908	NOP	NOP	NOP	PAF	NOP	PAF	NOP	PAF	NOP	NOP	NOP	UAC	
Tuesday 2008/06/03	5.518	0.594	128.532	127.228	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/04	4.594	0.586	121.580	120.660	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/05	3.362	0.594	102.788	101.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	ACT	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC	
week11:																	
Tuesday 2008/06/03	5.518	0.594	128.532	127.228	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/04	4.594	0.586	121.580	120.660	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/05	3.362	0.594	102.788	101.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	ACT	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC	
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC	
week12:																	
wednesday 2008/06/04	4.594	0.586	121.580	120.660	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/05	3.362	0.594	102.788	101.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	ACT	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC	
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/11	5.794	0.490	100.484	99.140	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
week13:																	
Thursday 2008/06/05	3.362	0.594	102.788	101.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	ACT	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC	
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/11	5.794	0.490	100.484	99.140	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/12	5.534	0.490	99.788	98.516	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
week14:																	
Friday 2008/06/06	3.434	0.594	101.332	99.684	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC	
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC	
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC	
wednesday 2008/06/11	5.794	0.490	100.484	99.140	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Thursday 2008/06/12	5.534	0.490	99.788	98.516	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT	
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	PAF	NOP	UAC	

Fig. M.1. Comparing forecasting values and prediction of machine status : week 8 to week 14.

position factor on 2008/06/03 is higher than the accepted standard criterion interval is between 2.5 and 5.5 mm. The maintenance of minimum cushion position factor needs to maintain or repair by urgent maintenance (or emergency maintenance). In figure 5.17, filling time factor is in the

Date	Minimum cushion position	Forecasting values			Predicting status of each position of machine equipment											Overall Status
		Filling Time	Filling peak	V-P pressure	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	
week15:																
Saturday 2008/06/07	4.554	0.490	102.292	101.532	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Sunday 2008/06/08	5.898	0.490	101.868	99.780	PAF	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	UAC
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC
wednesday 2008/06/11	5.794	0.490	100.484	99.140	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/12	5.534	0.490	99.788	98.516	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	PAF	NOP	UAC
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	PAF	NOP	UAC
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Monday 2008/06/16	4.342	0.450	96.512	94.444	NOP	NOP	NOP	PAF	NOP	NOP	PAF	NOP	NOP	NOP	NOP	UAC
week17:																
Monday 2008/06/09	5.930	0.490	101.748	99.764	NOP	NOP	NOP	PAF	NOP	COF	NOP	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC
wednesday 2008/06/11	5.794	0.490	100.484	99.140	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/12	5.534	0.490	99.788	98.516	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	PAF	ACT
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Monday 2008/06/16	4.342	0.450	96.512	94.444	NOP	NOP	NOP	PAF	NOP	NOP	PAF	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/17	4.438	0.466	99.004	97.132	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
wednesday 2008/06/18	4.414	0.466	98.844	96.964	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
week18:																
Tuesday 2008/06/10	6.418	0.490	99.652	89.716	NOP	NOP	NOP	NOP	PAF	COF	NOP	NOP	NOP	NOP	NOP	UAC
wednesday 2008/06/11	5.794	0.490	100.484	99.140	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/12	5.534	0.490	99.788	98.516	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	PAF	UAC
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Monday 2008/06/16	4.342	0.450	96.512	94.444	NOP	NOP	NOP	PAF	NOP	NOP	PAF	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/17	4.438	0.466	99.004	97.132	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Wednesday 2008/06/18	4.414	0.466	98.844	96.964	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/19	4.470	0.466	99.748	98.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
week20:																
Thursday 2008/06/12	5.534	0.490	99.788	98.516	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	NOP	PAF	UAC
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Monday 2008/06/16	4.342	0.450	96.512	94.444	NOP	NOP	NOP	PAF	NOP	NOP	PAF	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/17	4.438	0.466	99.004	97.132	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
wednesday 2008/06/18	4.414	0.466	98.844	96.964	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/19	4.470	0.466	99.748	98.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/20	4.390	0.466	97.220	95.932	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	PAF	ACT
week21:																
Friday 2008/06/13	5.834	0.490	100.540	99.122	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	NOP	PAF	NOP	UAC
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Monday 2008/06/16	4.342	0.450	96.512	94.444	NOP	NOP	NOP	PAF	NOP	NOP	PAF	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/17	4.438	0.466	99.004	97.132	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
wednesday 2008/06/18	4.414	0.466	98.844	96.964	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/19	4.470	0.466	99.748	98.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/20	4.390	0.466	97.220	95.932	NOP	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	PAF	ACT
Saturday 2008/06/21	4.382	0.466	97.276	95.972	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
week22:																
Sunday 2008/06/15	5.874	0.474	100.452	99.084	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Monday 2008/06/16	4.342	0.450	96.512	94.444	NOP	NOP	NOP	PAF	NOP	NOP	PAF	NOP	NOP	NOP	NOP	UAC
Tuesday 2008/06/17	4.438	0.466	99.004	97.132	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
wednesday 2008/06/18	4.414	0.466	98.844	96.964	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Thursday 2008/06/19	4.470	0.466	99.748	98.412	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Friday 2008/06/20	4.390	0.466	97.220	95.932	NOP	NOP	NOP	NOP	NOP	NOP	PAF	NOP	NOP	NOP	PAF	ACT
Saturday 2008/06/21	4.382	0.466	97.276	95.972	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	NOP	ACT
Sunday 2008/06/22	4.406	0.466	97.420	96.124	-	-	-	-	-	-	-	-	-	-	-	-

Fig. M.2. Comparing forecasting values and prediction of machine status : week 15 to week 22.

accepted standard criterion interval between 0.4 and 0.8 second and there is no any problem of it. However, filling peak factor (see figure 5.18) and V-P pressure factor (see figure 5.19) have a very high forecasting values at about 128.532 MPa and 127.228 MPa on 2008/06/03, respectively.

Thus both filling peak and V-P pressure factors have very high pressure at a nozzle head, in the meantime, the problem is also caused by some cracked surface of a seal ring is need to maintain immediately or emergency maintenance. And there is a serious problem of a seal ring surface needs to fix immediately. When considering the status of a machine, we found most positions of machine equipment are in normal operation status. Only “D6” position has partial failure status and the overall status of machine is also unaccepted. The “D4” position of machine equipment was repaired on 2008/06/03 that the lead wires for the heater and thermocouples are tightened and some part of the thermocouples holes of the heating cylinder are fixed. The “D6” position has to awaiting for replacement of new seal ring on 2008/06/04. This case provides another evidence for the matching between the two algorithms.

In figure 5.15, the forecasting values of the fifth week on Wednesday 2008/06/04 of minimum cushion position factor is at about 4.594 mm and its forecasting value is in the accepted standard interval between 2.5 and 5.5 mm (see figure 5.16). Filling time factor has forecasting values at about 0.586 and the forecasting values is also in the accepted standard criteria (the interval between 0.4 and 0.8 second) (see figure 5.17). Both minimum cushion position and filling time factors have not any problem. Filling peak factor has a higher forecasting value on 2008/06/04 at about 121.580 MPa (see figure 5.18) and V-P pressure factor has forecasting value at approximately 120.660 MPa (see figure 5.19). Both filling peak and V-P pressure factors forecasting values exceeded the accepted standard criterion interval between 80 and 110 MPa and between 85 and 110 MPa, respectively. The high pressure of filling peak and V-P pressure factors is caused by the surface of a seal ring is wore. Then a technician has to check all positions of machine equipment after the “D6” position had been fixed (i.e. replacing a new seal ring and purging a barrel) and the overall status of machine is turn to normal operation status again. Hence, the overall status of machine is acceptable status on 2008/06/04.

For the sixth and seventh weeks in figure 5.15 and the eighth week in figure M.1 in the accompanying CD-ROM disk, all factors of each week in the standard criteria. For example, the minimum cushion position factor has the forecasting values on (Thursday) 2008/06/05, (Friday) 2008/06/06 and (Saturday) 2008/06/07 at about 3.362, 3.434 and 4.554 mm, respectively. The forecasting values of the sixth to the eighth weeks are in the standard criteria interval between 2.5 and 5.5 mm (see figure 5.16). Thus there is not any problem of minimum cushion position factor in this four weeks. Filling time factor has forecasting values at about 0.594, 0.594 and 0.490 second, respectively, and these forecasting values are also in the standard criteria (the accepted interval between 0.4 and 0.8 second) (see figure 5.17) and it also has not any problem for the sixth through the eighth weeks. Similarly, the forecasting values of filling peak and V-P pressure factors are also in the standard criteria as minimum cushion position and filling time factors. For example, the forecasting values of filling peak factor are at about 102.788, 101.332 and 102.292 MPa for 2008/06/04, 2008/06/05, 2008/06/06 and 2008/06/07, respectively. The accepted standard crite-

ria for filling peak factor is between 80 and 110 MPa (see figure 5.18). The forecasting values of V-P pressure are at about 101.412, 99.684 and 101.532 MPa for 2008/06/05, 2008/06/06 and 2008/06/07, respectively. In the sixth and eight weeks, the forecasting values of V-P pressure factor exceeded the standard. However, the machine operation can be accepted as normal situation by engineers even though the forecasting values have a little bit higher than the standard criteria. The accepted standard criteria for V-P pressure factor is between 85 and 100 MPa (see figure 4.25). Considering the status of machine in the sixth and seventh weeks, we found the “D9” and “D10” positions of machine have partial failure in 2008/06/05 and 2008/06/06, respectively. Other positions in the sixth, seventh and eighth weeks are in normal operation status. Hence, there is not any problems of all four factors on 2008/06/05 and the maintenance of machine is upon machine maintenance plan. Thus the “D9” and “D10” positions of machine are awaiting for maintenance by machine maintenance plan. “D9” is a position mold mounting bolts and bolts/nuts at fixed platen has a little bit loose. And “D10” is a position mold mounting bolts and bolts/nuts at moved platen has tiny loose and screw holes have a tiny wear. These two positions in this situation allow a machine in operation until the end of the order of productions finished. Thus the overall status of machine equipment is acceptable during the sixth, seventh and eighth weeks.

The forecasting values of the ninth, tenth and eleventh weeks (see figure M.1 in the accompanying CD-ROM disk) of minimum cushion position factor have a very high values at about 5.898, 5.930 and 6.418 mm on (Sunday) 2008/06/08, (Monday) 2008/06/09 and (Tuesday) 2008/06/10 (see figure 5.16), respectively. The forecasting of minimum cushion position factor for these three weeks have some problem due to the exceeding forecasting value of the standard criteria interval between 2.5 and 5.5 mm. The maintenance of machine for minimum cushion position factor is upon emergency maintenance because the forecasting value is higher than 5.5 mm of the accepted standard criterion. Considering the other three factors are described as follows. Filling time factor has forecasting values for 2008/06/08, 2008/06/09 and 2008/06/10 (see figure 5.17) are 0.490, 0.490 and 0.490 second, respectively. There is not any problem of filling time factor due to the forecasting values of them are in the accepted standard criteria (the interval between 0.4 and 0.8 second). Following by filling peak factor forecasting values are at about 101.868, 101.748 and 99.652 MPa for 2008/06/08, 2008/06/09 and 2008/06/10 (see figure 5.18), respectively. Similarly, the forecasting values of V-P pressure are at about 99.780, 99.764 and 89.716 MPa (see figure 5.19), respectively. The forecasting values of both filling peak and V-P pressure factors of these three weeks are in the accepted standard criteria in the interval between 80 and 110 and between 85 and 100 MPa, respectively. And these two factors have not any problem. The status of machine equipment positions was considered by following. On 2008/06/08 of the ninth week in figure M.1 in the accompanying CD-ROM disk, there is partial failure in the position of “D1” and “D6”. The “D1” position of machine equipment is a safety door in non-operation side of injection machine. The partial failure symptom of “D1” position is the mold closing/opening when the safety door in

non-operation side is opened. In this machine, when the mold is closing/opening the safety door in non-operation side is not immediately closed/opened. And the “D6” position of machine equipment has some melt leakage at a nozzle head again. The overall status of machine is unacceptable status. However, the machine is still running until the end of the products order is finished due to company policy. The reason is a different size of mold die depends on a different product order. A new mold die has been changed when a new order of products starts to produce. For an example, 20,000 products of an order is produced by a first mold die. The nozzle head has melt leakage when the machine has produced at the 6,000 products of using the first mold die. Because it still has 14,000 products remaining to produce. If the machine is stopped for maintenance and the first mold die has to clean up. By the same mold die when the nozzle head are cleaned and the remaining products are continued to produce for the same type of products again. And when this 20,000 products of the first order were finished to produce. The machine has to be stopped again and the first mold die will be replaced with a second mold die (a new mold die) and the nozzle head has been cleaned up at the same time. With this reason, the factory does not immediately stop the machine, if the machine has a tiny symptom of machine equipment and the machine can running for producing the products. Frequency of stopping machine running and changing mold die leads to waste the time for machine maintenance and to delay for producing the products. This is company policy for saving time and machine maintenance cost. Even though the melt leakage has been occurred at a nozzle head. If the remaining amount of products of an order can be finished in a few hours. The machine still has to be in operation to produce the products until producing the end of products of an order are finished. In the ninth week, the minimum cushion position factor problem is caused by the partial failure of “D1” and “D6” positions of machine equipment need to maintain within 1-2 working days.

**Note:**

The machine is stopped running at approximately 3:30 am when the all products of an order is finished and then the machine is waiting for emergency maintenance on 2008/06/10.

In the previous day (2008/06/08) of forecasting, the occurrence of melt leakage at about 23:46 pm and the machine is still running over night through the next day on 2008/06/09 and for maintenance the machine. In the tenth week on (Monday) 2008/06/09 in figure M.1 in the accompanying CD-ROM disk, the minimum cushion position factor has forecasting value exceeds the standard criteria interval. Because the forecasting value of minimum cushion position factor has a high value at about 5.930 mm (see figure 5.16) that it is higher than 5.5 mm (the accepted criterion interval between 2.5 and 5.5 mm). Thus it has to maintain immediately. The problem of minimum cushion position factor is caused by the position of minimum cushion has a big different distance between a nozzle head and the injection position to the mold die. For other factors such as filling time, filling peak and V-P pressure, the forecasting values of them are in the standard criteria interval and their forecasting values are at about 0.490 second (see figure 5.17), 101.748 MPa

(see figure 5.18) and 99.764 MPa (see figure 5.19), respectively. The forecasting values of these three factors are in the standard criteria in the interval between 0.4 and 0.8 second, between 80 and 110 MPa and between 85 and 100 MPa for filling time, filling peak and V-P pressure factors, respectively. Machine maintenance plan is required for a machine. The overall status of machine equipment on 2008/06/09 is unacceptable status. Because three positions of machine equipment have partial failure such as “D1”, “D4” and “D6”. The “D1” has a problem about a safety door in non-operation side of injection machine is not immediately closed/opened when the mold is closing/opening and “D4” positions of machine status has some problem occur as the lead wires for the heater bands and thermocouple are loosed. The lead wires and thermocouple has a tiny in contact with the fixed platen. The contact of the lead wires can leads to the damage of the coating in a short time. And “D6” positions of machine status has a problem about some melt leakage at a nozzle head since 2008/06/08. On 2008/06/09, the status of “D1” and “D4” position have partial failure. Only “D6” position is awaiting for maintenance since 2008/06/08 until 2008/06/09 and they still are not maintained on this day due to await for replacement with a nozzle head. The “D6” positions of machine equipment needs to maintain immediately due to complete failure of “D6” position and the unacceptable overall status of machine. Then the “D6” position of machine was fixed on 2008/06/10 that “D1” and “D4” positions were also maintained at the same time. Only the “D1” position of machine equipment had been repaired and “D4” position had also been repaired by making the lead wires for heater bands and thermocouple tightened. However, on 2008/06/09 afternoon, a maintenance service team checked the “D6” positions and found some part of a nozzle ring surface had a tiny cracked and the machine has to waiting for replacement of a new nozzle ring for a couple days. Thus the “D6” positions of machine equipment had not been repaired on 2008/06/9.

The forecasting of the eleventh week is on (Tuesday) 2008/06/10 in figure M.1 in the accompanying CD-ROM disk. The minimum cushion position factor has a very high forecasting value at about 6.418 mm (see figure 5.16) and its forecasting value exceeds the standard criteria interval and the forecasting value is higher than 5.5 mm (the accepted criterion interval between 2.5 and 5.5 mm). Thus the machine has to maintain immediately due to more cracked at nozzle head. While filling time, filling peak and V-P pressure factors have forecasting values at about 0.490 second (see figure 5.17), 99.652 MPa (see figure 5.18) and 89.716 MPa (see figure 5.19), respectively, are in the standard criteria interval of each factor and the maintenance of machine by maintenance plan required. The overall status of machine equipment on 2008/06/10 is still unacceptable status. Because the emergency maintenance of “D6” position of machine equipment was not replaced with new equipment on 2008/06/09 due to waiting for the order of new equipment of company. The “D4” position of machine equipment also has partial failure. There is some problem on the surface thermocouple and it was cleaned by bushing the thermocouple mounting face of the heating cylinder and the temperature sensor of the thermocouple using a sand paper or wire bush. The

“D6” position of machine still has complete failure on 2008/06/10. It was awaiting for replacing new equipment on 2008/06/11. The overall status of machine equipment is unacceptable.

The next forecasting is the forecast of the twelve th week on (Wednesday) 2008/06/11 in M.1 figure in the accompanying CD-ROM disk. The forecasting value of minimum cushion position is at about 5.794 mm (see figure 5.16) and the forecasting value is higher than 5.5 mm (the accepted interval between 2.5 and 5.5 mm). The maintenance of machine has to immediately maintain. Filling time, filling peak and V-P pressure factors have forecasting values at about 0.490 second (see figure 5.1), 100.484 MPa (see figure 5.18) and 99.140 MPa (see figure 5.19), respectively. They are in the standard criteria interval of each factor and the maintenance of machine by maintenance plan required. The overall status of machine is acceptable status. The “D6” position of machine equipment had been replaced by a new nozzle ring. Then all positions of machine equipment were checked by a technician on the same day. Hence, all positions of machine equipment are in normal operation.

In the thirteenth week on (Thursday) 2008/06/12 in figure M.1 in the accompanying CD-ROM disk, the forecasting value of minimum cushion position factor is at approximately 5.534 mm (see figure 5.16) and the machine needs to immediately maintain due to the forecasting value of minimum cushion position factor is a little bit higher than 5.5 mm (the accepted interval between 2.5 and 5.5 mm). However, an engineer of factory still accepts the status of minimum cushion position and the machine is allowed in operation. Filling time, filling peak and V-P pressure factors have forecasting values at about 0.490 second (see figure 5.17), 99.788 MPa (see figure 5.18) and 98.516 MPa (see figure 5.19), respectively. They are in the standard criteria interval of each factor. The maintenance of machine by maintenance plan is required. The overall status of machine is acceptable status and all machine equipment positions have normal operation status. However, there is the “D3” position of machine equipment has partial failure status and the cause of problem of “D3” position is the water jacket temperature has a little bit low and has water leakage in the surrounding area. Thus, the forecasting of maintenance is immediately maintain due to the forecasting value of minimum cushion position factor is higher than 5.5 mm. However, the problem of machine was occurred at night. The machine has to wait for maintenance for tomorrow morning.

In figure M.1 in the accompanying CD-ROM disk, the forecasting value of the fourteenth week on (Friday) 2008/06/13 of minimum cushion position factor is at roughly 5.834 mm (see figure 5.16) and the machine needs immediately maintain due to the fact that the forecasting value of minimum cushion position factor is higher than 5.5 mm (the accepted interval between 2.5 and 5.5 mm). The forecasting values of filling time, filling peak and V-P pressure factors are at about 0.490 second (see figure 5.17), 100.540 MPa (see figure 5.18) and 99.122 MPa (see figure 5.19), respectively. They are in the standard criteria interval of each factor and the maintenance of machine by maintenance plan is required. The overall status of machine is unacceptable status.

However, the status of the “D5” position of machine equipment is still partial failure status as the previous day (2008/06/12) forecasting. After the “D5” position of machine maintenance has been checked including purge cover interlock, exhaust pipe and shutter valve, this position effects to the injection and plasticizing for minimum cushion position factor. The cover interlock and exhaust pipe have been fixed and the shutter valve needs to be double checked and more tests on it on 2008/06/16. If there is more wearing on the shutter valve, it would be changed to a new shutter valve. Hence, the injection machine has been stopped running at approximately 18:15 pm on 2008/06/13. “D10” position, a position of mold mounting bolts and bolts/nuts at moved platen of the mold mounting unit is loose. It needs to tighten. On (Saturday) 2008/06/14, the injection machine was not in operation due to company holiday.

In the fifteenth week (see figure M.2 in the accompanying CD-ROM disk), the forecasting value of minimum cushion position factor on (Sunday) 2008/06/15 is about 5.874 mm (see figure 5.16). The forecasting value of minimum cushion position factor is higher than 5.5 mm (the accepted interval between 2.5 and 5.5 mm), and the emergency maintenance is required. The three factors remaining such as filling time, filling peak and V-P pressure factors have the forecasting values of them at about 0.474 second (see figure 5.17), 100.452 MPa (see figure 5.18) and 99.084 MPa (see figure 5.19), respectively. The forecasting values of these three factors are in the standard criteria interval of each factor and the maintenance of machine by maintenance plan required. The shutter valve of the “D5” position has been replaced with a new shutter valve on 2008/06/15. Then the status of machine was checked by a technician as following results. The overall status of machine equipment is acceptable status. Because the overall status of machine equipment is recorded by a technician after a new shutter valve is replaced, while the forecasting values of minimum cushion position factor is forecasted before the new equipment is replaced. Hence, all positions of machine equipment has normal operation status at the current.

In the sixteenth week (on Monday 2008/06/16 in figure M.1 in the accompanying CD-ROM disk), the forecasting values of the four factors as 4.342 mm (see figure 5.16), 0.450 second (see figure 5.17), 96.512 MPa (see figure 5.18) and 94.444 MPa (see figure 5.19) for minimum cushion position, filling time, filling peak and V-P pressure factors, respectively. All forecasting values of these four factors are in the standard criteria interval of each factor and machine maintenance plan is required. Considering the status of machine, there are two factors have partial failure such as “D4” position of machine and the remaining factors are in normal operation status. The problem of “D4” position of machine equipment is the soldered part of the thermocouple holes of the heating cylinders are damaged. Thus, the overall status of machine is unacceptable status. Because the problems of “D4” of machine equipment have occurred, Even though the machine can still operate to produce for products. In addition, a problem of “D7” position of machine equipment is the emergency stop button operation (front) on the molding machine is not properly working. Hence, the maintenance of machine of minimum cushion position, filling time, filling

peak and V-P pressure factors is to follow machine maintenance plan and the overall status of machine is accepted.

In figure M.2 in the accompanying CD-ROM disk the seventeenth, eighteenth and nineteenth weeks have the forecasting values of each week as following. The forecasting values of the seventeenth week of (Tuesday) 2008/06/17 are 4.438 mm (see figure 5.16), 0.466 second (see figure 5.17), 99.004 MPa (see figure 5.18) and 97.132 MPa (see figure 5.19) for minimum cushion position, filling time, filling peak and V-P pressure factors, respectively. The forecasting values of the eighteenth week of (Wednesday) 2008/06/18 are 4.414 mm, 0.466 second, 98.844 MPa and 96.964 MPa for minimum cushion position, filling time, filling peak and V-P pressure factors, respectively. And the forecasting values of the nineteenth week of (Thursday) 2008/06/19 are 4.470 mm, 0.466 second, 99.748 MPa and 98.412 MPa for minimum cushion position, filling time, filling peak and V-P pressure factors, respectively. The overall status of machine equipment on 2008/06/17, 2008/06/18 and 2008/06/19 are acceptable status. Hence, there is no any problem of the minimum cushion position, filling time, filling peak and V-P pressure factors on 2008/06/17, 2008/06/18 and 2008/06/19, respectively. The machine maintenance is upon machine maintenance plan and all positions of machine equipment are in normal operation.

In the twentieth week in figure M.1 in the accompanying CD-ROM disk, the forecasting values on (Friday) 2008/06/20 of minimum cushion position, filling time, filling peak and V-P pressure factors are 4.390 mm (see figure 5.16), 0.466 second (see figure 5.17), 97.220 MPa (see figure 5.18) and 95.932 MPa (see figure 5.19), respectively. There is no any problem of these four factors and the maintenance of machine is upon machine maintenance plan. The overall status of machine is acceptable status. There is "D7" position of machine has partial failure status. The D8 position of machine equipment is a safety door in operation side of injection machine. The prediction status of the D8 position is partial failure status (PAF status). The safety door in operation side of a machine has ajar when the door is closing, but the machine can be running until the end of the production order. Thus the D8 positions of machine equipment has to fix for tomorrow morning (on 2008/06/21) due to non-service team to maintaining machine over night. And the status of "D11" position of machine is partial failure status and the problem of "D11" is caused by there are some dirty on the tie bar, machine frame and the platen of machine. Thus both the "D8" and "D11" positions of machine equipment have to fix by maintenance plan.

In the twenty-first week (on Saturday 2008/06/21 in figure M.1 in the accompanying CD-ROM disk), the forecasting values of the four factors are 4.382 mm (see figure 5.16), 0.466 second (see figure 5.17), 97.276 MPa (see figure 5.18) and 95.972 MPa (see figure 5.19) for minimum cushion position, filling time, filling peak and V-P pressure factors, respectively. There is not any problems with these four factors and the machine maintenance is upon machine maintenance plan. The overall status of machine equipment is acceptable status. The "D8" position of machine equipment had been fixed by a machine maintenance service team.

The twenty-second week forecasting (on Sunday 2008/06/22 in figure 4.M.1 in the accompanying CD-ROM disk), the forecasting values of the four factors are 4.406 mm (see figure 5.16), 0.466 second (see figure 5.17), 97.420 MPa (see figure 5.18) and 96.124 MPa (see figure 5.19) for minimum cushion position, filling time, filling peak and V-P pressure factors, respectively. There are not any problems with these four factors and the machine maintenance also is upon machine maintenance plan as the previous day forecasting. The status of machine equipment was not recorded on this day due to the last inspection was on the day before this day (2008/06/21).

## **Appendix N**

### **CMIMS Coding (1) - in Accompanying CD-ROM Disk.**

CMIMS coding consists of CMIMS coding-(1), (2), (3), (4) and (5). In appendix N in accompanying CD-ROM disk, figure N.1 to N.18 illustrate CMIMS coding-(1) for HO-T2FTS method coding as following.



```

*****
H O - T 2 F T S      M E T H O D
*****

Imports System.Data
Imports System.Data.OleDb
Partial Class HO_T2FTSModel
    Inherits System.Web.UI.Page
    Dim Low As New ArrayList
    Dim Upe As New ArrayList
    Dim Mi As New ArrayList
    Dim SizeOfGroup As Integer = 0
    Dim idate As Date
    Dim fdate As Date
    Dim forecast As Double
    Dim fullforecast As New ArrayList
    Dim fullforecast2 As New ArrayList
    Dim fullforecast3 As New ArrayList
    Dim fullforecast4 As New ArrayList
    Dim stops filter date As Integer
    Dim mf, mf1, mf2, mf3, mf4 As String
    Dim outpredic1, outpredic2, outpredic3, outpredic4 As String

    Protected Sub Button1_Click(ByVal sender As Object, ByVal e As System.EventArgs)
        Handles Button1.Click

            Session.Timeout = 60

            Session("mf1") = " "
            Session("mf2") = " "
            Session("mf3") = " "
            Session("mf4") = " "

            Session("machine") = DropDownList1.SelectedValue.ToString
            If CheckBox1.Checked = True Then
                Session("chkb1") = "1"
            Else
                Session("chkb1") = "0"
            End If
            If CheckBox2.Checked = True Then
                Session("chkb2") = "1"
            Else
                Session("chkb2") = "0"
            End If
            If CheckBox3.Checked = True Then
                Session("chkb3") = "1"
            Else
                Session("chkb3") = "0"
            End If
            If CheckBox4.Checked = True Then
                Session("chkb4") = "1"
            Else
                Session("chkb4") = "0"
            End If

            Dim result As Double
            Dim nstart, nstop As Integer
            nstart = iwtxt.Text
            nstop = swtxt.Text
            idate = DateTime.Parse(initdate.Text)
            fdate = DateTime.Parse(finaldate.Text)

            Session("idate") = idate
            Session("fdate") = fdate

            If nstart > nstop Then
                nstart = nstop
            End If
            Label3.Text = ""
            Dim f As String
            f = "HO2FTS.xls"
            Dim output As New ArrayList

```

Fig. N.1. CMIMS coding-1 (1)

```

Dim min As Double = 100
Dim rowmin As Integer
Dim j As Integer = 0

' Finding the minimum position
j = 0
If CheckBox1.Checked = True Then
    result = find_lenght(2, f, 5)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 5)
        output.Add(result)
    Next

    For i As Integer = nstart To nstop
        If output(j) < min Then
            min = output(j)
            rowmin = j
        End If
        j = j + 1
    Next
End If
j = 0
mf1 = ""
If CheckBox1.Checked = True Then
    Label3.Text = Label3.Text + "<br>Minimum Cushion Position <br><table>"
    result = find_lenght(2, f, 5)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 5)
        check_min_cus(forecast)
        'check_mf_min(forecast)
        If (j = rowmin) Then
            Label3.Text = Label3.Text + "<tr><td><b><span style='color:red'>RMSE of " & i.ToString + "order " + Math.Round(result, 6).ToString + " </b><td><b><span style='color:red'>Forecasting Value= " + Math.Round(forecast, 6).ToString + " " & mf1.ToString + "</b>"
        End If
    Next
    Dim str As String = Left(mf1, 3)
    Session("pred1") = str
    If (str = "MF2" Or str = "MF3") Then
        Label3.Text = Label3.Text + " There is some problems of this factor"
        <a href='laivfdt.aspx?idate=" + idate + "&fdate=" + fdate + "'> LAIVFDT </a><br>"
    Else
        Label3.Text = Label3.Text + " There is not a problem of this factor"
        <a href='laivfdt.aspx?idate=" + idate + "&fdate=" + fdate + "'> LAIVFDT</a> or <a href='javascript:history.go(-1)'>Goto next factor</a> </a><br>"
    End If
Else
    Label3.Text = Label3.Text + "<tr><td>RMSE of " + i.ToString + "order " & i.ToString + "order " + Math.Round(result, 5).ToString + " <td>Forecasting Value= " + Math.Round(forecast, 5).ToString + " " & mf1.ToString + "<br>"
End If
j = j + 1
Next
Label3.Text = Label3.Text + "</table>"
End If

output = New ArrayList
min = 100

' Finding the minimum position
j = 0
mf2 = ""
If CheckBox2.Checked = True Then
    result = find_lenght(2, f, 7)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 7)
        output.Add(result)
    Next

    For i As Integer = nstart To nstop

```

Fig. N.2. CMIMS coding-1 (2)

```

        If output(j) < min Then
            min = output(j)
            rowmin = j
        End If
        j = j + 1
    Next
End If
j = 0
If CheckBox2.Checked = True Then
    Label3.Text = Label3.Text + "<br>Filling Time <br><table>"
    result = find_lenght(2, f, 7)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 7)
        check_fil_tim(forecast)
        'check mf_fil(forecast)
        If (j = rowmin) Then
            Label3.Text = Label3.Text + "<tr><td><b><span style='color:red'>RMSE of "
            " + i.ToString + "order " + Math.Round(result, 6).ToString + " </b> <td><b><span
            style='color:red'> Forecasting Value= " + Math.Round(forecast, 6).ToString + " "
            + "<td><b><span style='color:red'>" + mf2.ToString + "</b>"
            Dim str As String = Left(mf2, 3)
            Session("pred2") = str
            If (str = "MF2" Or str = "MF3") Then
                Label3.Text = Label3.Text + " There is some problems of this factor"
                <a href='laivfddt.aspx?idate=" + idate + "&fdate=" + fdate + "'> LAIVFDDT </a><br>"
            Else
                Label3.Text = Label3.Text + " There is not a problem of this factor"
                <a href='laivfddt.aspx?idate=" + idate + "&fdate=" + fdate + "'> LAIVFDDT </a><br>"
            End If
        Else
            Label3.Text = Label3.Text + "<tr><td>RMSE of " + i.ToString + "order "
            " + Math.Round(result, 5).ToString + " <td> Forecasting Value= " + Math.Round
            (forecast, 5).ToString + " " + "<td>" + mf2.ToString + "<br>"
        End If
        j = j + 1
    Next
    Label3.Text = Label3.Text + "</table>"
End If

output = New ArrayList
min = 100
' Finding the minimum position
j = 0
If CheckBox3.Checked = True Then
    result = find_lenght(2, f, 9)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 9)
        output.Add(result)
    Next

    For i As Integer = nstart To nstop
        If output(j) < min Then
            min = output(j)
            rowmin = j
        End If
        j = j + 1
    Next
End If
j = 0
If CheckBox3.Checked = True Then
    Label3.Text = Label3.Text + "<br>Filling Peak <br><table>"
    result = find_lenght(2, f, 9)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 9)
        check_fil_pea(forecast)
        'check mf_fil(forecast)
        If (j = rowmin) Then
            Label3.Text = Label3.Text + "<tr><td><b><span style='color:red'>RMSE of "
            " + i.ToString + "order " + Math.Round(result, 6).ToString + " </b> <td><b><span
            style='color:red'> Forecasting Value= " + Math.Round(forecast, 6).ToString + " "
            + "<td><b><span style='color:red'>" + mf3.ToString + "</b>"
            Dim str As String = Left(mf3, 3)
            Session("pred3") = str
            If (str = "MF2" Or str = "MF3") Then

```

Fig. N.3. CMIMS coding-1 (3)

```

        Label3.Text = Label3.Text + " There is some problems of this factor"
<a href='laivfddt.aspx?idate=' + idate + "&fdate=" + fdate + "'> LAIVFDT </a><br>"
    Else
        Label3.Text = Label3.Text + " There is not a problem of this factor"
<a href='laivfddt.aspx?idate=' + idate + "&fdate=" + fdate + "'> LAIVFDT </a><br>"
    End If
    Else
        Label3.Text = Label3.Text + "<tr><td>RMSE of " + i.ToString + "order "
+ Math.Round(result, 5).ToString + "    <td>    Forecasting Value= " + Math.Round
(forecast, 5).ToString + " " + "<td>" + mf3.ToString + "<br>"
        End If
        j = j + 1
    Next
    Label3.Text = Label3.Text + "</table>"
End If

output = New ArrayList
min = 100
' Finding the minimum position
j = 0
If CheckBox4.Checked = True Then
    result = find_lenght(2, f, 11)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 11)
        output.Add(result)
    Next
    For i As Integer = nstart To nstop
        If output(j) < min Then
            min = output(j)
            rowmin = j
        End If
        j = j + 1
    Next
End If
j = 0
If CheckBox4.Checked = True Then
    Label3.Text = Label3.Text + "<br>V-P Pressure <br><table>"
    result = find_lenght(2, f, 11)
    For i As Integer = nstart To nstop
        result = rmse_cal2(i, f, 11)
        check_VP_pre(forecast)
        'check mf fil(forecast)
        If (j = rowmin) Then
            Label3.Text = Label3.Text + "<tr><td><b><span style='color:red'>RMSE of
" + i.ToString + "order " + Math.Round(result, 6).ToString + "    </b> <td><b><span
style='color:red'>    Forecasting Value= " + Math.Round(forecast, 6).ToString + " "
+ "<td><b><span style='color:red'>" + mf4.ToString + "</b>"
            Dim str As String = Left(mf4, 3)
            Session("pred4") = str
            If (str = "MF2" Or str = "MF3") Then
                Label3.Text = Label3.Text + " There is some problems of this factor"
<a href='laivfddt.aspx?idate=' + idate + "&fdate=" + fdate + "'> LAIVFDT </a><br>"
            Else
                Label3.Text = Label3.Text + " There is not a problem of this factor"
<a href='laivfddt.aspx?idate=' + idate + "&fdate=" + fdate + "'> LAIVFDT </a><br>"
            End If
        Else
            Label3.Text = Label3.Text + "<tr><td>RMSE of " + i.ToString + "order "
+ Math.Round(result, 5).ToString + "    <td>    Forecasting Value= " + Math.Round
(forecast, 5).ToString + " " + "<td>" + mf4.ToString + "<br>"
        End If
        j = j + 1
    Next
    Label3.Text = Label3.Text + "</table>"
End If
End Sub

Function rmse_cal2(ByVal movavg As Integer, ByVal f As String, ByVal row As Integer) As
Double

'Open Excel file
Dim DBConnection = New OleDbConnection( _
    "Provider=Microsoft.Jet.OLEDB.4.0;" & _
    "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _

```

Fig. N.4. CMIMS coding-1 (4)

```

"Extended Properties=""Excel 8.0;HDR=No""")

DBConnection.Open()
'Query from Excel file
Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L500]"
Dim DBCommand = New OleDbCommand(SQLString, DBConnection)

'Access to data from Excel file via DBReader, each row is moved forward to next row
when the DBReader command is called.
'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
column.
Dim DBReader As IDataReader = DBCommand.ExecuteReader()
Dim temp As Double
Dim ADate, Fuzzyg, yt, d, x, xx, y, yy, p1, n, p2, m, p3, o, p4, l, p, md, ft, rmse
As New ArrayList
Dim stops As Integer = stopstxt.Text - 1
' Dim movavg As Integer = DropDownList1.SelectedValue.ToString

'Transfering data from Excel file to ADate and AD variables.
Dim temp2 As Integer = stops
For i As Integer = 0 To temp2
    DBReader.Read()

    If ((DBReader(0) >= idate) And (DBReader(0) <= fdate)) Then
        ADate.Add(DBReader(0))
        yt.Add(DBReader(row))
    Else
        stops = stops - 1
    End If
    stops_filter_date = stops
Next

'Comparing AD variable with data in Excel file for sort-out of fuzzy logical
relationship.
Dim j As Integer
'Finding a value of DH
Dim t As New ArrayList
For i = 0 To stops
    t.Add(yt(i))
Next
If (movavg = 1) Then
    For i = 0 To stops
        d.Add(Math.Abs(t(i)))
    Next
End If
If (movavg = 2) Then
    For i = 1 To stops
        d.Add(Math.Abs(t(i - 1) - t(i)))
    Next
End If
If (movavg = 3) Then
    For i = 2 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs((t(i - 1) - t
(i))))))
    Next
End If
If (movavg = 4) Then
    For i = 3 To stops
        d.Add(Math.Abs(Math.Abs(Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i -
1)) - Math.Abs(t(i - 1) - t(i))))))
    Next
End If
If (movavg = 5) Then
    For i = 4 To stops
        d.Add(Math.Abs(Math.Abs(Math.Abs(Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i -
2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t(i))))))
    Next
End If
If (movavg = 6) Then
    For i = 5 To stops
        d.Add(Math.Abs(Math.Abs(Math.Abs(Math.Abs(Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i -
3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1)
- t(i))))))
    Next

```

Fig. N.5. CMIMS coding-1 (5)

[illegible]

Fig. N.6. CMIMS coding-1 (6)

[illegible]

Fig. N.7. CMIMS coding-1 (7)

```

19)) - Math.Abs(t(i - 19) - t(i - 18)) - Math.Abs(t(i - 18) - t(i - 17)) - Math.Abs(t
(i - 17) - t(i - 16)) - Math.Abs(t(i - 16) - t(i - 15)) - Math.Abs(t(i - 15) - t(i -
14)) - Math.Abs(t(i - 14) - t(i - 13)) - Math.Abs(t(i - 13) - t(i - 12)) - Math.Abs(t(i
- 12) - t(i - 11)) - Math.Abs(t(i - 11) - t(i - 10)) - Math.Abs(t(i - 10) - t(i - 9))
- Math.Abs(t(i - 9) - t(i - 8)) - Math.Abs(t(i - 8) - t(i - 7)) - Math.Abs(t(i - 7) - t
(i - 6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i
- 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) -
Math.Abs(t(i - 1) - t(i)))
Next
End If
If (movavg = 23) Then
For i = 22 To stops
d.Add(Math.Abs(Math.Abs(t(i - 22) - t(i - 21)) - Math.Abs(t(i - 21) - t(i -
20)) - Math.Abs(t(i - 20) - t(i - 19)) - Math.Abs(t(i - 19) - t(i - 18)) - Math.Abs(t
(i - 18) - t(i - 17)) - Math.Abs(t(i - 17) - t(i - 16)) - Math.Abs(t(i - 16) - t(i -
15)) - Math.Abs(t(i - 15) - t(i - 14)) - Math.Abs(t(i - 14) - t(i - 13)) - Math.Abs(t(i
- 13) - t(i - 12)) - Math.Abs(t(i - 12) - t(i - 11)) - Math.Abs(t(i - 11) - t(i - 10))
- Math.Abs(t(i - 10) - t(i - 9)) - Math.Abs(t(i - 9) - t(i - 8)) - Math.Abs(t(i - 8) -
t(i - 7)) - Math.Abs(t(i - 7) - t(i - 6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t
(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) -
Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t(i)))
Next
End If
If (movavg = 24) Then
For i = 23 To stops
d.Add(Math.Abs(Math.Abs(t(i - 23) - t(i - 22)) - Math.Abs(t(i - 22) - t(i -
21)) - Math.Abs(t(i - 21) - t(i - 20)) - Math.Abs(t(i - 20) - t(i - 19)) - Math.Abs(t
(i - 19) - t(i - 18)) - Math.Abs(t(i - 18) - t(i - 17)) - Math.Abs(t(i - 17) - t(i -
16)) - Math.Abs(t(i - 16) - t(i - 15)) - Math.Abs(t(i - 15) - t(i - 14)) - Math.Abs(t(i
- 14) - t(i - 13)) - Math.Abs(t(i - 13) - t(i - 12)) - Math.Abs(t(i - 12) - t(i - 11))
- Math.Abs(t(i - 11) - t(i - 10)) - Math.Abs(t(i - 10) - t(i - 9)) - Math.Abs(t(i - 9)
- t(i - 8)) - Math.Abs(t(i - 8) - t(i - 7)) - Math.Abs(t(i - 7) - t(i - 6)) - Math.Abs
(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i - 3)) -
Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t
(i)))
Next
End If
If (movavg = 25) Then
For i = 24 To stops
d.Add(Math.Abs(Math.Abs(t(i - 24) - t(i - 23)) - Math.Abs(t(i - 23) - t(i -
22)) - Math.Abs(t(i - 22) - t(i - 21)) - Math.Abs(t(i - 21) - t(i - 20)) - Math.Abs(t
(i - 20) - t(i - 19)) - Math.Abs(t(i - 19) - t(i - 18)) - Math.Abs(t(i - 18) - t(i -
17)) - Math.Abs(t(i - 17) - t(i - 16)) - Math.Abs(t(i - 16) - t(i - 15)) - Math.Abs(t(i
- 15) - t(i - 14)) - Math.Abs(t(i - 14) - t(i - 13)) - Math.Abs(t(i - 13) - t(i - 12))
- Math.Abs(t(i - 12) - t(i - 11)) - Math.Abs(t(i - 11) - t(i - 10)) - Math.Abs(t(i -
10) - t(i - 9)) - Math.Abs(t(i - 9) - t(i - 8)) - Math.Abs(t(i - 8) - t(i - 7)) - Math.
Abs(t(i - 7) - t(i - 6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i -
4)) - Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2)
- t(i - 1)) - Math.Abs(t(i - 1) - t(i)))
Next
End If

'Display on screen
For i = 0 To stops
For j = 0 To SizeOfGroup - 1
If ((CSng(yt(i)) >= CSng(Low(j))) And (yt(i) < CSng(Upe(j)))) Then
Fuzzyg.Add((j + 1).ToString)
Exit For
End If
Next
Next

'Finding a value of X
For i = 0 To stops - movavg
x.Add(CSng(yt(i + movavg - 1) + d(i) / 2))
Next

'Finding a value of XX
For i = 0 To stops - movavg
xx.Add(CSng(yt(i + movavg - 1) - d(i) / 2))
Next

'Finding a value of Y
For i = 0 To stops - movavg

```

Fig. N.8. CMIMS coding-1 (8)

```

        y.Add(CSng(yt(i + movavg - 1) + d(i)))
    Next

    ''Finding a value of YY
    For i = 0 To stops - movavg
        yy.Add(CSng(yt(i + movavg - 1) - d(i)))
    Next

    ''Finding a value of p1
    For i = 0 To stops - movavg
        If (x(i) >= CSng(Low(Fuzzyg(i + movavg) - 1))) And x(i) <= CSng(Upe(Fuzzyg(i +
movavg) - 1)) Then
            p1.Add(x(i))
        Else
            p1.Add(0)
        End If
    Next

    ''Finding a value of n
    For i = 0 To stops - movavg
        If (p1(i) <> 0) Then
            n.Add(1)
        Else
            n.Add(0)
        End If
    Next

    ''Finding a value of p2
    For i = 0 To stops - movavg
        If (xx(i) >= CSng(Low(Fuzzyg(i + movavg) - 1))) And xx(i) <= CSng(Upe(Fuzzyg(i
+ movavg) - 1)) Then
            p2.Add(xx(i))
        Else
            p2.Add(0)
        End If
    Next

    ''Finding a value of m
    For i = 0 To stops - movavg
        If (p2(i) <> 0) Then
            m.Add(1)
        Else
            m.Add(0)
        End If
    Next

    ''Finding a value of p3
    For i = 0 To stops - movavg
        If (y(i) >= CSng(Low(Fuzzyg(i + movavg) - 1))) And y(i) <= CSng(Upe(Fuzzyg(i
movavg) - 1)) Then
            p3.Add(y(i))
        Else
            p3.Add(0)
        End If
    Next

    ''Finding a value of o
    For i = 0 To stops - movavg
        If (p3(i) <> 0) Then
            o.Add(1)
        Else
            o.Add(0)
        End If
    Next

    ''Finding a value of p4
    For i = 0 To stops - movavg
        If (yy(i) >= CSng(Low(Fuzzyg(i + movavg) - 1))) And yy(i) <= CSng(Upe(Fuzzyg(i
+ movavg) - 1)) Then
            p4.Add(yy(i))
        Else
            p4.Add(0)
        End If
    Next

```

Fig. N.9. CMIMS coding-1 (9)

```

'Finding a value of o
For i = 0 To stops - movavg
    If (p4(i) <> 0) Then
        l.Add(1)
    Else
        l.Add(0)
    End If
Next

'Finding a value of P
For i = 0 To stops - movavg
    p.Add(p1(i) + p2(i) + p3(i) + p4(i))
Next

'Finding a value of mi (middle value of the length)
For i = 0 To stops - movavg
    md.Add(Mi(Fuzzyg(i + movavg - 1) - 1))
Next

Dim round5 As Double

'Finding a value of f(t)
Dim ft_size As Integer = 1
For k As Integer = 1 To movavg
    fullforecast.Add("n/a")
    fullforecast2.Add("n/a")
    fullforecast3.Add("n/a")
    fullforecast4.Add("n/a")
Next

For i = 1 To stops - movavg + 1
    ft_size = ft_size + 1
    ft.Add((p(i - 1) + md(i - 1)) / (n(i - 1) + m(i - 1) + o(i - 1) + l(i - 1) + 1))
    round5 = Math.Round((p(i - 1) + md(i - 1)) / (n(i - 1) + m(i - 1) + o(i - 1) + l(i - 1) + 1), 5)
    fullforecast.Add(round5)
    fullforecast2.Add(round5)
    fullforecast3.Add(round5)
    fullforecast4.Add(round5)
Next

forecast = ft(ft_size - 2)
fullforecast.Add(Math.Round(forecast, 5))
fullforecast2.Add(Math.Round(forecast, 5))
fullforecast3.Add(Math.Round(forecast, 5))
fullforecast4.Add(Math.Round(forecast, 5))

'Finding a value of RMSE
Dim sum As Double = 0
For i = 0 To stops - movavg
    rmse.Add(Math.Pow(yt(i + movavg - 1) - ft(i), 2))
    sum = sum + Math.Pow(yt(i + movavg - 1) - ft(i), 2)
Next
sum = sum / (stops + 2)
sum = Math.Pow(sum, 0.5)
fullforecast.Add(Math.Round(sum, 5))
fullforecast2.Add(Math.Round(sum, 5))
fullforecast3.Add(Math.Round(sum, 5))
fullforecast4.Add(Math.Round(sum, 5))
temp = temp + 1

'Calulation part
Labell1.Text = ""
Labell1.Text = "<table border='1'><tr><td valign='bottom'>"
For i = 0 To stops
    Labell1.Text = Labell1.Text + ADate(i).ToString + "<br>"
Next

Labell1.Text = Labell1.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops

```

Fig. N.10. CMIMS coding-1 (10)

```

        Labell.Text = Labell.Text + "A" + Fuzzyg(i).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops
    Labell.Text = Labell.Text + yt(i).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg + 1
    Labell.Text = Labell.Text + System.Math.Round(d(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(x(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(xx(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(y(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'> <br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(yy(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(pl(i), 5).ToString + "<br>"
Next

'
Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(n(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(p2(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(m(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(p3(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(o(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(p4(i), 5).ToString + "<br>"
Next

Labell.Text = Labell.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Labell.Text = Labell.Text + System.Math.Round(l(i), 5).ToString + "<br>"
Next

```

Fig. N.11. CMIMS coding-1 (11)

```

Label1.Text = Label1.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Label1.Text = Label1.Text + System.Math.Round(p(i), 5).ToString + "<br>"
Next

Label1.Text = Label1.Text + "</td><td valign='bottom'><br>"
For i = 0 To stops - movavg
    Label1.Text = Label1.Text + System.Math.Round(md(i), 5).ToString + "<br>"
Next

Label1.Text = Label1.Text + "</td><td valign='bottom'><br><br><br>"
For i = 0 To stops - movavg
    Label1.Text = Label1.Text + System.Math.Round(ft(i), 5).ToString + "<br>"
Next

Label1.Text = Label1.Text + "</td><td valign='bottom'><br><br><br>"
For i = 0 To stops - movavg
    Label1.Text = Label1.Text + System.Math.Round(rmse(i), 5).ToString + "<br>"
Next

Label1.Text = Label1.Text + "</td>"

Label2.Text = sum.ToString

'Closing connection
Label2.Text = ""
For i = 0 To SizeOfGroup - 1
    Label2.Text = Label2.Text + CSng(Low(i)).ToString + "      " + CSng(Mi(i)).
ToString + "      " + CSng(Upe(i)).ToString + "<br>"
Next

DBReader.Close()
Return sum

End Function

Function find_lenght(ByVal movavg As Integer, ByVal f As String, ByVal row As Integer)
As Double

'Open Excel file
Dim DBConnection = New OleDbConnection( _
    "Provider=Microsoft.Jet.OLEDB.4.0;" &
    "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _
    "Extended Properties=""Excel 8.0;HDR=No""")

DBConnection.Open()
'Query from Excel
Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L500]"
Dim DBCommand = New OleDbCommand(SQLString, DBConnection)

'Access to data from Excel file via DBReader, each row is moved forward to next row
when the DBReader command is called.
'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
column.
Dim DBReader As IDataReader = DBCommand.ExecuteReader()

Dim temp As Double
Dim ADate, Fuzzyg, yt, d, x, xx, y, yy, pl, n, p2, m, p3, o, p4, l, p, md, ft, rmse
As New ArrayList
Dim stops As Integer = stopstxt.Text - 1
' Dim movavg As Integer = DropDownList1.SelectedValue.ToString

'Transfering data from Excel file to ADate and AD variables.
Dim temp2 As Integer = stops
For i As Integer = 0 To temp2
    DBReader.Read()
    If ((DBReader(0) >= idate) And (DBReader(0) <= fdate)) Then
        ADate.Add(DBReader(0))
        yt.Add(DBReader(row))
    Else
        stops = stops - 1
    End If
Next

```

Fig. N.12. CMIMS coding-1 (12)

```

'Comparing AD variable with data in Excel file for sort-out of fuzzy logical
relationship.
Dim j As Integer

'Finding a value of DH
Dim t As New ArrayList
For i = 0 To stops
    t.Add(yt(i))
Next

If (movavg = 1) Then
    For i = 0 To stops
        d.Add(Math.Abs(t(i)))
    Next
End If

If (movavg = 2) Then
    For i = 1 To stops
        d.Add(Math.Abs(t(i - 1) - t(i)))
    Next
End If

If (movavg = 3) Then
    For i = 2 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs((t(i - 1) - t
1))))))
    Next
End If

If (movavg = 4) Then
    For i = 3 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i -
1)) - Math.Abs(t(i - 1) - t(i))))
    Next
End If

If (movavg = 5) Then
    For i = 4 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i -
2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t(i))))
    Next
End If

If (movavg = 6) Then
    For i = 5 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i -
3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1)
- t(i))))
    Next
End If

If (movavg = 7) Then
    For i = 6 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i -
4)) - Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2)
- t(i - 1)) - Math.Abs(t(i - 1) - t(i))))
    Next
End If

If (movavg = 8) Then
    For i = 7 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 7) - t(i - 6)) - Math.Abs(t(i - 6) - t(i -
5)) - Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3)
- t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t(i))))
    Next
End If

If (movavg = 9) Then
    For i = 8 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 8) - t(i - 7)) - Math.Abs(t(i - 7) - t(i -
6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4)
- t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs
(t(i - 1) - t(i))))
    Next
End If

If (movavg = 10) Then
    For i = 9 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 9) - t(i - 8)) - Math.Abs(t(i - 8) - t(i -
7)) - Math.Abs(t(i - 7) - t(i - 6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5)

```

Fig. N.13. CMIMS coding-1 (13)





```

(i - 19) - t(i - 18)) - Math.Abs(t(i - 18) - t(i - 17)) - Math.Abs(t(i - 17) - t(i - 16)) - Math.Abs(t(i - 16) - t(i - 15)) - Math.Abs(t(i - 15) - t(i - 14)) - Math.Abs(t(i - 14) - t(i - 13)) - Math.Abs(t(i - 13) - t(i - 12)) - Math.Abs(t(i - 12) - t(i - 11)) - Math.Abs(t(i - 11) - t(i - 10)) - Math.Abs(t(i - 10) - t(i - 9)) - Math.Abs(t(i - 9) - t(i - 8)) - Math.Abs(t(i - 8) - t(i - 7)) - Math.Abs(t(i - 7) - t(i - 6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t(i)))
Next
End If
If (movavg = 25) Then
    For i = 24 To stops
        d.Add(Math.Abs(Math.Abs(t(i - 24) - t(i - 23)) - Math.Abs(t(i - 23) - t(i - 22)) - Math.Abs(t(i - 22) - t(i - 21)) - Math.Abs(t(i - 21) - t(i - 20)) - Math.Abs(t(i - 20) - t(i - 19)) - Math.Abs(t(i - 19) - t(i - 18)) - Math.Abs(t(i - 18) - t(i - 17)) - Math.Abs(t(i - 17) - t(i - 16)) - Math.Abs(t(i - 16) - t(i - 15)) - Math.Abs(t(i - 15) - t(i - 14)) - Math.Abs(t(i - 14) - t(i - 13)) - Math.Abs(t(i - 13) - t(i - 12)) - Math.Abs(t(i - 12) - t(i - 11)) - Math.Abs(t(i - 11) - t(i - 10)) - Math.Abs(t(i - 10) - t(i - 9)) - Math.Abs(t(i - 9) - t(i - 8)) - Math.Abs(t(i - 8) - t(i - 7)) - Math.Abs(t(i - 7) - t(i - 6)) - Math.Abs(t(i - 6) - t(i - 5)) - Math.Abs(t(i - 5) - t(i - 4)) - Math.Abs(t(i - 4) - t(i - 3)) - Math.Abs(t(i - 3) - t(i - 2)) - Math.Abs(t(i - 2) - t(i - 1)) - Math.Abs(t(i - 1) - t(i))))
    Next
End If

Dim s As Double = 0
Dim c As Double = 0
Dim base As Double = 0
Dim length As Double
Dim min As Double = 0
Dim max As Double = 0

For i = 0 To stops - movavg + 1
    s = s + d(i)
    c = c + 1
Next
base = s / c
base = base / 2
min = yt(0)
max = yt(0)
For i = 1 To stops - 1
    If (yt(i) >= max) Then
        max = yt(i)
    End If
    If (yt(i) <= min) Then
        min = yt(i)
    End If
Next

If (base >= 0.001 And base <= 0.01) Then
    If base > 0.005 Then
        length = 0.01
        min = Math.Truncate(min * 100) / 100
    Else
        length = 0.001
        min = Math.Truncate(min * 1000) / 1000
    End If
End If

If (base >= 0.01 And base <= 0.1) Then
    If base > 0.05 Then
        length = 0.1
        min = Math.Truncate(min * 10) / 10
    Else
        length = 0.01
        min = Math.Truncate(min * 100) / 100
    End If
End If

If (base > 0.1 And base <= 1) Then
    If base > 0.5 Then
        length = 1
        min = Math.Truncate(min * 1) / 1
    Else

```

Fig. N.16. CMIMS coding-1 (16)

```

        length = 0.1
        min = Math.Truncate(min * 10) / 10
    End If
End If

If (base > 1 And base <= 10) Then
    If base > 5 Then
        length = 10
        min = Math.Truncate(min * 0.1) / 0.1
    Else
        length = 1
        min = Math.Truncate(min * 1) / 1
    End If
End If

If (base > 10 And base <= 100) Then
    If base > 50 Then
        length = 100
        min = Math.Truncate(min * 0.01) / 0.01
    Else
        length = 10
        min = Math.Truncate(min * 0.1) / 0.1
    End If
End If

If (base > 100 And base <= 1000) Then
    If base > 500 Then
        length = 1000
        min = Math.Truncate(min * 0.001) / 0.001
    Else
        length = 100
        min = Math.Truncate(min * 0.01) / 0.01
    End If
End If
temp = temp + 1
While min < max
    Low.Add(min)
    Upe.Add(min + length)
    Mi.Add(min + length / 2)
    SizeOfGroup = SizeOfGroup + 1
    min = CSng(min + length)
End While

End Function

Protected Sub check_mf_min(ByVal forecast As Double)

    If (forecast >= 2.5 And forecast <= 5.5) Then
        mf = "MF1 : Maintainance Plan"
    Else
        If (forecast >= 1.0 And forecast < 2.5) Then
            mf = "MF2 : Maintainance within 1-2 working day "
        Else
            If (forecast >= 5.5) Then
                mf = "MF3 : Emergency Maintainance"
            Else
                If (forecast >= 0.0 And forecast < 1.0) Then
                    mf = "MF3 : Emergency Maintainance"
                End If
            End If
        End If
    End If
End If
End Sub

Protected Sub check_min_cus(ByVal forecast As Double)

    If (forecast >= 2.5 And forecast <= 5.5) Then
        mf1 = "MF1"
    Else
        If (forecast >= 1.0 And forecast < 2.5) Then
            mf1 = "MF2"
        Else
            If (forecast >= 5.5) Then
                mf1 = "MF3"
            End If
        End If
    End If
End Sub

```

Fig. N.17. CMIMS coding-I (17)

```

        Else
            If (forecast >= 0.0 And forecast < 1.0) Then
                mf1 = "MF3"
            End If
        End If
    End If
    End If
    Session("mf1") = mf1.ToString
End Sub

Protected Sub check_fil_tim(ByVal forecast As Double)

    If (forecast >= 0.4 And forecast <= 8.8) Then
        mf2 = "MF1"
    Else
        If ((forecast >= 0.3 And forecast < 0.4) Or (forecast >= 0.8 And forecast <= 0.4)
4)) Then
            mf2 = "MF2"
        Else
            If (forecast < 0.3) Or (forecast > 0.9) Then
                mf2 = "MF3"
            Else
                mf2 = "MF3"
            End If
        End If
    End If
    Session("mf2") = mf2.ToString
End Sub

Protected Sub check_fil_pea(ByVal forecast As Double)

    If (forecast >= 80 And forecast < 110) Then
        mf3 = "MF1"
    Else
        If (forecast < 80) Or (forecast >= 110 And forecast < 125) Then
            mf3 = "MF2"
        Else
            If (forecast >= 125) Then
                mf3 = "MF3"
            Else
                mf3 = "MF3"
            End If
        End If
    End If
    Session("mf3") = mf3.ToString
End Sub

Protected Sub check_VP_pre(ByVal forecast As Double)

    If (forecast >= 85 And forecast < 110) Then
        mf4 = "MF1"
    Else
        If (forecast > 85) Or (forecast >= 100 And forecast < 120) Then
            mf4 = "MF2"
        Else
            If (forecast >= 120) Then
                mf4 = "MF3"
            Else
                mf4 = "MF3"
            End If
        End If
    End If
    Session("mf4") = mf4.ToString
End Sub

Protected Sub check_mf_fil(ByVal forecast As Double)

    If (forecast >= 0.4 And forecast <= 0.8) Then
        mf = "MF1 : Maintenance Plan"
    Else
        If (forecast >= 0.3 And forecast < 0.4) Or (forecast > 0.8 And forecast <= 0.9)
Then
            mf = "MF2 : Maintenance within 1-2 working day "
        Else

```

Fig. N.18. CMIMS coding-1 (18)

## **Appendix O**

### **CMIMS Coding (1) and (2) - in Accompanying CD-ROM Disk.**

In appendix O in accompanying CD-ROM disk, figure O.1 to O.4 expose CMIMS coding-(1) for HO-T2FTS method coding and figure O.5 to O.18 illustrate CMIMS coding-(2) for LAIVFDT-OPN method coding as following.



```

        If (forecast > 0.9) Or (forecast < 0.3) Then
            mf = "MF3 : Emergency Maintainance "
        Else
            mf = "MF3 : Emergency Maintainance "
        End If
    End If
End Sub

Protected Sub Button4_Click(ByVal sender As Object, ByVal e As System.EventArgs)
Handles Button4.Click
    Calendar1.Visible = Not Calendar1.Visible
End Sub

Protected Sub Calendar1_SelectionChanged(ByVal sender As Object, ByVal e As System.
EventArgs) Handles Calendar1.SelectionChanged
    initdate.Text = Calendar1.SelectedDate.Date
    Calendar1.Visible = False
End Sub

Protected Sub Calendar2_SelectionChanged(ByVal sender As Object, ByVal e As System.
EventArgs) Handles Calendar2.SelectionChanged
    finaldate.Text = Calendar2.SelectedDate.Date
    Calendar2.Visible = False
End Sub

Protected Sub Page_Load(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me
.Load
End Sub

Protected Sub Button5_Click(ByVal sender As Object, ByVal e As System.EventArgs)
Handles Button5.Click
    Calendar2.Visible = Not Calendar2.Visible
End Sub

Protected Sub Button6_Click(ByVal sender As Object, ByVal e As System.EventArgs)
Handles Button6.Click

    Dim result As Double
    Dim nstart, nstop As Integer
    nstart = iwtxt.Text
    nstop = swtxt.Text
    idate = DateTime.Parse(initdate.Text)
    fdate = DateTime.Parse(finaldate.Text)
    If nstart > nstop Then
        nstart = nstop
    End If
    Label3.Text = ""
    Dim f As String
    f = "HO2TFTS.xls"
    Dim output As New ArrayList
    Dim a As Double

    If CheckBox1.Checked = True Then
        result = 0
        fullforecast = New ArrayList
        fullforecast.Add("Date")
        Label3.Text = Label3.Text + "Attribute Minimum Cushion Position <br>"
        a = date full forecast(1, f, 5)
        result = find_lenght(2, f, 5)
        Dim inde As Integer = 0
        For i As Integer = nstart To nstop
            fullforecast.Add(i.ToString + " Order")
            result = rmse_cal2(i, f, 5)
        Next
        Label3.Text = Label3.Text + "<table border='1'>"
        For i As Integer = 0 To stops_filter_date + 3
            Label3.Text = Label3.Text + "<tr>"
            For j As Integer = nstart To nstop + 1
                Label3.Text = Label3.Text + "<td>" + fullforecast(i + inde *
(stops filter date + 4)).ToString
                inde = inde + 1
            Next

```

Fig. O.1. CMIMS coding-1 (19)

```

        inde = inde + 1
    Next
    inde = 0
Next
Label3.Text = Label3.Text + "</table>"
End If
End Sub

Function date_full_forecast(ByVal movavg As Integer, ByVal f As String, ByVal row As Integer) As Double
    'Open Excel file
    Dim DBConnection = New OleDbConnection( _
        "Provider=Microsoft.Jet.OLEDB.4.0;" & _
        "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _
        "Extended Properties=""Excel 8.0;HDR=No""")

    DBConnection.Open()
    'Query from Excel
    Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L500]"
    Dim DBCommand = New OleDbCommand(SQLString, DBConnection)

    'Access to data from Excel file via DBReader, each row is moved forward to next row
    when the DBReader command is called.
    'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
    column.
    Dim DBReader As IDataReader = DBCommand.ExecuteReader()
    Dim ADate As New ArrayList
    Dim stops As Integer = stopstxt.Text - 1
    ' Dim movavg As Integer = DropDownList1.SelectedValue.ToString

    'Transferring data from Excel file to ADate and AD variables.
    Dim temp2 As Integer = stops
    For i As Integer = 0 To temp2
        DBReader.Read()
        If ((DBReader(0) >= idate) And (DBReader(0) <= fdate)) Then
            Dim dateround As Date
            dateround = DBReader(0)
            fullforecast.Add(dateround.ToString("d"))
        Else
            stops = stops - 1
        End If
    Next
    fullforecast.Add("Forecast next day")
    fullforecast.Add("RMSE")
    DBReader.Close()
End Function

Function date_full_forecast2(ByVal movavg As Integer, ByVal f As String, ByVal row As Integer) As Double
    'Open Excel file
    Dim DBConnection = New OleDbConnection( _
        "Provider=Microsoft.Jet.OLEDB.4.0;" & _
        "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _
        "Extended Properties=""Excel 8.0;HDR=No""")

    DBConnection.Open()
    'Query from Excel
    Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L500]"
    Dim DBCommand = New OleDbCommand(SQLString, DBConnection)

    'Access to data from Excel file via DBReader, each row is moved forward to next row
    when the DBReader command is called.
    'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
    column.
    Dim DBReader As IDataReader = DBCommand.ExecuteReader()
    Dim ADate As New ArrayList
    Dim stops As Integer = stopstxt.Text - 1
    ' Dim movavg As Integer = DropDownList1.SelectedValue.ToString

    'Transferring data from Excel file to ADate and AD variables.
    Dim temp2 As Integer = stops
    For i As Integer = 0 To temp2
        DBReader.Read()
    Next

```

Fig. O.2. CMIMS coding-1 (21)

```

        If ((DBReader(0) >= idate) And (DBReader(0) <= fdate)) Then
            Dim dateround As Date
            dateround = DBReader(0)
            fullforecast2.Add(dateround.ToString("d"))
        Else
            stops = stops - 1
        End If
    Next
    fullforecast2.Add("Forecast next day")
    fullforecast2.Add("RMSE")
    DBReader.Close()
End Function

Function date_full_forecast3(ByVal movavg As Integer, ByVal f As String, ByVal row As Integer) As Double
    'Open Excel file
    Dim DBConnection = New OleDbConnection( _
        "Provider=Microsoft.Jet.OLEDB.4.0;" & _
        "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _
        "Extended Properties=""Excel 8.0;HDR=No""")

    DBConnection.Open()
    'Query from Excel
    Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L500]"
    Dim DBCommand = New OleDbCommand(SQLString, DBConnection)

    'Access to data from Excel file via DBReader, each row is moved forward to next row
    when the DBReader command is called.
    'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
    column.
    Dim DBReader As IDataReader = DBCommand.ExecuteReader()
    Dim ADate As New ArrayList
    Dim stops As Integer = stopstxt.Text - 1
    ' Dim movavg As Integer = DropDownList1.SelectedValue.ToString

    'Transferring data from Excel file to ADate and AD variables.
    Dim temp2 As Integer = stops
    For i As Integer = 0 To temp2
        DBReader.Read()

        If ((DBReader(0) >= idate) And (DBReader(0) <= fdate)) Then
            Dim dateround As Date
            dateround = DBReader(0)
            fullforecast3.Add(dateround.ToString("d"))
        Else
            stops = stops - 1
        End If
    Next
    fullforecast3.Add("Forecast next day")
    fullforecast3.Add("RMSE")
    DBReader.Close()
End Function

Function date_full_forecast4(ByVal movavg As Integer, ByVal f As String, ByVal row As Integer) As Double
    'Open Excel file
    Dim DBConnection = New OleDbConnection( _
        "Provider=Microsoft.Jet.OLEDB.4.0;" & _
        "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _
        "Extended Properties=""Excel 8.0;HDR=No""")

    DBConnection.Open()
    'Query from Excel
    Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L500]"
    Dim DBCommand = New OleDbCommand(SQLString, DBConnection)

    'Access to data from Excel file via DBReader, each row is moved forward to next row
    when the DBReader command is called.
    'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
    column.
    Dim DBReader As IDataReader = DBCommand.ExecuteReader()
    Dim ADate As New ArrayList
    Dim stops As Integer = stopstxt.Text - 1
    ' Dim movavg As Integer = DropDownList1.SelectedValue.ToString

```

Fig. O.3. CMIMS coding-1 (22)

```

'Transferring data from Excel file to ADate and AD variables.
Dim temp2 As Integer = stops
For i As Integer = 0 To temp2
    DBReader.Read()
    If ((DBReader(0) >= idate) And (DBReader(0) <= fdate)) Then
        Dim dateround As Date
        dateround = DBReader(0)
        fullforecast4.Add(dateround.ToString("d"))
    Else
        stops = stops - 1
    End If
Next
fullforecast4.Add("Forecast next day")
fullforecast4.Add("RMSE")
DBReader.Close()
End Function

End Class

```

Fig. O.4. CMIMS coding-1 (23)

```

*****
'      L A I V F D T - O P N      M E T H O D
*****

Imports System.Data
Imports System.Data.OleDb
Partial Class laivfdt
    Inherits System.Web.UI.Page
    Dim SD1, SD2, SD3, SD4, SD5, SD6, SD7, SD8, SD9, SD10, SD11 As String
    Dim Output As String = ""
    Dim report As String = ""
    Dim IVFDTDate As Date
    Dim Finalstatus As String
    Dim Status As String
    Dim d1st, d2st, d3st, d4st, d5st, d6st, d7st, d8st, d9st, d10st, d11st As String
    Dim d1de, d2de, d3de, d4de, d5de, d6de, d7de, d8de, d9de, d10de, d11de As String
    Dim d1sy, d2sy, d3sy, d4sy, d5sy, d6sy, d7sy, d8sy, d9sy, d10sy, d11sy As String
    Dim d1so, d2so, d3so, d4so, d5so, d6so, d7so, d8so, d9so, d10so, d11so As String
    Dim overml As String
    Dim overeq1 As String
    Dim typeid, model, capacity, mfgbrandname, serailno As String
    Dim finalforecast1, finalforecast2, finalforecast3, finalforecast4 As String
    Dim gfinalforecast As String
    Dim errortxt As String
    Dim overallstatus As String
    Dim count As Integer

    Protected Sub Page_Load(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me
        .Load

        'Open Excel file
        Dim f2 As String = "CMIMSdatabase.xls"
        Dim DBConnection2 = New OleDbConnection(
            "Provider=Microsoft.Jet.OLEDB.4.0;" & _
            "Data Source=" & Server.MapPath("~/excel/" & f2) & ";" & _
            "Extended Properties=""Excel 8.0;HDR=No""")
        DBConnection2.Open()
        'Query from Excel file
        Dim SQLString2 As String = "SELECT * FROM [MachineDetails$A2:L28]"
        Dim DBCommand2 = New OleDbCommand(SQLString2, DBConnection2)
        Dim DBReader2 As IDataReader = DBCommand2.ExecuteReader()

        While (DBReader2.Read)
            If DBReader2(0) = Session("machine").ToString Then
                typeid = DBReader2(1)
                model = DBReader2(2)
                capacity = DBReader2(3)
                mfgbrandname = DBReader2(4)
                serailno = DBReader2(5)
            End If
        End While

        Dim f As String = "LAIVFDT.xls"
        Dim DBConnection = New OleDbConnection(
            "Provider=Microsoft.Jet.OLEDB.4.0;" & _
            "Data Source=" & Server.MapPath("~/excel/" & f) & ";" & _
            "Extended Properties=""Excel 8.0;HDR=No""")

        DBConnection.Open()
        'Query from Excel file
        Dim SQLString As String = "SELECT * FROM [Sheet1$A1:L28]"
        Dim DBCommand = New OleDbCommand(SQLString, DBConnection)
        'Access to data from Excel file via DBReader, each row is moved forward to next row
        when the DBReader command is called.
        'To refer a position such as DBReader(0), DBReader(0) refers to data in the first
        column.
        Dim DBReader As IDataReader = DBCommand.ExecuteReader()
        Dim StartD, EndD As Date

        StartD = Date.Parse(Request.QueryString("idate")).ToShortDateString
        EndD = Date.Parse(Request.QueryString("fdate")).ToShortDateString
        finalforecast1 = Session("mf1").ToString
        finalforecast2 = Session("mf2").ToString
        finalforecast3 = Session("mf3").ToString

```

Fig. O.5. CMIMS coding-2 (1)

```

finalforecast4 = Session("mf4").ToString
Label1.Text = ""
report = report + "<h3>Report of machine maintenance</h3>"
report = report + "<table><tr>"
report = report + "<td align='right' width='200'><b>Forecast data</b> from date:  "
<td> " + StartD + " <tr><td align='right'>to date:<td> " + EndD
report = report + "<tr><td colspan='2'><hr>"
report = report + "<tr><td><b> Machine Detail:</b><td>"
report = report + "<tr><td>Machine no<td>" + Session("machine").ToString
report = report + "<tr><td>Type<td>" + typeid
report = report + "<tr><td>Model<td>" + model
report = report + "<tr><td>MFG. brand name<td>" + mfgbrandname
report = report + "<tr><td>Capacity<td>" + capacity
report = report + "<tr><td>Serial no<td>" + serailno

While (DBReader.Read)
    IVFDTDate = DBReader(0)
    If IVFDTDate >= StartD And IVFDTDate <= EndD Then
        SD1 = DBReader(1)
        SD2 = DBReader(2)
        SD3 = DBReader(3)
        SD4 = DBReader(4)
        SD5 = DBReader(5)
        SD6 = DBReader(6)
        SD7 = DBReader(7)
        SD8 = DBReader(8)
        SD9 = DBReader(9)
        SD10 = DBReader(10)
        SD11 = DBReader(11)
        'Output = Output + DBReader(0).ToString + " <br> "
        Label1.Text = ""
        H1()
        '
        '
        check_1()
        ov1()
    End If
End While

report = report + "<tr><td colspan='2'><hr>"
report = report + "<tr><td> <b>List of equipment status:</b><td>"
report = report + "<tr><td>Forecasting date:<td>" + EndD.AddDays(+1)
report = report + "<tr><td><b>equipment positions:<td>status</b>"

If (d1st = "PAF" Or d1st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D1<td><span style='color:red'>
'>" + d1st
Else
    report = report + "<tr><td>D1<td>" + d1st
End If

If (d2st = "PAF" Or d2st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D2<td><span style='color:red'>
'>" + d2st
Else
    report = report + "<tr><td>D2<td>" + d2st
End If

If (d3st = "PAF" Or d3st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D3<td><span style='color:red'>
'>" + d3st
Else
    report = report + "<tr><td>D3<td>" + d3st
End If

If (d4st = "PAF" Or d4st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D4<td><span style='color:red'>
'>" + d4st
Else
    report = report + "<tr><td>D4<td>" + d4st
End If

If (d5st = "PAF" Or d5st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D5<td><span style='color:red'>
'>" + d5st
Else
    report = report + "<tr><td>D5<td>" + d5st
End If

```

Fig. O.6. CMIMS coding-2 (2)

```

'>" + d5st
Else
    report = report + "<tr><td>D5<td>" + d5st
End If

If (d6st = "PAF" Or d6st = "COF") Then
    report = report + "<tr><td><span style='color:red'>Dd6<td><span style='color:red'>" + d6st
Else
    report = report + "<tr><td>D6<td>" + d6st
End If

If (d7st = "PAF" Or d7st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D7<td><span style='color:red'>" + d7st
Else
    report = report + "<tr><td>D7<td>" + d7st
End If

If (d8st = "PAF" Or d8st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D8<td><span style='color:red'>" + d8st
Else
    report = report + "<tr><td>D8<td>" + d8st
End If

If (d9st = "PAF" Or d9st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D9<td><span style='color:red'>" + d9st
Else
    report = report + "<tr><td>D9<td>" + d9st
End If

If (d10st = "PAF" Or d10st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D10<td><span style='color:red'>" + d10st
Else
    report = report + "<tr><td>D10<td>" + d10st
End If

If (d11st = "PAF" Or d11st = "COF") Then
    report = report + "<tr><td><span style='color:red'>D11<td><span style='color:red'>" + d11st
Else
    report = report + "<tr><td>D11<td>" + d11st
End If

If d1st = "PAF" Or d8st = "COF" Then
    report = report + "<tr><td colspan='2'><hr>"
    report = report + "<tr><td><b><span style='color:red'>Core critical equipment position:</b><td> D1"
    report = report + "<tr><td>Daily check description:<td>" + dlde
    report = report + "<tr><td>Current status:<td>" + d1st
    report = report + "<tr><td>Problem:<td>" + dlsy
    report = report + "<tr><td>Solution:<td>" + dlso
    report = report + "<tr><td colspan='2'><b>Overall status of equipment</b>"
    report = report + "<tr><td>Overall status of machine:<td>" + overml
    report = report + "<tr><td>Overall status of equipment:<td>" + overeq1
    count = count + 1
Else
    report = report + "<tr><td colspan='2'><hr>"
    report = report + "<tr><td><b>Other equipment position:</b><td> D1"
    report = report + "<tr><td>Daily check description:<td>" + dlde
    report = report + "<tr><td>Current status:<td>" + d1st
    report = report + "<tr><td>Problem:<td>" + dlsy
    report = report + "<tr><td>Solution:<td>" + dlso
    report = report + "<tr><td colspan='2'><b>Overall status of equipment</b>"
    report = report + "<tr><td>Overall status of machine:<td>" + overml
    report = report + "<tr><td>Overall status of equipment:<td>" + overeq1
    count = count + 1
End If

If d2st = "PAF" Or d2st = "COF" Then
    report = report + "<tr><td colspan='2'><hr>"

```

Fig. O.7. CMIMS coding-2 (3)







```

End If

If d11st = "PAF" Or d11st = "COF" Then
    report = report + "<tr><td colspan='2'><hr>"
    report = report + "<tr><td><b><span style='color:red'>Core critical equipment
position:</b><td> d11"
    report = report + "<tr><td>Daily check description:<td>" + d11de
    report = report + "<tr><td>Current status:<td>" + d11st
    report = report + "<tr><td>Problem:<td>" + d11sy
    report = report + "<tr><td>Solution:<td>" + d11so
    report = report + "<tr><td colspan='2'><b>Overall status of equipment</b>"
    report = report + "<tr><td>Overall status of machine:<td>" + overml
    report = report + "<tr><td>Overall status of equipment:<td>" + overeq1
    count = count + 1
Else
    report = report + "<tr><td colspan='2'><hr>"
    report = report + "<tr><td><b>Other equipment position:</b><td> d11"
    report = report + "<tr><td>Daily check description:<td>" + d11de
    report = report + "<tr><td>Current status:<td>" + d11st
    report = report + "<tr><td>Problem:<td>" + d11sy
    report = report + "<tr><td>Solution:<td>" + d11so
    report = report + "<tr><td colspan='2'><b>Overall status of equipment</b>"
    report = report + "<tr><td>Overall status of machine:<td>" + overml
    report = report + "<tr><td>Overall status of equipment:<td>" + overeq1
    count = count + 1
End If

report = report + "<tr><td><td><tr><td colspan='2'><b>Overall prediction of machine
maintenance:</b>"
If (Session("pred1") <> "") And (Session("chkb1") = "1") Then
    report = report + "<tr><td> Minimum cushion position:<td>"
    If Session("pred1") = "MF1" Then
        report = report + "Maintenance Plan"
    End If
    If Session("pred1") = "MF2" Then
        report = report + "Emergency Maintenance"
    End If
    If Session("pred1") = "MF3" Then
        report = report + "Maintenance within 1-2 working day"
    End If
End If

If (Session("pred2") <> "") And (Session("chkb2") = "1") Then
    report = report + "<tr><td> Filling time:<td>"
    If Session("pred2") = "MF1" Then
        report = report + "Maintenance Plan"
    End If
    If Session("pred2") = "MF2" Then
        report = report + "Emergency Maintenance"
    End If
    If Session("pred2") = "MF3" Then
        report = report + "Maintenance within 1-2 working day"
    End If
End If

If (Session("pred3") <> "") And (Session("chkb3") = "1") Then
    report = report + "<tr><td> Filling peak:<td>"
    If Session("pred3") = "MF1" Then
        report = report + "Maintenance Plan"
    End If
    If Session("pred3") = "MF2" Then
        report = report + "Emergency Maintenance"
    End If
    If Session("pred3") = "MF3" Then
        report = report + "Maintenance within 1-2 working day"
    End If
End If

If (Session("pred4") <> "") And (Session("chkb4") = "1") Then
    report = report + "<tr><td> V-P pressure:<td>"
    If Session("pred4") = "MF1" Then
        report = report + "Maintenance Plan"
    End If
    If Session("pred4") = "MF2" Then
        report = report + "Emergency Maintenance"
    End If

```

Fig. O.11. CMIMS coding-2 (7)

```

        If Session("pred4") = "MF3" Then
            report = report + "Maintenance within 1-2 working day"
        End If
    End If

    report = report + "<tr><td><tr><td colspan='2'><b>The conclusion of machine health:</b>"

    'If overml = "Very good" And overeq1 = "ACT" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is acceptable and all equipment of machine has very good status. Machine maintenance is upon machine maintenance plan"
    'End If

    'If overml = "Good" And overeq1 = "ACT" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is acceptable and most of machine equipment have good status. However, some equipment of machine should be inspected and maintained. Machine maintenance is upon machine maintenance plan"
    'End If

    'If overml = "Good" And overeq1 = "UAC" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is unacceptable. Some equipment of machine has good status and some machine equipment need to inspect and maintain. Machine maintenance is upon maintenance with 1-2 working days."
    'End If

    'If overml = "Moderate" And overeq1 = "ACT" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is unacceptable. Some equipment of machine has moderate status and some machine equipment need to repair and maintain. Machine maintenance is upon maintenance with 1-2 working days."
    'End If

    'If overml = "Moderate" And overeq1 = "UAC" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is unacceptable. Some equipment of machine has moderate status and some machine equipment need to repair and maintain. Machine maintenance is upon maintenance with 1-2 working days."
    'End If

    'If overml = "Moderate" And overeq1 = "UAC" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is unacceptable. Some equipment of machine has moderate status and some machine equipment need to repair and maintain. Machine maintenance is upon maintenance with 1-2 working days."
    'End If

    'If overml = "Poor" And overeq1 = "ACT" Then
    '    report = report + "<tr><td colspan='2'>Overall status of machine is unacceptable. Some equipment of machine has poor status and some machine equipment must fix or replace with new equipment. Machine maintenance is upon maintenance with 1-2 working days."
    'End If

    report = report + "<tr><td colspan='2'>" + overallstatus + "</td></tr>"
    report = report + "<tr><td colspan='2'><hr>"
    report = report + "<tr><td colspan='2'><b>Description of symbols</b>"
    report = report + "<tr><td>D1<td>Checking safety door (Non-operation side)."
    report = report + "<tr><td>D2<td>Emergency stop button operations check (Rear)."
    report = report + "<tr><td>D3<td>Checking water jacket temperature setting (Hopper machine position)."
    report = report + "<tr><td>D4<td>Checking an electronic line and sensor thermocouple of heater barrel)."
    report = report + "<tr><td>D5<td>Checking purge cover interlock, exhaust pipe and shutter value."
    report = report + "<tr><td>D6<td>Checking melt leakage at a nozzle."
    report = report + "<tr><td>D7<td>Emergency stop button operations check (Front)."
    report = report + "<tr><td>D8<td>Checking safety door (Operation side)."
    report = report + "<tr><td>D9<td>Checking mold mounting bolts and bolts/nuts at fixed platen."
    report = report + "<tr><td>D10<td>Checking mold mounting bolts and bolts/nuts at moved platen."
    report = report + "<tr><td>D11<td>Checking and cleaning tie bar and slide ring value."

```

Fig. O.12. CMIMS coding-2 (8)

```

report = report + "<tr><td>NOF<td>Normal operation status"
report = report + "<tr><td>PAF<td>Partial failure status"
report = report + "<tr><td>COF<td>Complete failure status"
report = report + "<tr><td>ACT<td>Acceptable status"
report = report + "<tr><td>UAC<td>Unacceptable status"

End If
End If
End Sub

Sub Al_0()
If SD10 = "NOP" Then
    'Output = Output + "show Msg box4 <br>"
    box4()
    Al_1()
Else
    If SD10 = "PAF" Then
        'Output = Output + "show Msg box5 <br>"
        box5()
        Al_2()
    Else
        If SD10 = "COF" Then
            'Output = "show Msg box6 <br>"
            box6()
            'Al_3() ***
        Else
            '5 1 ***
            Output = Output + "error please check the condisiton and try again"
        End If
    End If
End If
End Sub

Sub Al_1()
If SD4 = "NOP" Then
    'Output = Output + "show Msg box7 <br>"
    box7()
    Al_1_1()
Else
    If SD4 = "PAF" Then
        'Output = Output + "show Msg box8 <br>"
        box8()
        Al_1_2()
    Else
        If SD4 = "COF" Then
            'Output = Output + "show Msg box9 <br>"
            box9()
            Al_1_2()
        Else
            '5 1 ***
            Output = Output + "error please check the condisiton and try again"
        End If
    End If
End If
End Sub

Sub Al_1_1()
If SD8 = "NOP" Then
    'Output = Output + "show Msg box10 <br>"
    box10()
    Al_1_1_1()
Else
    If SD8 = "PAF" Then
        'Output = Output + "show Msg box11 <br>"
        box11()
        Al_1_1_2()
    Else
        If SD8 = "COF" Then
            'Output = Output + "show Msg box12 <br>"
            box12()
            Al_1_2()
        Else
            '5 1 ***
            Output = Output + "error please check the condisiton and try again"
        End If
    End If
End If
End Sub

```

Fig. O.13. CMIMS coding-2 (9)

```

        End If
    End If
End Sub

Sub A1_1_1_1()
    If SD6 = "NOP" Then
        'Output = Output + "show Msg box13 <br>"
        box13()
        A1_1_1_1_1()
    Else
        If SD6 = "PAF" Then
            'Output = Output + "show Msg box14 <br>"
            box14()
            A1_1_1_1_2()
        Else
            If SD6 = "COF" Then
                'Output = Output + "show Msg box15 Moderate UAC<br>"
                box15()
                o() 'ตัวใด ไม่ใช่อุณหภูมิระดับ
            Else
                '5 1 ***
                Output = Output + "error please check the condisiton and try again"
            End If
        End If
    End If
End Sub

Sub A1_1_1_1_1()
    If SD2 = "NOP" Then
        'Output = Output + "show Msg box16 Very Good ACT<br>"
        box16()
        o()
    Else
        If SD2 = "PAF" Then
            'Output = Output + "show Msg box17 Good UAC<br>"
            box17()
            o()
        Else
            If SD2 = "COF" Then
                'Output = Output + "show Msg box18 Good UAC <br>"
                box18()
                o()
            Else
                '5 1 ***
                Output = Output + "error please check the condisiton and try again"
            End If
        End If
    End If
End Sub

Sub A1_1_1_1_2()
    If SD1 = "NOP" Then
        'Output = Output + "show Msg box19 Moderate ACT<br>"
        box19()
        o()
    Else
        If SD1 = "PAF" Then
            'Output = Output + "show Msg box20 Moderate UAC<br>"
            box20()
            o()
        Else
            If SD1 = "COF" Then
                'Output = Output + "show Msg box21 Poor UAC<br>"
                box21()
                o()
            Else
                '5 1 ***
                Output = Output + "error please check the condisiton and try again"
            End If
        End If
    End If
End Sub

```

Fig. O.14. CMIMS coding-2 (10)

```

Sub A1_1_1_2()
  If SD3 = "NOP" Then
    'Output = Output + "show Msg box22 <br>"
    box22()
    A1_1_1_2_1()
  Else
    If SD3 = "PAF" Then
      'Output = Output + "show Msg box23 Poor UAC<br>"
      box23()
      o()
    Else
      If SD3 = "COF" Then
        'Output = Output + "show Msg box24 Poor UAC<br>"
        box24()
        o()
      Else
        '5_1 ***
        Output = Output + "error please check the condisiton and try again"
      End If
    End If
  End If
End Sub

Sub A1_1_1_2_1()
  If SD7 = "NOP" Then
    'Output = Output + "show Msg box25 Moderate ACT<br>"
    box25()
    o()
  Else
    If SD7 = "PAF" Then
      'Output = Output + "show Msg box26 Poor UAC<br>"
      box26()
      o()
    Else
      If SD7 = "COF" Then
        'Output = Output + "show Msg box27 Poor<br>"
        box27()
        o()
      Else
        '5_1 ***
        Output = Output + "error please check the condisiton and try again"
      End If
    End If
  End If
End Sub

Sub A1_1_2()
  If SD11 = "NOP" Then
    'Output = Output + "show Msg box28 <br>"
    box28()
    A1_1_2_1()
  Else
    If SD11 = "PAF" Then
      'Output = Output + "show Msg box29 Poor UAC<br>"
      box29()
      o()
    Else
      If SD11 = "COF" Then
        'Output = Output + "show Msg box30 Poor UAC <br>"
        box30()
        o()
      Else
        '5_1 ***
        Output = Output + "error please check the condisiton and try again"
      End If
    End If
  End If
End Sub

Sub A1_1_2_1()
  If SD6 = "NOP" Then
    'Output = Output + "show Msg box31 <br>"
    box31()
    A1_1_2_1_1()
  End If
End Sub

```

Fig. O.15. CMIMS coding-2 (11)

```

Else
  If SD6 = "PAF" Then
    'Output = Output + "show Msg box32 Poor UAC<br>"
    box32()
    o()
  Else
    If SD6 = "COF" Then
      'Output = Output + "show Msg box33 Poor UAC<br>"
      box33()
      o()
    Else
      '5_1 ***
      Output = Output + "error please check the condisiton and try again"
    End If
  End If
End If
End Sub

Sub A1_1_2_1_1()
  If SD1 = "NOP" Then
    'Output = Output + "show Msg box34 Good ACT<br>"
    box34()
    o()
  Else
    If SD1 = "PAF" Then
      'Output = Output + "show Msg box35 Moderate UAC<br>"
      box35()
      o()
    Else
      If SD1 = "COF" Then
        'Output = Output + "show Msg box36 Moderate UAC<br>"
        box36()
        o()
      Else
        '5_1 ***
        Output = Output + "error please check the condisiton and try again"
      End If
    End If
  End If
End Sub

Sub A1_2()
  If SD5 = "NOP" Then
    'Output = Output + "show Msg box37 <br>"
    box37()
    A1_2_1()
  Else
    If SD5 = "PAF" Then
      'Output = Output + "show Msg box38 Moderate UAC<br>"
      box38()
      o()
    Else
      If SD5 = "COF" Then
        'Output = Output + "show Msg box39 Moderate UAC<br>"
        box39()
        o()
      Else
        '5_1 ***
        Output = Output + "error please check the condisiton and try again"
      End If
    End If
  End If
End Sub

Sub A1_2_1()
  If SD6 = "NOP" Then
    'Output = Output + "show Msg box40 Moderate ACT<br>"
    box40()
    o()
  Else
    If SD6 = "PAF" Then
      'Output = Output + "show Msg box41 Poor UAC<br>"
      box41()
      o()
    End If
  End If
End Sub

```

Fig. O.16. CMIMS coding-2 (12)

```

Else
    If SD6 = "COF" Then
        'Output = Output + "show Msg box42 Poor UAC<br>"
        box42()
        o()
    Else
        '5_1 ***
        Output = Output + "error please check the condisiton and try again"
    End If
End If
End Sub

Sub B1_0()
    If SD4 = "NOP" Then
        'Output = Output + "show Msg box43 <br>"
        box43()
        B1_1()
    Else
        If SD4 = "PAF" Then
            'Output = Output + "show Msg box44 Poor UAC <br>"
            box44()
            'N/A
        Else
            If SD4 = "COF" Then
                'Output = Output + "show Msg box45 Poor UAC<br>"
                box45()
                o()
            Else
                '5_1 ***
                Output = Output + "error please check the condisiton and try again"
            End If
        End If
    End If
End Sub

Sub B1_1()
    If SD6 = "NOP" Then
        'Output = Output + "show Msg box46 Very Good ACT<br>"
        box46()
        o()
    Else
        If SD6 = "PAF" Then
            'Output = Output + "show Msg box47 Moderate UAC<br>"
            box47()
            o()
        Else
            If SD6 = "COF" Then
                'Output = Output + "show Msg box48 Moderate UAC<br>"
                box48()
                o()
            Else
                '5_1 ***
                Output = Output + "error please check the condisiton and try again"
            End If
        End If
    End If
End Sub

Sub C1_0()
    If SD7 = "NOP" Then
        'Output = Output + "show Msg box49 Very Poor UAC<br>"
        box49()
        o()
    Else
        If SD7 = "PAF" Then
            'Output = Output + "show Msg box50 Very Poor UAC<br>"
            box50()
            o()
        Else
            If SD7 = "COF" Then
                'Output = Output + "show Msg box51 Very Poor UAC<br>"
                box51()
                o()
            End If
        End If
    End Sub

```

Fig. O.17. CMIMS coding-2 (13)

```

Else
    '5_1 ***
    Output = Output + "error please check the condisiton and try again"
End If
End If
End Sub

Sub o()
    Label1.Text = Output.ToString()
End Sub

Sub box1()
    d9st = "NOP"
    d9de = "The status of injection machine equipment is good."
    d9sy = "The machine has normal operation. The mold mounting bolts/nuts at the fixed
    platen part of the mold clamping unit is tight and not damage or screw holes are not
    damage and no water leakage from the temperature control piping."
    d9so = "N/A"
End Sub

Sub box2()
    d9st = "PAF"
    d9de = "The status of injection machine equipment is moderate."
    d9sy = "The mold mounting bolts and bolts/nuts at the fixed platen part of the mold
    clamping unit is tiny loose or screw holes have a little wear or there is some water
    leakage from the temperature control piping. "
    d9so = "Tightness of mold mounting bolts or fixing screw holes or fixing the
    temperature control piping."
End Sub

Sub box3()
    d9st = "COF"
    d9de = "The status of injection machine equipment is poor."
    d9sy = "The machine has abnormal operation. The mold mounting bolts/nuts at the
    fixed platen part of the mold clamping unit is absolutely loose or damage or screw
    holes are damaged or the temperature control piping is damaged."
    d9so = "Tightness of mold mounting bolts or modifying screw engagement length of
    mold mounting or fixing the temperature control piping. "
End Sub

Sub box4()
    d10st = "NOP"
    d10de = "The status of injection machine equipment is good."
    d10sy = "The machine has normal operation. The mold mounting bolts/nuts at the
    moved platen part of the mold clamping unit is tight and not damage or screw holes are
    not damage and no water leakage from the temperature control piping."
    d10so = "N/A"
End Sub

Sub box5()
    d10st = "PAF"
    d10de = "The status of injection machine equipment is moderate."
    d10sy = "The mold mounting bolts and bolts/nuts at the moved platen part of the
    mold clamping unit is tiny loose or screw holes have a little wear or there is some
    water leakage from the temperature control piping. "
    d10so = "Tightness of mold mounting bolts or fixing screw holes or fixing the
    temperature control piping."
End Sub

Sub box6()
    d10st = "COF"
    d10de = "The status of injection machine equipment is poor."
    d10sy = "The machine has abnormal operation. The mold mounting bolts/nuts at the
    moved platen part of the mold clamping unit is absolutely loose or damage or screw
    holes are damaged or the temperature control piping is damaged."
    d10so = "Tightness of mold mounting bolts or modifying screw engagement length of
    mold mounting or fixing the temperature control piping. "
End Sub

Sub box7()
    d4st = "NOP"
    d4de = "The status of injection machine equipment is good. "
    d4sy = "The machine has normal operation. The heater band and the heating cylinder

```

Fig. O.18. CMIMS coding-2 (14)

## **Appendix P**

# **CMIMS Coding (2) - in Accompanying CD-ROM Disk.**

In appendix P in accompanying CD-ROM disk, figure P.1 to P.18 illustrate CMIMS coding-(2) for LAIVFDT-OPN method coding as following.



```

are not damaged in the heater's wiring terminal and the band is not disconnected and
the thermocouple mounting face of the heating cylinder and the temperature sensor of it
are clean and the thermocouple clamp springs and lead wire coating are not damaged."
d4so = "N/A"
End Sub

Sub box8()
d4st = "PAF"
d4de = "The status of injection machine equipment is moderate."
d4sy = "There is a tiny wear of the heater's wiring terminal caused by burns or the
band is not connected or the thermocouple mounting face of the heating cylinder and
the temperature sensor of it are dirty or the thermocouple holes of the heating
cylinder have a little damaged or the thermocouple clamp springs and lead wire coating
have a little damaged."
d4so = "Fixing the heater's wiring terminal and connecting the band or cleaning the
thermocouple mounting face and the temperature sensor or fixing the thermocouple holes
of the heating cylinder and the thermocouple clamp springs and lead wire coating,"
End Sub

Sub box9()
d4st = "COF"
d4de = "The status of injection machine equipment is poor."
d4sy = "The heater's wiring terminal is damaged or the thermocouple holes of
heating cylinder dirty; or the thermocouple clamp springs or lead wire coating are
damaged."
d4so = "A new heater's wiring terminal is replaced or replacing a new thermocouple
holes of heating cylinder or a new thermocouple clamp springs or a new lead wire
coating. "
End Sub

Sub box10()
d8st = "NOP"
d8de = "The status of injection machine equipment is good."
d8sy = "The machine has normal operation. The ""the safety door is open"" message
us displayed on the ""ABNORMAL"" screen when the safety door is opened and disappears
when the door is closed. The mold closing /opening operations stop immediately and the
motor power turned off upon opening the safety door (operation side). "
d8so = "N/A"
End Sub

Sub box11()
d8st = "PAF"
d8de = "The status of injection machine equipment is moderate."
d8sy = "The mold closing/opening when the safety door (operation side) is opened."
d8so = "Reset by selecting the mode on the operational panel to the [STAND BY] mode
when the safety door is open and checking the mold does not close/open upon pressing
the [CLAM CLOSE] button or [CLAM OPEN] button."
End Sub

Sub box12()
d8st = "COF"
d8de = "The status of injection machine equipment is poor."
d8sy = "The mold closing/opening is still operating when the safety door (operation
side) is opened or there is abnormal sound or malfunction during safety door opening/
closing in an uninterrupted operation."
d8so = "Fixing the safety door (operation side) system."
End Sub

Sub box13()
d6st = "NOP"
d6de = "The status of injection machine equipment is good. "
d6sy = "The machine has normal operation. There is no melt leakage from the nozzle
during uninterrupted operation."
d6so = "N/A"
End Sub

Sub box14()
d6st = "PAF"
d6de = "The status of injection machine equipment is moderate."
d6sy = "There is melt leakage from the nozzle during uninterrupted operation or the
screw wear or the back flow of resin in the barrel has been occurred or there is a
tiny damage of the surface of nozzle head or seal ring. "
d6so = "Cleaning the nozzle head or purging the barrel of repairing the surface of
nozzle head or seal ring."

```

Fig. P.1. CMIMS coding-2 (15)

```

End Sub

Sub box15()
    d6st = "COF"
    d6de = "The status of injection machine equipment is poor."
    d6sy = "There is a lot of melt leakage from the nozzle during uninterrupted
operation or higher filling time; or seal ring has been broken or the surface of screw
head (nozzle head) or seal ring is damaged"
    d6so = "Replacing a new screw head or seal ring; or fixing screw head or seal ring"
    overm1 = "moderate"
    overeq1 = "UAC"
End Sub

Sub box16()
    d2st = "NOP"
    d2de = "The status of injection machine equipment is good."
    d2sy = "The machine has normal operation in the emergency stop button (rear side).
When pressing the [EMERGENCY STOP] button on the setting panel bracket to look the
button, ""the emergency stop button has been depressed"" message is displayed on the
screen. Pressing the [MOTOR] and [HEATERS] buttons on the operation [STOP] button is
depressed. "
    d2so = "N/A"
    overm1 = "Very Good"
    overeq1 = "ACT"
End Sub

Sub box17()
    d2st = "PAF"
    d2de = "The status of injection machine equipment is moderate."
    d2sy = "The molding machine is still operating when the emergency stop button (rear
side) is depressed."
    d2so = "Reset by setting the [MOTOR] and [HEATERS] buttons on the operational panel
do not turn on the power when the [EMERGENCY STOP] button is depressed."
    overm1 = "Good"
    overeq1 = "UAC"
End Sub

Sub box18()
    d2st = "COF"
    d2de = "The status of injection machine equipment is poor."
    d2sy = "The molding machine is still operating when the emergency stop button (rear
side) is depressed."
    d2so = "Fixing the emergency stop button operation system."
    overm1 = "Good"
    overeq1 = "UAC"
End Sub

Sub box19()
    d1st = "NOP"
    d1de = "The status of injection machine equipment is good. "
    d1sy = "The machine has normal operation. The ""the safety door is open"" message
us displayed on the ""ABNORMAL"" screen when the safety door is opened and disappears
when the door is closed. The mold closing /opening operations stop immediately and the
motor power turned off upon opening the safety door (non-operation side)."
    d1so = "N/A"
    overm1 = "Moderate"
    overeq1 = "ACT"
End Sub

Sub box20()
    d1st = "PAF"
    d1de = "The status of injection machine equipment is moderate."
    d1sy = "The mold closing/opening when the safety door (non-operation side) is
opened."
    d1so = "Reset by selecting the mode on the operational panel to the [STAND BY] mode
when the safety door is open and checking the mold does not close/open upon pressing
the [CLAM CLOSE] button or [CLAM OPEN] button."
    overm1 = "Moderate"
    overeq1 = "UAC"
End Sub

Sub box21()
    d1st = "COF"
    d1de = "The status of injection machine equipment is poor."

```

Fig. P.2. CMIMS coding-2 (16)

```

        d1sy = "The mold closing/opening is still operating when the safety door (non-
operation side) is opened or there is abnormal sound or malfunction during safety door
opening/closing in an uninterrupted operation."
        d1so = "Fixing the safety door (non-operation side) system."
        overm1 = "Poor"
        overeq1 = "UAC"
End Sub

Sub box22()
    d3st = "NOP"
    d3de = "The status of injection machine equipment is good."
    d3sy = "The machine has normal operation. The water jacket has not reached the
desired temperature via the setting value in the water cooling field on the ""TEMP""
screen. There is no water leakage in the surrounding area. "
    d3so = "N/A"

End Sub

Sub box23()
    d3st = "PAF"
    d3de = "The status of injection machine equipment is moderate."
    d3sy = "The water jacket has reached the desired temperature via the setting value
in the water cooling or the hopper temperature is higher than 10 degree Celsius."
    d3so = "Checking whether there is water feeding in the water jacket using water
flow water or clean the cooling water piping or checking to ensure there is no water
leakage. "
    overm1 = "Poor"
    overeq1 = "UAC"
End Sub

Sub box24()
    d3st = "COF"
    d3de = "The status of injection machine equipment is poor."
    d3sy = "The water jacket has reached the desired temperature via the setting value
in the water cooling or the hopper temperature is higher than 10 degree Celsius or
cooling water piping is dilapidated."
    d3so = "Fixing or replacement of new cooling water facility or water jacket."
    overm1 = "Poor"
    overeq1 = "UAC"
End Sub

Sub box25()
    d7st = "NOP"
    d7de = "The status of injection machine equipment is good."
    d7sy = "The machine has normal operation in the emergency stop button (front side).
When pressing the [EMERGENCY STOP] button on the setting panel bracket to look the
button, ""the emergency stop button has been depressed"" message is displayed on the
screen. Pressing the [MOTOR] and [HEATERS] buttons on the operation [STOP] button is
depressed. "
    d7so = "N/A"
    overm1 = "Moderate"
    overeq1 = "ACT"
End Sub

Sub box26()
    d7st = "PAF"
    d7de = "The status of injection machine equipment is moderate."
    d7sy = "The molding machine is still operating when the emergency stop button
(front side) is depressed."
    d7so = "Reset by setting the [MOTOR] and [HEATERS] buttons on the operational panel
do not turn on the power when the [EMERGENCY STOP] button is depressed."
    overm1 = "Poor"
    overeq1 = "UAC"
End Sub

Sub box27()
    d7st = "COF"
    d7de = "The status of injection machine equipment is poor."
    d7sy = "The molding machine is still operating when the emergency stop button
(front side) is depressed."
    d7so = "Fixing the emergency stop button operation system."
    overm1 = "Poor"
    overeq1 = "UAC"
End Sub

```

Fig. P.3. CMIMS coding-2 (17)

```

Sub box28()
    d11st = "NOP"
    d11de = "The status of injection machine equipment is good."
    d11sy = "The machine has normal operation. There is no peeling, rust or crack in the coating at the exterior of the molding machine."
    d11so = "N/A"
End Sub

Sub box29()
    d11st = "PAF"
    d11de = "The status of injection machine equipment is moderate."
    d11sy = "There is some peeling or rust in the exterior of the molding machine. "
    d11so = "Clean the exterior of the molding machine (such as cover, machine frame, pipe hose and platen) using an air gun or rag."
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box30()
    d11st = "COF"
    d11de = "The status of injection machine equipment is poor."
    d11sy = "There is a lot of peeling, rust or some crack in the exterior of the molding machine."
    d11so = "Clean the exterior of the molding machine (such as cover, machine frame, pipe hose and platen) using an air gun or rag or replacement with new equipment."
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box31()
    d6st = "NOP"
    d6de = "The status of injection machine equipment is good. "
    d6sy = "The machine has normal operation. There is no melt leakage from the nozzle during uninterrupted operation."
    d6so = "N/A"
End Sub

Sub box32()
    d6st = "PAF"
    d6de = "The status of injection machine equipment is moderate."
    d6sy = "There is melt leakage from the nozzle during uninterrupted operation or the screw wear or the back flow of resin in the barrel has been occurred or there is a tiny damage of the surface of nozzle head or seal ring. "
    d6so = "Cleaning the nozzle head or purging the barrel of repairing the surface of nozzle head or seal ring."
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box33()
    d6st = "COF"
    d6de = "The status of injection machine equipment is poor."
    d6sy = "There is a lot of melt leakage from the nozzle during uninterrupted operation or higher filling time; or seal ring has been broken or the surface of screw head (nozzle head) or seal ring is damaged"
    d6so = "Replacing a new screw head or seal ring; or fixing screw head or seal ring"
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box34()
    d1st = "NOP"
    d1de = "The status of injection machine equipment is good."
    d1sy = "The machine has normal operation. The 'the safety door is open' message us displayed on the 'ABNORMAL' screen when the safety door is opened and disappears when the door is closed. The mold closing /opening operations stop immediately and the motor power turned off upon opening the safety door (non-operation side)."
    d1so = "M/A"
    overml = "Good"
    overeq1 = "ACT"
End Sub

Sub box35()

```

Fig. P4. CMIMS coding-2 (18)

```

        d1st = "PAF"
        d1de = "The status of injection machine equipment is moderate."
        d1sy = "The mold closing/opening when the safety door (non-operation side) is
opened."
        d1so = "Reset by selecting the mode on the operational panel to the [STAND BY] mode
when the safety door is open and checking the mold does not close/open upon pressing
the [CLAM CLOSE] button or [CLAM OPEN] button."
        overm1 = "Moderate"
        overeq1 = "UAC"
End Sub

Sub box36()
    d1st = "COF"
    d1de = "The status of injection machine equipment is poor."
    d1sy = "The mold closing/opening is still operating when the safety door (non-
operation side) is opened or there is abnormal sound or malfunction during safety door
opening/closing in an uninterrupted operation."
    d1so = "Fixing the safety door (non-operation side) system."
    overm1 = "Moderate"
    overeq1 = "UAC"
End Sub

Sub box37()
    d5st = "NOP"
    d5de = "The status of injection machine equipment is good. "
    d5sy = "The machine has normal operation. Injection machine and plasticizing are
not performed when the purge cover safety door is open. Shutter valve is disabled when
the safety and purge cover safety door are open. The purge cover safety door is not
broken. "
    d5so = "N/A"
End Sub

Sub box38()
    d5st = "PAF"
    d5de = "The status of injection machine equipment is moderate."
    d5sy = "Injection and plasticizing are not performed when the purge cover safety
door is open or shutter valve is disabled when the safety door and purge cover safety
door are open."
    d5so = "Reset by pressing the [INJECTION] button and [PLASTICIZING] button and
checking the safety door and purge cover are open."
    overm1 = "Moderate"
    overeq1 = "UAC"
End Sub

Sub box39()
    d5st = "COF"
    d5de = "The status of injection machine equipment is poor."
    d5sy = "Injection and plasticizing are not performed when the purge cover safety
door is open or shutter valve is disabled when the safety door and purge cover safety
door are open or the purge cover safety door is broken."
    d5so = "Fixing or replacement of a new purge cover."
    overm1 = "Moderate"
    overeq1 = "UAC"
End Sub

Sub box40()
    d6st = "NOP"
    d6de = "The status of injection machine equipment is good. "
    d6sy = "The machine has normal operation. There is no melt leakage from the nozzle
during uninterrupted operation."
    d6so = "N/A"
    overm1 = "Moderate"
    overeq1 = "ACT"
End Sub

Sub box41()
    d6st = "PAF"
    d6de = "The status of injection machine equipment is moderate."
    d6sy = "There is melt leakage from the nozzle during uninterrupted operation or the
screw wear or the back flow of resin in the barrel has been occurred or there is a
tiny damage of the surface of nozzle head or seal ring. "
    d6so = "Cleaning the nozzle head or purging the barrel of repairing the surface of
nozzle head or seal ring."
    overm1 = "Poor"

```

Fig. P.5. CMIMS coding-2 (19)

```

    overeq1 = "UAC"
End Sub

Sub box42()
    d6st = "COF"
    d6de = "The status of injection machine equipment is poor."
    d6sy = "There is a lot of melt leakage from the nozzle during uninterrupted
operation or higher filling time; or seal ring has been broken or the surface of screw
head (nozzle head) or seal ring is damaged"
    d6so = "Replacing a new screw head or seal ring; or fixing screw head or seal ring"
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box43()
    d4st = "NOP"
    d4de = "The status of injection machine equipment is good. "
    d4sy = "The machine has normal operation. The heater band and the heating cylinder
are not damaged in the heater's wiring terminal and the band is not disconnected and
the thermocouple mounting face of the heating cylinder and the temperature sensor of it
are clean and the thermocouple clamp springs and lead wire coating are not damaged."
    d4so = "N/A"
End Sub

Sub box44()
    d4st = "PAF"
    d4de = "The status of injection machine equipment is moderate."
    d4sy = "There is a tiny wear of the heater's wiring terminal caused by burns or the
band is not connected or the thermocouple mounting face of the heating cylinder and
the temperature sensor of it are dirty or the thermocouple holes of the heating
cylinder have a little damaged or the thermocouple clamp springs and lead wire coating
have a little damaged."
    d4so = "Fixing the heater's wiring terminal and connecting the band or cleaning the
thermocouple mounting face and the temperature sensor or fixing the thermocouple holes
of the heating cylinder and the thermocouple clamp springs and lead wire coating,"
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box45()
    d4st = "COF"
    d4de = "The status of injection machine equipment is poor."
    d4sy = "The heater's wiring terminal is damaged or the thermocouple holes of
heating cylinder dirty; or the thermocouple clamp springs or lead wire coating are
damaged."
    d4so = "A new heater's wiring terminal is replaced or replacing a new thermocouple
holes of heating cylinder or a new thermocouple clamp springs or a new lead wire
coating. "
    overml = "Poor"
    overeq1 = "UAC"
End Sub

Sub box46()
    d6st = "NOP"
    d6de = "The status of injection machine equipment is good. "
    d6sy = "The machine has normal operation. There is no melt leakage from the nozzle
during uninterrupted operation."
    d6so = "N/A"
    overml = "Very Good"
    overeq1 = "ACT"
End Sub

Sub box47()
    d6st = "PAF"
    d6de = "The status of injection machine equipment is moderate."
    d6sy = "There is melt leakage from the nozzle during uninterrupted operation or the
screw wear or the back flow of resin in the barrel has been occurred or there is a
tiny damage of the surface of nozzle head or seal ring. "
    d6so = "Cleaning the nozzle head or purging the barrel of repairing the surface of
nozzle head or seal ring."
    overml = "Moderate"
    overeq1 = "UAC"
End Sub

```

Fig. P.6. CMIMS coding-2 (20)

```

Sub box48()
    d6st = "COF"
    d6de = "The status of injection machine equipment is poor."
    d6sy = "There is a lot of melt leakage from the nozzle during uninterrupted
operation or higher filling time; or seal ring has been broken or the surface of screw
head (nozzle head) or seal ring is damaged"
    d6so = "Replacing a new screw head or seal ring; or fixing screw head or seal ring"
    overml = "Moderate"
    overeq1 = "UAC"
End Sub

Sub box49()
    d7st = "NOP"
    d7de = "The status of injection machine equipment is good."
    d7sy = "The machine has normal operation in the emergency stop button (front side).
When pressing the [EMERGENCY STOP] button on the setting panel bracket to look the
button, ""the emergency stop button has been depressed"" message is displayed on the
screen. Pressing the [MOTOR] and [HEATERS] buttons on the operation [STOP] button is
depressed."
    d7so = "N/A"
    overml = "Very Poor"
    overeq1 = "UAC"
End Sub

Sub box50()
    d7st = "PAF"
    d7de = "The status of injection machine equipment is moderate."
    d7sy = "The molding machine is still operating when the emergency stop button
(front side) is depressed."
    d7so = "Reset by setting the [MOTOR] and [HEATERS] buttons on the operational panel
do not turn on the power when the [EMERGENCY STOP] button is depressed."
    overml = "Very Poor"
    overeq1 = "UAC"
End Sub

Sub box51()
    d7st = "COF"
    d7de = "The status of injection machine equipment is poor."
    d7sy = "The molding machine is still operating when the emergency stop button
(front side) is depressed."
    d7so = "Fixing the emergency stop button operation system."
    overml = "Very Poor"
    overeq1 = "UAC"
End Sub

Sub check_1()
    If (finalforecast1 = "MF1") Then
        check_2()
    Else
        'goto L
        check_41()
    End If
End Sub

Sub check_2()
    If (finalforecast2 = "MF1") Then
        check_3()
    Else
        'goto M
        check_15()
    End If
End Sub

Sub check_3()
    If (finalforecast3 = "MF1") Then
        check_11()
    Else
        check_4()
    End If
End Sub

Sub check_4()
    If (finalforecast3 = "MF2") Then
        check_9()
    End If
End Sub

```

Fig. P.7. CMIMS coding-2 (21)

```

        Else
            check_5()
        End If
    End Sub

Sub check_5()
    If (finalforecast3 = "MF3") Then
        check_6()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
    'goto V
End Sub

Sub check_6()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_7()
    End If
End Sub

Sub check_7()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_8()
    End If
End Sub

Sub check_8()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_9()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gGO1"
        'goto S
    Else
        check_10()
    End If
End Sub

Sub check_10()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_14()
    End If
End Sub

Sub check_11()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gVG1"
        'goto S
    Else
        check_12()
    End If
End Sub

Sub check_12()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gGO1"
        'goto S
    End If
End Sub

```

Fig. P.8. CMIMS coding-2 (22)

```

        Else
            check_13()
        End If
    End Sub

Sub check_13()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_14()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_15()
    If (finalforecast2 = "MF2") Then
        check_16()
    Else
        'goto N
        check_28()
    End If
End Sub

Sub check_16()
    If (finalforecast3 = "MF1") Then
        check_25()
    Else
        check_17()
    End If
End Sub

Sub check_17()
    If (finalforecast3 = "MF2") Then
        check_22()
    Else
        check_18()
    End If
End Sub

Sub check_18()
    If (finalforecast3 = "MF3") Then
        check_19()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_19()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        check_20()
    End If
End Sub

Sub check_20()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO2"
        'goto S
    Else

```

Fig. P.9. CMIMS coding-2 (23)

```

        check_21()
    End If
End Sub

Sub check_21()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO3"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_22()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gGO2"
        'goto S
    Else
        check_23()
    End If
End Sub

Sub check_23()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        check_24()
    End If
End Sub

Sub check_24()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_25()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gVG1"
        'goto S
    Else
        check_26()
    End If
End Sub

Sub check_26()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gGO2"
        'goto S
    Else
        check_27()
    End If
End Sub

Sub check_27()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_28()
    If (finalforecast2 = "MF3") Then
        check_33()
    Else

```

Fig. P.10. CMIMS coding-2 (24)

```

        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check 29()
    If (finalforecast3 = "MF3") Then
        check_30()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check 30()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        check_32()
    End If
End Sub

Sub check 31()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_32()
    End If
End Sub

Sub check 32()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_33()
    If (finalforecast3 = "MF1") Then
        check_38()
    Else
        check_34()
    End If
End Sub

Sub check 34()
    If (finalforecast3 = "MF2") Then
        check_35()
    Else
        check_29()
    End If
End Sub

Sub check 35()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_36()
    End If
End Sub

Sub check 36()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_37()
    End If

```

Fig. P.11. CMIMS coding-2 (25)

```

End Sub

Sub check_37()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_38()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_39()
    End If
End Sub

Sub check_39()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_39()
    End If
End Sub

Sub check_40()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_41()
    If (finalforecast1 = "MF2") Then
        check_42()
    Else
        'goto O
        check_81()
    End If
End Sub

Sub check_42()
    If (finalforecast2 = "MF1") Then
        check_49()
    Else
        'goto P
        check_55()
    End If
End Sub

Sub check_43()
    If (finalforecast3 = "MF3") Then
        check_44()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_44()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_45()
    End If

```

Fig. P.12. CMIMS coding-2 (26)

```

End Sub

Sub check_45()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_46()
    End If
End Sub

Sub check_46()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_47()
    If (finalforecast3 = "MF2") Then
        check_48()
    Else
        check_43()
    End If
End Sub

Sub check_48()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gGO2"
        'goto S
    Else
        check_50()
    End If
End Sub

Sub check_49()
    If (finalforecast3 = "MF1") Then
        check_52()
    Else
        check_47()
    End If
End Sub

Sub check_50()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        check_51()
    End If
End Sub

Sub check_51()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_52()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gGO1"
        'goto S
    Else
        check_53()
    End If
End Sub

```

Fig. P.13. CMIMS coding-2 (27)

```

Sub check_53()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gGO2"
        'goto S
    Else
        check_54()
    End If
End Sub

Sub check_54()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        'print Error! Please forecast again
        'goto F
    End If
End Sub

Sub check_55()
    If (finalforecast2 = "MF2") Then
        check_56()
    Else
        'goto Q
        check_68()
    End If
End Sub

Sub check_56()
    If (finalforecast3 = "MF1") Then
        check_65()
    Else
        check_61()
    End If
End Sub

Sub check_57()
    If (finalforecast3 = "MF3") Then
        check_58()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_58()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_59()
    End If
End Sub

Sub check_59()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_60()
    End If
End Sub

Sub check_60()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_61()

```

Fig. P.14. CMIMS coding-2 (28)

```

        If (finalforecast3 = "MF2") Then
            check_62()
        Else
            check_57()
        End If
    End Sub

Sub check_62()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        check_63()
    End If
End Sub

Sub check_63()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        check_64()
    End If
End Sub

Sub check_64()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_65()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gGO2"
        'goto S
    Else
        check_66()
    End If
End Sub

Sub check_66()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO1"
        'goto S
    Else
        check_67()
    End If
End Sub

Sub check_67()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_68()
    If (finalforecast2 = "MF3") Then
        check_69()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_69()
    If (finalforecast3 = "MF1") Then

```

Fig. P.15. CMIMS coding-2 (29)

```

        check_78()
    Else
        check_74()
    End If
End Sub

Sub check_70()
    If (finalforecast3 = "MF3") Then
        check_71()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_71()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_72()
    End If
End Sub

Sub check_72()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_73()
    End If
End Sub

Sub check_73()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_74()
    If (finalforecast3 = "MF2") Then
        check_75()
    Else
        check_70()
    End If
End Sub

Sub check_75()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_76()
    End If
End Sub

Sub check_76()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_77()
    End If
End Sub

Sub check_77()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else

```

Fig. P.16. CMIMS coding-2 (30)

```

        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_78()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_79()
    End If
End Sub

Sub check_79()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_80()
    End If
End Sub

Sub check_80()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_81()
    If (finalforecast1 = "MF3") Then
        check_82()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_82()
    If (finalforecast2 = "MF1") Then
        check_91()
    Else
        'goto R
        check_95()
    End If
End Sub

Sub check_83()
    If (finalforecast3 = "MF3") Then
        check_84()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_84()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        check_85()
    End If
End Sub

Sub check_85()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gPO2"
        'goto S
    Else

```

Fig. P.17. CMIMS coding-2 (31)

```

        check_86()
    End If
End Sub

Sub check_86()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_87()
    If (finalforecast3 = "MF2") Then
        check_88()
    Else
        check_83()
    End If
End Sub

Sub check_88()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_89()
    End If
End Sub

Sub check_89()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_90()
    End If
End Sub

Sub check_90()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_91()
    If (finalforecast3 = "MF1") Then
        check_92()
    Else
        check_87()
    End If
End Sub

Sub check_92()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_93()
    End If
End Sub

Sub check_93()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_94()
    End If

```

Fig. P.18. CMIMS coding-2 (32)

## **Appendix Q**

### **CMIMS Coding (2), (3), (4) and (5) - in Accompanying CD-ROM Disk.**

In appendix Q in accompanying CD-ROM disk, figure Q.1 to P.13 illustrate CMIMS coding-(2) for LAIVFDT-OPN method coding, Figure Q.14 shows CMIMS coding-(3) for loading data file, Figure Q.15 depicts CMIMS coding-(4) for loading data file and Figure Q.16 exposes CMIMS coding-(5) as following.



```

End Sub

Sub check_94()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_95()
    If (finalforecast2 = "MF2") Then
        check_96()
    Else
        'goto T
        check_108()
    End If
End Sub

Sub check_96()
    If (finalforecast3 = "MF1") Then
        check_104()
    Else
        check_97()
    End If
End Sub

Sub check_97()
    If (finalforecast3 = "MF2") Then
        check_102()
    Else
        check_98()
    End If
End Sub

Sub check_98()
    If (finalforecast3 = "MF3") Then
        check_99()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_99()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_100()
    End If
End Sub

Sub check_100()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_101()
    End If
End Sub

Sub check_101()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

```

Fig. Q.1. CMIMS coding-2 (33)

```

Sub check_102()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_103()
    End If
End Sub

Sub check_103()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_107()
    End If
End Sub

Sub check_107()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_104()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gMO2"
        'goto S
    Else
        check_105()
    End If
End Sub

Sub check_105()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gMO3"
        'goto S
    Else
        check_106()
    End If
End Sub

Sub check_106()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_108()
    If (finalforecast2 = "MF3") Then
        check_109()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_109()
    If (finalforecast3 = "MF1") Then
        check_110()
    Else
        check_115()
    End If
End Sub

Sub check_110()

```

Fig. Q.2. CMIMS coding-2 (34)

```

        If (finalforecast3 = "MF2") Then
            check_118()
        Else
            check_111()
        End If
    End Sub

Sub check_111()
    If (finalforecast3 = "MF3") Then
        check_112()
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_112()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        check_113()
    End If
End Sub

Sub check_113()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        check_114()
    End If
End Sub

Sub check_114()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_115()
    If (finalforecast4 = "MF1") Then
        gfinalforecast = "gPO1"
        'goto S
    Else
        check_116()
    End If
End Sub

Sub check_116()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_117()
    End If
End Sub

Sub check_117()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub check_118()
    If (finalforecast4 = "MF1") Then

```

Fig. Q.3. CMIMS coding-2 (35)

```

        gfinalforecast = "gPO2"
        'goto S
    Else
        check_119()
    End If
End Sub

Sub check_119()
    If (finalforecast4 = "MF2") Then
        gfinalforecast = "gPO2"
        'goto S
    Else
        check_120()
    End If
End Sub

Sub check_120()
    If (finalforecast4 = "MF3") Then
        gfinalforecast = "gVP1"
        'goto S
    Else
        'goto V
        errortxt = "Error! Please forecast again."
    End If
End Sub

Sub overall()
    If (overml = "very good" And overeq1 = "ACT" And gfinalforecast = "gVG1") Then
        overallstatus = "The overall status of machine is acceptable. All machine
equipment positions have very good status. A machine is ready for operation and Machine
maintenance is upon machine maintenance plan."
    Else
        If (overml = "Good" And overeq1 = "ACT" And gfinalforecast = "gGO1") Then
            overallstatus = "The overall status of machine is acceptable and most of
machine equipment positions have good status. However some machine equipment should
inspect and maintain. Machine maintenance is upon maintenance in 1-2 working days for
some machine equipment."
        Else
            If (overml = "Good" And overeq1 = "UAC" And gfinalforecast = "gGO2") Then
                overallstatus = "The overall status of machine is acceptable. Some
machine equipment has good status. Some machine equipment need to inspect and maintain.
Machine maintenance is upon maintenance in 1-2 working days."
            Else
                If (overml = "Moderate" And overeq1 = "ACT" And gfinalforecast = "gMO1"
) Then
                    overallstatus = "The overall status of machine is acceptable. Some
machine equipment has moderate status. Some machine equipment need to inspect and fix.
Machine maintenance in 1-2 working days is required."
                Else
                    If (overml = "Moderate" And overeq1 = "UCT" And gfinalforecast =
"gmO2") Then
                        overallstatus = "The overall status of machine is unacceptable.
Some machine equipment has moderate status. Some machine equipment has to fix or
maintenance. Machine maintenance is upon emergent maintenance."
                    Else
                        If (overml = "Moderate" And overeq1 = "UAC" And gfinalforecast
= "gmO3") Then
                            overallstatus = "The overall status of machine is
unacceptable. Some machine equipment has moderate status. Some machine equipment has to
emergency repair or maintenance. Machine maintenance is upon emergent maintenance."
                        Else
                            If (overml = "Poor" And overeq1 = "ACT" And gfinalforecast
= "gPO1") Then
                                overallstatus = "The overall status of machine is
unacceptable. Some machine equipment has poor status. Some machine equipment need to
fix or replace with new equipment. Machine maintenance is upon emergent maintenance."
                            Else
                                If (overml = "Poor" And overeq1 = "UAC" And
gfinalforecast = "gPO2") Then
                                    overallstatus = "The overall status of machine is
unacceptable. Some machine equipment has poor status. Some machine equipment need to
fix or replace with new equipment immediately. Machine maintenance is upon emergent
maintenance."
                                Else

```

Fig. Q.4. CMIMS coding-2 (36)



```

        overallstatus = "Machine conditions not found."
    End If
End Sub

Sub ov8()
    If (overeq1 = "ACT") Then
        ov38()
    Else
        ov9()
    End If
End Sub

Sub ov9()
    If (overeq1 = "UAC") Then
        ov44()
    Else
        ov61()
    End If
End Sub

Sub ov10()
    If (overeq1 = "ACT") Then
        ov61()
    Else
        ov11()
    End If
End Sub

Sub ov11()
    If (overeq1 = "UAC") Then
        ov65()
    Else
        overallstatus = "Machine conditions not found."
    End If
End Sub

Sub ov12()
    If (overeq1 = "ACT") Then
        ov16()
    Else
        ov13()
    End If
End Sub

Sub ov13()
    If (overeq1 = "UAC") Then
        ov21()
    Else
        overallstatus = "Machine conditions not found."
    End If
End Sub

Sub ov14()
    If (overeq1 = "ACT") Then
        ov50()
    Else
        ov15()
    End If
End Sub

Sub ov15()
    If (overeq1 = "UAC") Then
        ov56()
    Else
        overallstatus = "Machine conditions not found."
    End If
End Sub

Sub ov16()
    If (gfinalforecast = "gVG1") Then
        overallstatus1()
    Else
        ov17()
    End If

```

Fig. Q.6. CMIMS coding-2 (38)

```

End Sub

Sub ov17()
    If (gfinaforecast = "gG01") Or (gfinaforecast = "gG02") Then
        overallstatus2()
    Else
        ov18()
    End If
End Sub

Sub ov18()
    If (gfinaforecast = "gM01") Then
        overallstatus3()
    Else
        ov19()
    End If
End Sub

Sub ov19()
    If (gfinaforecast = "gM02") Then
        overallstatus4()
    Else
        ov20()
    End If
End Sub

Sub ov20()
    If (gfinaforecast = "gM03") Or (gfinaforecast = "gP01") Then
        overallstatus5()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

Sub ov21()
    If (gfinaforecast = "gVG1") Then
        overallstatus2()
    Else
        ov22()
    End If
End Sub

Sub ov22()
    If (gfinaforecast = "gG01") Or (gfinaforecast = "gG02") Then
        overallstatus3()
    Else
        ov23()
    End If
End Sub

Sub ov23()
    If (gfinaforecast = "gM01") Then
        overallstatus4()
    Else
        ov24()
    End If
End Sub

Sub ov24()
    If (gfinaforecast = "gM02") Then
        overallstatus5()
    Else
        ov25()
    End If
End Sub

Sub ov25()
    If (gfinaforecast = "gM03") Or (gfinaforecast = "gP01") Then
        overallstatus6()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or

```

Fig. Q.7. CMIMS coding-2 (39)

```

matching conditions not found."
    End If
End Sub

Sub ov26()
    If (gfinalforecast = "gVG1") Then
        overallstatus2()
    Else
        ov27()
    End If
End Sub

Sub ov27()
    If (gfinalforecast = "gGO1") Or (gfinalforecast = "gGO2") Then
        overallstatus3()
    Else
        ov28()
    End If
End Sub

Sub ov28()
    If (gfinalforecast = "gMO1") Then
        overallstatus4()
    Else
        ov29()
    End If
End Sub

Sub ov29()
    If (gfinalforecast = "gMO2") Then
        overallstatus5()
    Else
        ov30()
    End If
End Sub

Sub ov30()
    If (gfinalforecast = "gMO3") Or (gfinalforecast = "gPO1") Then
        overallstatus6()
    Else
        ov31()
    End If
End Sub

Sub ov31()
    If (gfinalforecast = "gPO2") Or (gfinalforecast = "gVP1") Then
        overallstatus7()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

Sub ov32()
    If (gfinalforecast = "gVG1") Then
        overallstatus3()
    Else
        ov33()
    End If
End Sub

Sub ov33()
    If (gfinalforecast = "gGO1") Or (gfinalforecast = "gGO2") Then
        overallstatus4()
    Else
        ov34()
    End If
End Sub

Sub ov34()
    If (gfinalforecast = "gMO1") Then
        overallstatus5()
    Else

```

Fig. Q.8. CMIMS coding-2 (40)

```

        ov35()
    End If
End Sub

Sub ov35()
    If (gfinalforecast = "gMO2") Then
        overallstatus6()
    Else
        ov36()
    End If
End Sub

Sub ov36()
    If (gfinalforecast = "gMO3") Or (gfinalforecast = "gPO1") Then
        overallstatus7()
    Else
        ov37()
    End If
End Sub

Sub ov37()
    If (gfinalforecast = "gPO2") Or (gfinalforecast = "gVP1") Then
        overallstatus8()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

Sub ov38()
    If (gfinalforecast = "gVG1") Then
        overallstatus3()
    Else
        ov39()
    End If
End Sub

Sub ov39()
    If (gfinalforecast = "gGO1") Or (gfinalforecast = "gGO2") Then
        overallstatus4()
    Else
        ov40()
    End If
End Sub

Sub ov40()
    If (gfinalforecast = "gMO1") Then
        overallstatus5()
    Else
        ov41()
    End If
End Sub

Sub ov41()
    If (gfinalforecast = "gMO2") Or (gfinalforecast = "gMO3") Then
        overallstatus6()
    Else
        ov42()
    End If
End Sub

Sub ov42()
    If (gfinalforecast = "gPO1") Or (gfinalforecast = "gPO2") Then
        overallstatus7()
    Else
        ov43()
    End If
End Sub

Sub ov43()
    If (gfinalforecast = "gVP1") Then
        overallstatus8()
    Else

```

Fig. Q.9. CMIMS coding-2 (41)

```

        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

Sub ov44()
    If (gfinalforecast = "gVG1") Then
        overallstatus4()
    Else
        ov45()
    End If
End Sub

Sub ov45()
    If (gfinalforecast = "gGO1") Then
        overallstatus5()
    Else
        ov46()
    End If
End Sub

Sub ov46()
    If (gfinalforecast = "gGO1") Or (gfinalforecast = "gMO1") Then
        overallstatus6()
    Else
        ov47()
    End If
End Sub

Sub ov47()
    If (gfinalforecast = "gMO2") Or (gfinalforecast = "gMO3") Then
        overallstatus7()
    Else
        ov48()
    End If
End Sub

Sub ov48()
    If (gfinalforecast = "gPO1") Or (gfinalforecast = "gPO2") Then
        overallstatus8()
    Else
        ov48()
    End If
End Sub

Sub ov49()
    If (gfinalforecast = "gVP1") Then
        overallstatus9()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

Sub ov50()
    If (gfinalforecast = "gVG1") Then
        overallstatus4()
    Else
        ov51()
    End If
End Sub

Sub ov51()
    If (gfinalforecast = "gGO1") Then
        overallstatus5()
    Else
        ov52()
    End If
End Sub

Sub ov52()
    If (qfinalforecast = "gGO1") Or (qfinalforecast = "gMO1") Then

```

Fig. Q.10. CMIMS coding-2 (42)

```

        overallstatus6()
    Else
        ov53()
    End If
End Sub

Sub ov53()
    If (gfinalforecast = "gMO2") Or (gfinalforecast = "gMO3") Then
        overallstatus7()
    Else
        ov54()
    End If
End Sub

Sub ov54()
    If (gfinalforecast = "gPO1") Or (gfinalforecast = "gPO2") Then
        overallstatus8()
    Else
        ov55()
    End If
End Sub

Sub ov55()
    If (gfinalforecast = "gVP1") Then
        overallstatus9()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

Sub ov56()
    If (gfinalforecast = "gVG1") Then
        overallstatus5()
    Else
        ov57()
    End If
End Sub

Sub ov57()
    If (gfinalforecast = "gGO1") Or (gfinalforecast = "gGO2") Then
        overallstatus6()
    Else
        ov58()
    End If
End Sub

Sub ov58()
    If (gfinalforecast = "gMO1") Or (gfinalforecast = "gMO2") Then
        overallstatus7()
    Else
        ov59()
    End If
End Sub

Sub ov59()
    If (gfinalforecast = "gMO3") Or (gfinalforecast = "gPO1") Then
        overallstatus8()
    Else
        ov60()
    End If
End Sub

Sub ov60()
    If (gfinalforecast = "gPO2") Or (gfinalforecast = "gVP1") Then
        overallstatus9()
    Else
        overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
    End If
End Sub

```

Fig. Q.11. CMIMS coding-2 (43)

```

Sub ov61()
  If (gfinalforecast = "gVG2") Then
    overallstatus6()
  Else
    ov62()
  End If
End Sub

Sub ov62()
  If (gfinalforecast = "gMO1") Or (gfinalforecast = "gMO2") Then
    overallstatus7()
  Else
    ov63()
  End If
End Sub

Sub ov63()
  If (gfinalforecast = "gMO3") Or (gfinalforecast = "gPO1") Then
    overallstatus8()
  Else
    ov64()
  End If
End Sub

Sub ov64()
  If (gfinalforecast = "gPO2") Or (gfinalforecast = "gVP1") Then
    overallstatus9()
  Else
    overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
  End If
End Sub

Sub ov65()
  If (gfinalforecast = "gGO2") Or (gfinalforecast = "gMO1") Then
    overallstatus7()
  Else
    ov66()
  End If
End Sub

Sub ov66()
  If (gfinalforecast = "gMO2") Or (gfinalforecast = "gMO3") Then
    overallstatus8()
  Else
    ov67()
  End If
End Sub

Sub ov67()
  If (gfinalforecast = "gPO1") Or (gfinalforecast = "gPO2") Or (gfinalforecast =
"gVP1") Then
    overallstatus9()
  Else
    overallstatus = "The results of forecasting are not available. Forecasting
machine maintenance values contrast with prediction of machine equipment status or
matching conditions not found."
  End If
End Sub

Sub overallstatus1()
  overallstatus = "The overall status of machine is acceptable. All machine equipment
positions have very good status. A machine is ready for operation and Machine maint
nance is upon machine maintenance plan."
End Sub

Sub overallstatus2()
  overallstatus = "The overall status of machine is acceptable and most of machine
equipment positions have good status. However some machine equipment should inspect and
maintain. Machine maintenance is upon maintenance within 1-2 working days for some
machine equipment."
End Sub

Sub overallstatus3()

```

Fig. Q.12. CMIMS coding-2 (44)

```

        overallstatus = "The overall status of machine is acceptable. Some machine
equipment has good status. Some machine equipment needs to inspect and maintain.
Machine maintenance is upon maintenance within 1-2 working days."
End Sub
Sub overallstatus4()
    overallstatus = "The overall status of machine is acceptable. Some machine
equipment has moderate status. Some machine equipment should fix. Machine maintenance
within 1-2 working days is required."
End Sub
Sub overallstatus5()
    overallstatus = "The overall status of machine is unacceptable. Some machine
equipment has moderate status. Some machine equipment needs to fix. Machine maintenance
is upon emergent maintenance."
End Sub
Sub overallstatus6()
    overallstatus = "The overall status of machine is unacceptable. Some machine
equipment has moderate status. Some machine equipment has to emergent repair or
maintenance. Machine maintenance is upon emergent maintenance."
End Sub
Sub overallstatus7()
    overallstatus = "The overall status of machine is unacceptable. Some machine
equipment has poor status. Some machine equipment should fix or replace with new
equipment. Machine maintenance is upon emergent maintenance."
End Sub
Sub overallstatus8()
    overallstatus = "The overall status of machine is unacceptable. Some machine
equipment has poor status. Some machine equipment needs to fix or replace with new
equipment immediately. Machine maintenance is upon emergent maintenance."
End Sub
Sub overallstatus9()
    overallstatus = "The overall status of machine is unacceptable. Some machine
equipment has very poor status. Some machine equipment must immediately fix or replace
with new equipment. The emergent maintenance of machine is required."
End Sub
End Class

```

Fig. Q.13. CMIMS coding-2 (45)

```

using System;
using System.Collections;
using System.Configuration;
using System.Data;
using System.Linq;
using System.Web;
using System.Web.Security;
using System.Web.UI;
using System.Web.UI.HtmlControls;
using System.Web.UI.WebControls;
using System.Web.UI.WebControls.WebParts;
using System.Xml.Linq;
using System.IO;

public partial class LoadFileHOT2FTS : System.Web.UI.Page
{
    protected void Page_Load(object sender, EventArgs e)
    {

    }
    protected void Button1_Click(object sender, EventArgs e)
    {
        if (FileUpload1.HasFile)
        {
            try
            {
                if (FileUpload1.PostedFile.ContentLength < 102400)
                {
                    String filename = Path.GetFileName(FileUpload1.FileName);
                    FileUpload1.SaveAs(Server.MapPath("~/excel/HO2TFTS.xls"));
                    Label1.Text = "Upload status: File uploaded!";
                }
                else
                {
                    Label1.Text = "Upload status: The file has to be less than 100 kb!";
                }
            }
            catch (Exception ex)
            {
                Label1.Text = "Upload status: The file could not be uploaded. The following
error occured: " + ex.Message;
            }
        }
    }
    protected void Button3_Click(object sender, EventArgs e)
    {
        Response.Redirect("../excel/HO2TFTS.xls");
    }
}

```

Fig. Q.14. CMIMS coding-3

```

using System;
using System.Collections;
using System.Configuration;
using System.Data;
using System.Linq;
using System.Web;
using System.Web.Security;
using System.Web.UI;
using System.Web.UI.HtmlControls;
using System.Web.UI.WebControls;
using System.Web.UI.WebControls.WebParts;
using System.Xml.Linq;
using System.IO;

public partial class LoadFileLAIVFDTModel : System.Web.UI.Page
{
    protected void Page_Load(object sender, EventArgs e)
    {

    }

    protected void Button1_Click(object sender, EventArgs e)
    {
        if (FileUpload1.HasFile)
        {
            try
            {
                if (FileUpload1.PostedFile.ContentLength < 102400)
                {
                    String filename = Path.GetFileName(FileUpload1.FileName);
                    FileUpload1.SaveAs(Server.MapPath("~/excel/LAIVFDT.xls"));
                    Label1.Text = "Upload status: File uploaded!";
                }
                else
                {
                    Label1.Text = "Upload status: The file has to be less than 100 kb!";
                }
            }
            catch (Exception ex)
            {
                Label1.Text = "Upload status: The file could not be uploaded. The following
error occured: " + ex.Message;
            }
        }
    }

    protected void Button2_Click(object sender, EventArgs e)
    {
        Response.Redirect("~/excel/LAIVFDT.xls");
    }
}

```

Fig. Q.15. CMIMS coding-4

```

! ****
! **                                     Master Page                                     **
! ****

Partial Class MasterPage
    Inherits System.Web.UI.MasterPage
End Class

! ****
! **                                     _Default                                     **
! ****

Partial Class _Default
    Inherits System.Web.UI.Page
End Class

```

Fig. Q.16. CMIMS coding-5