



EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE

CERN - ST Division

ST-Note-2003-043

4 April 2003

ST-HM DESIGN SECTION - STRATEGY AND WORKING METHODS

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Abstract

The design section of the ST-HM group is devoted to realise all studies for new transport and handling equipment to be procured and installed according to the needs of CERN.

In year 2002, the design section has gradually passed from strong engagement in few huge projects to a multitude of 'less expensive' projects that require a fast solution and procurement for the LHC installation. The future tasks of our section will be feasibility studies of transport and handling manoeuvres as required for the installation of LHC components and the calculation of lifting tools. In addition the procurement of not yet defined items to solve problems that will occur during the LHC installation. This document gives an overview of the organisation of the design section, the projects and will also underline some problems, such as the incompatibility between the urgency of the users and long CERN purchasing procedures, the work overload, the increasing design requirements for handling tools and operations that were originally not foreseen.

Presented at the 6th ST Workshop
Thoiry, France, April 1 – April 3, 2003

1 INTRODUCTION

Handling and Maintenance (ST-HM) group at CERN is in charge of all items concerning transport and Handling, including design, procurement, installation, managing of after-sale contracts, operation of all CERN handling means.

The design section (DE) of the ST-HM group is devoted to realize all studies for transport and handling equipment (new or second-hand) to be procured and installed according to the needs of CERN. The small yet effective section will in the future probably not have enough daily hours to do all the work required due to the increasing amount of work.

2 FROM PREDIFINED ITEM PROCUREMENT TO GLOBAL TRANSPORT STUDIES

In year 2002 and previous, our section was devoted mainly at the procurement of predefined items (by the users), followed by installation and operation of them. In these years, a real change is happening in the way of working of our section and group. It happens, in fact, more and more frequently that project leaders requires our group to make a full study of transport issues of their object, while looking for feasibility, installation path definition (from unloading from the trucks to final installation), identification of needed handling means, design, procurement and installation of them, execution of the transport operation. In a word, we are asked to take care of the object from arrival to CERN up to final installation, which makes the work more interesting but also more complex and time consuming.

For many items of LHC such as Cold boxes, magnets, etc. it becomes apparent that the fact that these item require to be transported has not been taken into account in an early phase of design. Or transport requirements have not been taken into account at all. Not to forget the problem to install a new more powerful and bigger machine in an already existing tunnel. Due to this fact, complex transport methods and adapted handling tools need to be studied further, when the object is completely designed and build, and sometimes, already delivered to CERN.

Giving an off-the-shelf transport method and items for LHC complex components: this seems to be a major issue from 2003 until the end of the LHC installation.

3 DESIGN STUDIES

During the year 2002, more and more requests for studies have been done to our section to ‘invent and build’ any type of lifting and handling tool. Small tools as hooks, interfaces between other tools, supports, are required at the very last minutes, i.e. when on the worksites, the crane driver and transport people realise that something is missing.

That imposes, generally, the execution of a very fast study and the production in some small ‘metal-work’ firm of the surrounding region. One of the problems that contribute to slow down the tooling production is the approval to the design dossier required by TIS.

In fact, the only items at CERN needing TIS approval for studies are: handling tools and accessories (unless they are CE) and pressure tanks and vessels.

Compulsory TIS approval is needed even if the designer is a qualified and/or experienced person. This approval does not relieve in any way the designer responsibility in case of failure. The required delay for approval can be weeks.

The second problem that increases the delivery time of internally designed tools is the purchasing steps to send out an order. A complete purchasing path (from preparation of a DAI and order sent to the firm) can take 2-3 weeks for order values of 5-10 kCHF.

In 2003 and following years, we expect more and more requirements for studies of handling tools, especially in the field of crane tools and spreaders. In fact, almost every LHC complex component requires an appropriate spreader that is hardly ever included in the supply contract for the item.

4 DRAWINGS / 3D INTEGRATION

Our section is already active to deliver electronic 3D mock-ups of main cranes and handling means in core underground caverns and LHC installation buildings. In the previous years, ~ 13 3D mock ups has been realised and in 2003 we will realize 6-8 more for ATLAS surface and underground cranes and beam dumps.

The drawing activity of section HM-DE has increased strongly in 2002 in the following 3 directions:

- Preparation of drawings of items to be inserted in the Invitations to Tender (a sort of pre-design to better explain the CERN needs and foreseen solutions)
- Preparation of construction drawings of internally designed handling items and accessories
- Preparation of schemas for handling operations: These sketches are more and more requested by TIS when describing the handling method of fragile and heavy materials at CERN. They include truck paths, mobile crane movements, place to be reserved in a site, feasibility of operations (mobile cranes operating into building or caverns or in a row of dipoles), etc... This drawing activity, started in 2002, will progressively increase in next years for the transport, storage, handling and installation of all LHC main components.

5 INVITATIONS TO TENDER / PROJECTS

In year 2002, a number of Invitations to tender and Price Enquiries (12) have been sent and orders (12) placed by our section mainly concerning LHC surface and underground transport (see Table 1). Most important are listed below:

- Power feed rail for TIs tunnels (~410 kCHF)
- 25 containers for LHC pipes and cable drums (~380 kCHF)
- Vehicles for tunnel: 6 heavy tractors, 4 light tractors, 4 electric pallet trucks, 40 new RTL (in IT) and 10 trailers for personnel (DO) for a global amount of ~850 kCHF
- Vehicles for surface: 2 forklifts and one sideloader (~300 kCHF)
- Lifts: 3 lifts for ATLAS (~180 kCHF)
- Hoisting means: 1 crane for BB5 and one hoist for USA15 for a total amount of ~100 kCHF

Global amount engaged in 2002 is ~1,8 MCHF.

Figure 1: some examples of bought items in 2002: from top left to right: sideloader, electric pallet truck, pipes container, forklift, tow tractor, cable drums container.



It is very important to compare with the Design Unit activity in year 2001: 12 Invitation to Tender and Price Enquiry sent, but the global amount of the orders and contracts was 7,9 MCHF.

In years 2003, we expect a situation comparable with the year 2002 for medium value contracts (200-1500 KCHF), but an increased effort in terms of design of small items: that will mean a strong increase in the number of Price Enquiries (up to 20) and small orders (< 10 kCHF).

Table 1: Summary of the procurement activity of ST-HM-DE section

Years	DO-IT number (supplies)	DAI and contract number (supplies)	Global amount of engagements
2001	5 DOs 6 ITs	5 orders (DAI) 2 contracts	~7,9 MCHF
2002	9 DOs 3 ITs	26 orders (DAI) 1 contract	~1,8 MCHF
2003 (at 25 th March)	5 DOs (20 foreseen in 2003) no ITs (2 foreseen)	15 orders (DAI), 60 foreseen no contracts, 1 foreseen	~584 kCHF (~3,7 MCHF foreseen)

It becomes apparent from these data that all the main handling means for LHC installation have been defined at an early stage, but now a big refining work is required.

6 CONCLUSIONS

It is clear that the trend for the future is a diminution of the huge contracts and an increase of design and procurement of light handling means. Although the overall budget of the managed contracts will decrease, this will imply the strong increase in design and drawing activities during the overall LHC installation time. In fact, the requests for material are nowadays arriving between 6 months and 2 weeks before the material is needed. A number of Price Enquiries and simple DAIs are foreseen. Every client, of course, pretends to be the more urgent and pretends to be served immediately (mostly when the items are really needed for the following weeks).

Main issues to permit our section to satisfy all the clients are:

- Evolution of CERN purchasing procedures
 - The need of establishing several Price Enquiries in the local zone and with restricted answer times: 2-3 weeks for 'off-the-shelf' material with a value included between 20 and 50 kCHF should be enough.
 - The need to fasten signature circuits over 50 kCHF (< 100 kCHF): It goes actually up to the financial controllers. A solution could be not to require all these signatures if the Order value is in the estimate done for the Divisional Request or similar.
- Establishing of a B contract to outsource small and urgent studies and to write 'technical dossiers' for TIS. This contract can be very similar to the one actually in place for studies in Civil Engineering group.

The overall amount of work will strongly increase, while the yearly-managed budget will stay stable. This implies a re-organisation of the section and the group and the possible solutions to afford better the next years can be:

- Reorganisation between ST-HM and EST-IC in terms of design: what should be designed by ST-HM? What by EST-IC? Who is in charge of what?
- Recruitment of the third 'missing staff' of the section, a person dedicated to drawing activities, but mostly to procurement of standard handling material.