

CHAPTER 3

EXPERIMENTAL METHODOLOGY

3.1 Introduction

This chapter details the experiments conducted to achieve the stipulated objectives.

The experimental work is divided into three phases as shown in Figure 3.1. In the 1st phase, the preliminary experiment involved the development of cast iron as the base for the DNR experiments. Nodularisation and inoculation processes were then carried out by adding 0.1-1.0% MgFeSi and 0.5-1.0% FeSi respectively. The 2nd phase of the research was to establish the effect of Mn addition, MgFeSi and FeSi on the mechanical properties and microstructure of the DNR. Thermal analysis was also conducted to observe the behavior of the molten metal during solidification. The alloy development based on pig iron is shown in Figure 3.2. In the 3rd phase of the research, analysis were conducted to determine the mechanical properties, microstructure of DNR using optical microscopy, Scanning Electron Microscope (SEM) equipped with Energy Dispersive X-ray Spectroscopy (EDX), X-Ray Diffraction (XRD) and image analyzer. A series of mechanical properties testing involving tensile (room and elevated temperature), hardness (macro and micro), corrosion and high temperature oxidation were studied in depth to support the analysis.

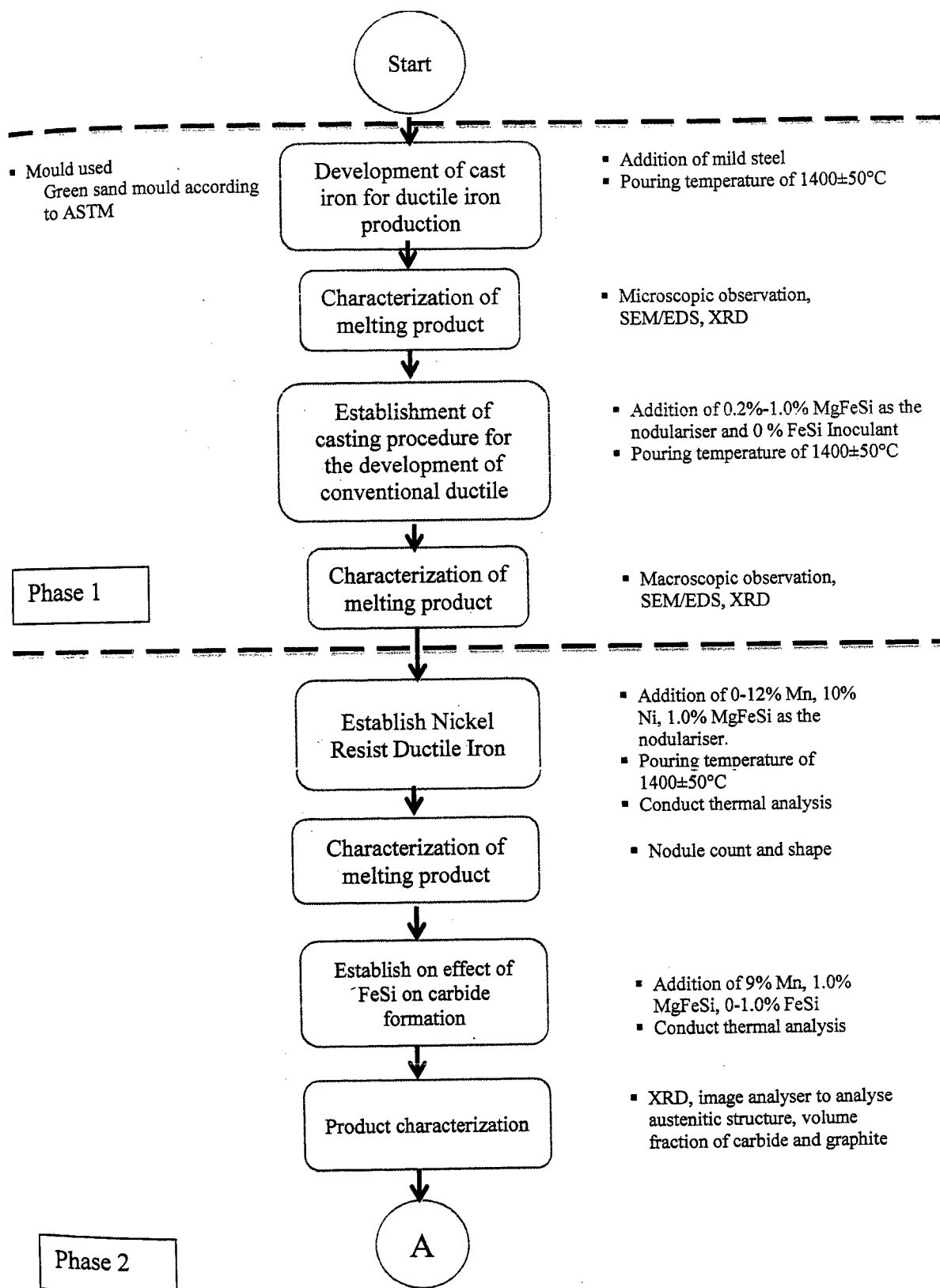


Figure 3.1 Overall experimental activities flowchart (continue)

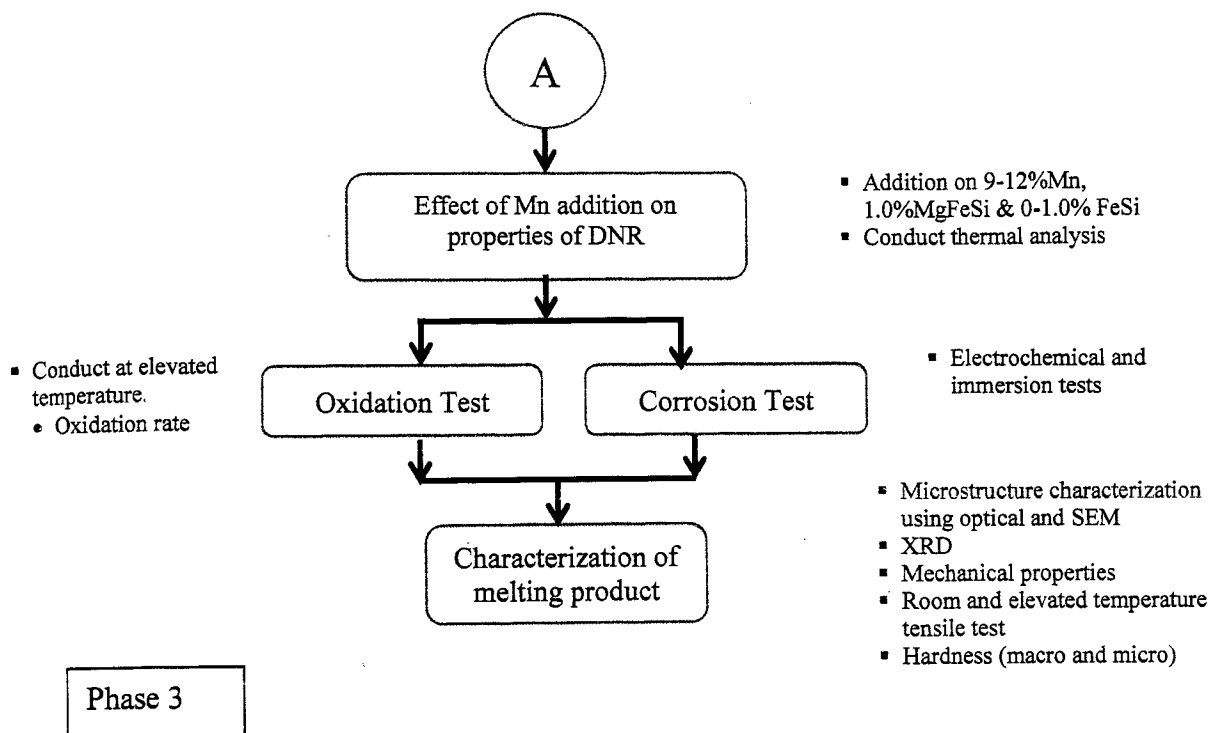


Figure 3.1 Overall experimental activities flowchart