for some platinum metal alloys. Coles, Loram and Waszink (Imperial College) described the low temperature behaviour of dilute solutions of iron in palladium and rhodium; in the latter no magnetic ordering is found up to 1 per cent Fe but low temperature resistance anomalies occur. Bates and Unstead (University of Nottingham) presented data for palladium-thorium alloys where reductions of the susceptibility of palladium by alloying are related to those occurring in palladium-uranium and other alloys.

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Quality Control in the Iron Foundry

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Control of metal quality is becoming increasingly important in the ironfounding industry as customers demand tighter specifications and apply more rigorous inspection techniques on the components ordered.

The three basic constituents of cast iron that affect strength, hardness and chilling characteristics are total carbon, silicon and phosphorus. The index which combines the effects of these elements is known as the carbon equivalent value and is normally calculated from the simple formula:

$$\text{Total carbon } \% + \frac{\text{Silicon } \% + \text{Phosphorus } \%}{3}$$

To meet specification requirements there is an obvious need to know the chemical analysis, carbon equivalent value or chilling characteristics of the metal as soon as it has been tapped from the furnace and before it is poured into the moulds. Chemical analysis is too slow, spectrographic analysis gives only the silicon value unless special techniques—too expensive for the majority of foundries—are used, and the chill test is open to a number of operational variables.

The technique for the determination of the carbon equivalent value from the cooling curve of a sample of iron has already been described in this journal (*Platinum Metals Review*, 1962, **6**, 20). The apparatus employed consists of a platinum : 13 per cent rhodium-platinum thermocouple, sheathed in silica and placed centrally in a mould cavity approximately $2\frac{1}{4}$ inches diameter by 3 inches high. The thermocouple is connected to an automatic temperature recorder and when the sample of metal is poured into the mould, the liquidus arrest temperature can be read off a chart.

Using this technique it is possible to determine the carbon equivalent value within about one minute of casting the sample and the value obtained is usually within ±0.05 of that obtained from calculating the value from analysis results—an error within the limits of analytical reproducibility. The quality of the metal can, therefore, be assessed before the castings are poured and, if necessary, corrections can be made. The technique has now found wide application in the ironfounding industry and in this country alone it is in use in at least seventy foundries.

Determining carbon equivalent value in the iron foundry

It is also important to control the pouring temperature, and a suitably adapted two-stage recorder with two platinum : rhodium-platinum couples is now available to measure both carbon equivalent value and the temperature of the molten metal.

The value of this "shop-floor" metal control method has been realised by the foundry staff and the cost of the equipment has been quickly recovered from the decrease in the number of defective castings produced.