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Development of the CLECIM-KSC Type DC Arc Furnace

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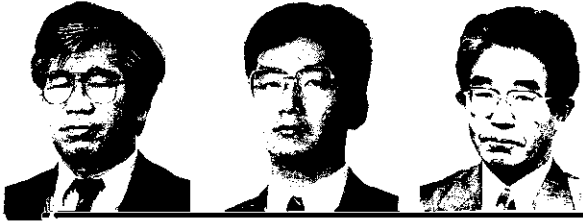
Synopsis :

Kawasaki Steel Corp. (KSC) has, in cooperation with the French company CLECIM, developed a new type of DC arc furnace and achieved uniform melting with a 100-t unit. The main features of the CLECIM-KSC type DC arc furnace are: (1) Arc deflection is prevented by an appropriate layout of three water-cooled electrodes and bus tubes and (2) arc direction also is controlled by individual control of each of the three bottom electrodes. The safety of the IRSID water-cooled bottom electrodes was confirmed by a heat transfer analysis. The service life of these electrodes is extremely long, and their simple configuration facilitates repairs to the furnace bottom refractors. To ensure safety and a good working environment around the furnace and high productivity, the bottom electrodes can be replaced from outside the furnace shell. Oxygen blowing and other operational tasks have been automated, and the dust collection system in the building which houses the furnace was designed on the basis of the flow analysis and model experiments.

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**The body can be viewed from the next page.**

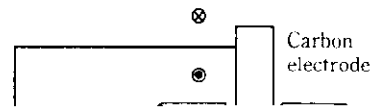
# Development of the CLECIM-KSC Type DC Arc Furnace\*



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developed the CLECIM-KSC type DC arc furnace to solve these problems with conventional large DC arc furnaces. The newly developed DC arc furnace was sup-



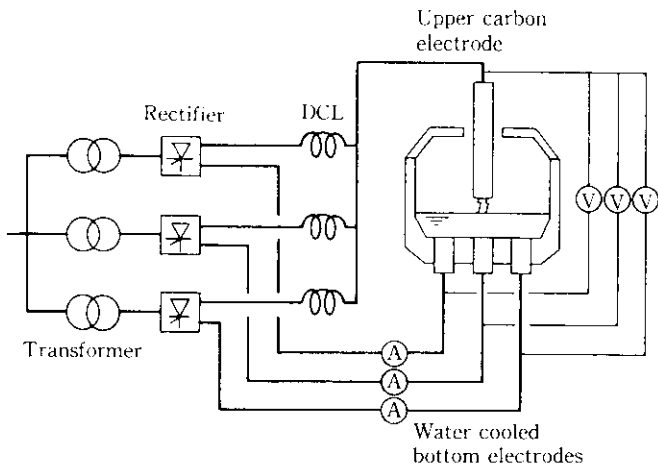


Fig. 3 Skeleton for control of arc direction

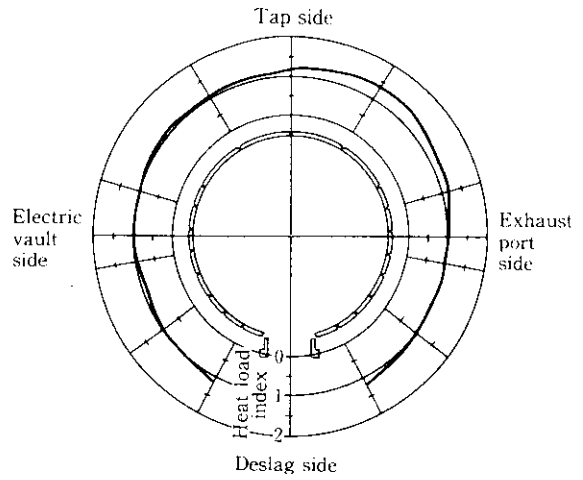
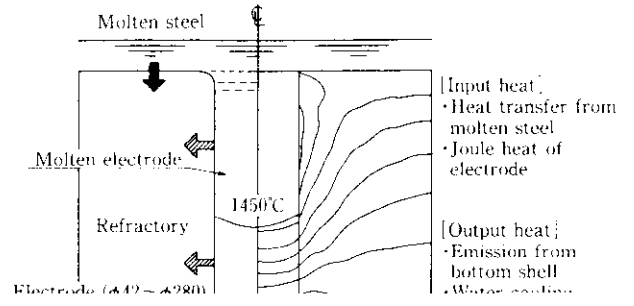
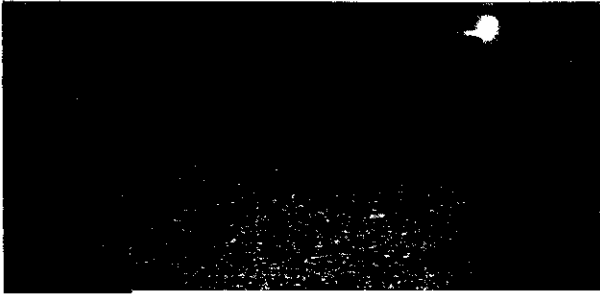
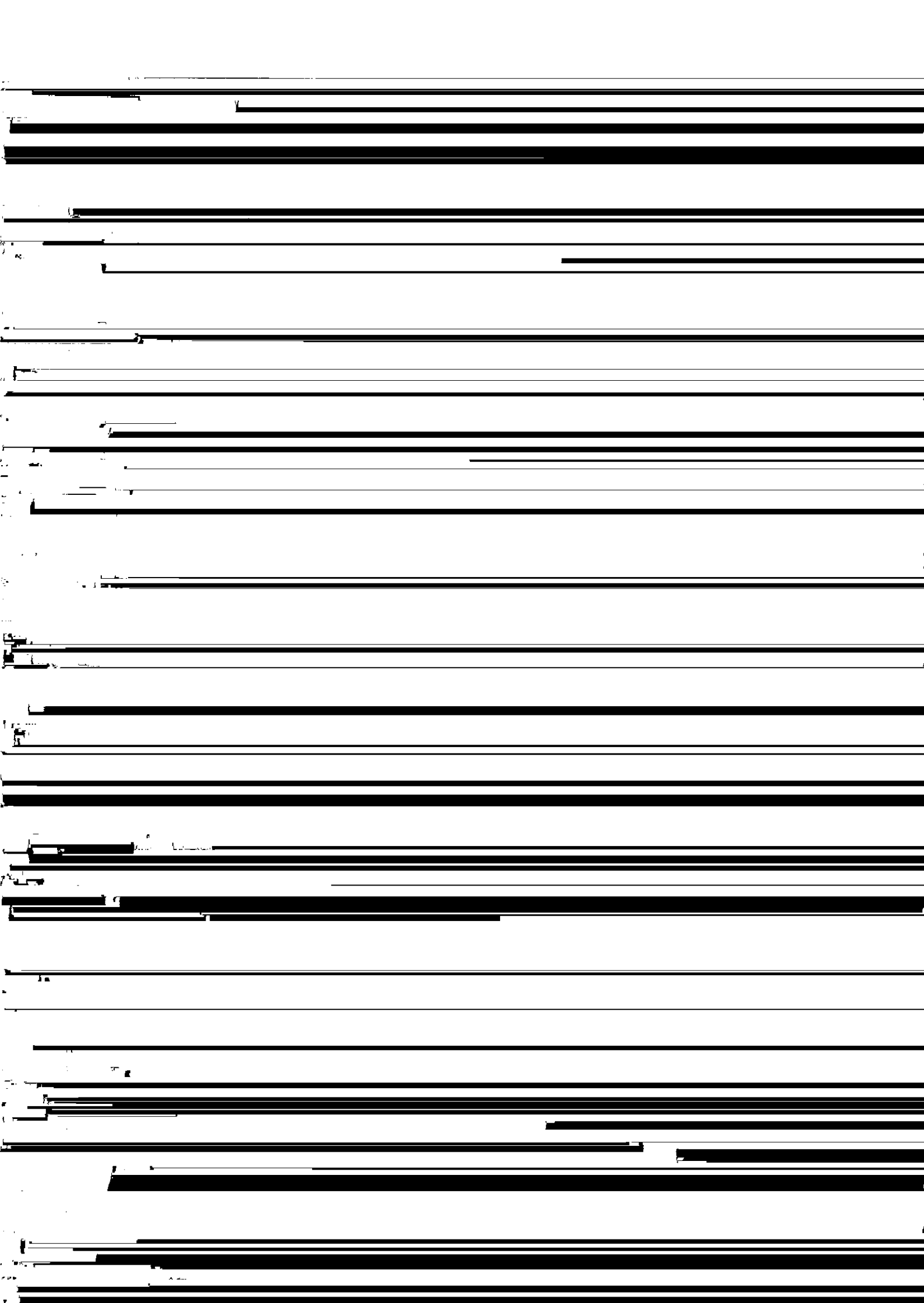


Fig. 4 Distribution of heat load on water cooled panels above hearth line

rent to any one of the three bottom electrodes by several percent, and the electric energy input is little affected by this. Furthermore, the arc direction can be delib-

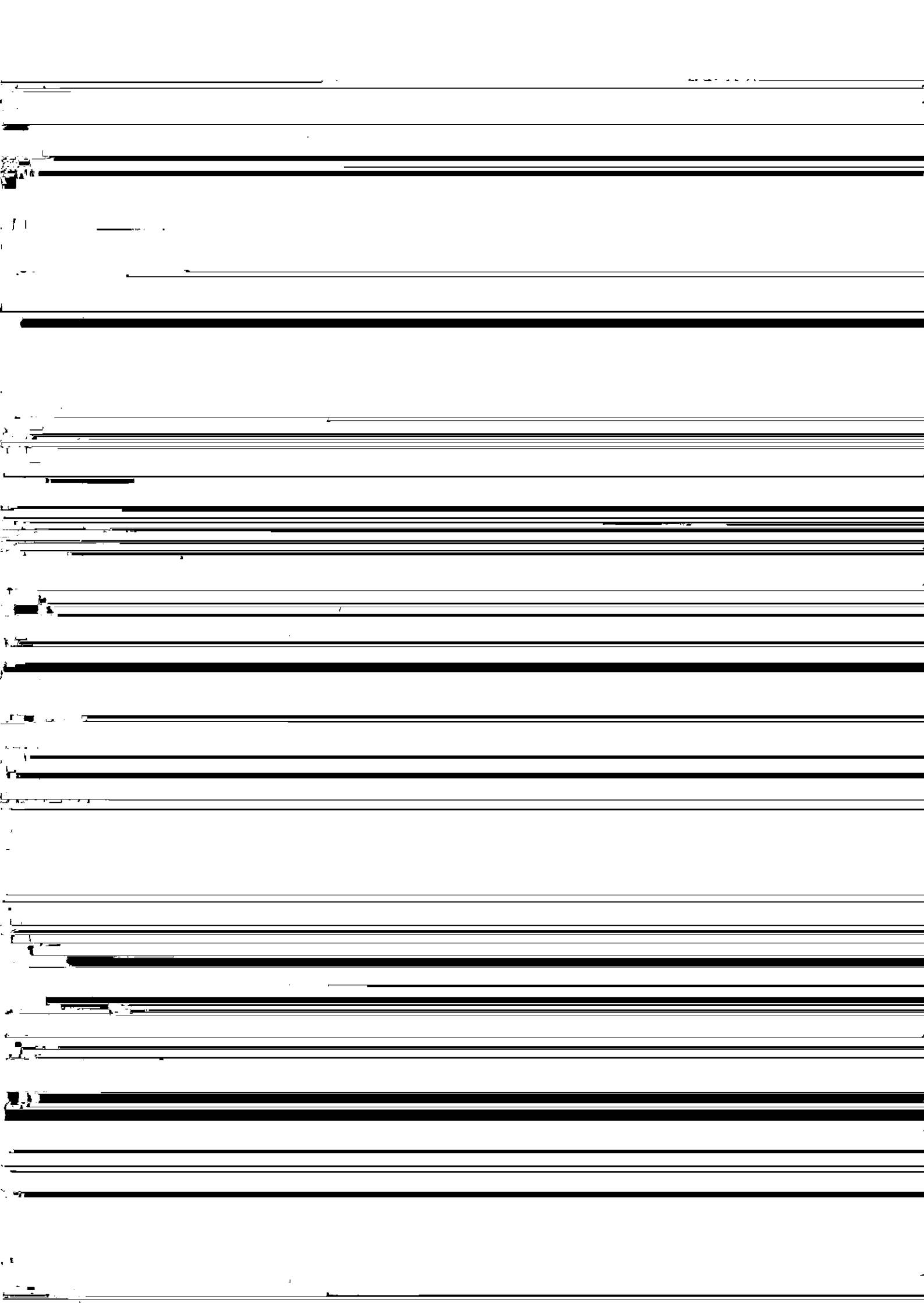




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Table 1 Automatic devices

Item	Features
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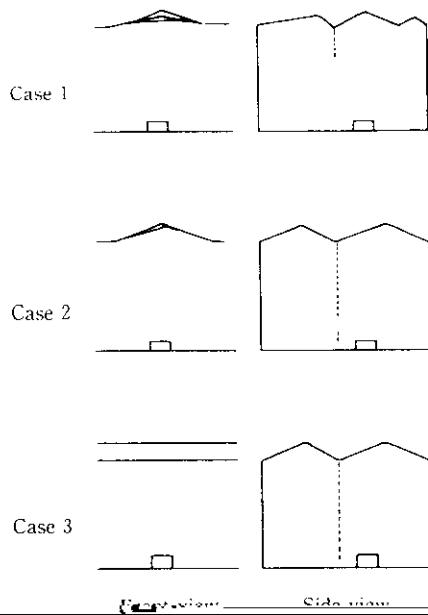


Table 2 Main specifications of 100 t DC arc furnace of Daiwa Steel at Mizushima

Item		Main specifications
Transformer capacity		100 MVA
Arc voltage, arc current		800 V, 100 kA
Electrode	Upper	28 in × 1
	Bottom	Water cooled billet × 3
Furnace shell (dia. × height)		φ 6 700 mm × 3 100 mm
Tapping system		LVT and ladle car
Scrap charging		1 or 2 buckets

Table 3 Operational results of 100 t DC arc furnace of Daiwa Steel at Mizushima

Productivity	Tap to tap time	57 min (average) 46 min (record)
	Carbon electrode	1.1 kg/t
Unit consumption	Electric power	300 kWh/t

analysis

Streamline



on the melting amount of the electrodes were grasped and safety was verified. As a result, it was found that the

**References**

1) T. Imai: Dai 135 kai Nishiyama Kinen Gijyutsu Koza,