



Characteristics and Operation

**of Multipurpose Continuous
Annealing Line at Chiba Works***

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tion since July 1980.

steel strip. The ranges of thickness and width of steel strip to be processed were determined to cover most of

reel to the first looper in **Fig. 1**. An external view of the entry equipment is shown in **Photo. 1**. The entry equipment performs the following two functions:

(1) To join cold rolled coils and feed them into the furnace at a constant speed. This function in-

volves: two pay-off reels which uncoil cold coils alternately, a crop rejector to remove off-gauge parts automatically, a narrow lap seam welder to join the preceding strip with the following one, and a looper to store the steel strip to be fed into



the furnace during welding.

(2) To remove rolling oil from the surface of steel strip. The cleaning equipment is designed for tin-

30% reduction of NO_x emission in comparison with conventional one.

For the precise control of temperature, this section

The equipment consists of two sets of each 240 heating pattern can be selected depending on the type

following three modes, as shown in Fig. 2:

- (1) Rapid cooling of strip to around room temperature, to be used for dual-phase cold rolled sheet steel with high tensile strength (commercial die-c

2.3.4 Second cooling section

Since this section is used in the slow cooling mode for high temperature and electrical steel, as is the

Steel type	Key factor	Measure
High temper tin plate Electrical steel	Stable high speed operation	①Optimization of hearth rolls in terms of profile and surface quality

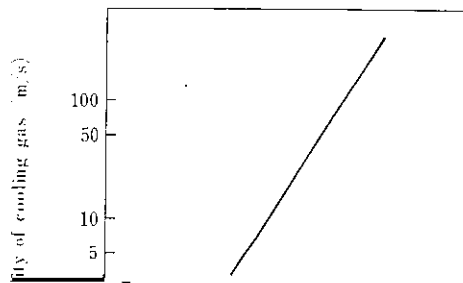


Fig. 5, four zones are used, and the flow of cooling gas is about 70% of maximum capacity.

3.3 Furnace with Excellent Stability at High Speed

The most difficult problem in processing high temper tinplate at a high speed is to prevent steel strip from mis-tracking in the furnace. On the basis of operation with the existing CAL (maximum processing speed: 550 m/min, capacity 2×10^4 t/month), the maximum

determined by the chemical composition of steel but

Master computer (MC)

Process computer

Data processing
To process coil informations
and annealing conditions



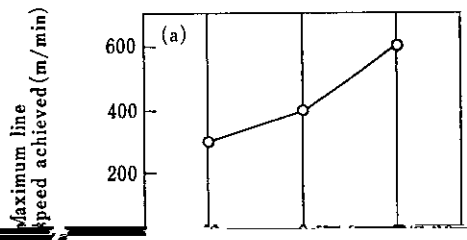
upon the situation immediately after start of operation and the experience with the newly developed equip-

speed of high temper tinplate are shown in Fig. 8. The output of every type has increased smoothly, and the

4.1 Production Achievement

Changes in the monthly production amount of various types of steels and in the maximum processing

increased with every production period, attaining stable operation at the specified maximum speed in the third month after start of operation.



The performance of most of the new equipment adopted in KM-CAL was confirmed throughout the trial operation and three-month commercial operation. The experience with major equipment will be described below.

(1) Furnace section

[Redacted]

[Redacted]

[Redacted]

shown in Table 5. Chemical composition of low

[Redacted]

[Redacted]

[Redacted]

[Redacted]

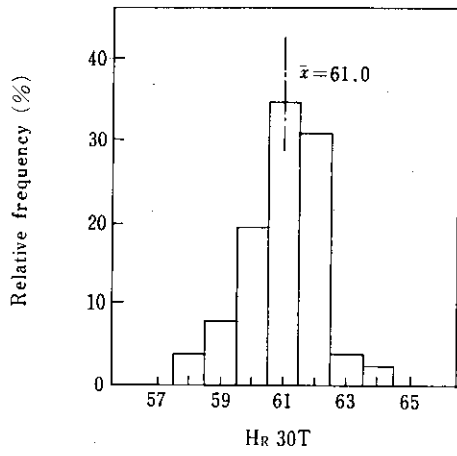


Fig. 11 Hardness distribution of high temper tinplate (T4-CA)

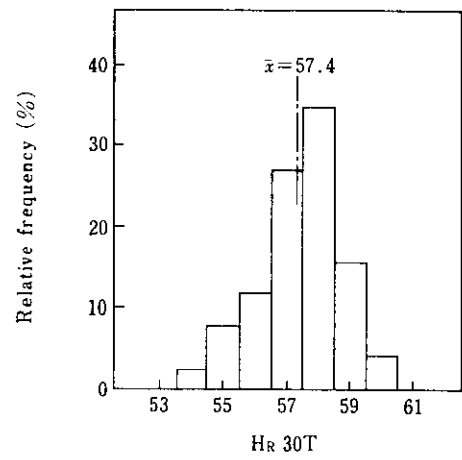


Fig. 12 Hardness distribution of low temper tinplate (T3-CA)

sticks were likewise good.

(4) Dual phase cold rolled high strength steel, CHLY

For this reason, KSC's CHLY, which is free from yield point elongation phenomenon immediately

~~By continuous annealing, permits omission of~~

(1) High temper tinplate was processed as fast as 600 m/min through the improved hearth roll and the

~~highly stable and fast tinplate~~