KAWASAKI STEEL TECHNICAL REPORT No.7 (March 1983)

Development of Ni-Fe alloy Plating for Prol onging Mold Life of Continuous Steel Casting

Hiroshi Kanayama, Akira Ichihara, Yuji Watanabe, Genji Hattori, Koji Suzuki

Synopsis :

Through Kawasaki Steel Corporation's platin g experience consecutively with Cr, Ni and MC (Multi-Coating) on the inner surface of the continuous casting mold, a Ni-Fe (4-10%) alloy has been newly de veloped for a single layer pl ating. Auxiliary anodes are adopted for the assembled mold plating prac tice to obtain plating layer uniform in thickness along the horizontal section. Tape red plating technique is also developed to realize thin plating at the upper part of the mold in consideration of high thermal conductivity, and thick plating at the lower part from the viewpoint of good wear resistance. Ni-Fe plating has a higher heat conductivity than Ni plating and MC, and shows an excellent wear resistance at higher temperatures such as 400 ¥. Commercial application of the tapered single layer Ni-F e plating proved a longer mold life, with mold cost per ton of strand reduce d by 25% for bloom and 43% for slab.

(c)JFE Steel Corporation, 2003

The body can be viewed from the next page.

1

14

, 1

1

Development of Ni-Fe Alloy Plating for Prolonging Mold Life of Continuous Steel Casting*

Hiroshi KANAYAMA ** Genji HATTORI **

Akira ICHIHARA ** Koji SUZUKI ***

Yuji WATANABE **

<u> </u>		
-		
A		
•		/

₽ *		
·		
		1
<u> </u>	and MC (Multi Constinue) and to inner a face for the stand of the	· •





۰.

	Main anode	Auxiliary anode]	• With subsidiary anode	
					1
-					
. 1					
<u>, </u>					
······································					
'I'j					
• • • • •					
· . · 1				Y	
	J				
,					
, F	<u> </u>				

	د . ۲	Heat treatment	Ni	Ni-4.7%Fe	Ni-7.9% Fe*	Y	× ~	<u>216</u> <u>114</u> 50	 	
	- 									
		1								
		· · · · · ·	-		*					
	0									
										
			2							
	· 								 	
-										

heat treatment. Breaking was found on base material of copper for both platings, and therefore adhesion of plating layers is considered to be sufficient.

1

cooled thereafter. Wear of these pieces was then measured by Tabor Wear Test, and Fig. 9 represents the results. Thickness of plating material divided by value of this wear gives the wear resistance which is

<u></u>		WAIT TREES ROALSUNION TO
	*	
Pn		
	f	
`		
3		
<u></u>		
<u>}</u>		
t		
\$ <u>~</u>		
<u>, 1</u>		
. . .		4
_		
<u>مربع</u> مربع	(
· · ·		
)		
, u		
ຢ_ ¶ີ ຢ⊒ `		
<u>}</u>		
		
ι, 	1	
ž	-	
	<u>}</u>	

Caster Caster plating 200 400 600 800 1000 1200 Ni Low (0.4-0.6 m /min) Ni ZZZZZ MC ZZZZZZ MC Ni-Fe ZZZZZZ MC ZZZZZZZ MC MC ZZZZZZZZZZZ Medium (0.6-0.8 m /min) MC ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	Caster	Casting rate	Type of	Number of heats cast	
Slab caster Low (0.4-0.6 m /min) Ni ZZZZ MC ZZZZZZ MC ZZZZZZ Ni-Fe ZZZZZZZ MC ZZZZZZZ Medium (0.6-0.8 m /min) MC ZZZZZZZZ MC Ni-Fe ZZZZZZZ MC ZZZZZZZZZZ Bloom caster Medium (0.8-1.0 m MC ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	Caster	Casting rate	plating	<u>200 400 600 800 1000 1200</u>	
Slab caster MC ZZZZZZ Medium (0.6-0.8 m /min) MC ZZZZZZZ Medium (0.6-0.8 m /min) MC ZZZZZZZZ Ni-Fe ZZZZZZZZZ Ni-Fe ZZZZZZZZZ Medium (0.8-1.0 m MC CZZZZZZZZ MC	•	Low	Ni		
Slab caster Ni-Fe Z/////Z Medium (0.6-0.8 m /min) MC Z////////////////////////////////////		(0.4-0.6 m	MC	777777	
Medium (0.6-0.8 m /min) MC ////////////////////////////////////	Slab caster	, 11141)	Ni-Fe	7777777	
Medium (0.8-1.0 m MC MC		Medium	МС	(//////////////////////////////////////	
Bloom (0.8-1.0 m MC //////////////////////////////////		(0.0~0.8 m /min)	Ni-Fe		
raster (0.0-1.0 m	Bloom	Medium	МС		
	caster	(0.0-1.0 jii			
					· -

Fig. 10 Comparison of mold life between different types of mold plating

4 Service Life and Life Cycle Cost of Mold Copper Plate

Fig. 10 represents compared service life by plating material of Ni-Fe plating, etc. now used in the process

Caster	Casting rate	Type of plating	Ratio of mold life cycle cost 10 20 30 40 50 60 70 80 9010
	Low (0.4-0.6 m	Ni	
Slab	(0,4-0.0 min) /min)	Ni-Fe	
caster	******	MC	~~~ <u>~~~~~~~~~~~</u> ~~~~~~~~~~~~~~~~~~~~~~