

Dual Stand Elongation control technology for dual stand skin pass mill

*G. T. Lee(lgtaek@posco.com)¹, S. J. Lee(sj1008@posco.com)², J. S. Kim(jskim@pusan.ac.kr)³
¹ POSCO, ² , ³

Key words : Skin Pass Mill, Elongation Control, Cold Rolling

1.

Rolling Process) (Tandem Cold
 Process) (Continuous Annealing
 4 ~ 5 (Mill)

Type(6Hi
 460 ~ 510mm, D7)

가

가

가

가

Fig.2

(Skin Pass Mill, SPM)

(Furnace)

가

가

590Mpa

(elongation)

가

[1]

가

가

440Mpa

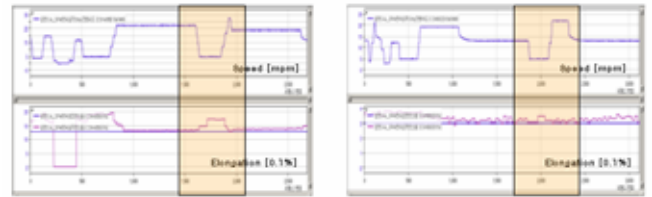
Fig.1

2.

, Dual Stand SPM

가

가



(a) Low carbon Steel (b) High Strength Steel
 Fig. 2 Variation of actual elongation according to speed change

1 SPM

SPM 1

가

Dual Stand SPM

(, ,)

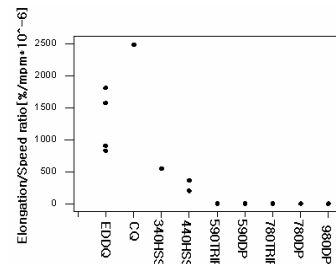


Fig. 3 Elongation sensitivity for rolling speed with steel grade

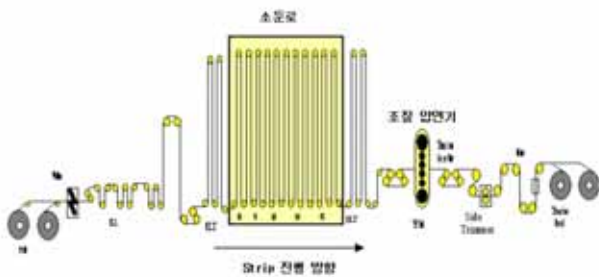


Fig.1 Schematic diagram of Continuous Annealing Line

2.

Steel 440Mpa~1480Mpa Low Carbon
 Strength Steel 가 High
 720~1750mm 가
 Size 0.4~2.0mm,

가 2
 CQ 4Hi
 가 B5, D7,
 D5 , 2 D7

. 1 150Ton
 Bright Roll(B2)
 , Dull Roll D7, D5 0.25, 0.22%
 . 2 1 150Ton
 0.36, 0.41, 0.45% 가
 가 1
 2

가 가

Fig. 6 Step

가

Bright Roll

#1

1.0%

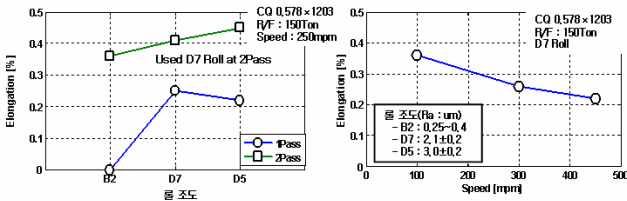


Fig. 4 Relation between elongation and roll roughness/speed

3. Dual Stand SPM

2

Plant

2

#1, #2

#1

#2

[2]

Fig. 5

ASR(Automatic Speed Regulator),
CFC(Constant Force Control),
ATR(Automatic Tension Regulator)
#4, 5 Bridle Roll

Regulator)

AEC_F(Automatic Elongation Control with Force)
AEC_T(Automatic Elongation Control with Tension)
AEC_F

, AEC_T

가 α, β

Weighting /Simulink

Matlab

Table 1

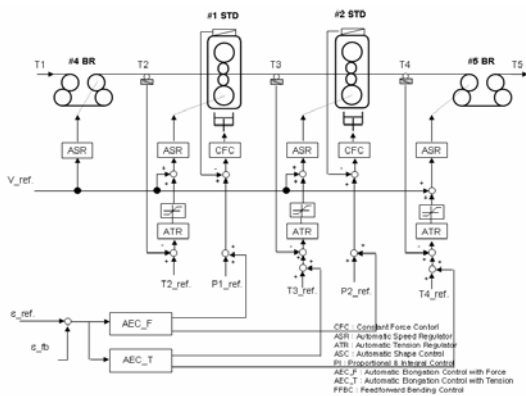


Fig. 5 Block diagram of controllers for Dual Stand SPM

Table 1 Mill specification and simulation conditions

SPM 사양 : 4# 2 Stands			
BUR Dia./Barrel Length	1000~1100 / 2050 [mm]		
WR Dia./Barrel Length	430~480 / 2100 [mm]		
WR Bending	+ - 60 [Ton]		
Max. R/F (Normal)	1000 (700) [Ton]		
Max. Mill Speed	450 [mpm]		
시뮬레이션 조건			
입속 소재 두께	0.713	폭	1017
장력 (T2, T3, T4)	2963, 3257, 3400 [kg]	Mill 상수	470 [Tor/rmm]
Master Speed	300 [mpm]	WR 반경	225 [mm]

0.5

AEC_F

가

1.0%

1.2%

AEC_F

가

225Ton

210Ton

open

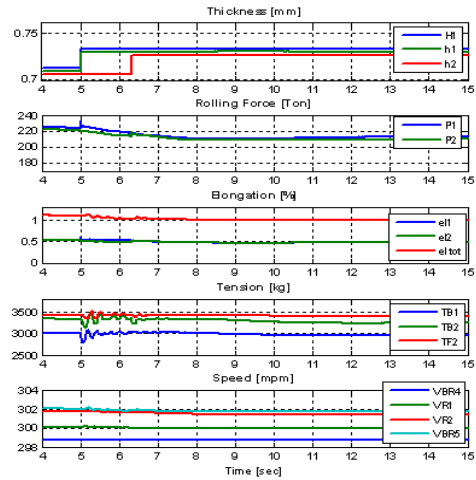


Fig. 6 Simulation results of elongation control for Dual stand SPM

4.

2

Bright Roll

#1

(CFC), (CEC)

(ATR),

1. (I), 962-976

2. " KACC, 2000..

3. Jortner,D., Osterle,J.F., and Zorowski,C.F., An Analysis of Cold Strip Rolling. Int.J.Mech.Sci. 1960,Vol.2, 179-194.

4. Grimble,M.J., A Roll-Force Model for Tinplate Rolling, GECJ. Of Science & Tech., Vol.43, No.1,1976,pp3-12.

5. S.A. Domanti, W.J.Edwards, P.J. Thomas and I.L. Chefneux, Application of Foil Rolling Models to Thin Steel Strip and Temper Rolling. Proc. 6th International rolling Conference, Duesseldorf, Germany, June 20-22,1994,422-429.