D5 - Report Description

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1. Model Strip Report

1.1 Purpose of Model Strip Report

The model strip report is a tool to trace the model´s pass schedule calculation. It contains a number of relevant data which are the basic of the pass schedule calculation as well as a number of relevant recalculated values, averages of readings over different numbers of single readings which are either the basis for adaptation or for information only.

1.2 Layout of Report

```
================================================================================================================================================
CAL Calculation Slab A16638 Stands 1-6                    Version 2.24 from 31/01/96                              5-FEB-1996 09:52:22
================================================================================================================================================
Valid    3                                                FM in L2
    Slab    Trb   FMexit                                                          Longterm Ada off, used shortterm Ada
Th  5.295  1.150  0.208 [in]     "1005P" sFrc6 20.00[Ton/in]  Slope 0.000070[Ton/in2] AdaTemp   1.001  [-]  CorThick  +0
Wd   43.5    0.0   42.5 [in]     MatLaw   5 Prop   1 RolStr   6-Load                  AdaTim   -7.619  [s]  OfsSpeed  -2
Ln 45.320      0      0 [ft]                Cool 111 LoopTa   6                       AdaThi  +0.0103 [in]  Limits   off
Te 2350.0 2000.0 1620.0 [oF]     Descale  2: North 1  16[s] South 1 150[s]           AdaWidt +0.5000 [in]  Correct  Speed
MatLaw   5: kF0 5186 m1:0.003340 m2:0.0290 Fo:0.950|0.938|0.828|1.055|0.816|0.798 To:0.906|0.919|0.879|0.996|0.815|0.803
   Ada   5: kF0 5186 m1:0.003340 m2:0.0290 Fo:0.952|0.940|0.828|1.059|0.817|0.798 To:0.909|0.922|0.880|1.001|0.815|0.803 g=10
================================================== Roughing Mill Area ==================================================

RM Pas Act Screw  ThIn  ThOut   Edg  WdIn   WdOu Force Speed TeIn TeOu         dur dTmp TeHead TeTail       Roll   Dia  Crown
                                42.2                        totalStrip
    1   1 3.998  5.295  4.257  43.2 42.17  43.23   953   618  2127 2042  Zo1: 0.11  0.6 2109.7 2109.7  Up NA05357 38.035 50.0
    2   1 2.674  4.257  2.952  47.2 43.23  43.41  1226   573  2091 2056  Zo2: 4.99 20.3 2109.0 2026.1  Lo NA05356 37.973  0.0
    3   1 1.698  2.952  1.970  43.2 43.18  43.47  1152   585  2146 2103  Zo3: 0.48  2.4 2088.8 1810.8                [in] [mil]
    4   1 0.898  1.970  1.179  47.2 43.47  43.54  1274   613  2097 2063  Zo4: 1.89 15.4 2086.4 1793.9  FMinHeadTemp 1933 [oF]
    5   0 1.780  1.178  1.178  42.1 38.79  38.79     0   428  2018 1994  Zo5: 7.56 35.3 2070.9 1777.9  FMinTailTemp 1748 [oF]
          [in]   [in]   [in]  [in]  [in]   [in]    [T] [fpm]                  [s] [oF]   [oF]   [oF]
================================================== Finishing Mill Area ==================================================
  St ThIn ThOu Gap ThOA ThOMF MsTo  TeIn Tail TeIP TeOu FrcC Tail FrcP FrcA  TorqCa  TrqPo TorqA  PowC  PowA  vIn vOut vRol vAct

  1 1179  716  704  701 684.7  131  2036 1757 1932 2004   983 1679 1244 1260  285462 406057 415022 2243  3298  156  256  240  238
  2  716  535  522  519 513.7   79  1971 1731 1884 1936   637 1029  727  741  139911 162140 164996 1597  1896  256  343  330  326
  3  535  409  396  393 398.3   69  1906 1691 1829 1871   545  840  602  596   95184 117279 118323 1468  1811  343  449  426  422
  4  409  308  295  293 303.1  101  1842 1651 1772 1816   771 1140  827  858  127207 125617 130168 2677  2695  449  595  558  552
  5  308  254  242  241 249.5   62  1793 1627 1728 1759   479  679  540  537   50532  67020  66435 1255  1622  595  723  688  681
  6  254  211  199  198 209.9   67  1739 1589 1677 1706   522  714  558  552   68765  77000  73542 1960  2032  723  872  816  811
    [in/1000]  [in/1000] [in/1000]  [oF] [oF] [oF] [oF]   [T]  [T]  [T]  [T]  [lbFt] [lbFt] [lbFt] [hp] [hp]      [fpm]    [fpm]

St  dur durA ovlHd-Tl ovlA bite  epsS  epsO   eps  epsA  red redA rMF  widIn widOu leng slipB slipF  vRolAv ThiAv Lp Tens CL Ov iG

 1  78.7  78.7  75 132 110 11.71 30.70 39.40  39.22 40.24 463 472 488  43.54 43.42  336 33.86  8.82   239.4 0.704 13 1200  0  0  0
 2  79.1  78.6  53  83  63  7.49 21.81 25.43  25.32 25.90 182 182 171  43.42 43.20  452 20.93  5.88   328.9 0.521 13 1400  0  0  0
 3  79.6  78.6  49  72  60  6.32 15.89 23.67  23.56 24.26 127 126 115  43.20 42.94  595 19.28  5.60   425.0 0.395 13 1600  0  0  0
 4  80.0  78.7  89 128  90  5.65 13.05 24.69  24.57 25.42 101 100  95  42.94 42.72  793 20.05  6.00   556.5 0.295 10 1900  0  0  0
 5  80.5  78.5  42  57  54  4.06 10.28 17.82  17.74 17.80  55  53  54  42.72 42.41  971 14.16  4.35   685.8 0.243  8 2150  0  0  0
 6  80.5  78.6  65  81  68  3.47  6.69 17.11  17.03 18.08  44  44  40  42.41 42.42 1170 13.52  4.23   814.6 0.200  0    0  0  0  0
    [s]   [s]  [%] [%] [%]  [deg]  [%]   [%]    [%]   [%]   [in/1000]  [in]   [in]  [ft]   [%]  [%]   [fpm]  [in] [o][psi][sec]

  St WRTop  Dia     WRBot   Dia     teRol Wear    Crown  gapCo vCorP vCorA      Force         Force      Grad  GradA Grd1A Grd2A
                                       on    WR   BR                    Min  Ave  Max Head Midd Tail   on
  1 HP23716 21.791  HP23717 21.791  68.3  0.50   8.0  0.0 -11.3 +1.75 +1.87  972-1321-1602 1072-1264-1484  7.07  5.26  4.93  5.58
  2 HP21937 20.645  HP21938 20.643  68.2  0.47   8.0  5.0 -12.8 +1.78 +1.75  637- 764- 974  683- 742- 883  3.96  2.55  1.50  3.58
  3 CO71452 20.038  CO71453 20.040  68.2  0.57   6.0 10.0 -12.8 +0.31 +0.24  514- 615- 904  564- 582- 761  2.96  2.51  0.47  4.52
  4 WH24075 19.400  WH24215 19.400  68.3  0.89   5.0 10.0 -12.0 -0.62 -0.64  696- 877-1041  796- 861- 964  3.70  2.14  1.66  2.61
  5 NA67091 20.292  NA67092 20.294  68.3  0.82   5.0 10.0 -11.2 -0.80 -0.83  441- 547- 686  540- 538- 628  1.99  1.12 -0.04  2.27
  6 WH33123 21.339  WH33124 21.339  68.4  0.82   4.0 10.0 -10.3 -2.39 -2.39  464- 587- 783  586- 571- 738  1.90  1.94 -0.39  4.23
      [-]    [in]    [-]     [in]   [oF] [mil][mil][mil] [mil]   [%]   [%]  [T]  [T]  [T]  [T]  [T]  [T]  [T/s] [T/s] [T/s] [T/s]

thickDev 0.0000[in] tempDev +46.17[oF] specForceF6 20.00[Ton/in] slope 0.000070[Ton/in2]

Measuring past F6: Averages Seg  25-225
Thick 0.2076[in] ThiAgc 0.2077[in] Width 42.44[in] Temp 1635.1[oF] Profile -0.260[mil] Wedge -0.26[mil] EdgDrop  0.34[mil] Head
Thick 0.2078[in] ThiAgc 0.2078[in] Width 42.45[in] Temp 1630.7[oF] Profile  0.000[mil] Wedge  0.67[mil] EdgDrop  0.62[mil] Strip
Adaptor Thick:   0 Val. pure -0.0200> 0.0103< 0.0400 old  0.0103 new  0.0107 on  Tgt:  198- 208- 216  Act:  204- 208- 214[mil]
Adaptor Temp : 175 Val. pure  0.7200> 1.0136< 1.2900 old  1.0013 new  1.0050 on  Tgt: 1570-1620-1660  Act: 1590-1631-1660[oF]
Adaptor Time :               -15.00>  -7.62<  15.00                    Width: Tgt: 4206-4250-4306  Act: 4225-4245-4262[in/100]

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1.3 Types of Values

1.3.1 Values of both Pass Schedule Calculation and Adaptation

PD Piece data

Slab data and target values from the level 3 system, transmitted to the level 2 system by the furnace computer.

TD Lookup Table Data

Data coming from a lookup table supplied by the level 2 system administrator and eventually changed by the operators.

SW Switches

Strategic switches set either by the operator or by the level 2 system administrator.

SP Setpoints

Setpoints transmitted to the level 1 system

OP Operator inputs

Inputs in the operator mask “setup data finishing mill”

PA Parameters

Model parameters and constants

1.3.2 Values of Pass Schedule Precalculation and Calculation

CA Calcuated Values

Calculated values from the pass schedule calculation

DC Adapters used by the calculation

Adapter set that is used to create the present pass schedule

AR Actual values of roughing mill and upstreams

Setpoints transmitted to the level 1 system

1.3.3 Values of Adaptation

AF Actual values of finishing mill area and downstreams

Actual readings from the strip in the finishing mill or downstreams, either the linear average over the entire strip, or the linear average over a given part of the strip as descriped.

PO Post calculated of finishing mill area and downstreams

Recalculated values for strip segments based on the actual readings for this segment. The adaptation uses the same algorithms as the pass schedule calculations, but input data from the readings during rolling. These values are averages over a certain number of strip segments.

DA Adapters created by the adaptation

Adapters that are results of the adaptation.

SI Signals occured during rolling

From Level 1 transmitted signal stated during rolling.

1.4 Values Description

1.4.1 Header Values

Th	PD	target thickness of slab (cold), tranfer bar and strip (cold)
Wd	PD	target width of slab (cold), tranfer bar and strip (cold)
Ln	PD	target length of slab (cold), tranfer bar and strip (cold)
Te	PD	target discharge temperature, target roughing mill exit temperature and target strip temperature leaving F6
“1005A”	PD	steel grade
sFrc6	TD	preset specific rollforce on F6 (only relevant in “force” strategy)
Slope	TD	preset specific rollforce slope (only relevant in “force” strategy)
MatLaw	TD	used material law, see steelgrade reference table
Lube	TD	roll lubrication settings for the first 4 stand (see also LubPres)
		0 set to “off”
		L setting “low”
		M set to “medium”
		H set to “high”
RolStr	TD	used rolling strategy lookup table, see steelgrade reference table
	SW	operator-switch state rolling strategy (“force” or “load”)
Op-Corr	SW	operator correction mode for load strategy
		“abs” absolute draft corrections (in [mil])
		“rel” relative draft corrections (in % correction to the present relative draft)

Cool	TD	roll cooling pattern
LoopTa	TD	used looper strategy lookup table, see steelgrade reference table
Descale	TD	used descaling table, see steelgrade reference table
North	SW	north spray header “1”=on, “0”=off
	TD	time north spray header is on
South	SW	south spray header “1”=on, “0”=off
	TD	time south spray header is on
Longterm Ada	SW	operator-switch state (“on” or “off”) for long term speed adaption at the time of calculation (obsolete)
AdaTemp	DC	temperature adapter at time af pass schedule creation
AdaTim	DC	transfer bar delivery time adapter at time af pass schedule creation
AdaThi	DC	thickness adapter at time af pass schedule creation
Offs_SG	OP	sideguides adjustment offset by operator input
CorThick	OP	thickness offset by operator input
OfsSpeed	OP	F6 speed variation by operator input
BelowMax	CA	the mill’s speed reserve until maximum possible speed for the present pass schedule, referenced to F1 stand
Limits	SW	operator-switch limit check (“on” or “off”)
Correct	SW	system administrator switch state for gap error correction (“Speed” or “Gap”)
MatLaw	TD	Number of material law
kF0	DC	general rollforce coefficient
m1	DC	temperature coefficient
m2	DC	speed coefficient
Fo	DC	rollforce stand coefficients F1 to F6

To	DC	rolltorque stand coefficients F1 to F6
ADA	TD	Number of material law
kF0	DA	general rollforce coefficient
m1	DA	temperature coefficient
m2	DA	speed coefficient
Fo	DA	rollforce stand coefficients F1 to F6
To	DA	rolltorque stand coefficients F1 to F6
g	PA	rollforce and rolltorque learning rate %

1.4.2 Roughing Mill Values

Pas	TD	pass number used by precalculation
	AR	pass number used by calculation
Act	TD	flag loadpass (1=load pass, 0=unload pass) precalculation
	AR	flag loadpass (1=load pass, 0=unload pass) calculation
ThIn	CA	entry thickness by precalculation
	PO	entry thickness by calculation
ThOut	CA	exit thickness by precalculation
	PO	exit thickness by calculation
Edg	TD	edger screwdown used by precalculation
	AR	edger screwdown used by calculation
WdIn	CA	entry width by precalculation
	PO	entry width by calculation
WdOut	CA	exit width by precalculation
	PO	exit width by calculation

Force	CA	rollforce roughing mill by precalculation
	AR	rollforce roughing mill for calculation
Speed	TD	rolling speed roughing mill for precalculation
	AR	rolling speed roughing mill for calculation
TeIn	AR	temperature pyrometer RM entry side, average over the entire bar
TeOut	AR	temperature pyrometer RM exit side, average over the entire bar
Zo1	PA	distance RM gap to start table cover for precalculation distance pyrometer on RM exit side to start table cover for calculation
Zo2	PA	distance table cover start to table cover end
Zo3	PA	distance table cover end to descaler start
Zo4	PA	distance descaler start to descaler end
Zo5	PA	distance descaler end to F1 gap
dur	CA	duration of the strip head in each zone
dTmp	CA	temperature drop for headend each zone
TeHead	CA	entry temperature headend each zone for precalculation
	PO	entry temperature headend each zone for calculation
TeTail	CA	entry temperature tailend each zone for precalculation
	PO	entry temperature tailend each zone for calculation
Roll Te	PA	average work roll temperature roughing mill
Up	PA	roll ID, diameter and ground crown of upper roughing mill roll
Lo	PA	roll ID, diameter and ground crown of lower roughing mill roll
To	PA	tons on roll for roughing mill roll set

Up	PA	roll ID, diameter and ground crown of upper roughing mill roll
FMinHead	AR	temperature at FM entry pyrometer, average over first 10 readings
FMinTail	AR	temperature at FM entry pyrometer, average over last 10 readings

1.4.3 Finishing Mill Area

St	PA	stand number
ThIn	CA	entry thickness
ThOu	CA	exit thickness
Gap	SP	transmitted loadgap
ThOA	AF	loadgaps, average over the entire strip
ThOMF	PO	exit thickness recalculated from massflow
MsTo	CA	millstretch calculated, only for display (effective calculation is done in level1 using the same algorithm).
TeIn	CA	entry temperature for headend
Tail	CA	entry temperature for tailend
TeIP	PO	entry temperature over the defined strip part
TeOu	CA	exit temperature for headend
FrcC	SP	rollforce for headend
Tail	CA	entry temperature for tailend
FrcP	PO	rollforce for the defined strip part
FrcA	AF	rollforce for the defined strip part
TorqCa	CA	rolltorque for headend
TrqPo	PO	rolltorque for the defined strip part
TorqA	AF	rolltorque for the defined strip part
PowC	CA	rollpower for headend
PowA	AF	rollpower for the defined strip part
vIn	CA	entry speed, without adaptive correction
vOut	CA	exit speed, without adaptive correction
vRol	SP	rollspeed, including adaptive correction

vAct	AF	rollspeed, average over the entire strip
dur	CA	rolling time
durA	AF	rolling time
ovlA	AF	motor utility for the defined strip part
bite	CA	bite angle
epsS	TD	original preset relative reduction
epsO	TD	operator corrected preset of relative reduction
Cor	OP	operator draft correction in “relative” mode
eps	CA	relative reduction, fitted to transferbar- and strip thickness
epsMF	PO	relative reduction recalculated from massflow
red	CA	absolute reduction
rMF	PO	absolute reduction recalculated from massflow for the defined strip part
widOu	CA	exit width
leng	CA	exit length
LubPres Top	TD	lubricant pressure for top roll set
Bot	TD	lubricant pressure for bottom roll set
yldStr	CA	specific yield stress (“strip module”)
slipF	CA	forward slip
slipB	CA	backward slip
Lp	TD	looper angle total (includes operator correction)
Of	OP	operator correction to looper angle
Tens	TD	specific strip tension total (including operator correction)
Of	OP	operator correction to tension
CL	SI	indication current limit reached

Ov	SI	indication AGC in overload protection; time when it occured
iG	SI	indication of manual gap intervention
WRTop	PA	upper workroll identification
Dia	PA	upper workroll diameter
WRBot	PA	lower workroll identification
Dia	PA	lower workroll diameter
teRol	PA	workroll surface temperature before threading
Wear	PO	roll wear total
Crown	PA	grinded owrkroll crown, average upper+lower/2
gapCo	CA	stand gap correction (last active stand equals thickness adapter)
vCorP	DC	stand speed correction
vCorA	DA	stand speed correction
Force Min	AF	minimum reading for rollforce over the entire strip
Force Ave	AF	average reading for rollforce over the entire strip
Force Max	AF	maximum reading rollforce oer the entire strip
Force Head	AF	average over first 10 force readings
Force Midd	AF	average over 10 force readings in the strip middle
Force Tail	AF	average over last 10 force readings
Grad	SP	rollforce gradient - rollforce increase over rolling time
on/off	SW	switch “gradient on” or “gradient off”
GradA	PO	rollforce gradient postcalculated
Grd1A	PO	rollforce gradient postcalculated for front strip part
Grd2A	PO	rollforce gradient postcalculated for rear strip part
thickDev	CA	calculated thickness deviation

tempDev		CA calculated FM exit temperature deviation
specForceF6	CA	specific rollforce on F6 (force strategy only)
slope		CA specific rollforce slope (force strategy only)
Averages Seg	PA	preset range of segments for adaptation and protocol
Narrow	PO	range from first width reading under target minimum width to last width reading under target width minimum, average amount of width limit violation (only if a width reading is below target width minimum)

1.4.4 Measured Values Past F6

Thick		AF	ABB telegram x-ray readings for the defined strip part
ThiAGC		AF	Intel telegram x-ray readings for the defined strip part
Width		AF	width readings, average for the defined strip part
Temp		AF	temperature readings for the defined strip part
Profile		AF	profile readings for the defined strip part
Wedge		AF	wedge readings for the defined strip part
EdgDrop		AF	edge drop readings for the defined strip part
Thick		AF	ABB telegram x-ray readings for entire strip
ThiAGC		AF	Intel telegram x-ray readings for entire strip
Width		AF	width readings, average for entire strip
Temp		AF	temperature readings for entire strip
Profile		AF	profile readings for entire strip
Wedge		AF	wedge readings for entire strip
EdgDrop		AF	edge drop readings for entire strip
Adaptor Thick			
	Val	PA	number of readings for adaptation (obsolete)
	pure	PA	lower limit
		PO	pure deviation (obsolete)
		PA	upper limit
	old	DC	old thickness adapter
	new	DA	new thickness adapter
	on/off	SW	switch “thickness adaptation on”
Tgt		PD	exit thickness, lower limit, target, and upper limit

Act		AF	exit thickness minimum, average and maximum reading over the entire strip
Adaptor Temp			
	Val	PA	number of readings for adaptation
	pure	PA	lower limit
		PO	pure deviation
		PA	upper limit
	old	DC	old temperature adapter
	new	DA	new temperature adapter
Tgt		PD	exit temperature F6, lower limit, target, and upper limit
Act		AF	exit temperature F6 minimum, average and maximum reading over the entire strip
Adapter Time			Transferbar transport time adapter
		PA	lower limit
		PO	deviation
		PA	upper limit

2. Revision and Document Distribution List

REVISION LIST

Date	Version	Author	Description
95-Dec-05	V1.0	W.Bal.	first draft
96-Feb-28	as built	W.Bal.	as built
96-Aug-01	V1.1	W.Bal	updated

DISTRIBUTION LIST

Version	Receiver
as built	ARMCO
V1.1	ARMCO