# *D4 - Displays and Dialogs*

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# 1. General

This chapter describes all displays and dialogs of the HSM Level 2 system.

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## 1.1 Update Modes

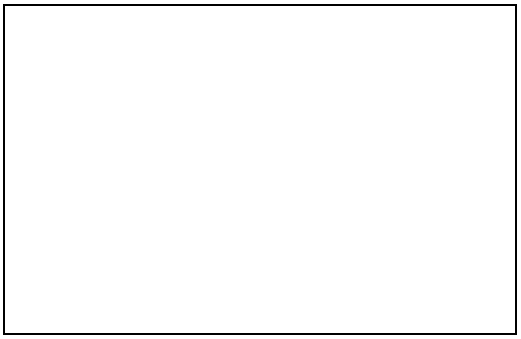
For all material related displays which do have the slab identification as a key, there are two different modes for displaying the related data:

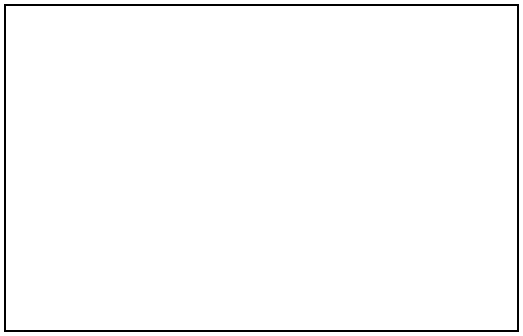


You can toggle between these two modes by clicking on with mouse button 1.

Selecting a certain display in the general ***Menu Bar***, the window ***initially*** is displayed in ***Default Mode***.

The actual mode is shown by a toggle button in the top left area within the actual display:





### 1.1.1 Default Mode

The material shown on the display depends on the actual production. This mode additionally depends on the actual (physical) location (station) of your terminal.

For HSM there are following 3 stations:

- *Roughing Mill (RM pulpit)*
- *Finishing Mill (FM pulpit)*
- *Weighing and Banding (Weigher/Bander Shanty)*

For all other located terminals (offices, computerroom,...) the default points to Finishing Mill Station.

That means, whenever a material aproaches or enters the production area of a specific station, the data on your display will switch to show information of that particular new material.

### 1.1.2 Select Mode

In this mode you can obtain information on materials other than the default material.

Setting Select Mode, the actual display keeps the data of the selected material on the screen, independent of the actual production. To view different materials you can click on the slab ID field and modify it to the ID you want to get information on. Pressing the buttons RETURN or ENTER you get the new data on your screen.

If no data exist for your choosen slab ID, all display data fields will be reset.

To get back to the actual production, you just have to set *Default Mode* again.

# 2. Description of Displays and Dialogs

## 2.1 Basic Data

### 2.1.1 Primary Data

The display describes the actual product to be produced. *General and Analysis Data* give information about the slab coming from the caster and *Target Data* describe the final product.

*Dialogs:*

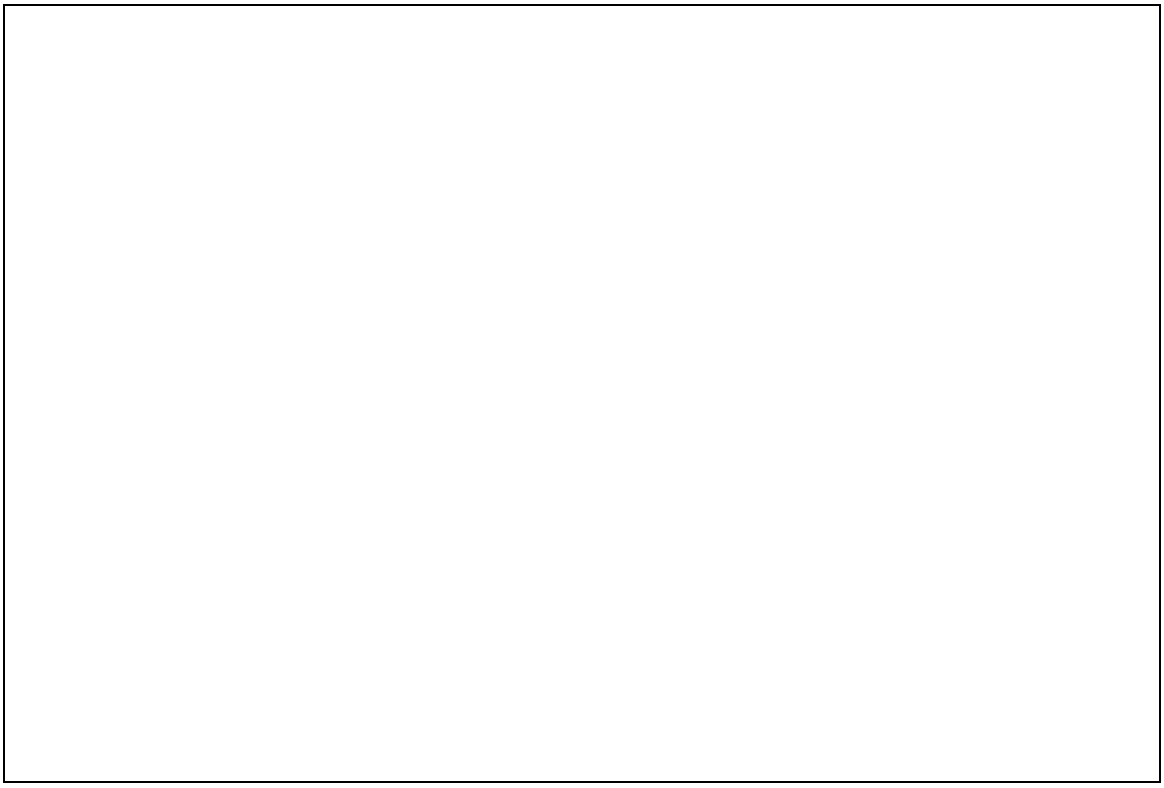
**Modify Primary Data:**

Within this dialog all data can be modified

### 2.1.2 Roll Inventory

This display shows the actual installed rolls for RM and FM. Stand related information contains roll ID, diameter and tons on roll. The scroll lists on top and bottom of the display contain the available rolls, received from Level 3 system.

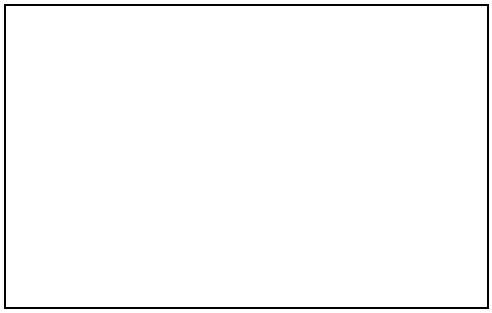
*Display Layout:*



*Dialogs*:

**Modify Edger Diameters:**

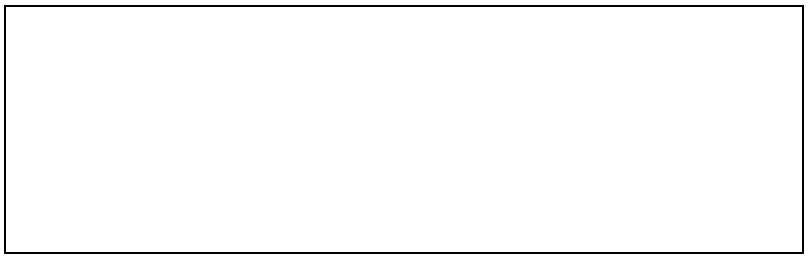
Should the edger rolls be changed (RM Edger and/or Primary Edger) the corresponding diameters can be set within this dialog



**Start Roll Change:**

Clicking on this push button the roll change dialog is started


Following window appears to confirm entering *Modify Mode.*



When you press the OK button, you are allowed to select in the lists for top and bottom rolls the new roll you want to insert into the stand.

To *exit* from *Modify Mode* click on the push button


**Note: Exit from *Modify Mode* transmits all diameters of the actual installed rolls to the Level 1 system**

After you have selected a roll, the stands where you are allowed to insert the roll will be highlighted (next picture).

After selecting a certain stand (here in this case stand 2) following confirmation box is displayed.

Pushing the OK button, the roll is inserted into the stand and the data will be transmitted to the Level 1 System. Additionally, the roll disappears from the list of available rolls.
The Cancel button cancels the operation without performing any changes.

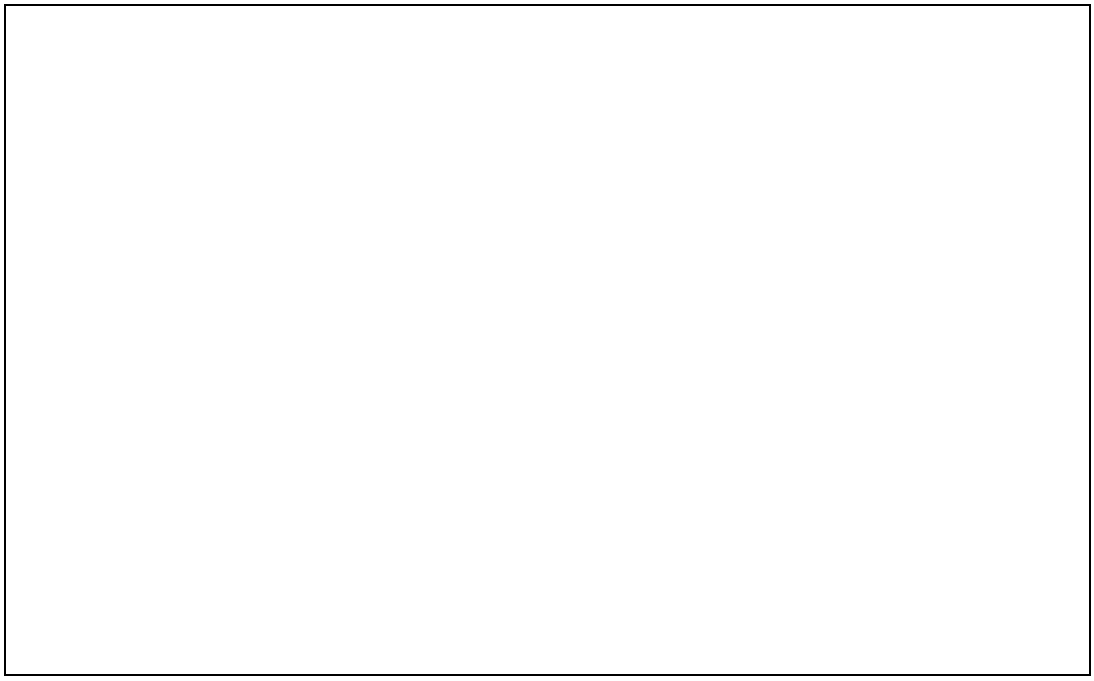
## ! WARNING !

**From the point of time, the new roll data are confirmed, the Finishing Mill Model considers the new data for the setpoint calculation.**

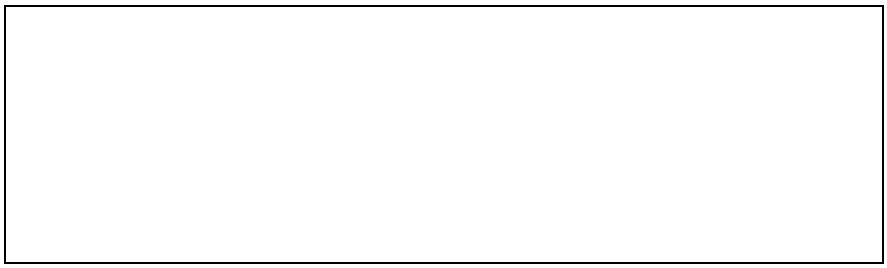
**Therefore - a Level 2 Roll Change must not be done in advance to a real manual roll change, while still some slabs are rolled.**

**Create / Modify Roll:**

This display shows all available data of a particular roll.

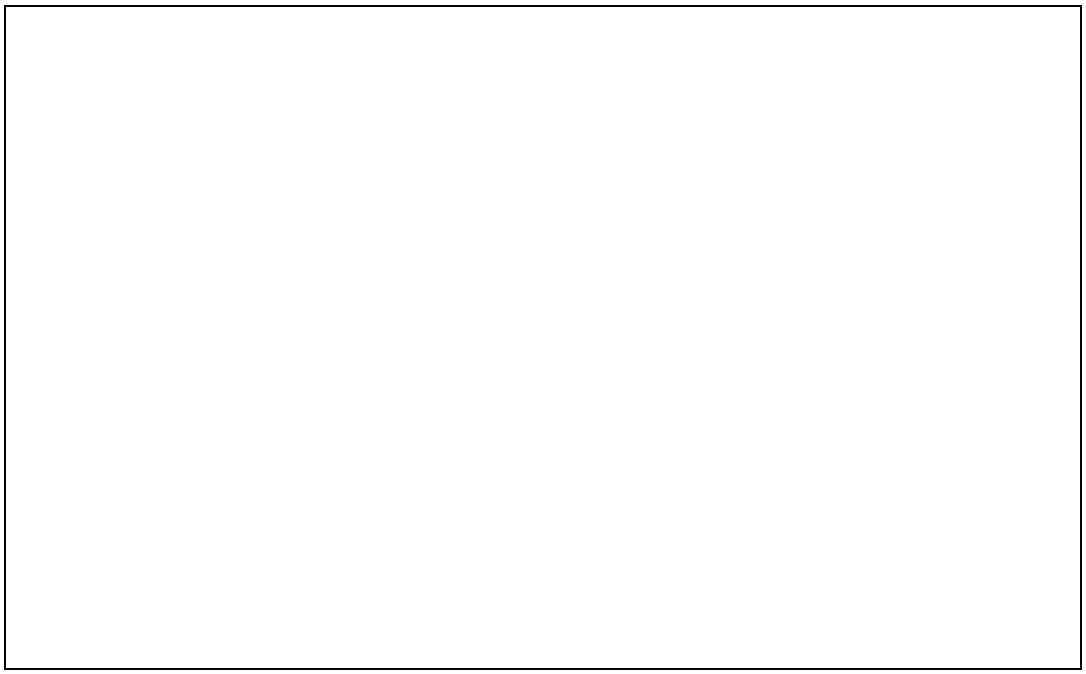


Enter the roll ID and hit the *Return* button.
The roll ID itself is defined to contain two leading ASCII characters and 5 numeric digits (eg. WH08558). Should the entered roll ID be wrong (here A123456), following window appears on your screen.



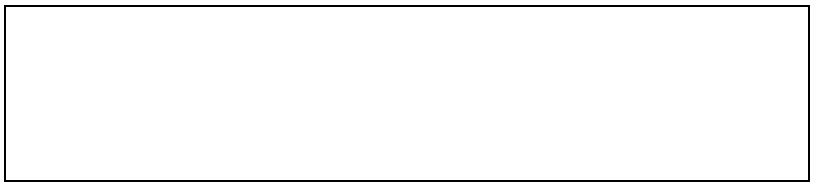
Click OK and enter the roll ID in the correct format.

In following example ID WH31889 was entered.

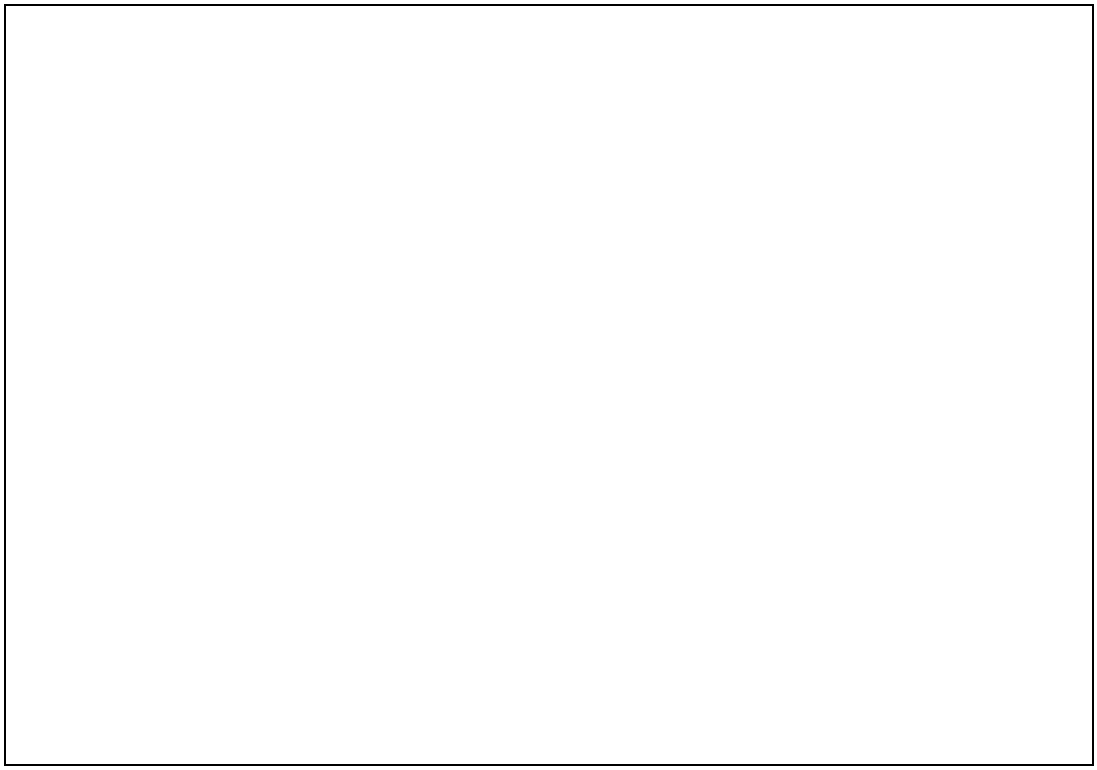


Roll WH31889 is a designated Finishing Mill Top Work Roll and not yet installed in any stand (Stand Number and Stand-In Date/Time as well as Number of Rolled Coils and Tons and Footage on Roll are empty).

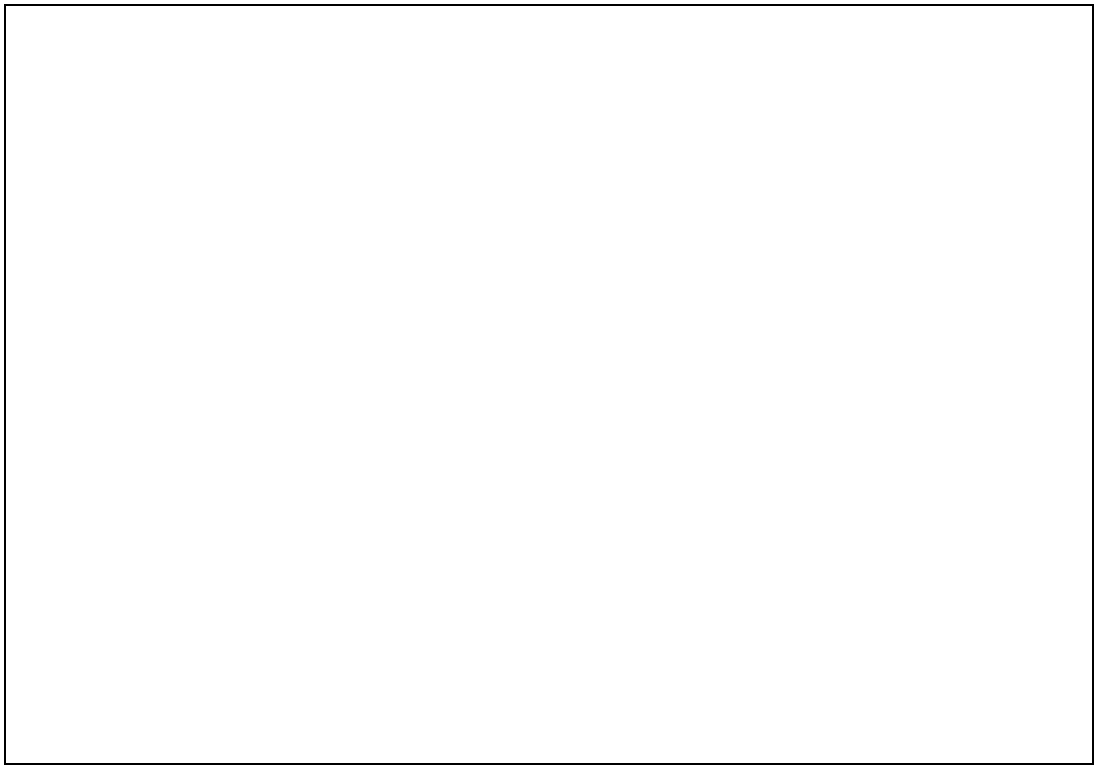
If a roll does not exist in the Level 2 roll inventory, following window pops up.



By pressing the button *Modify/Create*, a new roll can be created or the data of an existing roll can be modified (next picture with WH31889).



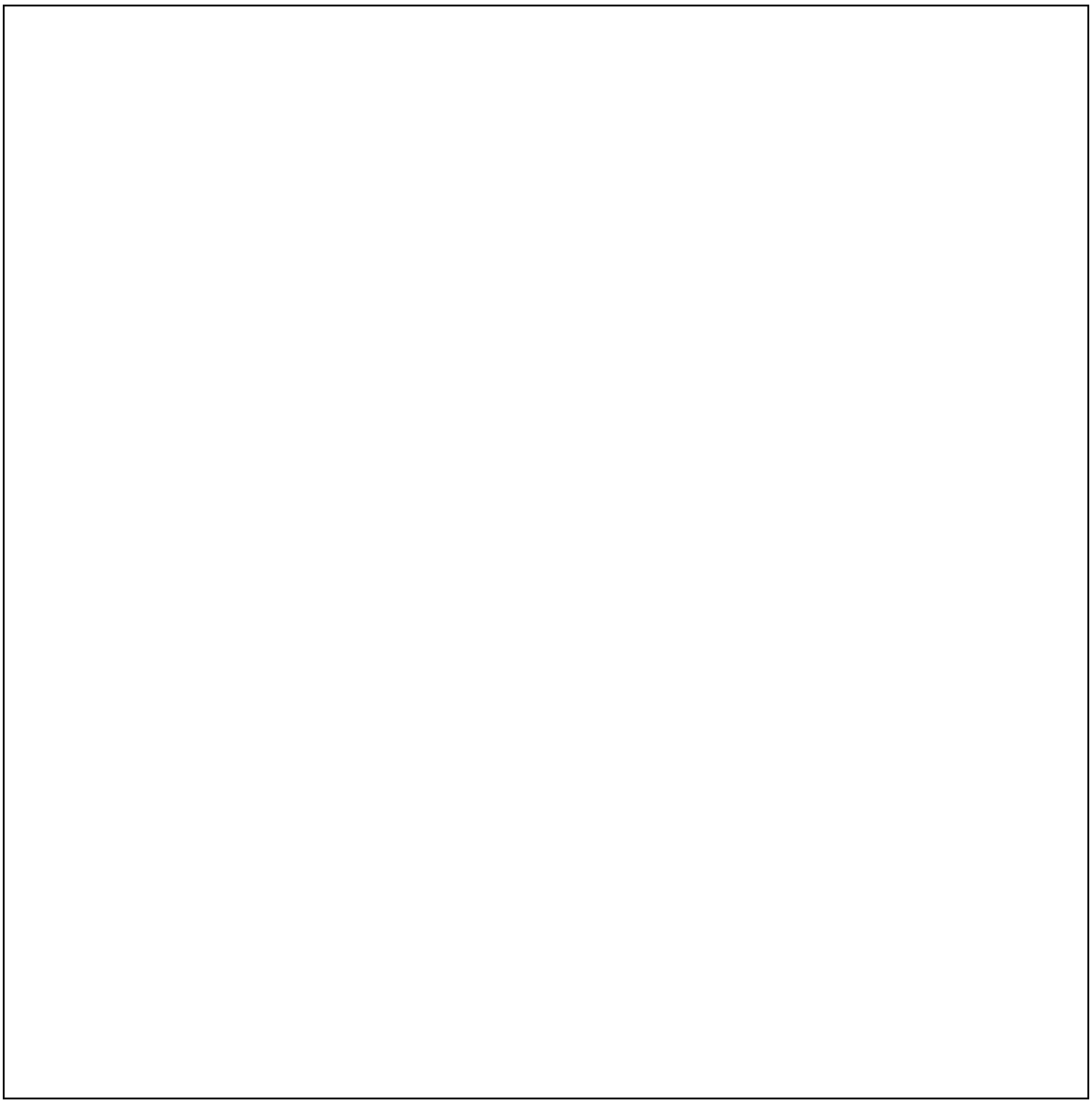
If data for an already installed roll are to be modified, *Stand Type, Roll Type* and *Position* can not be changed (following example with WH33124, which is installed at stand 6).



### 2.1.3 Mill Stretch

This display shows the actual mill stretch curves and calibration data for the finishing mill stands.

*Display Layout:*



*Dialogs*:

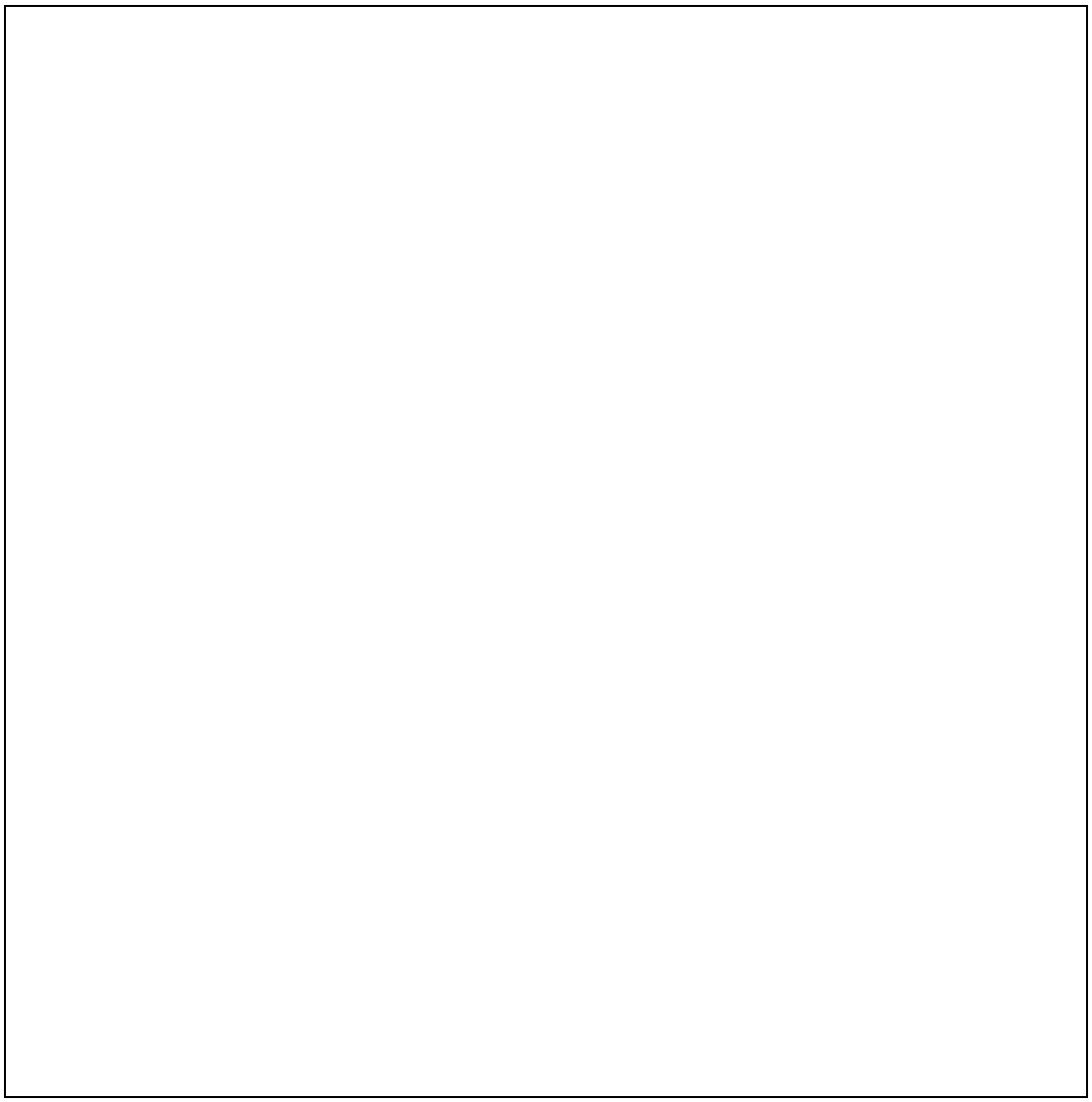
**Push Buttons in the Mask:**

| | |
|---|---|
| **Stand x** | Select a certain stand |
| **OS** | Select curve of Operator Side |
| **OS** | Select curve of Operator/Drive Side total |
| **DS** | Select curve of Drive Side |
| **Actual** | Select actual used curve (shown in shades of red) |
| **Measured/Previous** | Select measured or previous used curve (shown in shades of blue) |

If the automatic mill stretch evaluation sequence has been started at the Level 1 system (calibration with mill stretch) and the calibration is ready (not yet confirmed), the data can be seen on the mill stretch display by pushing the button **Measured/Previous** (can be done in advance).

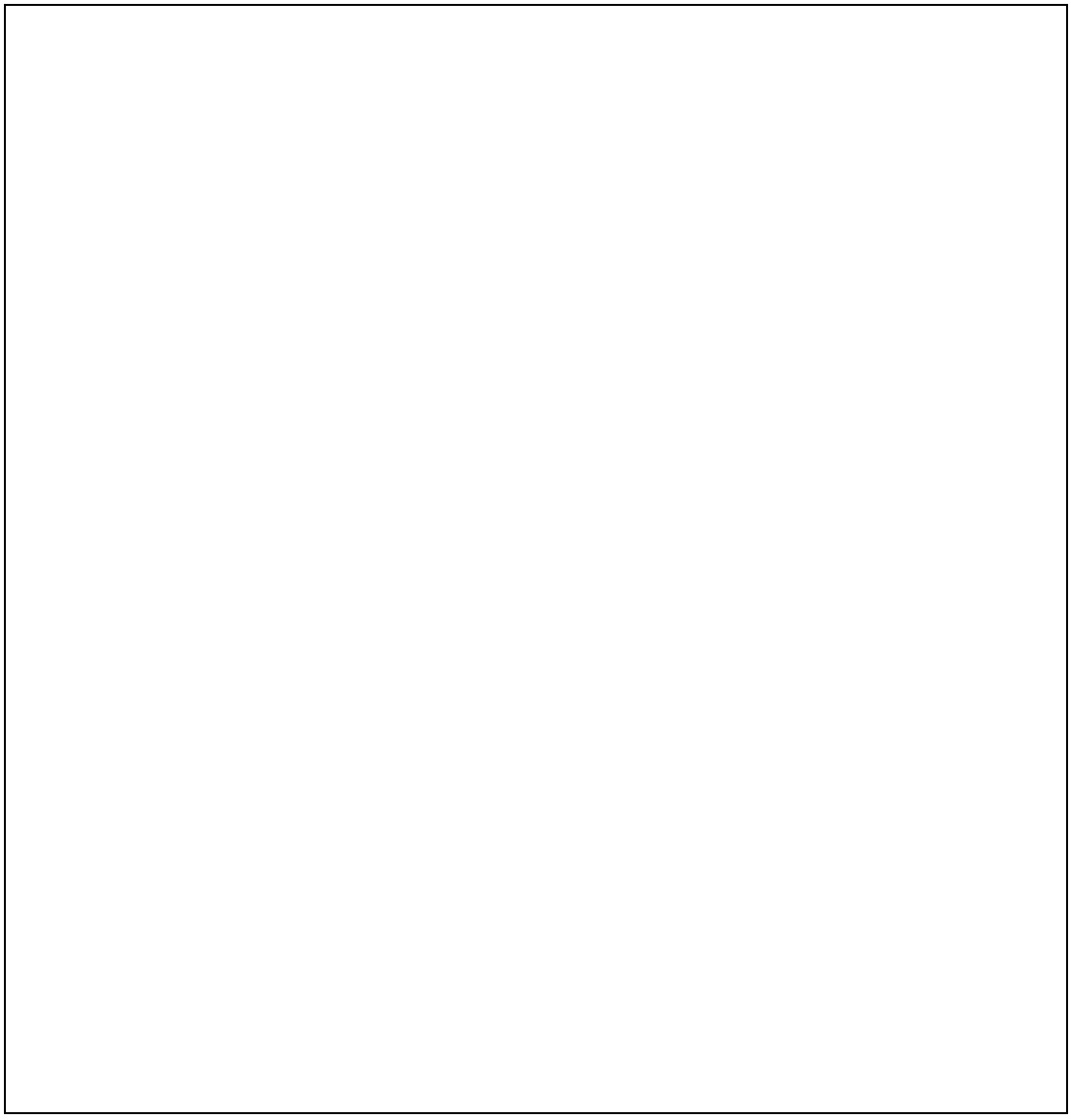
As soon as the measured mill stretch data are accepted at the Level 1, the so far actual data at the Level 2 are saved as **Previous** (curve changes blue) and the actually recorded data are activated and become the **Actual** values (curve changes to red) in the display.

Following picture shows the previous Operator and Drive Side stretch curves for stand 3.



## Calibration Data

This display shows the actual and previous used calibration data for all finishing mill stands.
Pushing the button Print, the data are printed at the laser printer in the Finishing Mill Pulpit.

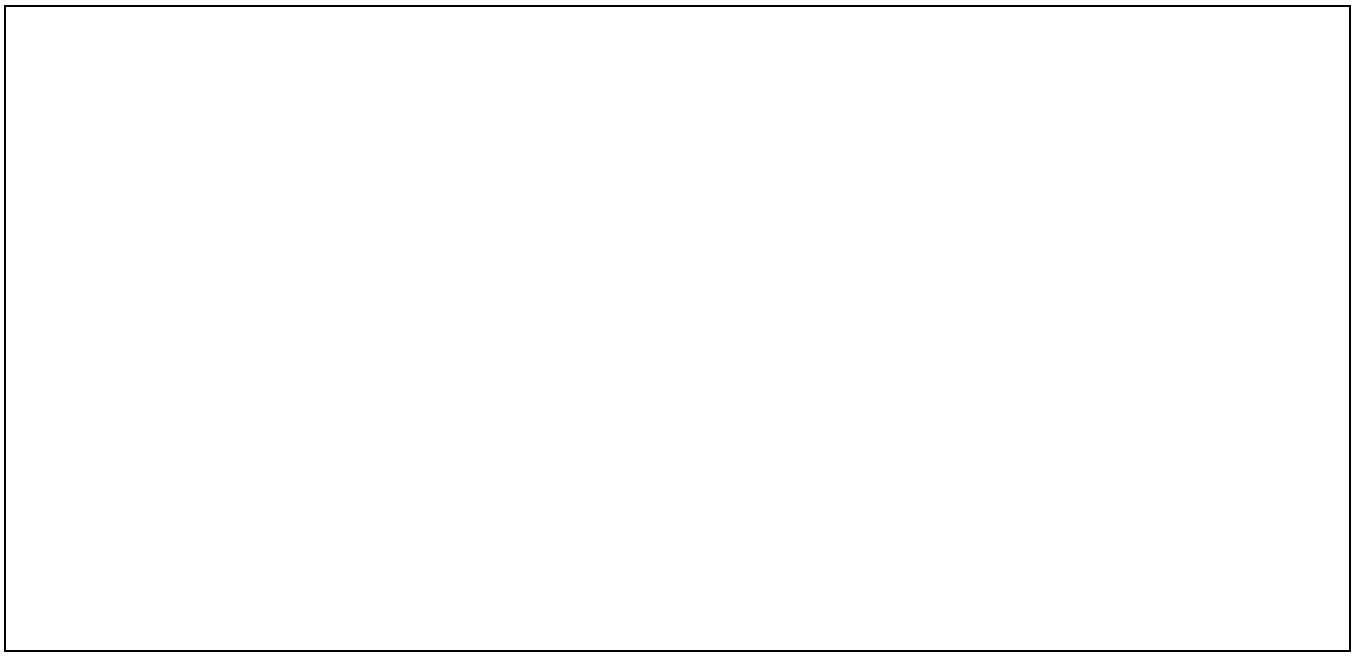


## 2.2 Rolling Setup Data

### 2.2.1 Table Data Roughing Mill

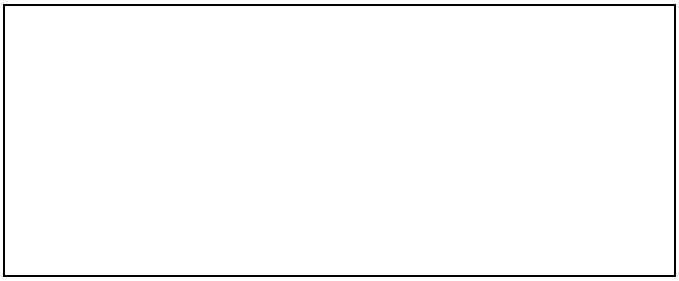
This display gives information about setup reference table data for Roughing Mill.

*Display Layout:*



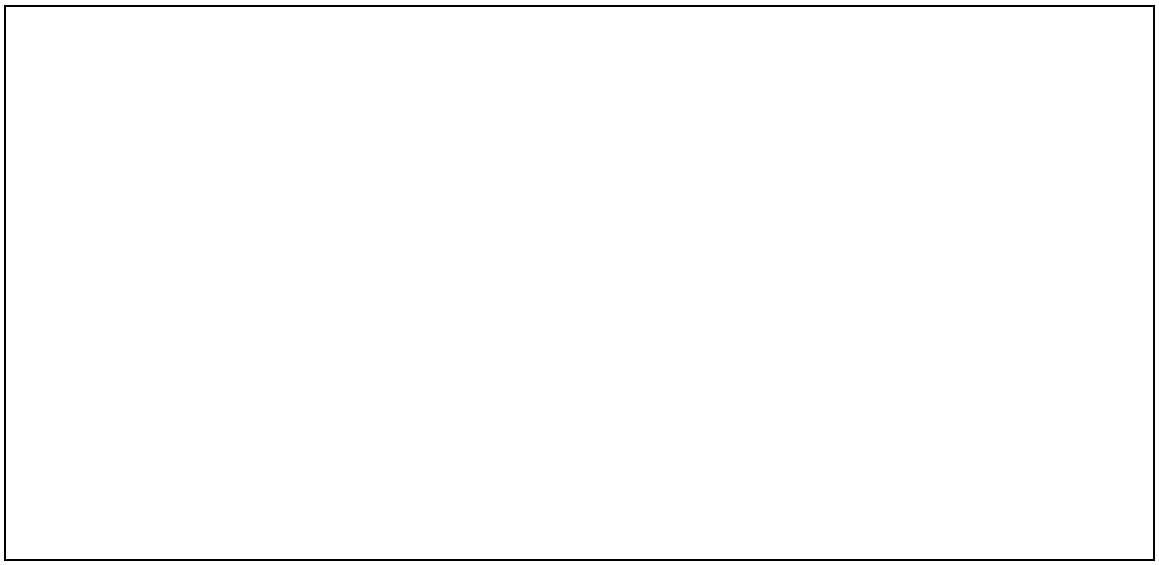
*Dialogs*:

Switching over to Select Mode, a Recipe Number can be entered. If the recipe does not exist, following box appears on the screen.



**Modify Table Data:**

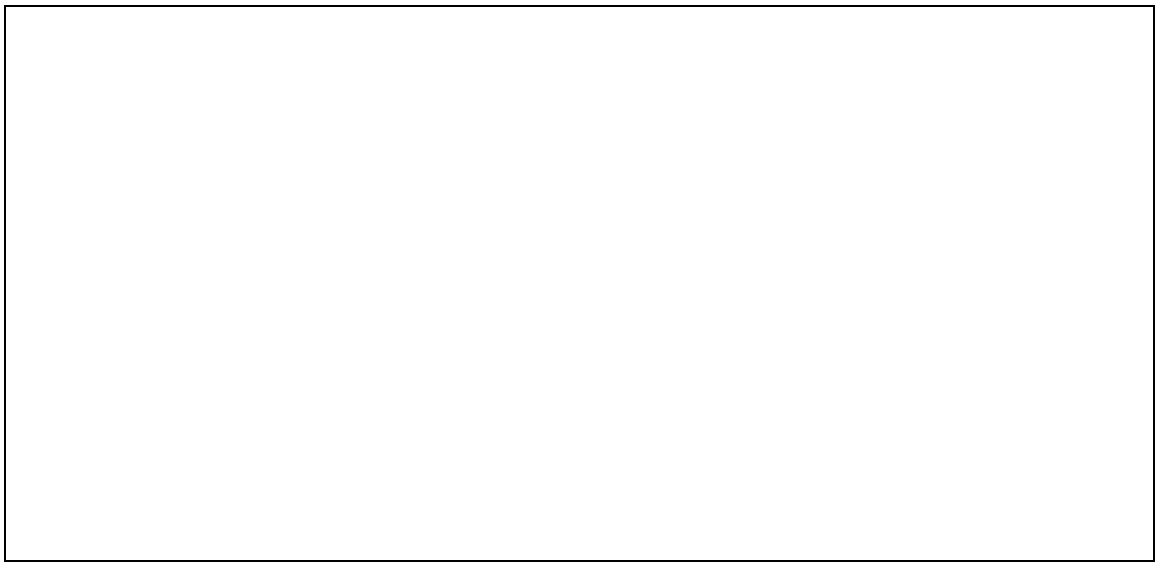
All data for the selected recipe number can be modified



Descaling patterns can be modified by click on the corresponding toggle buttons ON/OFF.

**Create Table Data:**

A new reference table can be created.
To activate an actually created recipe, a reference to a certain steel grade or group of steel grades has to be defined (see chapter Steel Grade Reference Table, SRTclass Rougher).



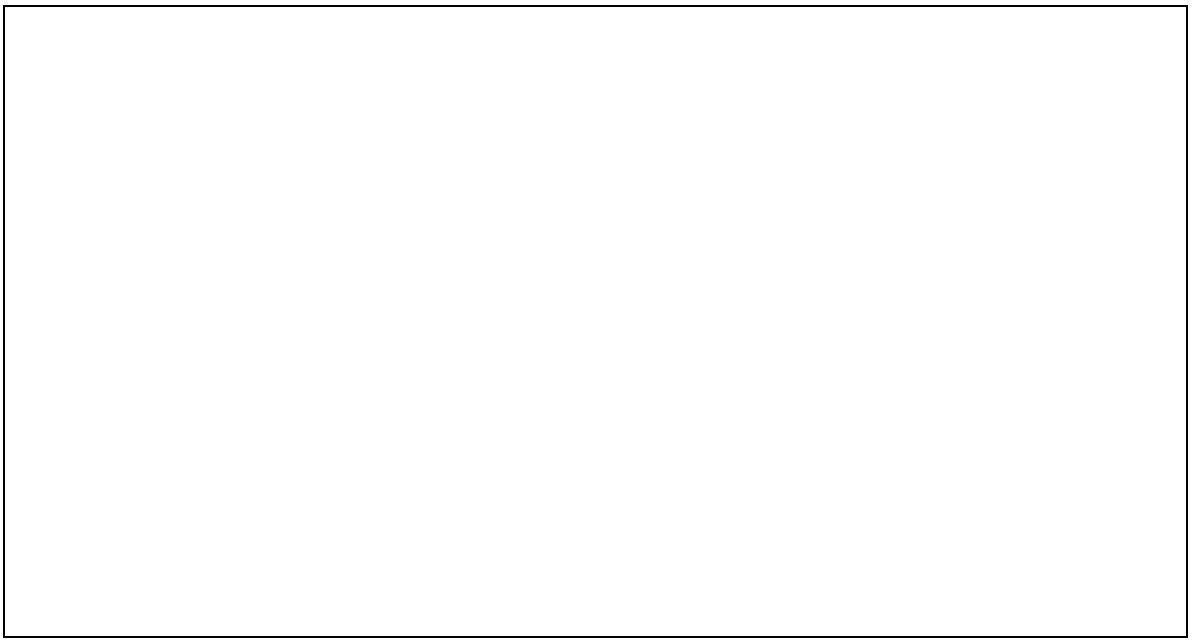
**Delete Table Data:**

An existing reference table can be deleted

### 2.2.2 Table Data Cooling

This display gives information about reference data for strip cooling.

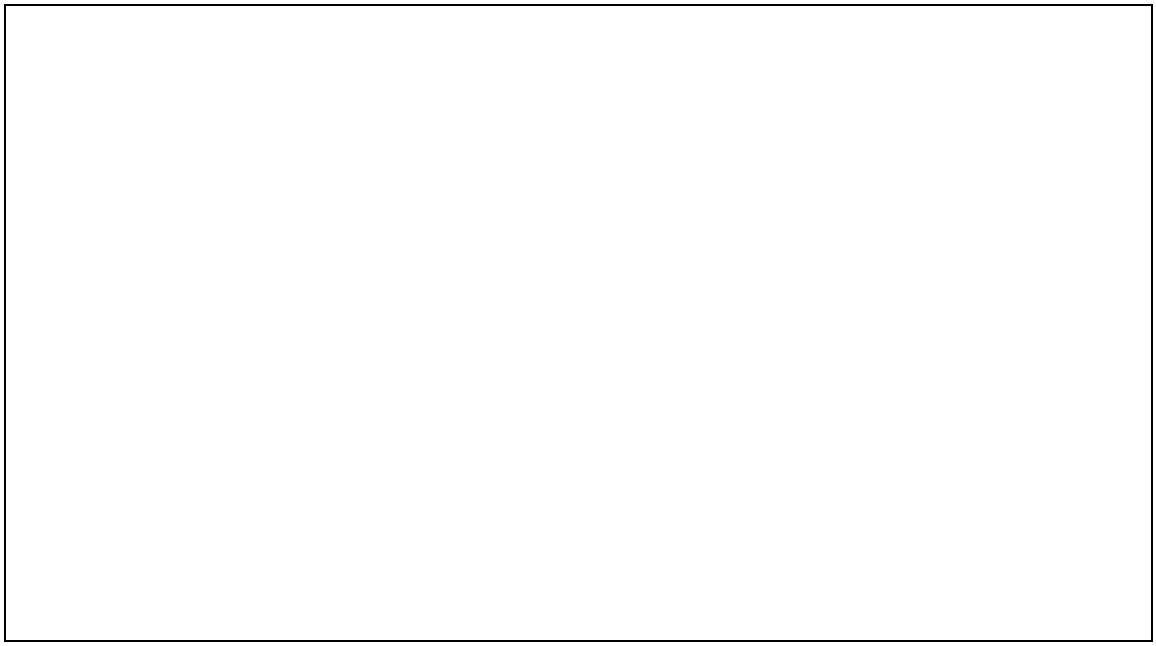
*Display Layout:*



*Dialogs:*

**Modify Table Data:**

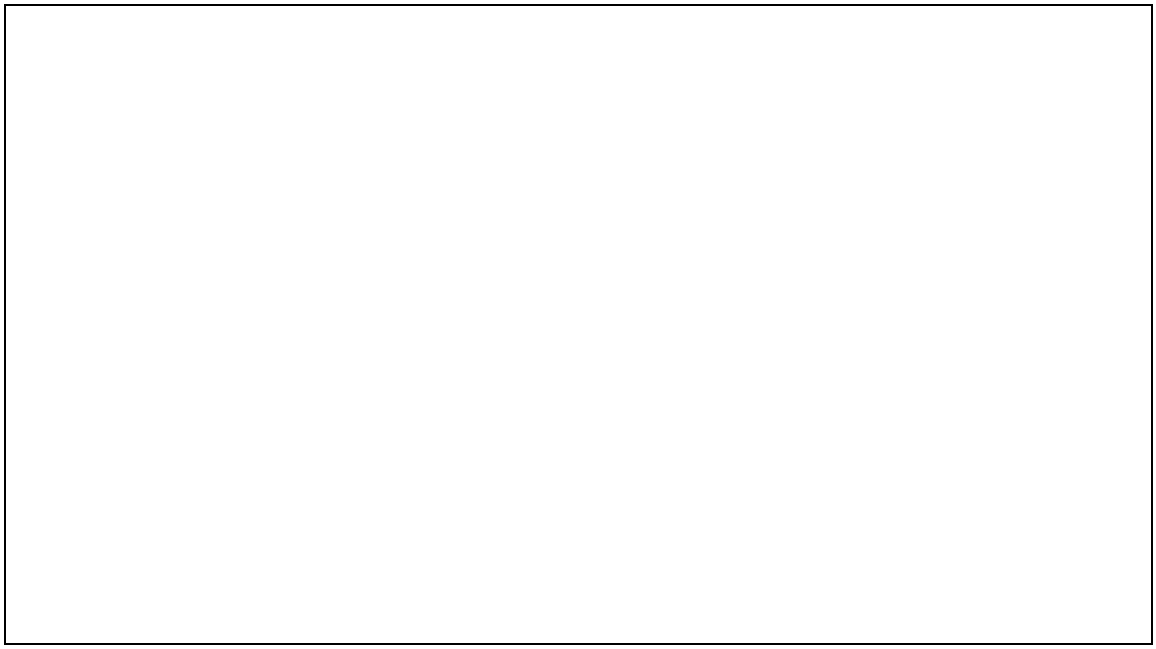
Existing reference data can be modified



Cooling patterns can be modified by click on the corresponding toggle buttons ON/OFF.

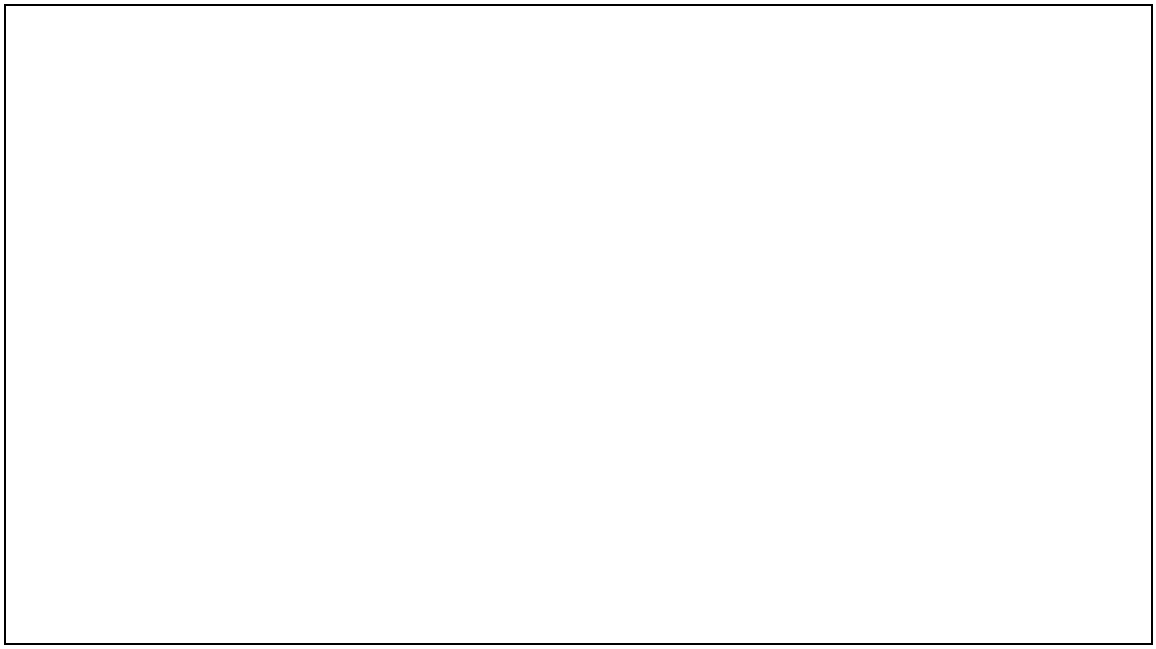
**Create Table Data:**

New reference data can be created



**Delete Table Data:**

Existing reference data can be deleted

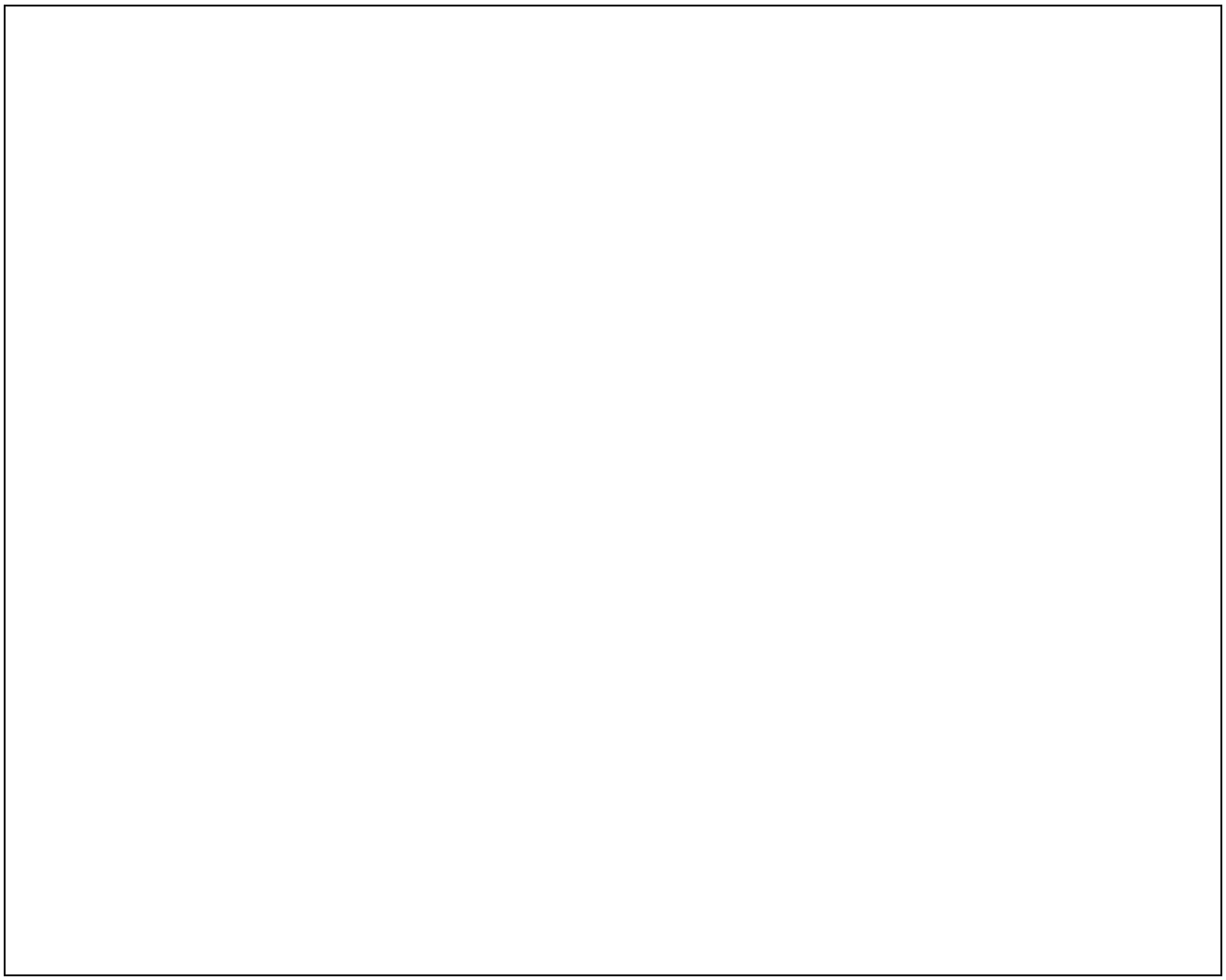


### 2.2.3 General Model Data

The general model data is a set of parameters, default values, adjustments, limits and switches used by the setup model to calculate the pass schedule.

The General Model Data Mask enables the system administrator to monitor, control and change relevant model parameters in oder to tune the model or to react on a change in the mill.

*Display Layout:*



*Dialogs:*

**Modify General Model Data:**
All actual adjusted parameters can be modified

### 2.2.3.1 Parameter Description

#### 2.2.3.1.1 Types of Values

**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 input**
Inputs in the operator mask “setup data finishing mill”

**PA** **Parameters**
Model parameter

**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 value RM**
Actual value of roughing mill and upstream

**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 occurred during rolling**
From Level 1 transmitted signal stated during rolling.

### 2.2.3.1.2 Parameters

#### General

*Maximal Reduction F1 to F6*
PA maximum allowed relative reduction on stand F1

*Corr.spec.Force F1 to F6*
PA correction to specific roll force on F1 stand only used in “force” strategy

*Stretch Correct RM*
PA linear part of the roughing mill´s millstretch
This value is used for the precalculation and calculation of the transfer bar thickness

*Rel Tol Fo/Rad Iter*
PA percentage of radius deviation in roll flattening iteration

*Max Iter Fo/Rad Com*
PA maximum allowed iterations in roll flattening calculation

*Ave Temp Work Rolls*
PA default value for workroll surface temperature

*Ambient Temp Top*
PA default ambient temperature below the hot strip

*Ambient Temp Bottom*
PA default ambient temperature below the hot strip

*Water Temp*
PA default cooling and descaling water temperature

*Amb Temp Top RMDT*
PA ambient temperature on top of roughing mill delay table

*Amb Temp Bot RMDT*
PA ambient temperature on bottom of roughing mill delay table

*Min Work Roll Rad RM*
PA lower limit for work roll radius (= diameter/2) for roughing mill

*Max Work Roll Rad RM*
PA upper limit for work roll radius (= diameter/2) for roughing mill

*Spec Roll Force RM*
PA default value for roughing mill roll force prediction in tons per inch of the strip width

*Off Pos St Ent Si Gui*
OP offset to the side guide position in finishing mill.
*Operator change in "Setup Data Finishing Mill" possible*.

**Miscellaneous**

*RM Pyrom South*
SW pyrometer on south side of roughing mill is valid

*RM Pyrom North*
SW pyrometer on north side of roughing mill is valid

## Limitations

*Temp Adap Min*
PA lower limit for temperature adapter

*Temp Adap Max*
PA upper limit for temperature adapter

*Thick Adap Min*
PA lower limit for thickness adapter

*Thick Adap Max*
PA upper limit for thickness adapter

*Force Sta Adap Min*
PA lower limit for stand force adapter, obsolete

*Force Sta Adap Max*
PA upper limit for stand force adapter, obsolete

*Force Adap Min*
PA lower limit for roll force adapters

*Force Adap Max*
PA upper limit for roll force adapters

*Torque Adap Min*
PA lower limit for rolltorque adapters

*Torque Adap Max*
PA upper limit for rolltorque adapters

*Time Adap Min*
PA lower limit for transferbar time adapter

*Time Adap Max*
PA upper limit for transferbar time adapter

**Adaption Ranges**

*First Record Recalc*
PA first segment used for adaptive threading

*Records Recalc*
PA number of segments used for adaptive threading

*First Record Adapt*
PA first segment used for roll force and rolltorque adaptation

*Records Adapt*
PA number of segments used for roll force and rolltorque adaptation

*Striphead Start*
PA striphead part excluded from thickness adaptation

*Striphead End*
PA end of striphead for thickness adaptation

## Adapters

*Temp Act*
DA global temperature adapter, obsolete

*Temp Prev*
DA previous global temperature adapter, obsolete

*Time RMDT*
DA transferbar time adapter

## Speed Values

*Def Last Pass RM*
PA default value for rolling speed in the last pass in the roughing mill

*Default RM to FM*
PA default speed on roughing mill delivery table

*Default Descale*
PA default speed value for descaler

*PR Scale Break*
PA default speed in pinch roll scale breaker

## Thermal Crown

*# Work Roll Slizes*
PA number of slices for the calculation of the thermal crown

*Heat Tr Roll-Air*
PA heat transfer coefficient for heat transfer roll to air

*Heat Tr Roll-Wat*
PA heat transfer coefficient for heat transfer roll to roll cooling water

*TiStep Ther Crown Mod*
PA time slices for thermal crown calculation

*Cycle Ti Ther Crown Mod*
PA invokation cycle for the thermal crown model

*# Points Approximation*
PA number of points for calculation of the thermal crown

*Alpha Water F1-F3*
PA heat transision coefficient F1 to F3 to cooling water when roll cooling is in state “full cooling”

*Alpha Water F4-F6*
PA heat transision coefficient F4 to F6 to cooling water when roll cooling is in state “full cooling”

*Alpha Water idle F1-F3*
PA heat transision coefficient F1 to F3 to cooling water when roll cooling is in state “idle”

*Alpha Water idle F4-F6*
PA heat transision coefficient F4 to F6 to cooling water when roll cooling is in state “idle”

## Roll Wear

*Coeff F1 to Coeff F6*
PA roll wear coefficients for stands F1 to F6

## Learning Rates

*Sh Te Adap Fo / To*
PA obsolete

*Lo Te Adap Fo / To*
PA learning rate for force and torque adaptation

*Temp Adaption*
PA learning rate for temperature adaptation

*Adap Temp Int Cool*
PA obsolete

*Thickness Adaption*

PA learning rate for thickness adaption

*Speed Adaption*

PA learning rate for speed adaptation

## Interstand Cooling

*Width*

PA width of cooling spray headers

*Flow Rate F1-F2*

PA flow rate for spray header after F1

*Flow Rate F3-F4*

PA flow rate for spray header after F3

*Width Scale Breaker*

PA width of scale breaker spray headers

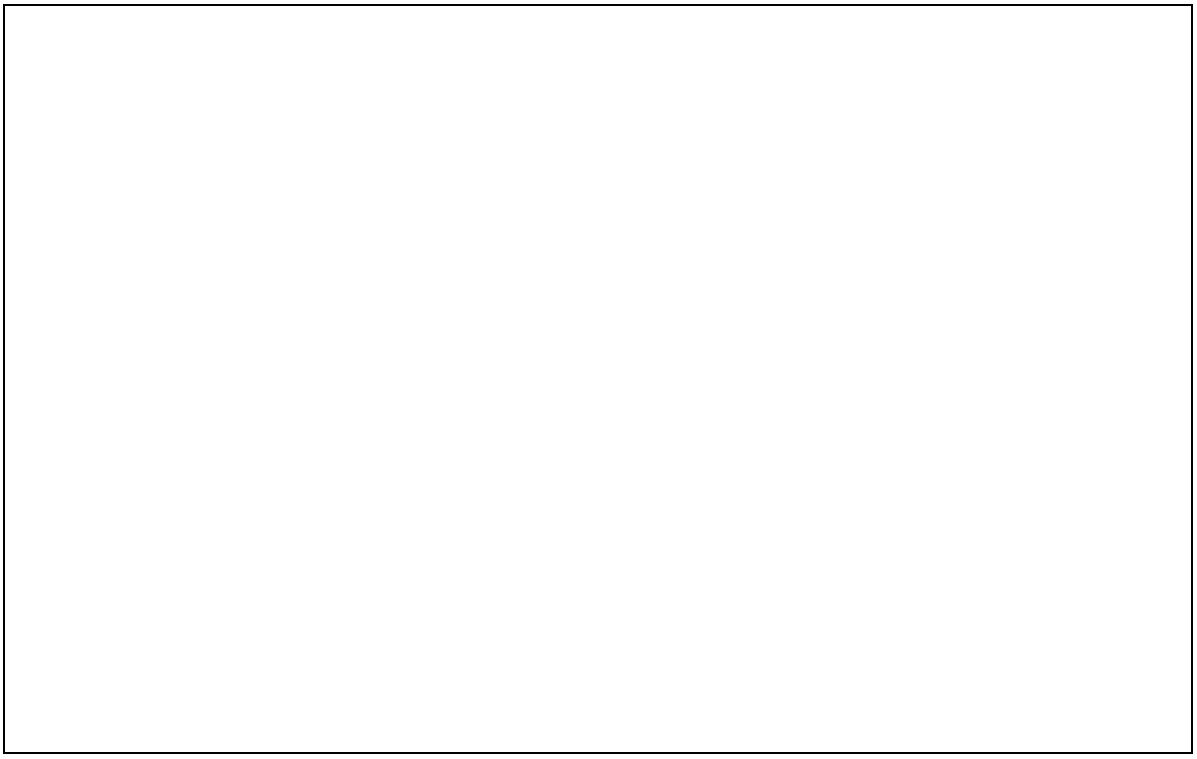
*Flow Rate Scale Br*

PA flow rate for scale breaker

### 2.2.4 Steel Grade Reference Table

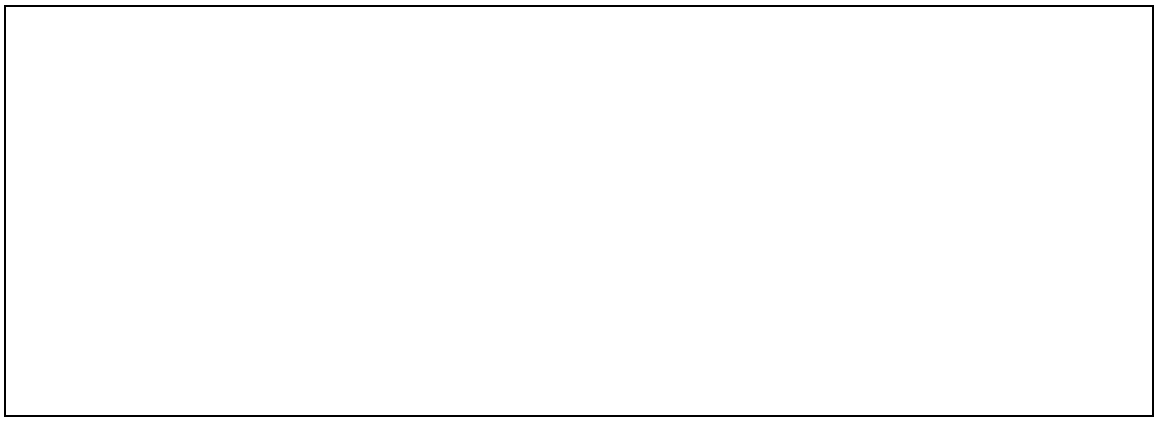
This display gives an overview about the available steel grades at the HSM Level 2 system and corresponding references.

*Display Layout:*

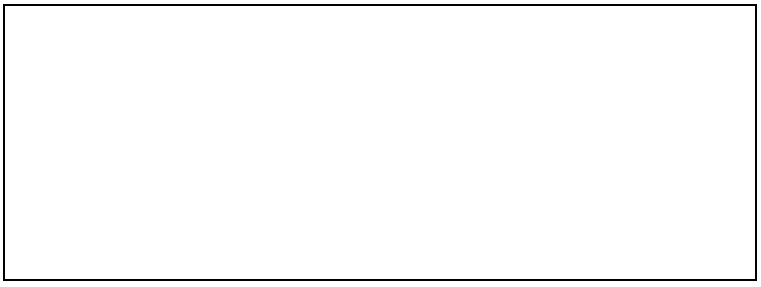


*Dialogs:*

Before *Modify* or *Delete Dialog* can be started, the particular grade has to be selected from the list by clicking on the line, containing the grade.

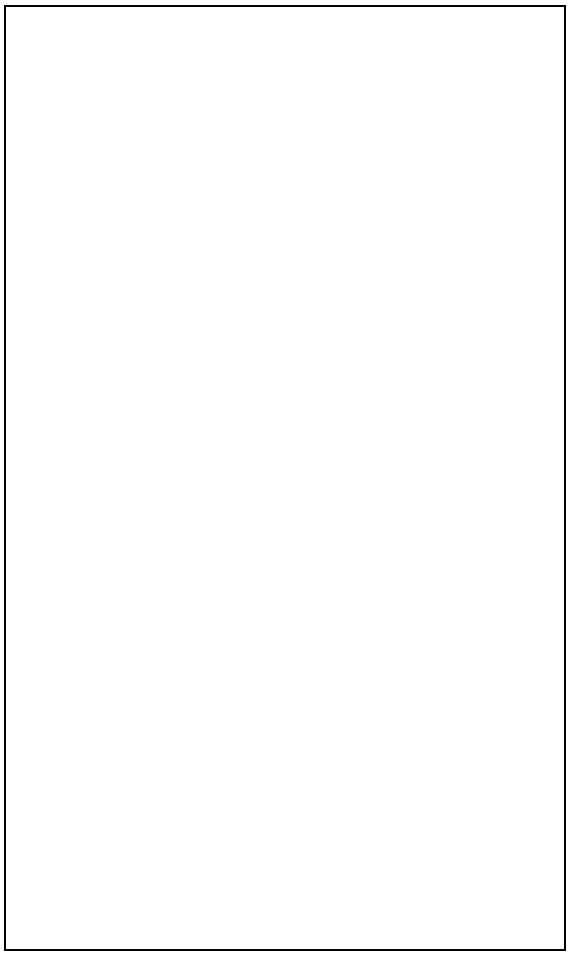


If the dialog is started without doing so, following box is displayed.



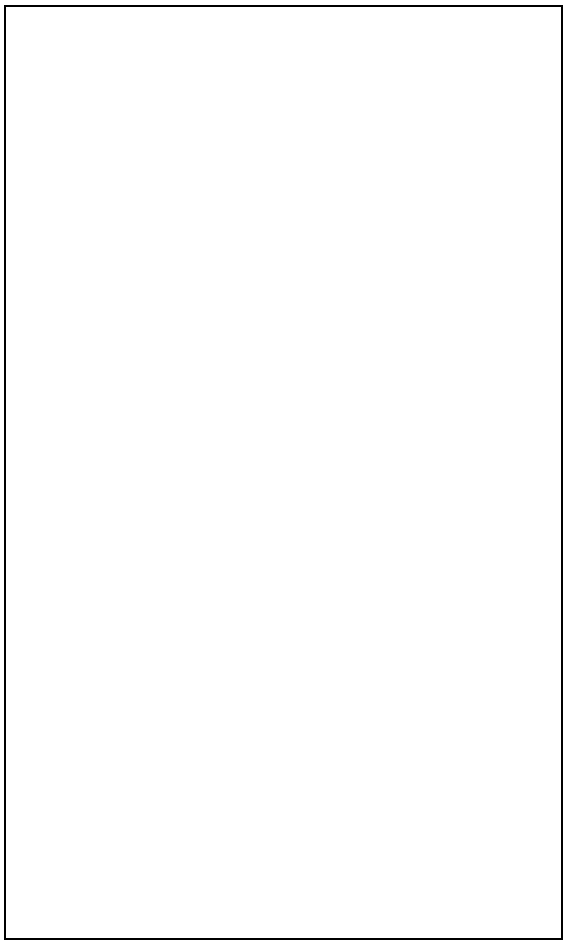
**Modify Steel Grade Reference:**

An existing steel grade entry can be modified



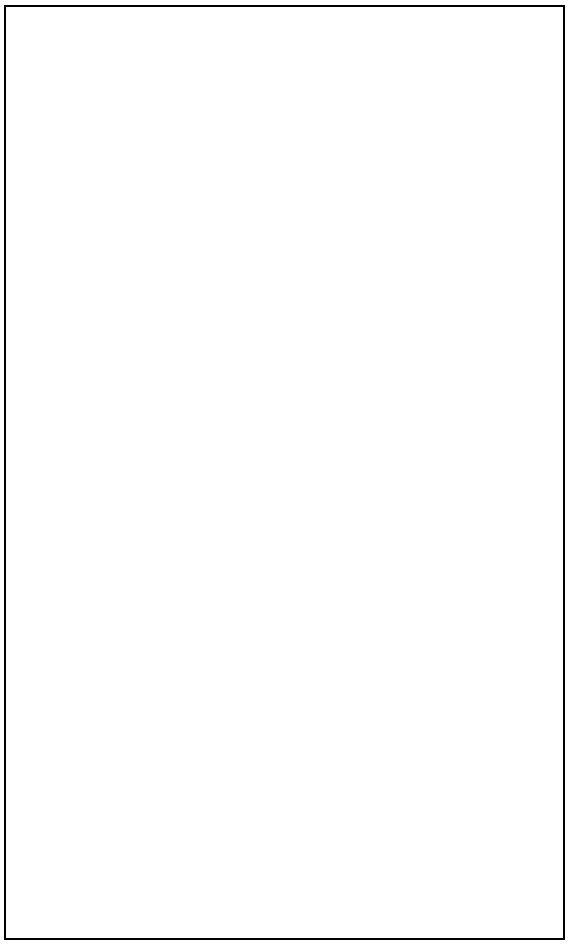
**Create Steel Grade Reference:**

New steel grade entry can be created



**Delete Steel Grade Reference:**

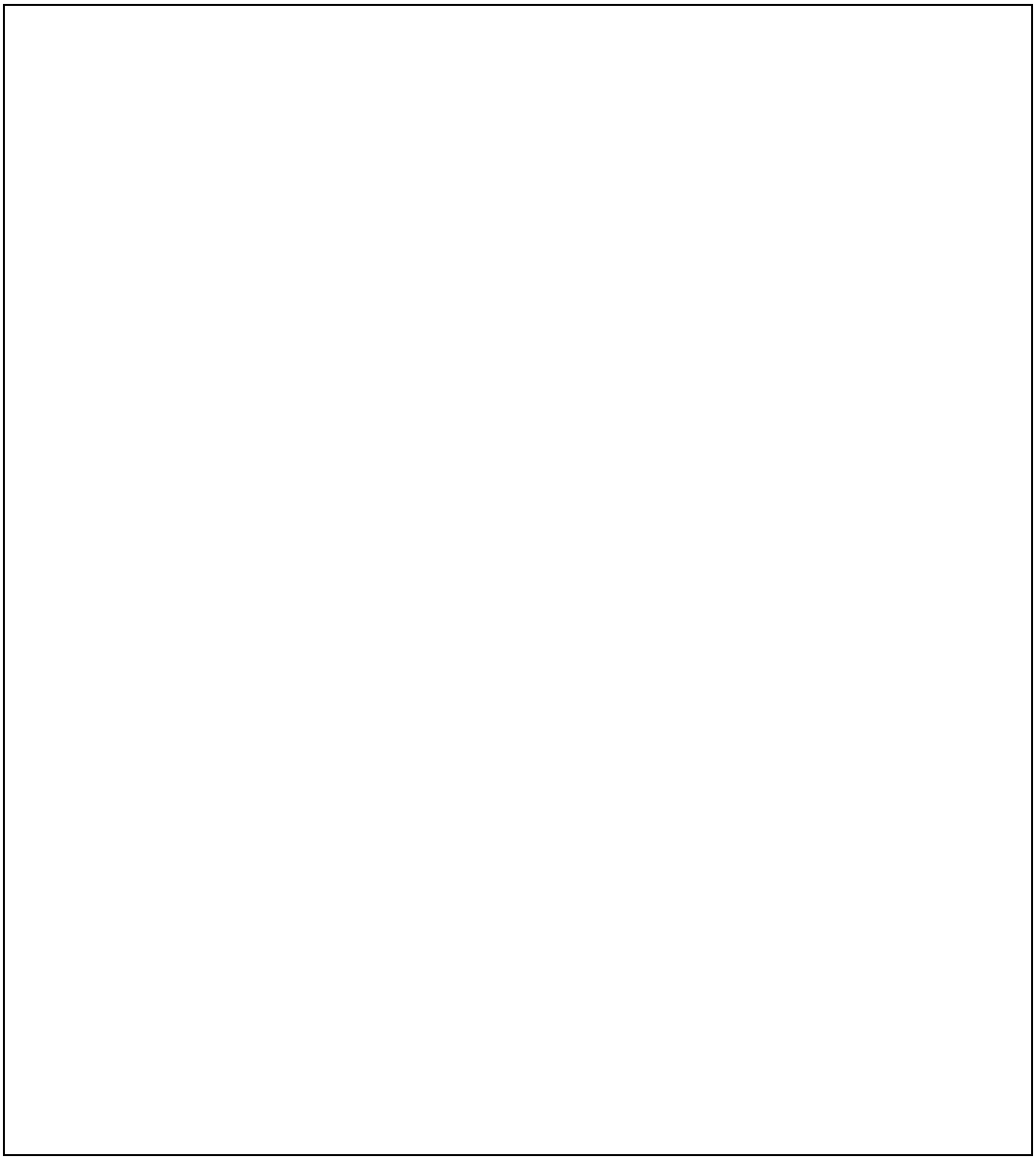
An existing steel grade entry can be deleted



### 2.2.4.1 Rolling Strategy

Information about rolling strategy data

*Display Layout:*



*Dialogs:*

**Modify Rolling Strategy:**
An existing record can be modified

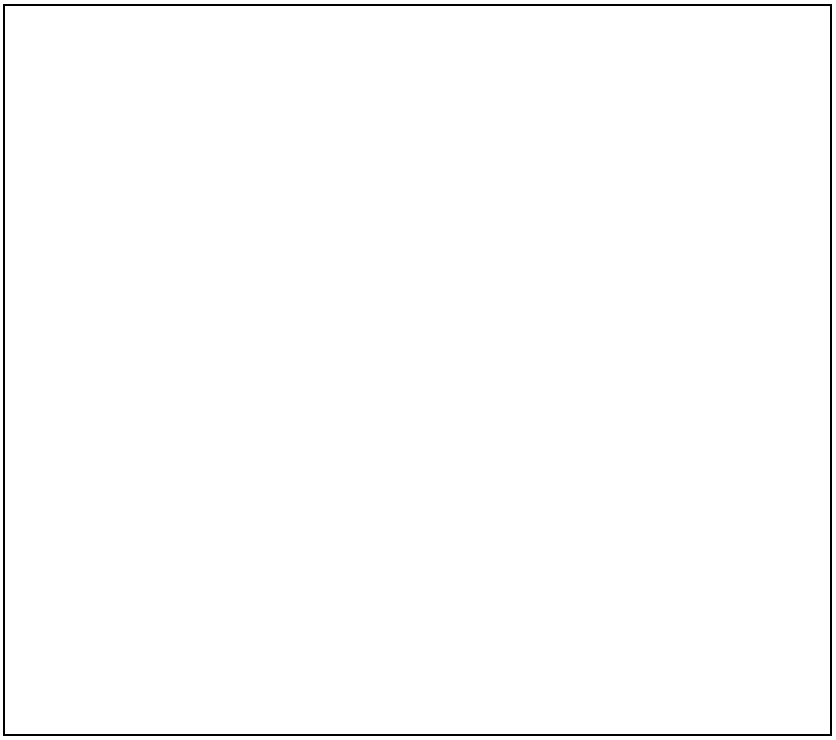
**Create Rolling Strategy:**
New record can be created

**Delete Rolling Strategy:**
An existing record can be deleted

### 2.2.4.2 Looper Strategy

Information about looper strategy parameters

*Display Layout:*



*Dialogs:*

**Modify Looper Strategy:**
An existing record can be modified

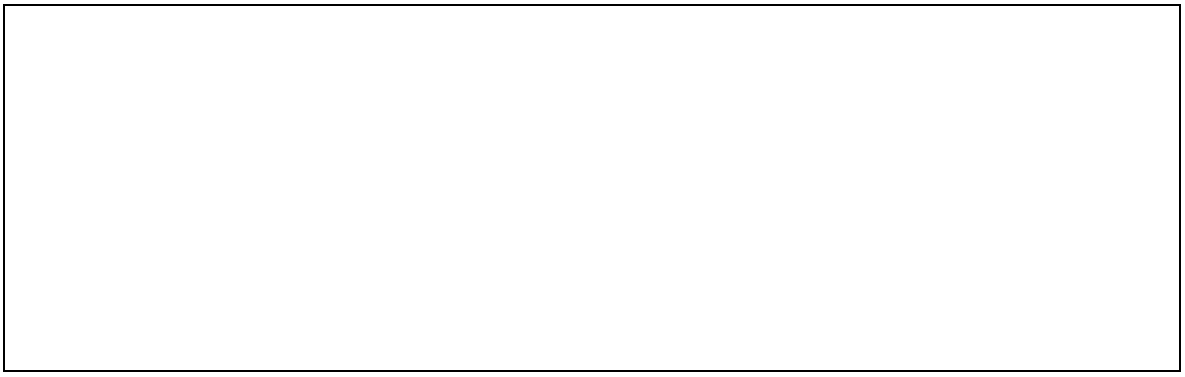
**Create Looper Strategy:**
New record can be created

**Delete Looper Strategy:**
An existing record can be deleted

### 2.2.4.3 Interstand Cooling Strategy

Information about interstand cooling strategy parameters

*Display Layout:*



*Dialogs:*

**Modify Interstand Cooling Strategy:**
An existing record can be modified (select list line)

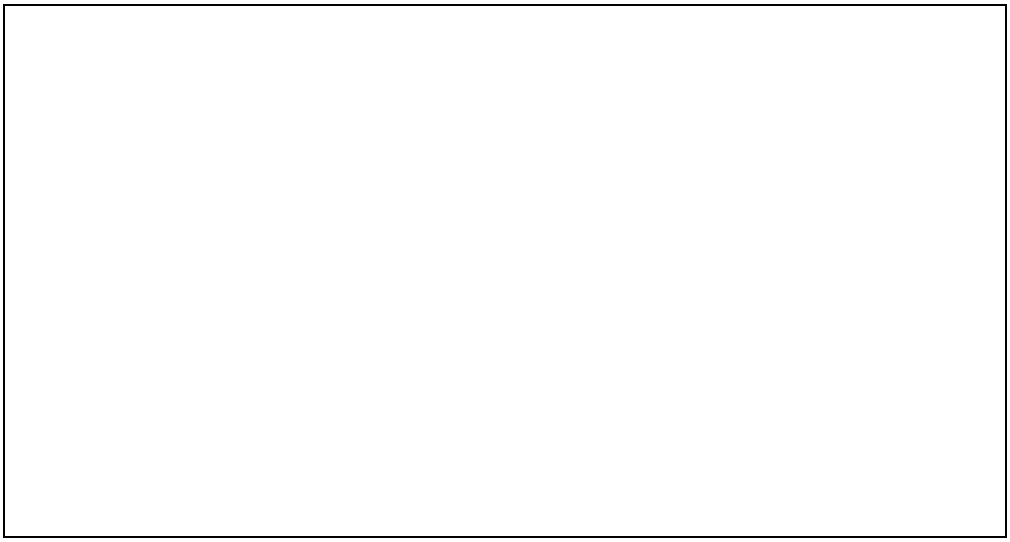
**Create Interstand Cooling Strategy:**
New record can be created

**Delete Interstand Cooling Strategy:**
An existing record can be deleted (select list line)

### 2.2.4.4 Descaling Strategy

Information about descaling strategy parameters

*Display Layout:*



*Dialogs:*

**Modify Descaling Strategy:**
An existing record can be modified (select list line)

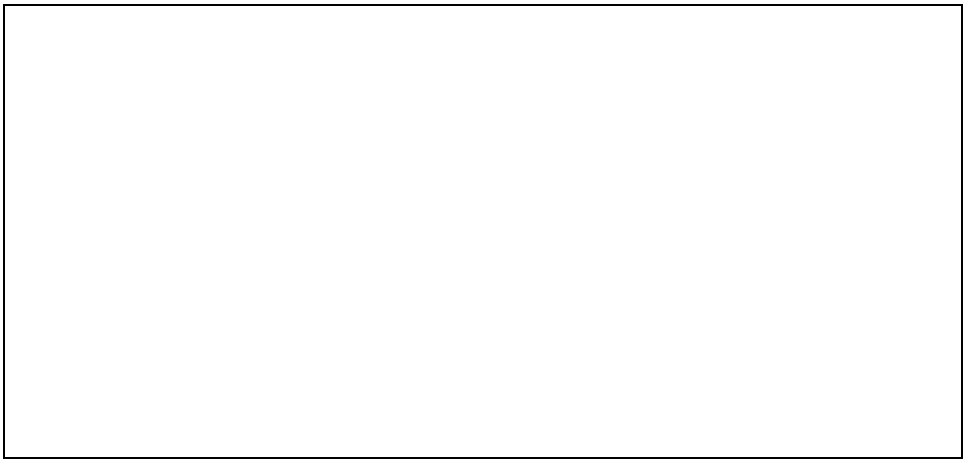
**Create Descaling Strategy:**
New record can be created

**Delete Descaling Strategy:**
An existing record can be deleted (select list line)

### 2.2.4.5 SRTclass Rougher

Information about Setup Reference Table classes for Roughing Mill

*Display Layout:*



*Reference Recipe No.* specifies the recipe, which is used for this class at the defined **Slab Width Range** and **Slab Thickness Range**. The corresponding reference pass schedule data can be seen in *Table Data Roughing Mill*.

*Dialogs:*

**Modify SRTclass Rougher:**
An existing record can be modified

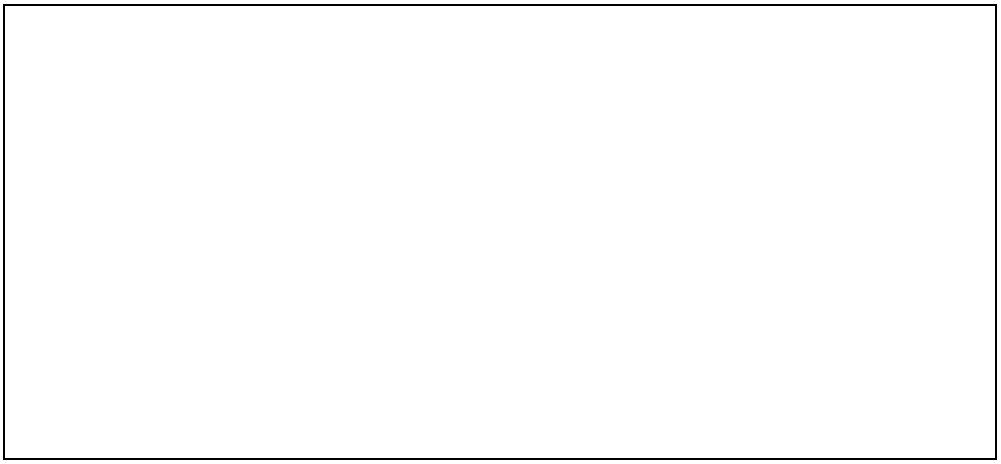
**Create SRTclass Rougher:**
New record can be created

**Delete SRTclass Rougher:**
An existing record can be deleted

### 2.2.4.6 SRTclass Cooling

Information about Cooling Reference Table for strip cooling

*Display Layout:*



*Reference Recipe No.* specifies the recipe, which is used for this class at the defined **Strip Width Range** and **Strip Thickness Range**. The corresponding reference cooling data can be seen in *Table Data Cooling*.

*Dialogs:*

**Modify SRTclass Cooling:**
An existing record can be modified

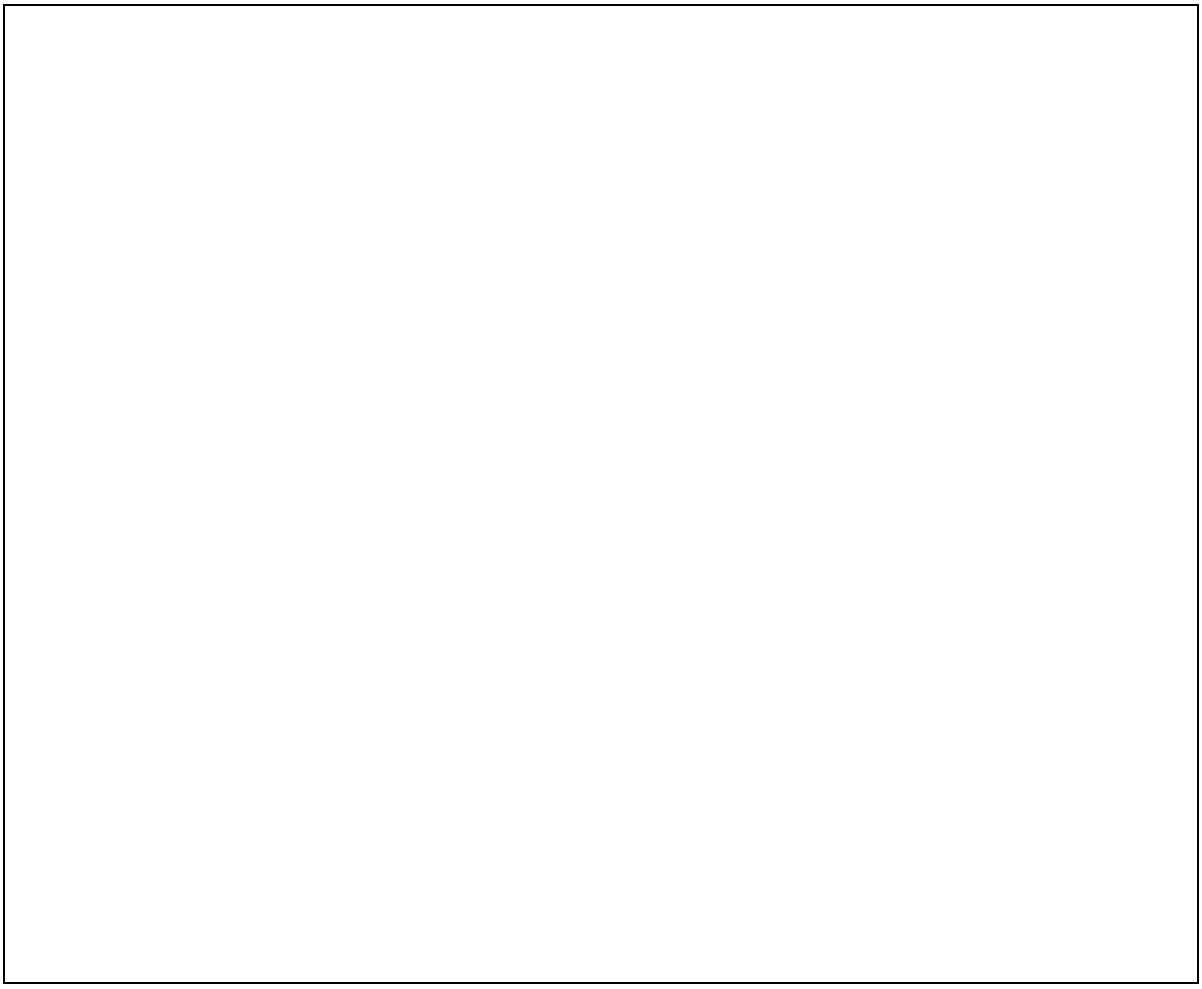
**Create SRTclass Cooling:**
New record can be created

**Delete SRTclass Cooling:**
An existing record can be deleted

### 2.2.4.7 Material Law

Information about material law parameters

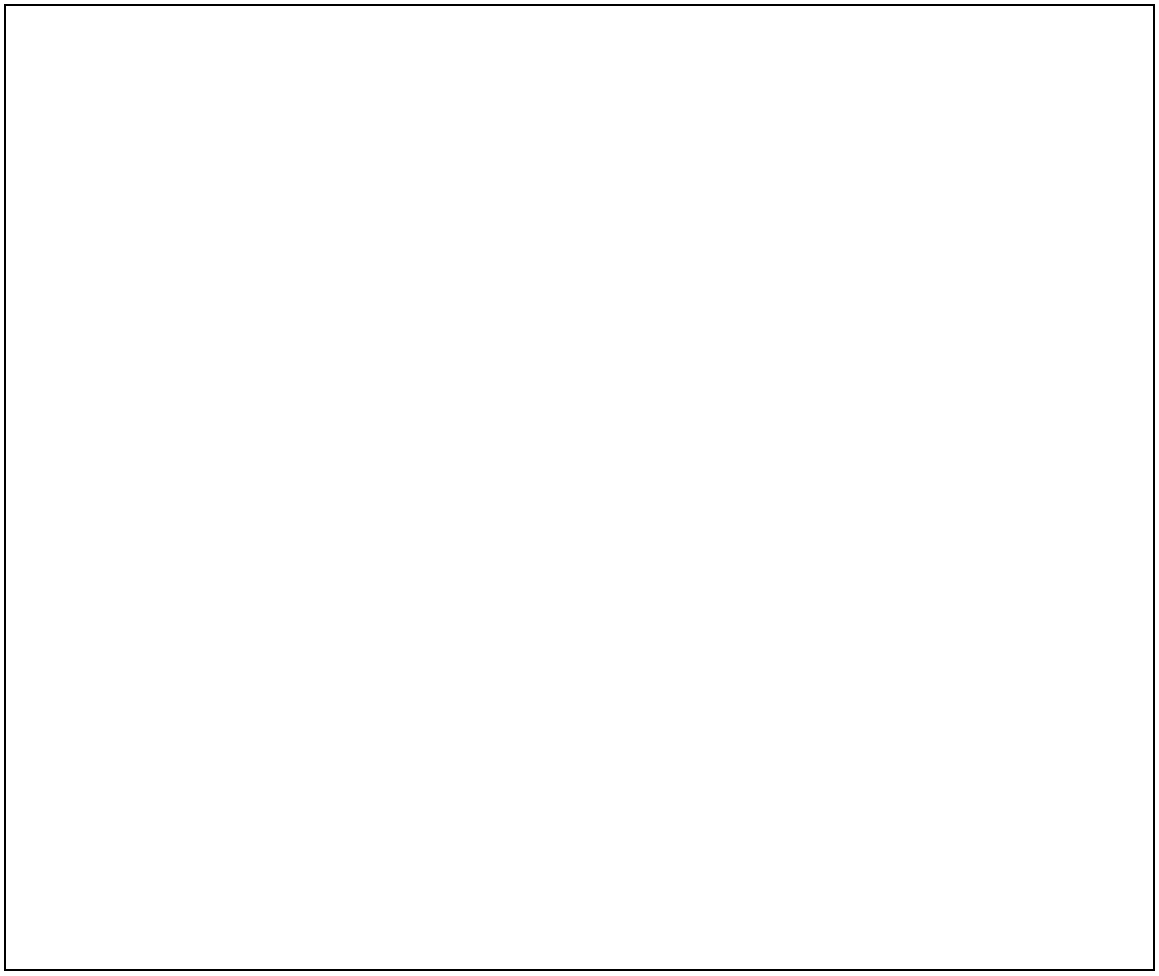
*Display Layout:*



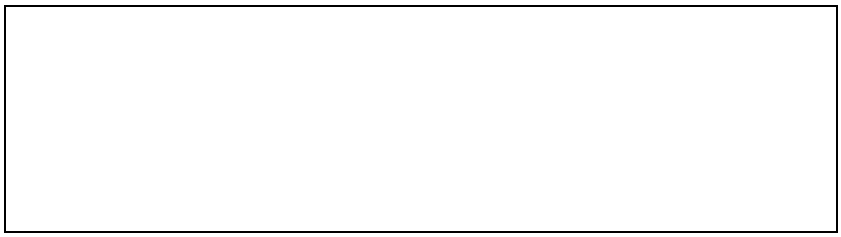
*Dialogs:*

**Copy Material Law:**

New record can be created by copying from an existing record



**An existing record can not be overwritten by the copy function !**



**Modify Material Law:**
An existing record can be modified

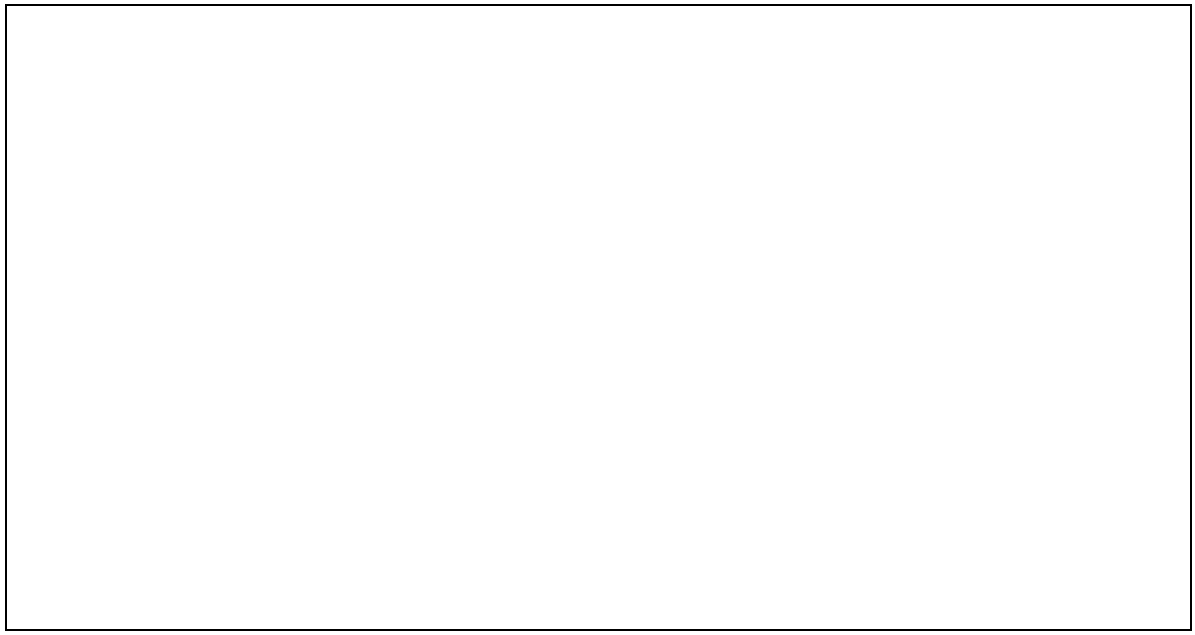
**Create Material Law:**
New record can be created

**Delete Material Law:**
An existing record can be deleted

### 2.2.4.8 Material Properties

Information about material property parameters

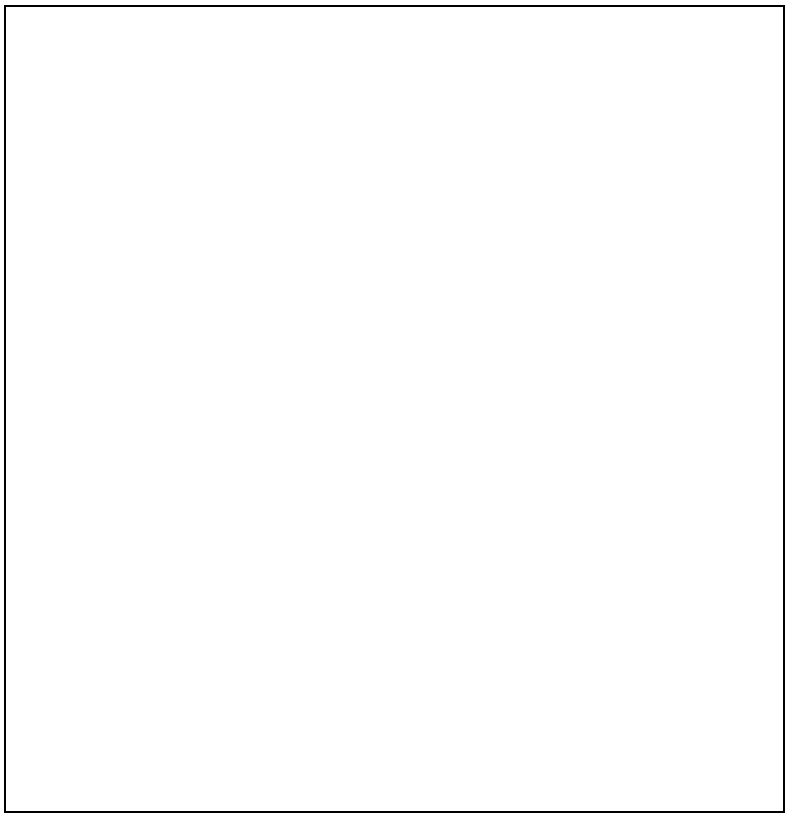
*Display Layout:*



*Dialogs:*

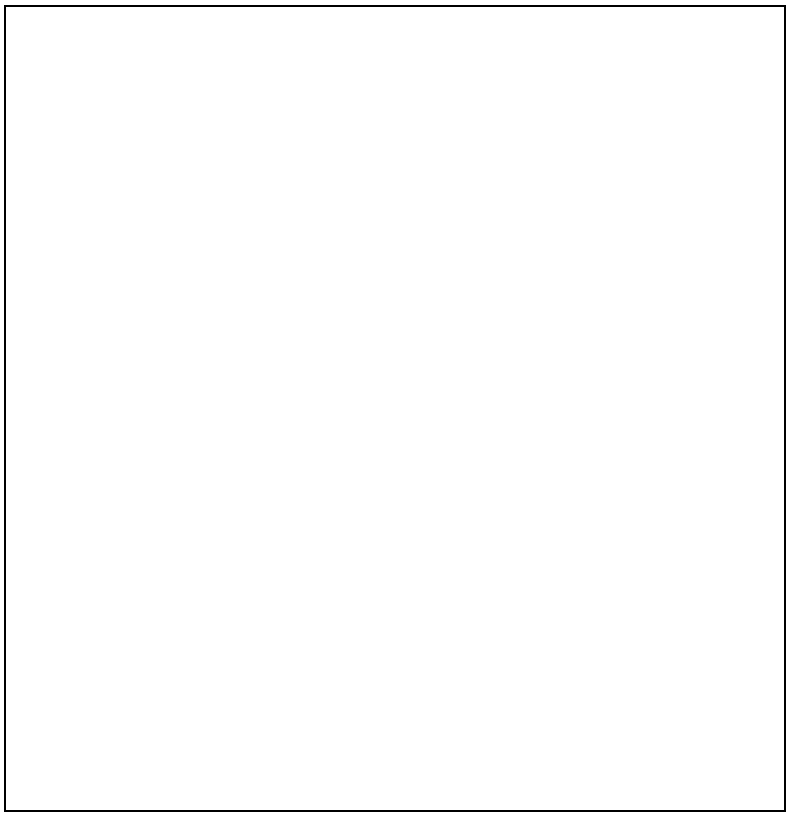
**Modify Material Property:**

An existing record can be modified



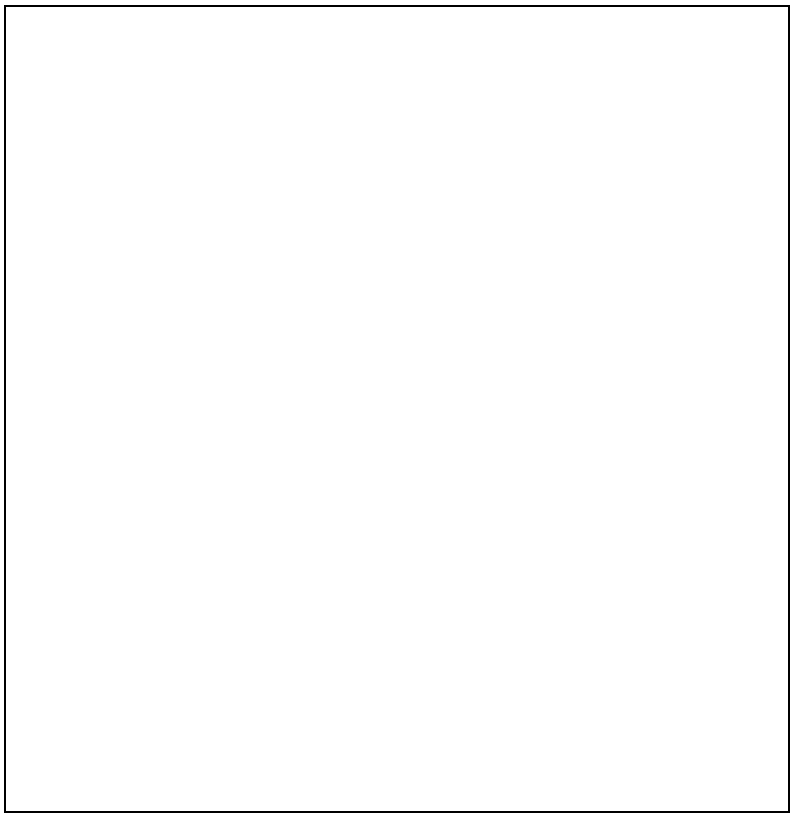
**Create Material Property:**

New record can be created

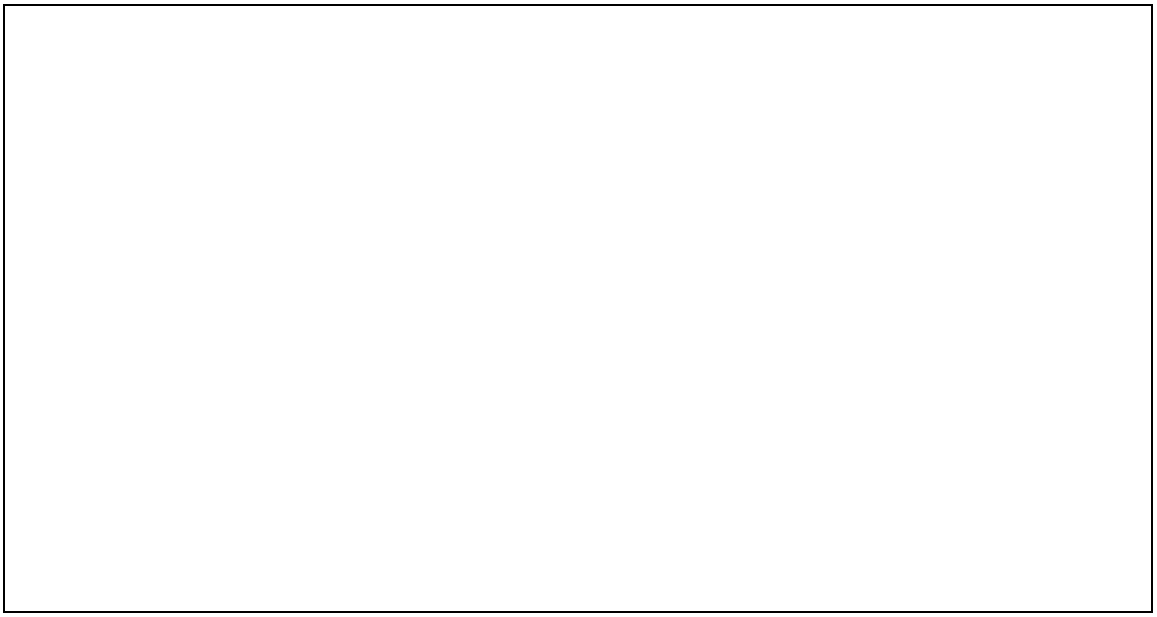


**Delete Material Property:**

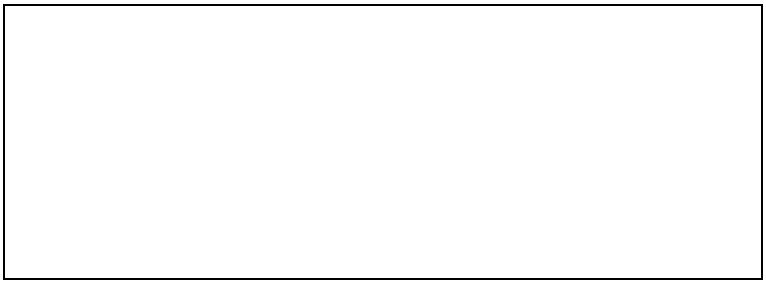
An existing record can be deleted



Before any of the following *Modify Dialogs* can be started, the particular item has to be selected in the corresponding list.



Otherwise following box is displayed

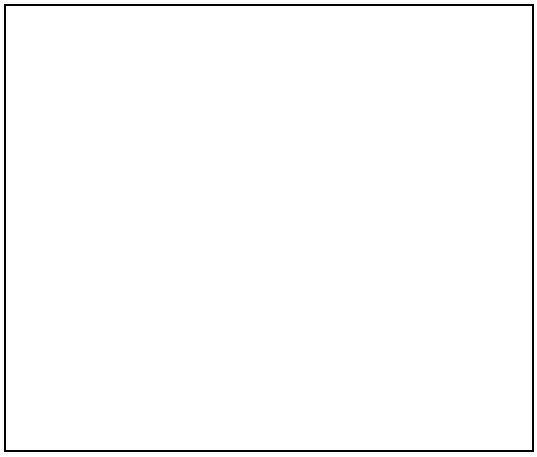


**Modify Material Property Density:**

Density values for the selected line can be modified

**Modify Material Property Capacity:**

Capacity values for the selected line can be modified

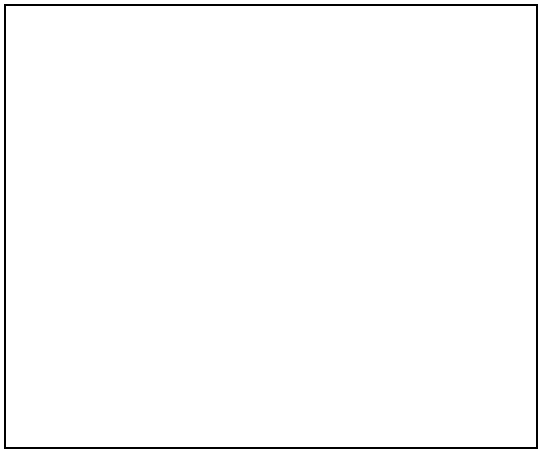


**Modify Material Property Conductivity:**

Conductivity values for the selected line can be modified

**Modify Material Property Expansion:**

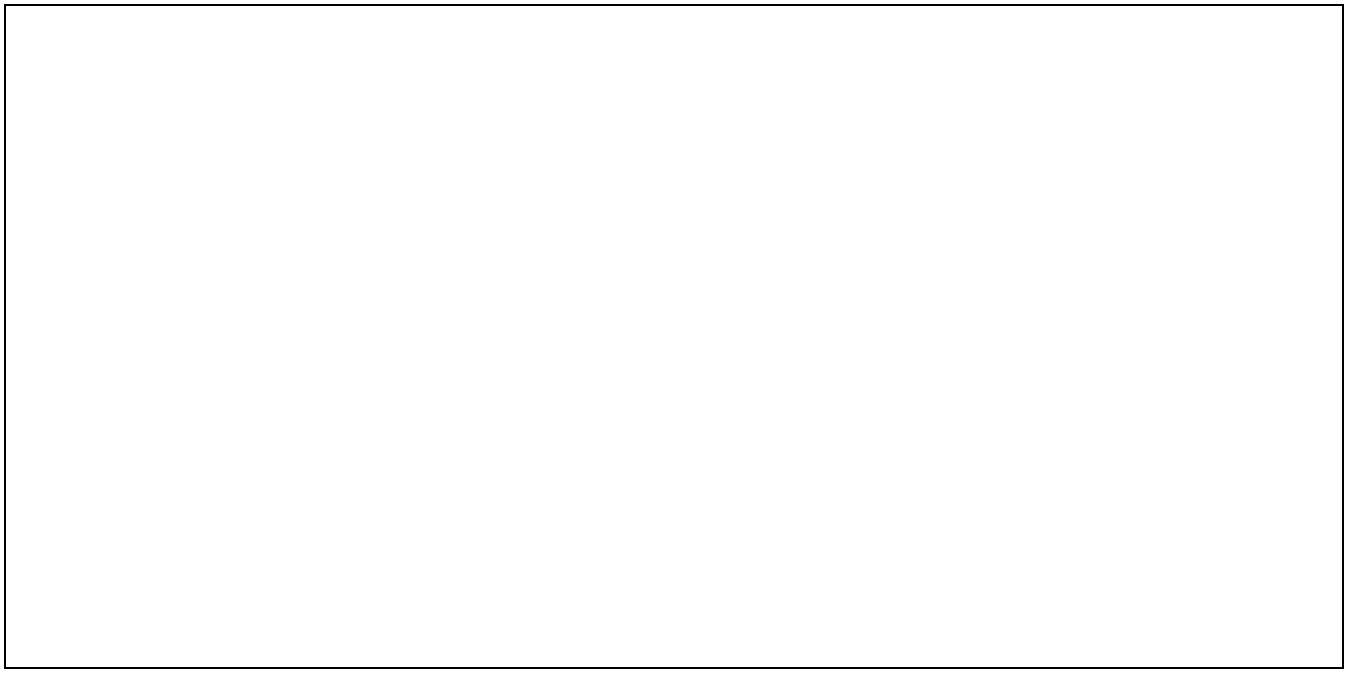
Expansion values for the selected line can be modified



### 2.2.5 Setup Data Roughing Mill

This display gives information about the Roughing Mill setup for a particular slab

*Display Layout:*



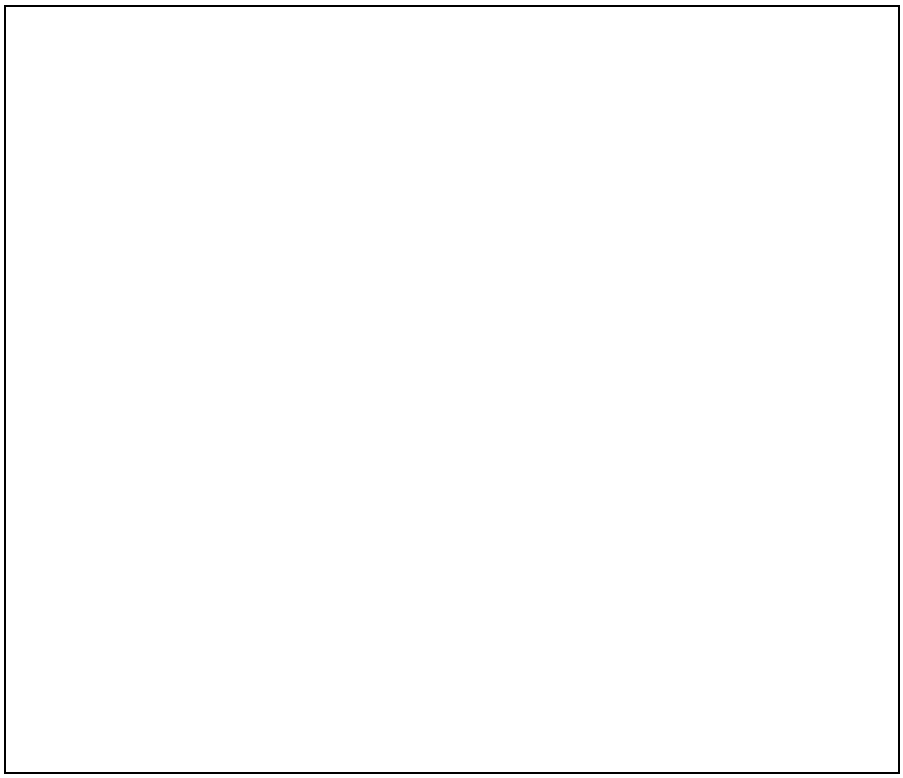
**RM pass schedule is downloaded to the Level 1 system at following events:**

- ☐ **Furnace discharging (for actual slab)**
- ☐ **Last pass RM finished (for next slab in furnace)**
- ☐ **Push button *Send Pass Schedule***

*Dialogs:*

**Modify Descale:**

Descaling can be modified by click on the corresponding toggle buttons ON/OFF



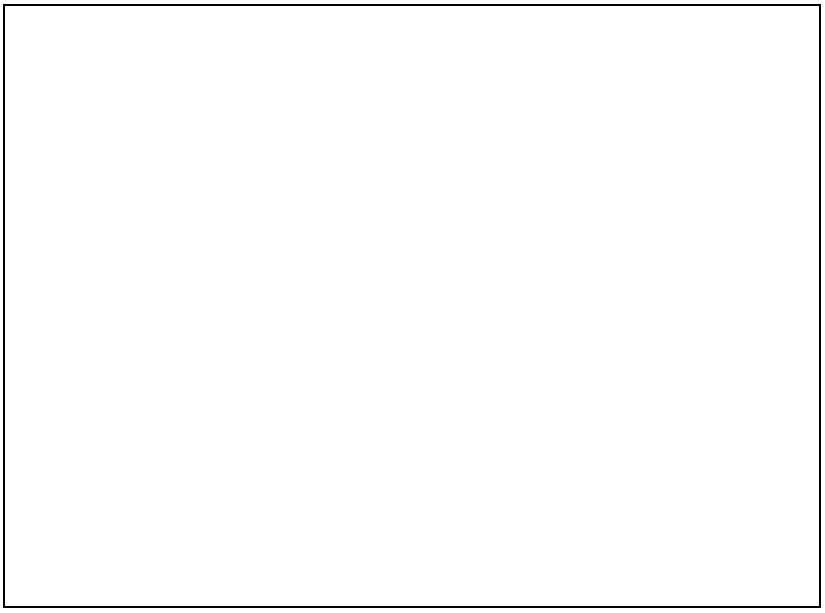
Note: Any change in the descaling practice will be updated in the corresponding setup reference table data and will influence all following slabs, rolled with the same recipe number.

Dialog is allowed only, while the slab is still in the furnace.

**Modify Edger Offsets:**

Offsets for Primary and RM Edger can be adjusted.

Each time, the *Up* or *Down Arrow* button is clicked on, the actual adjust is increased or decreased by **50 mil**.
**Maximum** for the offset is **in both directions** (open and close) **950 mil**.



Note: Any change in the edger offsets will be updated in the corresponding setup reference table data and will influence all following slabs, rolled with the same recipe number.

**Push Buttons:**

Creates, based on the RM setup reference table, an actual RM pass schedule and starts the FM model afterwards.

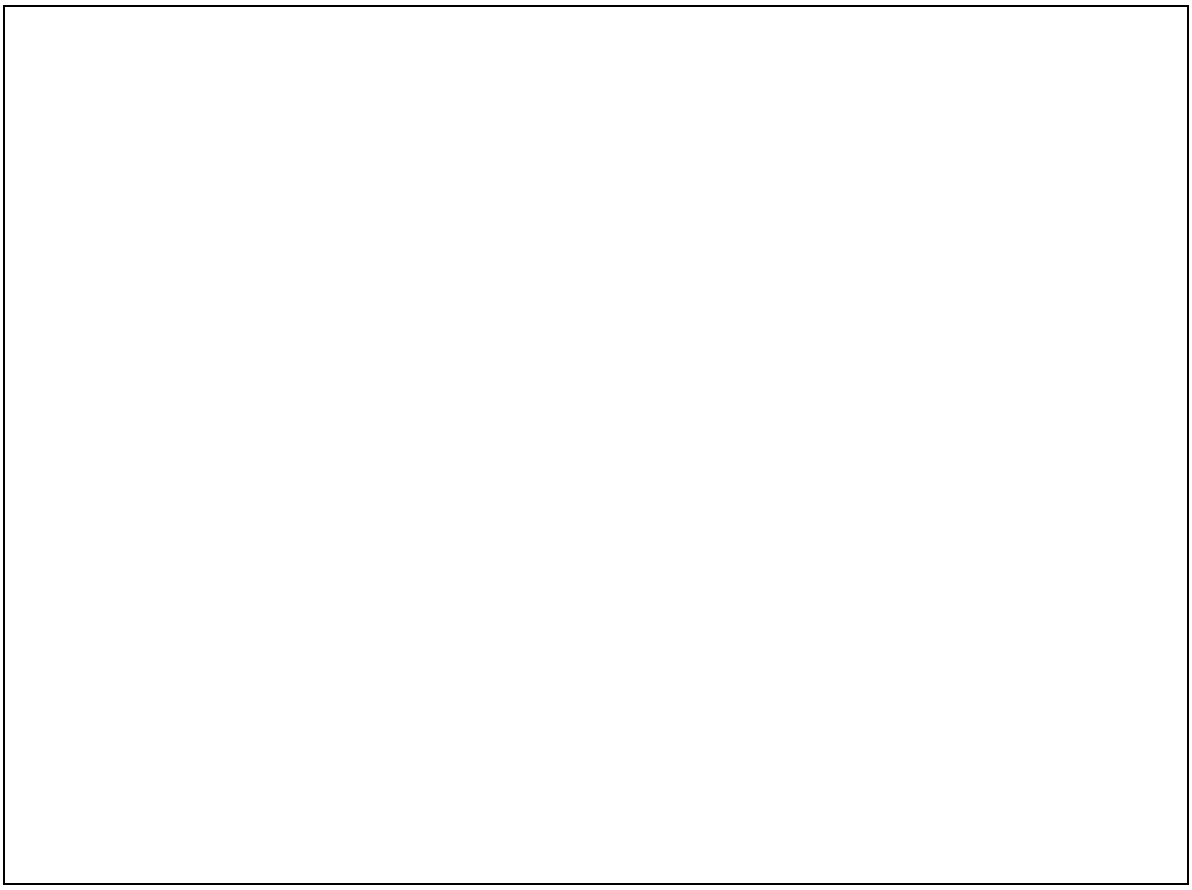
When Primary Data where invalid at furnace charging and the automatic RM pass schedule creation failed at this time, after correcting the Primary Data manually, this button can be used.

Downloads the actual RM pass schedule to the Level 1 system (deadline is furnace discharging).

### 2.2.6 Setup Data Finishing Mill

Information about Finishing Mill pass schedule

*Display Layout:*



A field, kept in color *Tan*, indicates that it can be manually altered.

### 2.2.6.1 Parameter Description

#### 2.2.6.1.1 Types of Values

Please see *General Model Data*, chapter *Parameter Description* at page 26.

#### 2.2.6.1.2 Parameters

**Strip Identification**

*Slab ID*

PD Strip Identification

*Grade*

PD steel grade

**Strip**

*Thickness Target*

PD target strip thickness (cold value)

*Thickness Actual*

AF the actual reading of the x-ray gauge (cold value)

*Width Target*

PD the cold target strip width

*Width Actual*

AF the actual reading of the width gauge (cold value)

*Fin.Temp Target*

PD the target strip temperature on the finishing mill exit side

*Fin.Temp Actual*

AF the actual reading of the pyrometer on the finishing mill exit side

*Fin.Temp Calculated*

CA the calculated exit temperature for the headend on the exit side of the last active stand

*DC Temp Target*

PD the target strip temperature on the downcoiler

*DC Temp Actual*

AF the actual reading of the pyrometer on the downcoiler

**Scale Breaker**

*Target Speed*

SP target scale breaker speed

*State Descaler North/South*

SP state (ON or OFF) for FM entry descaler

*Time Descaler North/South*

SP time period (seconds), FM entry descaler should stay ON; only relevant if state is ON

**Transfer Bar**

*Thick Target*

PD the target transfer bar thickness from the piece data, hot

*Thick Actual*

CA the calculated transfer bar thickness based on the roughing mill pass schedule ( for precalculation ) or the actual values for screwdown and roll force on the roughing mill ( for calculation )

*Temp Target*

PD the target transfer bar temperature on the roughing mill gap exit side at the last pass in the roughing mill, regardless if it is a load or an unload pass

*Temp Actual*

AR the actual reading of the pyrometer on the roughing mill north side

*F1 Entry Temp. Actual*

AF the actual reading of the pyrometer on the finishing mill entry side

*Calc. Width*

CA the transfer bar width calculated from the roughing mill pass schedule ( precalculation ) or from the actual values of the roughing mill ( calculation ), warm value

*Entry SG Offset*

OP offset to calculated entry side guide position;

**Adjusted side guide position itself is defined as:**
**Calculated transfer bar width (Level 2) + 1.5 inch (Level 1)**

**Pass Schedule**

*F1 to F6 diamonds*

SI shows, if stand is active or dummy;
Filled diamond means *Active Stand*
Empty diamond means *Dummy Stand*

*Load Gap*

SP calculated load gap

*Draft*

CA calculated absolute thickness reduction

*Draft Change*

OP draft change request done by the operator;
The draft change request is an input for the pass schedule precalculation respectively the pass schedule calculation.

The requested draft change is added to the draft on the according stand(s). In order to get the required gauge, the model distributes the draft on the remaining stands and resets the draft change request. The resulting relative thickness reductions (see “Relative Draft”, below ) reductions are stored in overwrite-mode to the corresponding rolling strategy lookup table. Draft change is not possible in “Force” strategy.

**Note: In *dummy stand* rolling, the draft change is considered, but not reset and not permanently stored.**

*Relative Draft*

CA relative thickness reduction

*Rolling Speed*
SP rolling speed

*Rolling Force*
SP preset roll force for the strip headend

*Rolling Torque*
CA calculated roll torque for the strip headend

*Load*
CA calculated roll power for the strip headend

*Exit Strip Width*
CA calculated exit strip width (hot value)

*Looper Angle*
SP looper angle from lookup table for each looper

*Looper Tension*
SP specific tension form lookup table for each looper

**Speed Offset F1**

*Actual*
OP actual adjusted offset to the model calculated rolling speed of the entire mill. This speed offset is added to the calculated speed on the first active stand. The speeds of the other stands are calculated considering the resulting total rolling speed for the first active stand.

*Request*
OP requested speed offset. This offset is an operator input and is added to the actual speed offset at the time of a pass schedule precalculation or a pass schedule calculation. If this speed offset request should result in a violation of the minimum or maximum speed on one of the active stands, the requested speed offset is cut back to a value the mill to run fast as respecvtively as slow as possible without violating the stand speed limits.

**Thickn.Offset**

*Actual*

OP actual adjusted operator given thickness offset. This offset is added to the target strip thickness.

*Request*

OP requested thickness offset. This offset is an operator input and is added to the actual thickness offset at the time of pass schedule precalculation or pass schedule calculation.

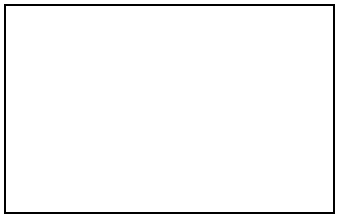
**Rolling Strategy**

PA rolling strategy mode, “Load” or “Force”.

“Load” strategy is based on preset relative thickness reduction each stand which are subject to operator modifications, if necessary.

“Force” strategy is based on a specific roll force on the last active stand and a roll force “slope” which determines the reductions on the upstream stands in order to meet a constant relative strip profile. The slope itself is a subject to operator modifications, but the reduction each stand can not be modified separately.

### 2.2.6.2 Buttons



*Print* generates and prints the model strip report for the strip, identified at *Slab ID,* at the laser printer in the finishing mill pulpit.

On/Off enables or disables the automatic printout of the process report for the actual strip. If enabled, printout is done at end of rolling in FM when the adaptation is finished.

Resets the actual thickness and speed adaptor set, depending on the actual value of the thickness adaptor.
If thickness adaptor (can be seen in window *Advanced*) reaches or exceeds the value of +/-10 mil, the adaptors are reset to half of the actual value.
If the thickness adaptor is below +/-10 mil, the adaptors are reset to 0 (zero).

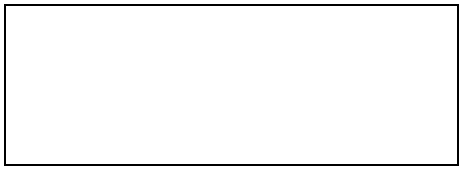
**Note !**

**After a work roll change in F5 or F6 or in all stands, the adaptors have to be reset.**

The thickness adapter and the stand speed adapters compensate load gap

inaccuracies caused by latent changes in the noload gaps and in the mill stretch during rolling.

Opens the window Advaced Strategy Data;
Description please see chapter *Advanced Strategy Data* at page 71.

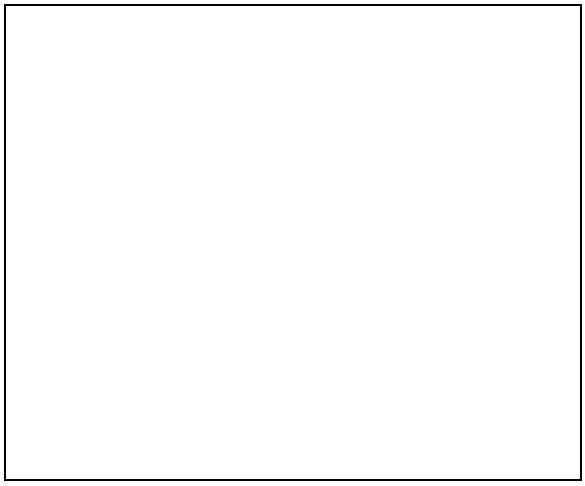


Starts for the strip, identified at *Slab ID,* the pass schedule precalculation. If the button is pushed in ***Default Mode***, the set points are **transmitted to** the **Level 1** system.
As soon as rolling in FM is started, the button is for the actually rolled strip disabled (message *Model start not allowed anymore*).

*Dialogs:*

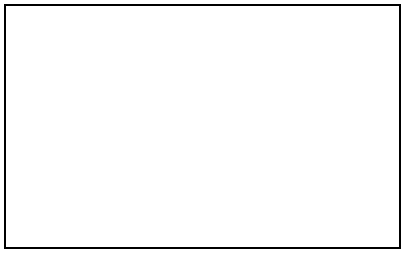
**Modify Descale:**

Actual descaling practice can be modified;
parameters please see on page 62



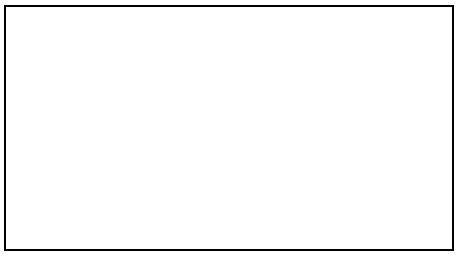
**Modify Speed Offset:**

Speed of actual calculated pass schedule can be influenced;
parameters please see on page 64



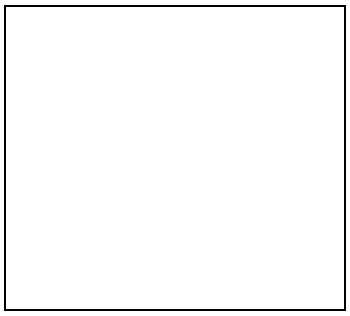
**Modify Thickn. Offset:**

Finishing gauge of actual calculated pass schedule can be influenced; parameters please see on page 65



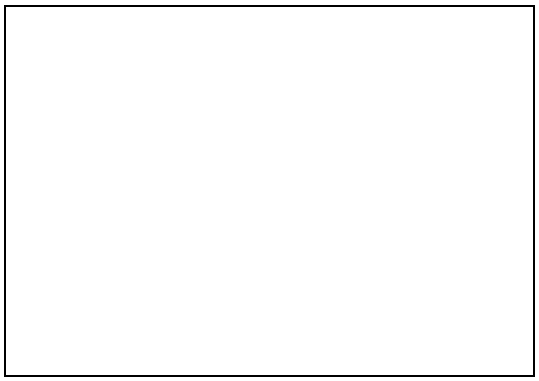
**Modify Draft:**

Stand specific drafts of actual calculated pass schedule can be influenced



**Modify Looper:**

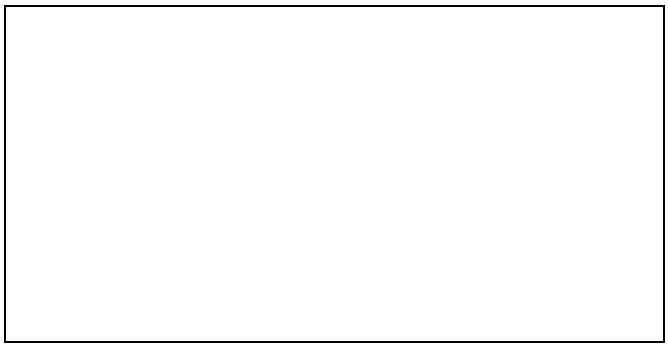
Looper strategy table can be modified;
Any modification will stay for the next material, rolled with the same looper strategy (see chapter *Steel Grade Reference Table* on page 34)



After pushing button OK, only the fields that have been modified, will be updated (e.g. if you set *Looper Angle* to 8 but leave *Looper Tension* empty, only the Looper Angle will be stored).

**Modify SG Offset:**

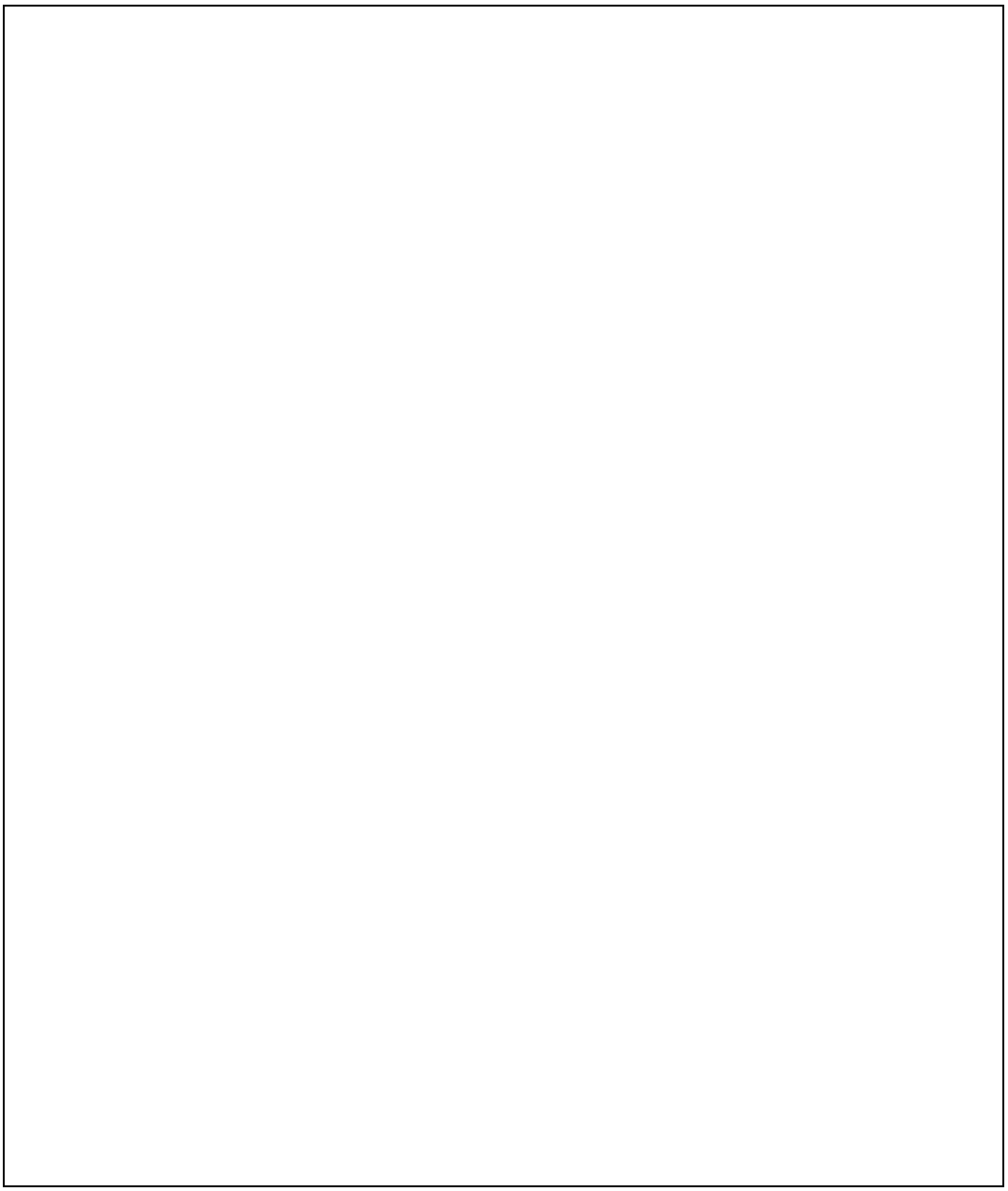
Pinch Roll Scale Breaker Side Guide and Stand Entry Side Guides can be opened or closed



Each time, the *Up* or *Down Arrow* button is clicked on, the actual side guide offset is increased or decreased by **250 mil**.
**Maximum** for the offset is **in both directions** (open and close) **1.0 inch.**

### 2.2.6.3 Advanced Strategy Data

Shows strategy parameters and switches, used in FM model.



### 2.2.6.3.1 Parameters

**Rolling Strategy**

*Load*

SW rolling strategy mode, “Load Strategy”

*Force*

SW rolling strategy mode, “Force Strategy”

**Rolling Strategy “Force”**

*Maximum Relative Draft*

TD upper limit for relative thickness reduction in “force”-strategy

*Roll Force Slope*

TD preset roll force slope in “Force Strategy”

**Rolling Strategy “Load”**

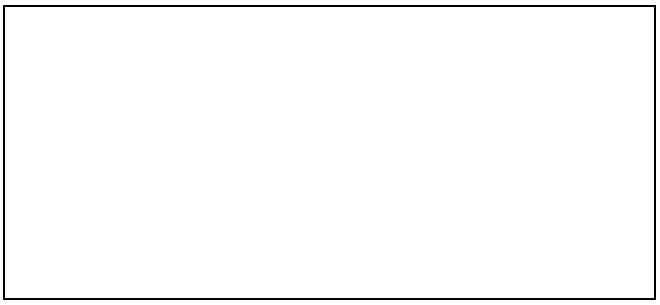
*Original Relative Draft*

TD preset relative draft from lookup table. This set of parameter can be changed by the operator in order to store an empiric good draft distribution.

*Reset Rolling Strategy*

OP push button to overwrite the operator changed relative drafts with the original settings shown in “Original Relative Drafts”

Reset action itself is done after confirming following box with OK.



**Switches**

*Calculation*

SW switch pass schedule calculation at last pass RM ON/OFF

*Adaption Fo/To*

SW switch “force and torque online adaptation ON/OFF”

*Adaption Temp*

SW switch “temperature adaptation ON/OFF”

*Limit Checks*

SW switch “limit checks ON/OFF”;
only relevant in “Load” strategy; in “Force” strategy the limit check is performed always.

In state “limit checks ON”, the model checks not only for stand speed violations, but also for violations of the maximum roll force for each stand and the maximum motor load for each stand based on the limits set in “stand data” and “force utility” in the General Model Data.

If the target thickness can not be rolled without violating a limit, the alternate strip thickness from the piece data is targeted.

If there is no alternate strip thickness, the strip thickness will be increased by 0.04”. In both cases, a red information message apears on the screen.

If this higher strip thickness can not be rolled, no pass schedule is created, and an error message appears.

*Adaption Thick*

SW switch “thickness adaptation ON/OFF”
Controls, if the pass schedule precalculation and the pass schedule calculation consider the actual thickness adapter (see next page) in their calculation.

*Adaption Speed*

SW switch “stand speed adaptation ON/OFF”
The pass schedule precalculation and the pass schedule calculation consider the stand speed adapter set in their calculation. The adaptation updates the stand speed adapter set based on the stand speed measurement after the strip is rolled.

*Long Term Ada*

SW switch “stand speed and thickness long term adaptation ON/OFF”. Obsolete

This function was implemented to classify the thickness and speed adapter sets in to the gauge-, material-, width- and length classes.

*Thick.Adapter Act.*

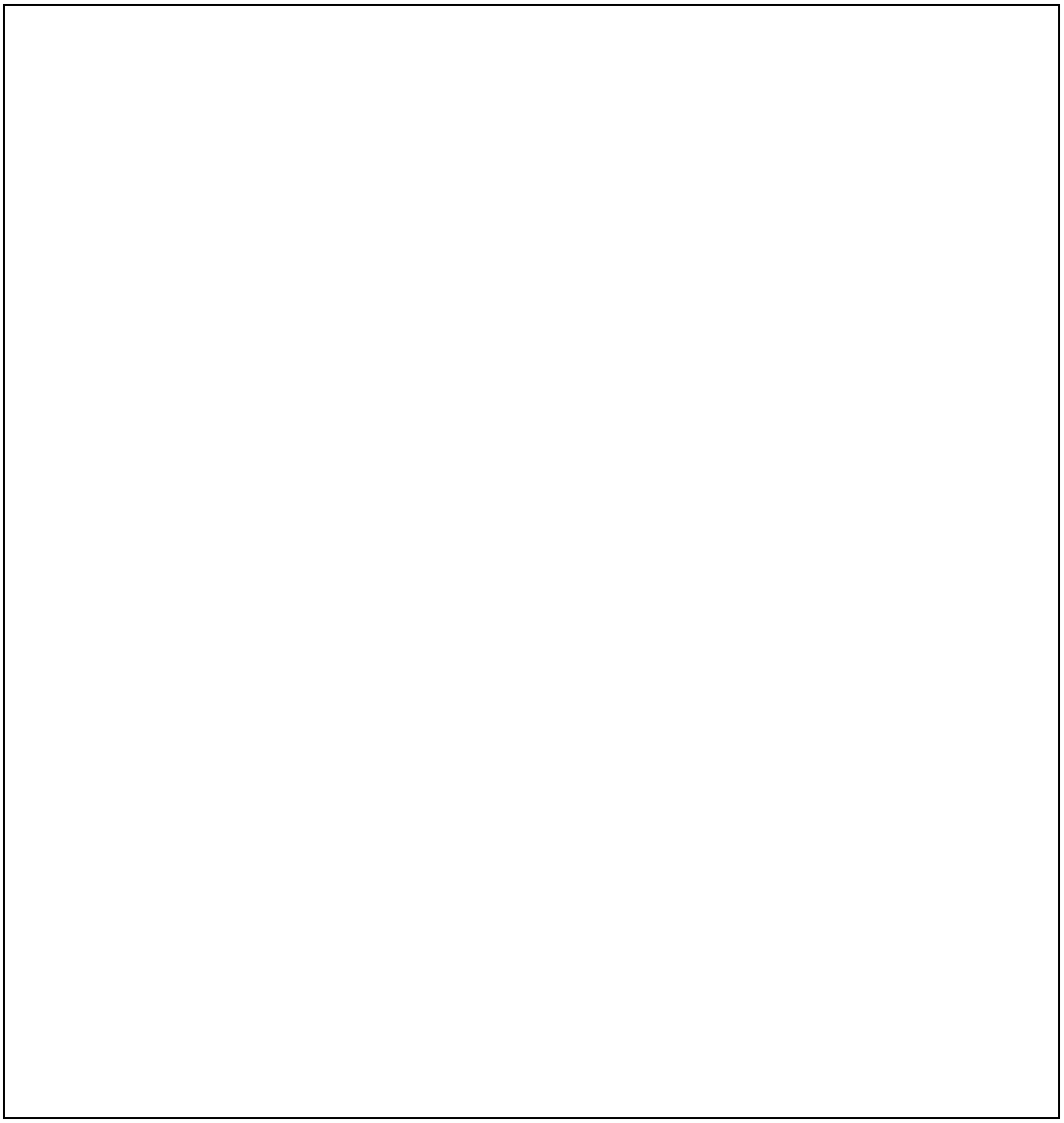
DC actual thickness adapter;
The adaptation updates the actual thickness adapter based on the x-ray measurement after the strip is rolled and saves the previous value in *Thick.Adapter Prev.*

*Thick.Adapter Prev.*

DA thickness adapter of previous material

### 2.2.6.3.2 Dialog Modify Advanced

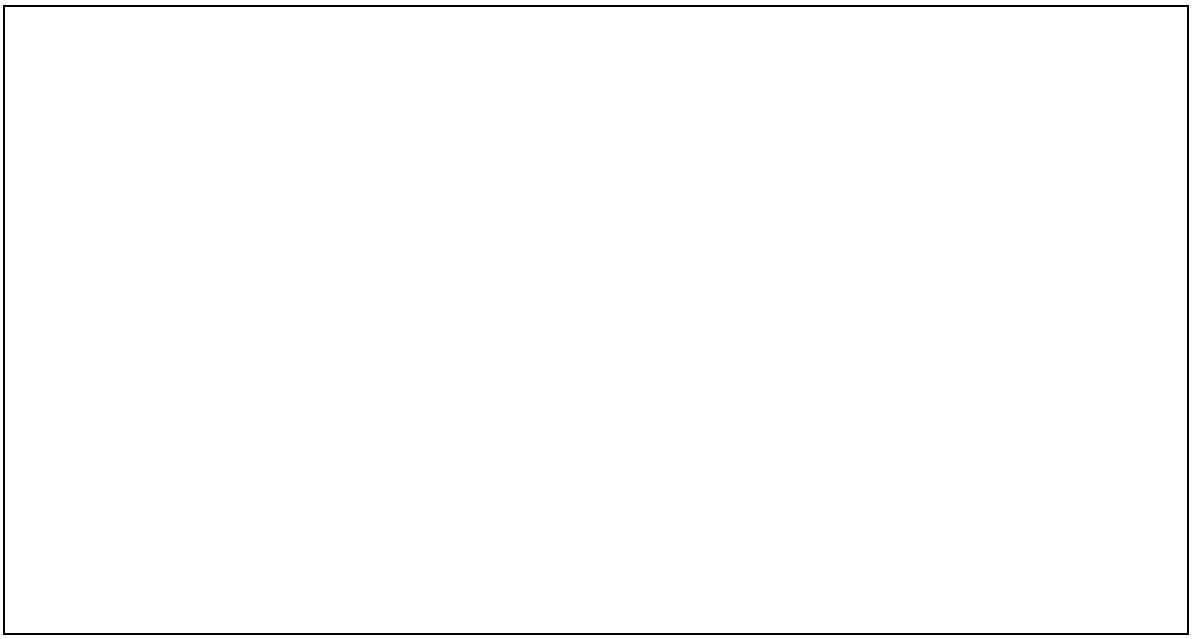
Above described parameters and switches can be modified and will be updated and used after pushing *OK*.
*Cancel exits* the dialog *without* accepting any *changes*.



### 2.2.7 Setup Data Cooling

Shows the cooling setup for the selected slab

*Display Layout:*



**Note:** In this display the cooling setup can be modified directly by click on the particular cooling section but won't be updated on the system unless button

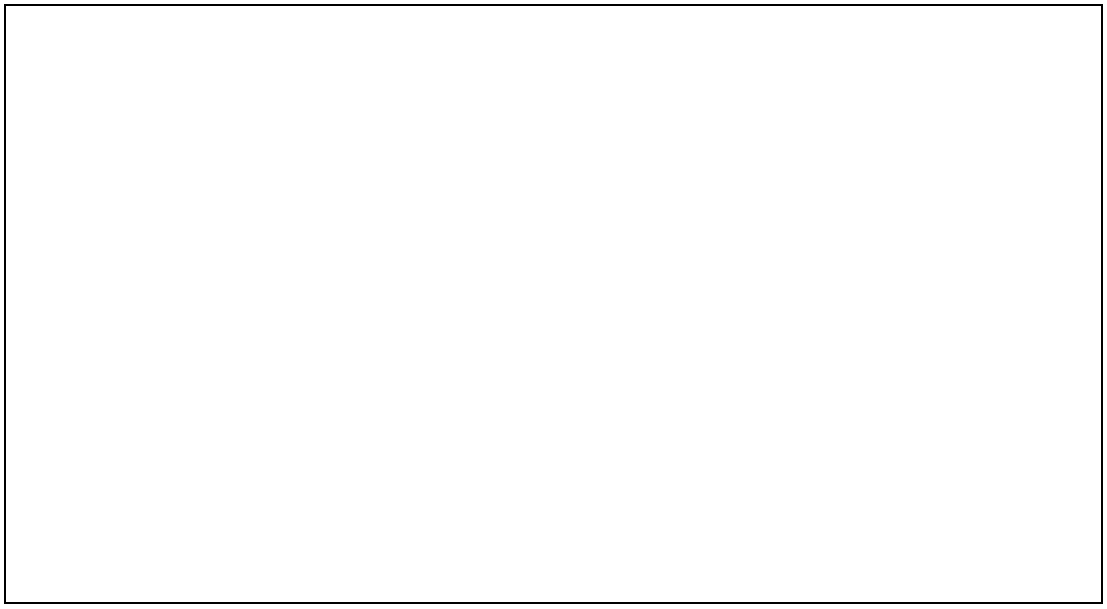
is pressed.

So if you modify sections and then enter Modify Mode without pushing the button Send Cooling Setup previously, the Modify screen has the origin settings, which differ to your previous changes.

*Dialogs:*

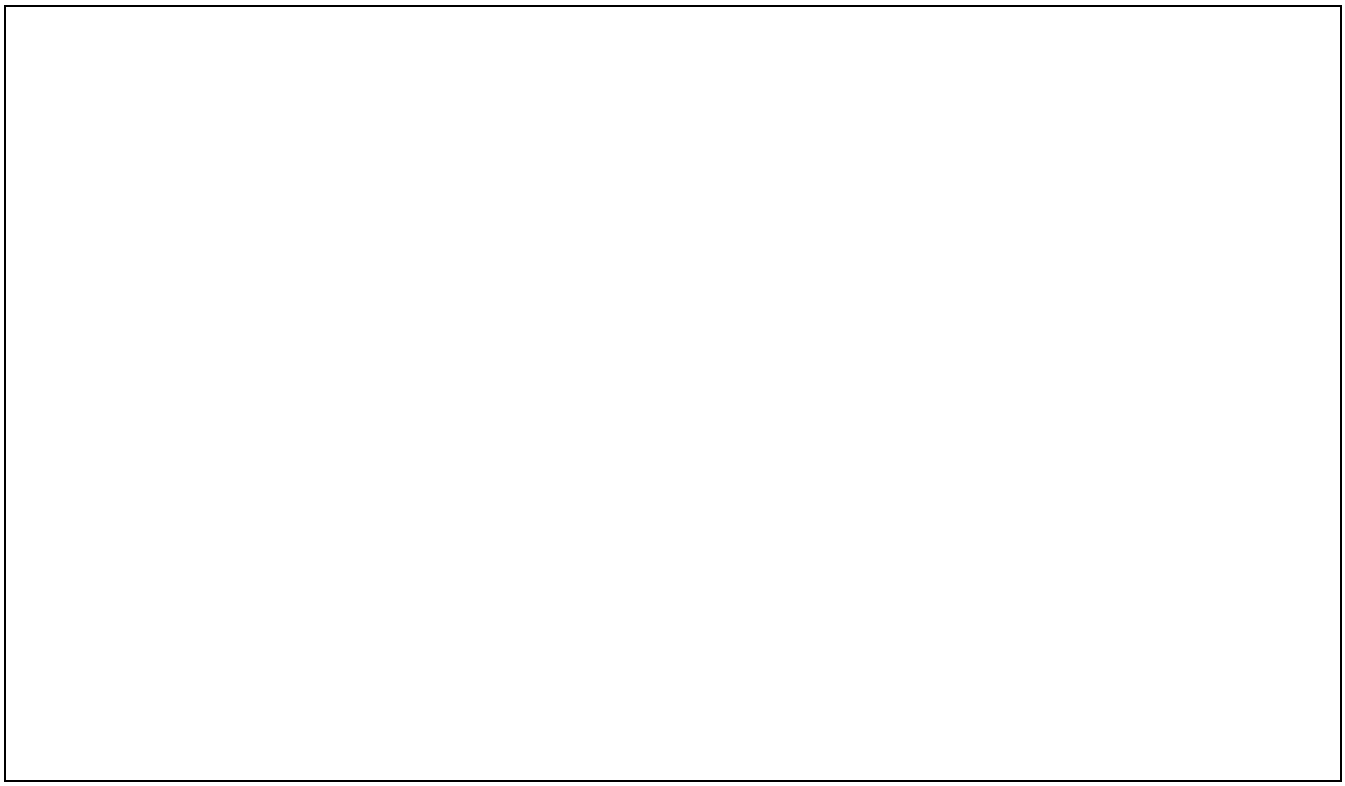
**Modify Cooling Setup:**

Additionally to the cooling sections, cooling start and end timing can be modified (in seconds related to strip in mill F2).



# 2.3 Material Tracking

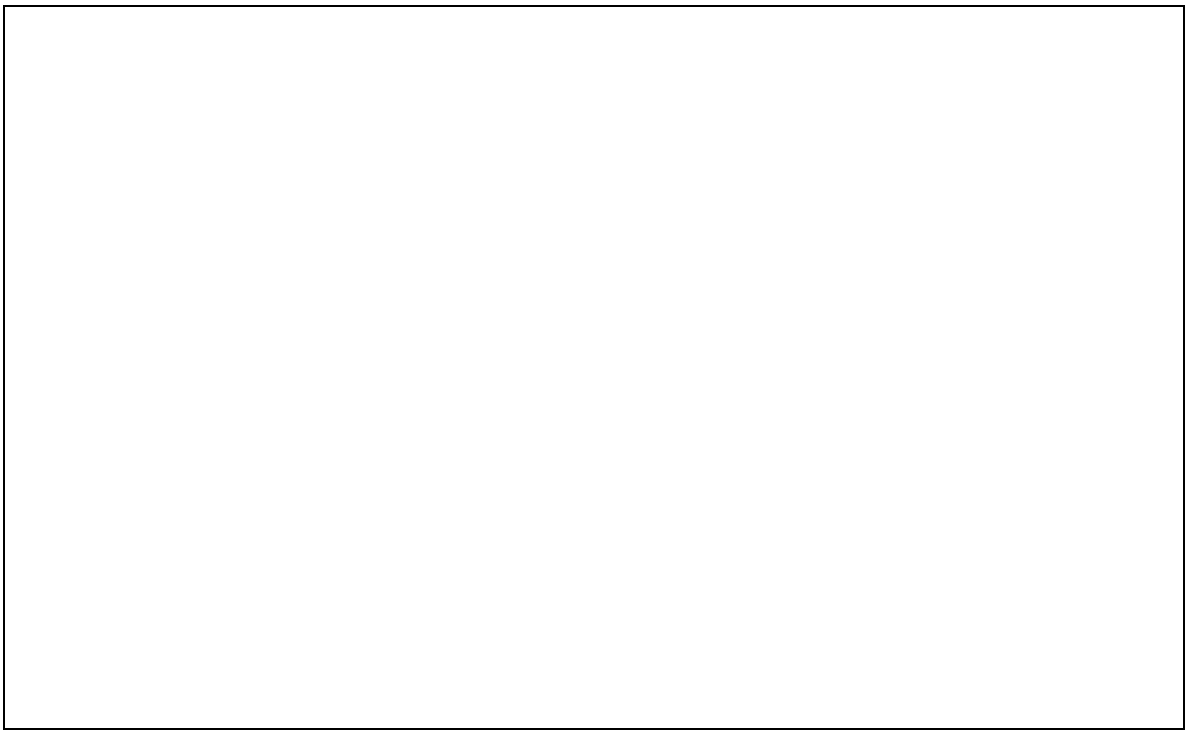
## 2.3.1 Material Tracking Overview



*Dialogs:*

**Enter Coil Weight / Confirm Coil:**

This dialog is used by the *Weighing and Banding Operator* to confirm or enter weight, disposition and defect code for a produced coil.



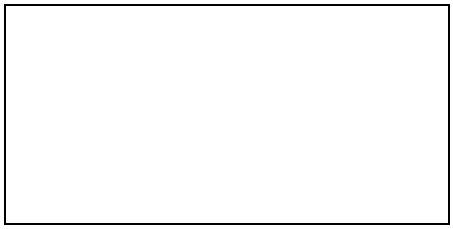
The display pops up with the data for the oldest coil within the weighing and banding queue (max. 5 coils).
*Disposition* and *Defect Codes* can be entered diretly or by a single click on the corresponding line in the shown lists.
When button Confirm is pushed, the production result data are sent to the Level 3 system and the coil is removed from HSM Level 2.

Confirming a coil should be done as soon as weighing data are available.
**Dont let the queue run full !**
Should 5 coils already be waiting for confirmation and the next coil comes from

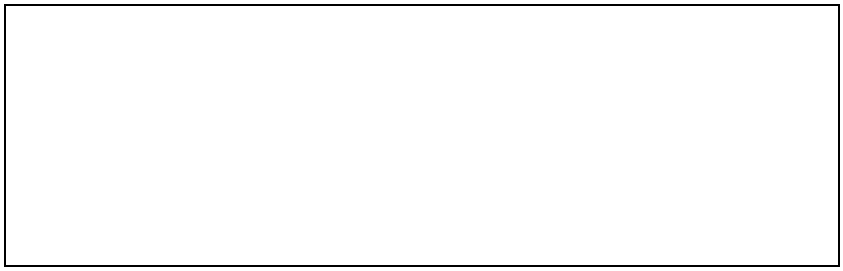
down coiler, the system automatically removes the oldest coil and sends it to Level 3.

**Delete Slab:**

Similar to the *Confirm Coil Dialog* a certain slab is reported to Level 3 and removed from the system.
This dialog is used for taking a slab out of actual production (cobble, runback).
Pushing the button *Delete Slab*, the ID of the trouble maker has to be entered.



If the slab ID is invalid or not existing, following box appears



Further dialog is same as shown at *Confirm Coil*.

*Button Area:*

Close displayTracking Overview

Open display *Roll Inventory* (see page 5)

Open display *Primary Data* (see page 3)

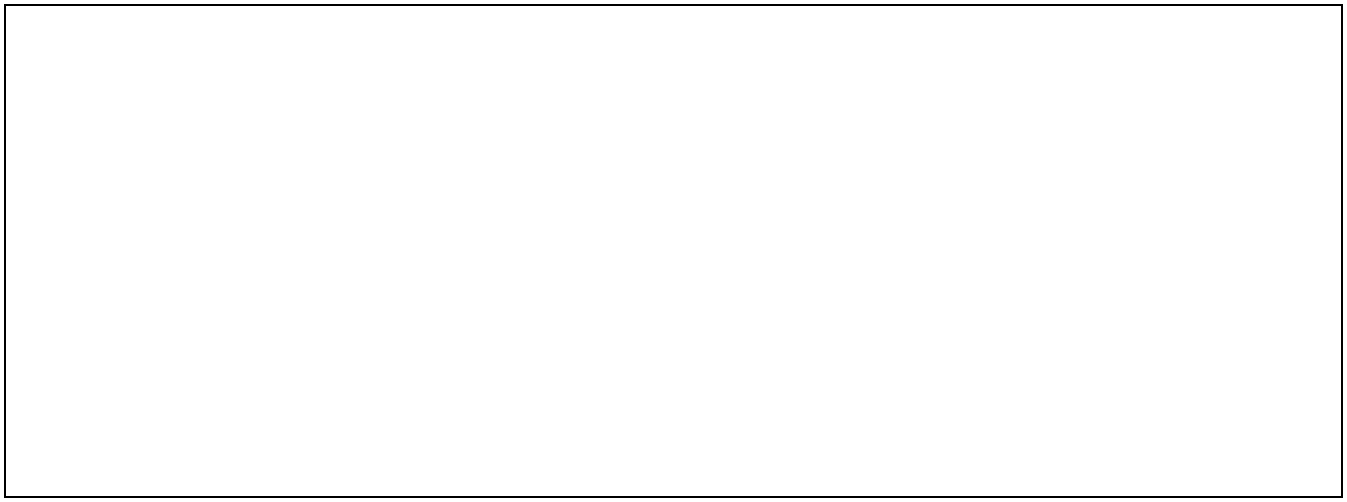
Open display *Setup Data RM* (see page 56)

Open display *Setup Data FM* (see page 60)

Open display *Setup Data Cooling* (see page 76)

### 2.3.2 Furnace Map

*Display Layout:*



First slab in list (top) is next to be discharged.

**Slab dimensions** (length, width and thickness) are the **dimensions at discharging temperature** (hot values).

**Target strip dimensions** (width and thickness) are the **dimensions at room temperature** (cold values).

The Furnace Map should give an overview about the next coming slabs and the actual temperatures. It displays whatever the Reheat Furnace computer sends (cyclically every 30 seconds). There is no active tracking behind.

*Dialogs:*

**Furnace Map Request:**

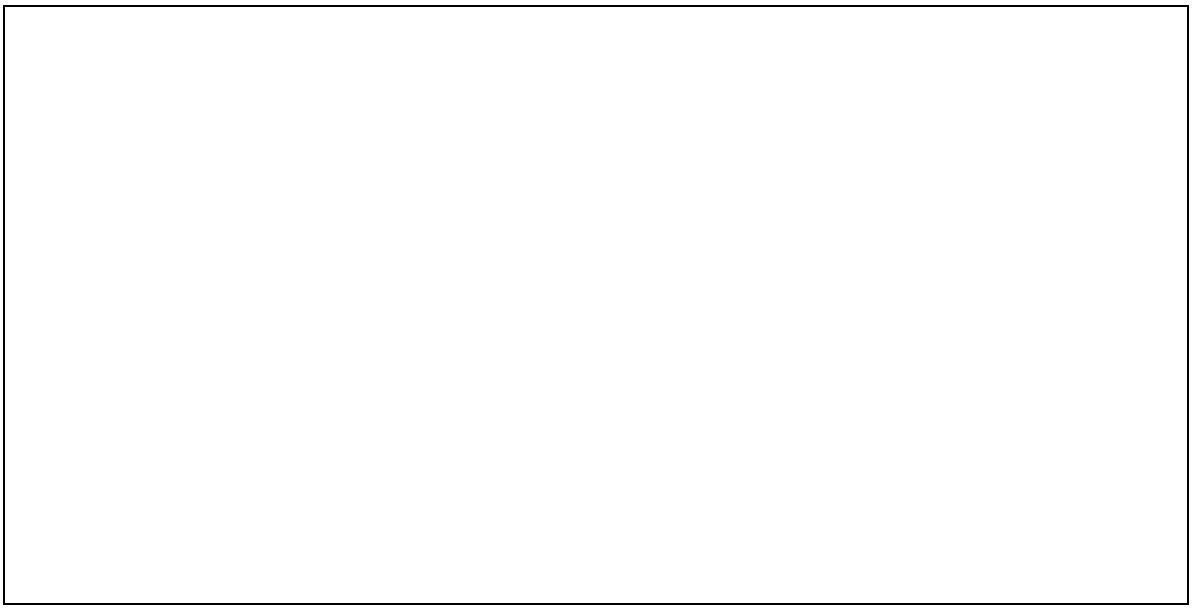
Requests the actual Furnace Map from the Reheat Furnace Level 2 computer.
Since the Furnace computer sends the map every 30 seconds, this function is practically not needed.

## 2.4 Actual Production Data

### 2.4.1 Primary Edger Area

This display shows actual Furnace and Primary Edger data.

*Display Layout:*



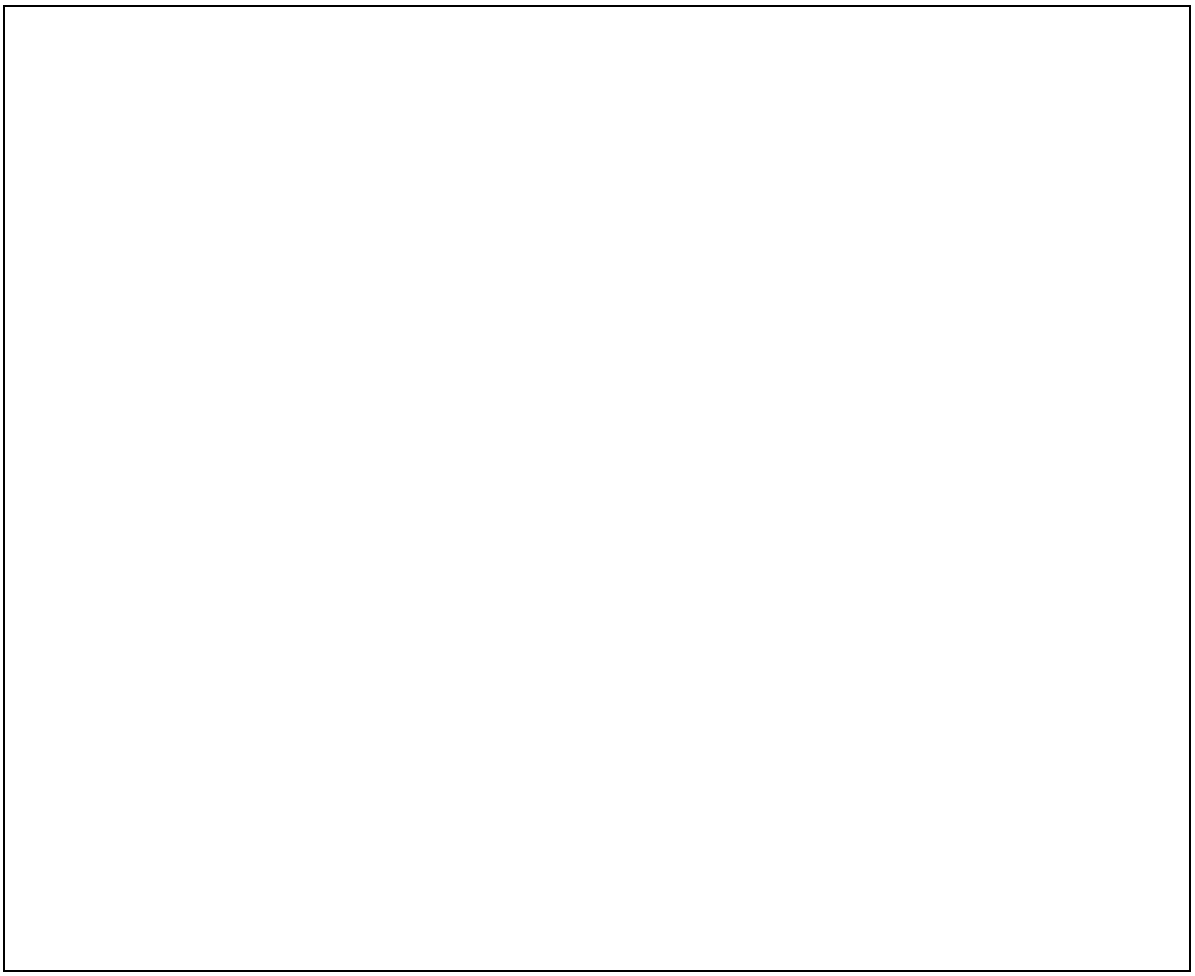
*Dialogs:*

None

### 2.4.2 Roughing Mill Area

This display shows actual data for the Roughing Mill.

*Display Layout:*



*Dialogs:*

None

### 2.4.3 Finishing Mill Area

This display shows actual data for the Finishing Mill and strip cooling line.

*Display Layout:*

*Dialogs:*

None

# 3. Revision and Document Distribution List

**REVISION LIST**

| Date | Version | Author | Description |
|---|---|---|---|
| 94-Dec-05 | V1.0 | F.Dvo. | first draft |
| 95-Jan-30 | V1.1 | F.Dvo. | final version |
| 95-Dec-30 | V1.2 | F.Dvo. | revision |
| 96-Feb-28 | as built | F.Dvo. | as built |
| | | | |

**DISTRIBUTION LIST**

| Version | Receiver |
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| as built | ARMCO |
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