



EUMUCO HYDRAULIC PRESS

OPERATOR MANUAL

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1 Introduction

1.1 Purpose of this Document

The Main objective of this document is to outline the detailed functionality of the Control system Upgradation of the EUMUCO Hydraulic Press machine and gives basic guidelines to operate the machine. Hardware updated from relay logic to Siemens S7 PLC.

RAM movement in auto cycle is controlled by existing Relay logic. The purpose of the upgraded control system is to control the

1.2 General

1.2.1 Abbreviations

- HMI-Human Machine Interface
- PLC -Programmable Logic controller
- PS- Pressure Setpoint
- LUB- Lubrication

1.2.2 References

- EUMUCO Hydraulic press relay logic electrical diagram
- FDS of EUMUCO Hydraulic press Machine

1.2.3 Precondition:

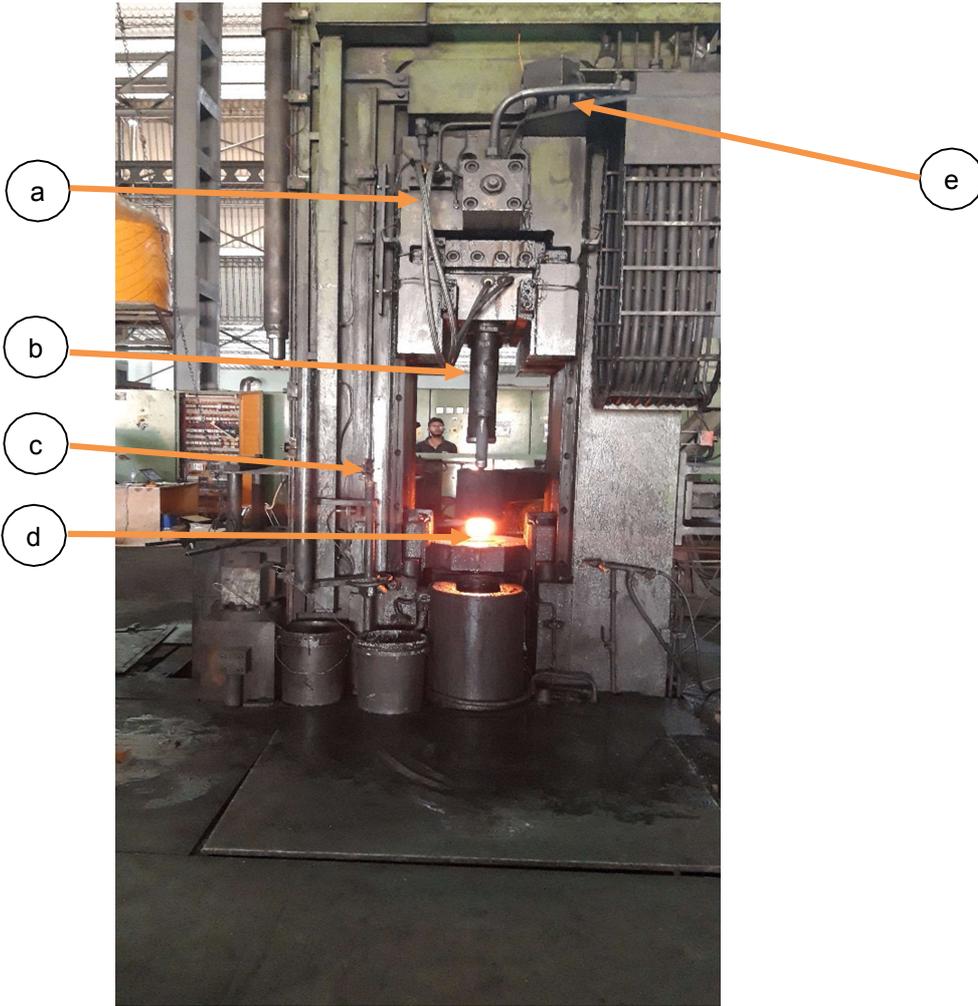
It's necessary to Turn on the "Press in Auto" selector switch whenever the press is running. Also, Operator has to turn on the "Lub Auto On" selector switch whenever lubrication auto function is needed,

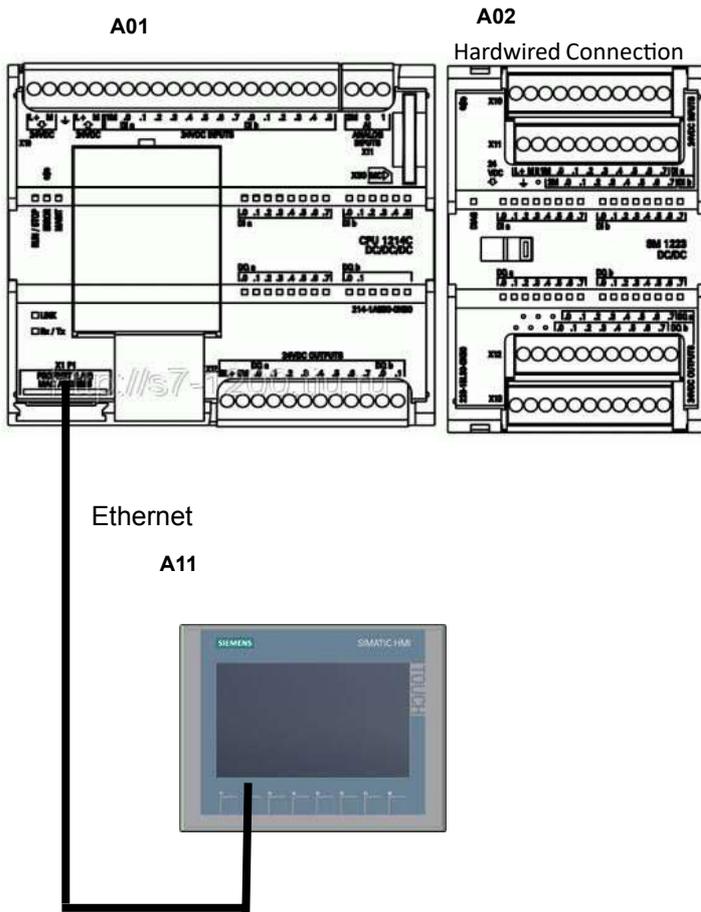
1.3 Description of machine

The Hydraulic press consist of RAM, Lubrication unit, Descaling unit and etc.

The concern part of the system is showed in the image below, and the parts are named as follow:

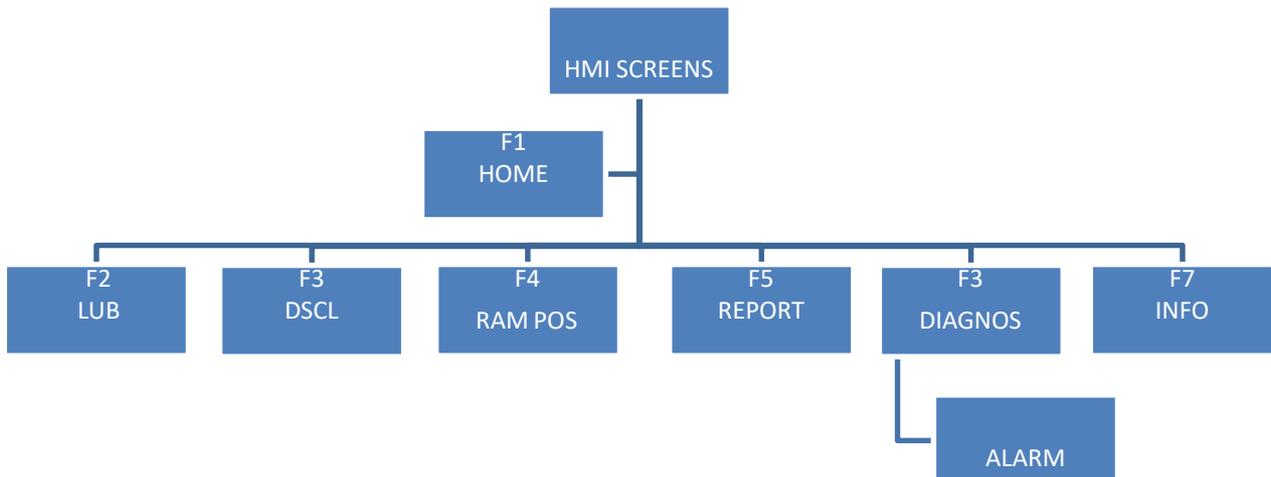
S.NO	CONTENTS	COMMENTS
a	RAM Mount	Complete RAM arrangement with Punches
b	Punch X	Position of Punch 1, 2, 3
c	Punch Area	Punch 2, 3 travel limit position
d	Billet	Billet holding area
e	Position encoder	Wire draw encoder to identify the RAM position





2 HMI

2.1 HMI HIERARCHY



2.2 USER ADMINISTRATION

Single levels of user are used

- Engineer

Admin users has an entire authority to access the screens on the HMI.

Screens Authority	HOM E	MANUA L	PATTERN	REPORT	ALAR M	SETTINGS	INF O
Admin	Yes	Yes	Yes	Yes	Yes	Yes	Yes

List of default users with their username and password available here,

1. Engineer - xxx User name: xxxxxx, Password: xxxxxx

2.3 EUMUCO Hydraulic Operation Control

Entire process consists of three level of operation, named as follow,

- RAM punching process control
- Descaling motor control
- Lubrication process control

2.3.1 RAM Punching Process Control:

To handle the Ram punching process, "RAM_POS" HMI screen is used to feed all the control parameters, RAM auto cycle process is controlled by existing Relay logic. The PLC controller with operator interface (HMI) is used to monitor the RAM position and pressure to stop at the setpoint to avoid collision with billet. This ram movement can be monitored by plc and can identify the position reference to the feeded limit setpoints by the operator.

- RAM travelled length in "mm"- In forward
- Hydraulic oil pressure in "Bar" –In forward

2.3.2 RAM Punching Process Control:

To handle the Descaling motor process, "DSCL" HMI screen is used to feed all the control parameters.

2.3.3 Lubrication Process Control:

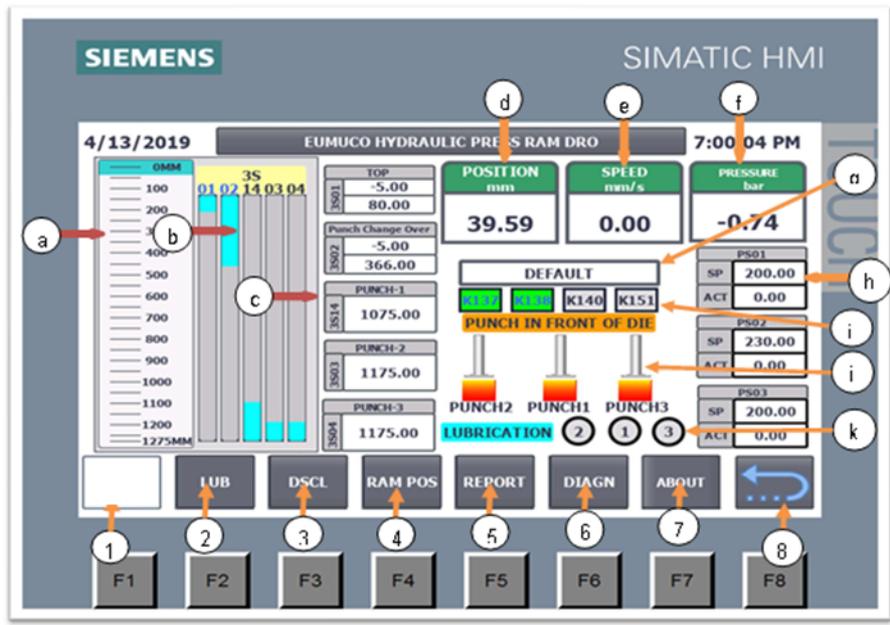
To handle the Descaling motor process, "LUB" HMI screen is used to feed all the control parameters, Lubrication is used to apply cooling medium over the Ram punch (DIE), it will be done on the begging of every punch (only in forward),

Three solenoid outputs are used to do this function. Whenever the Operator parameterized, condition satisfied the output will turn ON,

3 SCREENS

HMI Screens and the descriptions are detailed in this section.

3.1.1 Home Screen:



Functions of Buttons as per the user privilege:

S.NO	CONTENTS	COMMENTS
1-F1	HOME	Display's home screen
2-F2	LUBRICATION	Lubrication process control screen
3-F3	DESCALING	De-selector process control screen
4-F4	RAM POSITION	RAM Position control screen
5-F5	REPORT	Product Count and Machine information's
6-F6	DIAGNOSTIC	HMI system information's, Alarm
7-F7	ABOUT	Project information Screen
8-F8	BACK	Returns back to last Page

HMI Navigation details:

S.N O	CONTENTS	COMMENTS
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a	RAM movement in mm	Dynamic scale to identify ram position graphically
b	Punch Active Setpoints	Dynamic scale showing the active setpoint limits for the respective punches
c	Punch Active Setpoints	Dynamic I/O fields, to show the setpoints feeded for punch limits
d	RAM Position in mm	Analog value field to show the RAM position in mm during movement
e	RAM movement Speed	Analog value field to show the RAM movement rate in mm per Second
f	RAM Hydraulic pressure	Analog Value field to show the Hydraulic pressure
g	Active Recipe	Text field to show the name of Active Recipe for punch Limits
h	Pressure Active Setpoints	Dynamic I/O fields to show the setpoints and actual values of three level punch
i	Active Contactor	Dynamic Text field to represent the active contactor on individual punching
j	Active Punch	Static Graphical symbol to represent the active Punch in position
k	Active Lubrication Output	Static Graphical symbol to represent the active lubrication solenoid during punching

The Home screen is used for only monitoring the RAM Movement control parameters. It consists of Block icons, output field to show the setpoint, actual values of RAM functions during punching,

3.1.2 Lubrication Process Control Screen:

Purpose of the Screen:

Operator can use this screen to enter, control and monitoring the lubrication solenoid ON/OFF process, lubrication output solenoid 01, 02, 03 can be turned ON in two modes, these are AUTO/MANUAL mode, Manual mode control can be done by using the Selector Switches (SS) available on the operator panel, Named as: Lub1 Manual SS, Lub2 Manual SS, Lub3 Manual SS

Precondition for manual control would be the Mode selector switch (SS) should be in manual.

For Auto mode operation,

Step 1: The Mode selector switch should be in "Auto" mode,

Step 2: Lub 1, Lub 2, Lub 3 any of those required output will be turned on using on/Off button,

Step 3: Operator will get an input field after enabling the "Lub X" button applicable for individual lubrications

Step 4: The start, end setpoint in mm to enable the lubrications corresponding to the Ram movement will be feeded in it

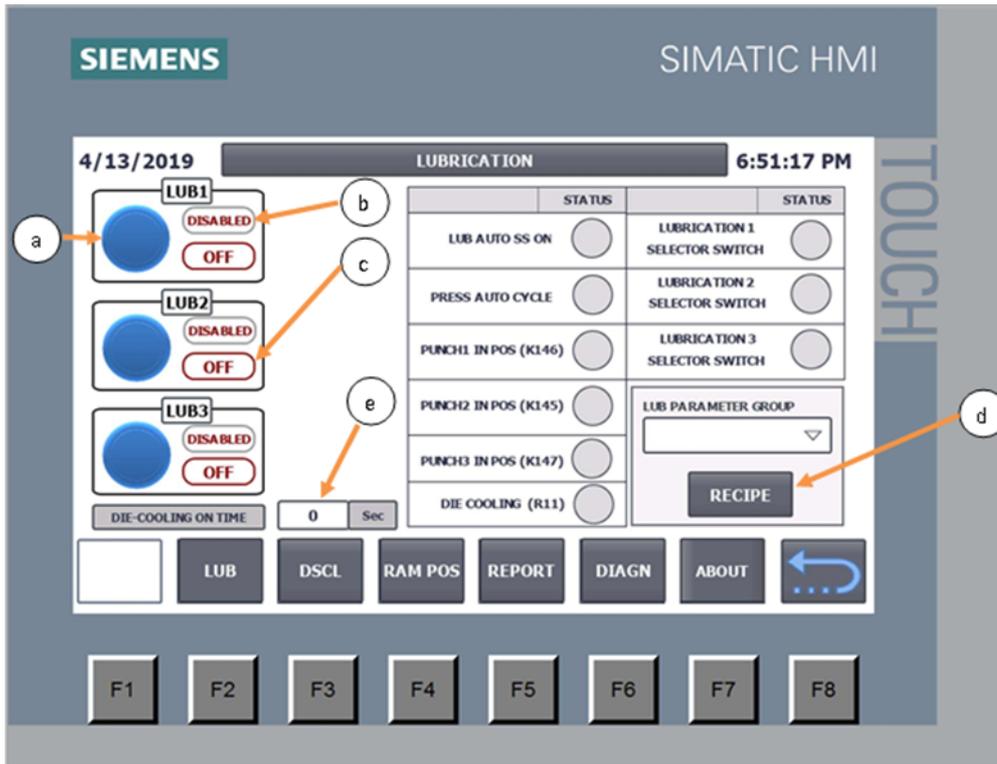
Step 5: Initially Operator will choose the parameter set form the **Recipe manager**, can be accessed by the button named as "Recipe" on the screen

Step 6: It will open a Recipe manager, where the operator can manage parameter group. Necessary group will be select and download to the PLC

Step 7: once a parameter group is downloaded to the PLC then it will appear in the lubrication

screen I/O fields.

Step 8: if operator want to overwrite those values can be done on the I/O field directly



Process description:

In Auto mode, Whenever the Ram movement reaches the parameterized limit, the respective lubrication will get turn ON during only forward movement. If operator want to disable any of lubrication during auto mode can be done by accessing respective Lub buttons, The status of lubrication button and its output showed on the screen,

Die-Cooling on Time:

Die cooling is used when the K141 contactor turned on, after completing the three punches ejector liver will push out the job, during that time lubrication will be applied over it. So, to do this the I/O field on the screen to provide the lubrication ON time after K141 become active is used,

HMI Navigation details:

- Lubrication Enable/Disable Button
- Status field for corresponding lubrication button Enabled/Disabled
- Status field to represent the corresponding lubrication output ON/OFF
- Recipe manager screen selection button
- I/O field for Holding the on time of die cooling output

4/13/2019 a LUBRICATION 6:52:52 PM

LUB1 ENABLED
OFF

LUB2 ENABLED
OFF

LUB3 ENABLED
OFF

DIE-COOLING ON TIME: 0 Sec

Lubrication 01
cam sp: 0.00

Lubrication 02
cam sp: 0.00

Lubrication 03
cam sp: 0.00

	STATUS		STATUS
LUB AUTO SS ON	<input type="radio"/>	LUBRICATION 1 SELECTOR SWITCH	<input type="radio"/>
PRESS AUTO CYCLE	<input type="radio"/>	LUBRICATION 2 SELECTOR SWITCH	<input type="radio"/>
PUNCH1 IN POS (K146)	<input type="radio"/>	LUBRICATION 3 SELECTOR SWITCH	<input type="radio"/>
PUNCH2 IN POS (K145)	<input type="radio"/>	LUB PARAMETER GROUP <input type="text"/>	
PUNCH3 IN POS (K147)	<input type="radio"/>		
DIE COOLING (R11)	<input type="radio"/>	RECIPE	

LUB DSCL RAM POS REPORT DIAGN ABOUT ↶

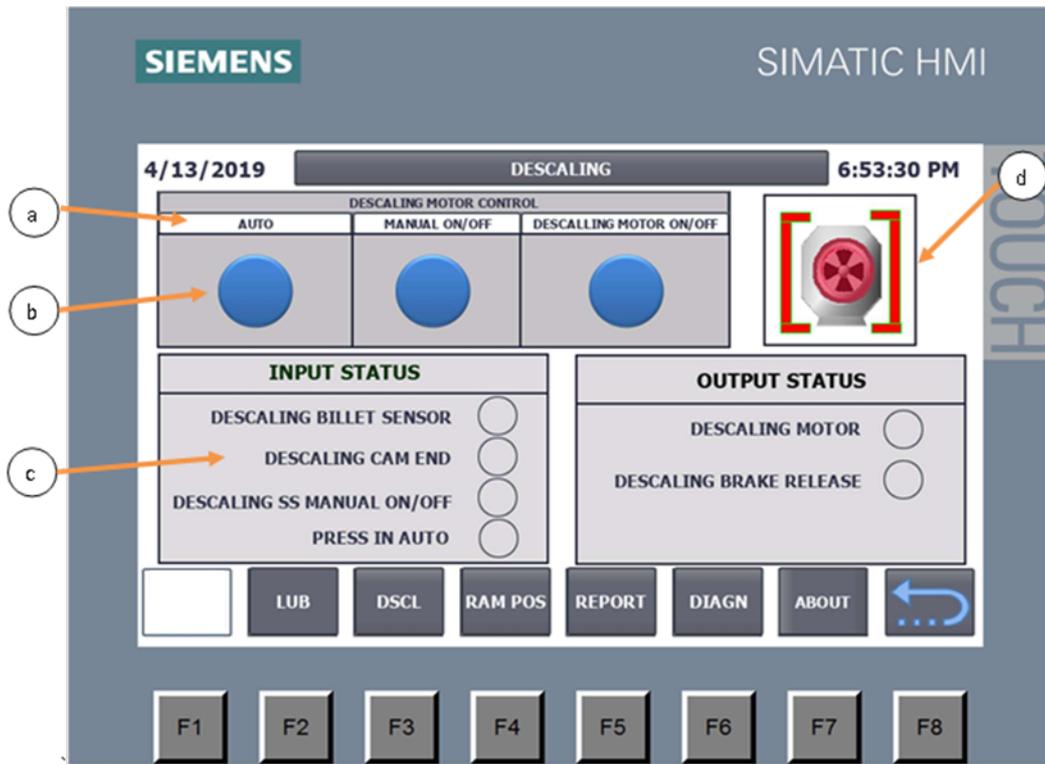
F1 F2 F3 F4 F5 F6 F7 F8

TOUCH

HMI Navigation details:

- Active lubrication 01 setpoint (Limit to start and end)
- Active lubrication 02 setpoint (Limit to start and end)
- Active lubrication 03 setpoint (Limit to start and end)

3.1.3 Descaling Process Control Screen:



What is Descaling:

A motor connected with rotary wheel is used to resize the billet. That motor control can be done using this screen, it has two modes of operation: Auto/ Manual Mode.

Steps in Auto mode:

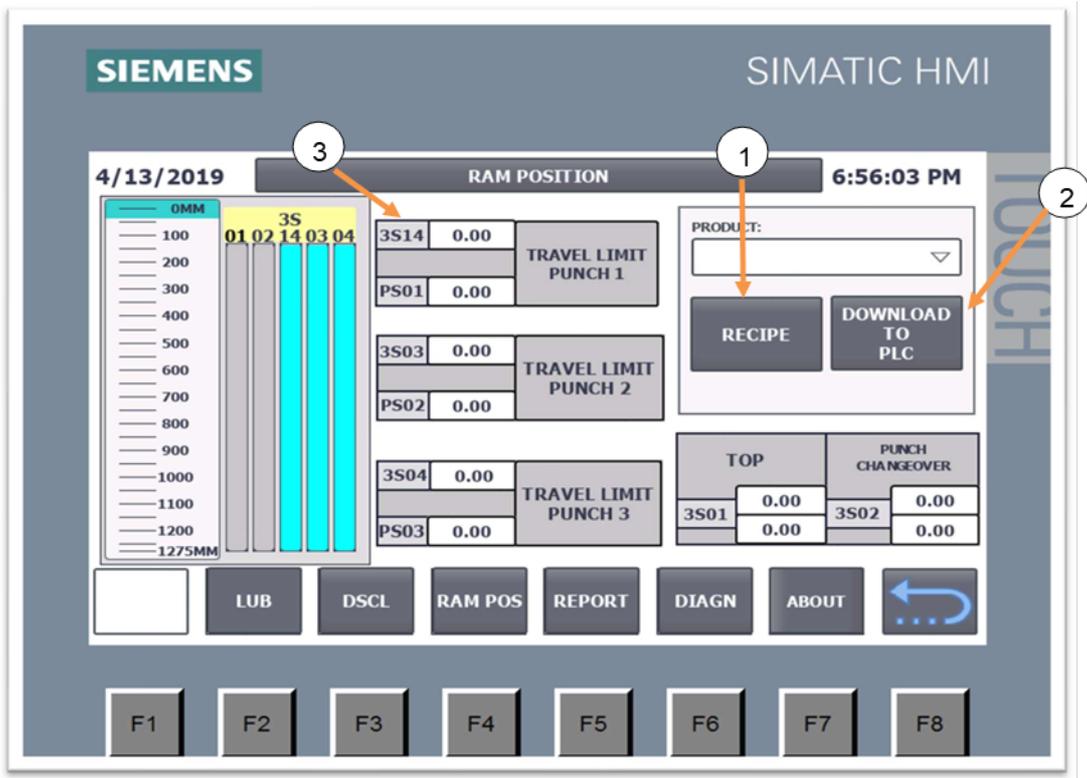
Step 1: Operator will enable the Auto mode button; it can be confirmed by green indication on the text field.

Step 2: In auto mode, if Billet inlet sensor input detected by the PLC it will turn on the Break release coil and motor, Step 3: Motor will continue to run until the cam end sensor input detected, or if “auto” input disabled.

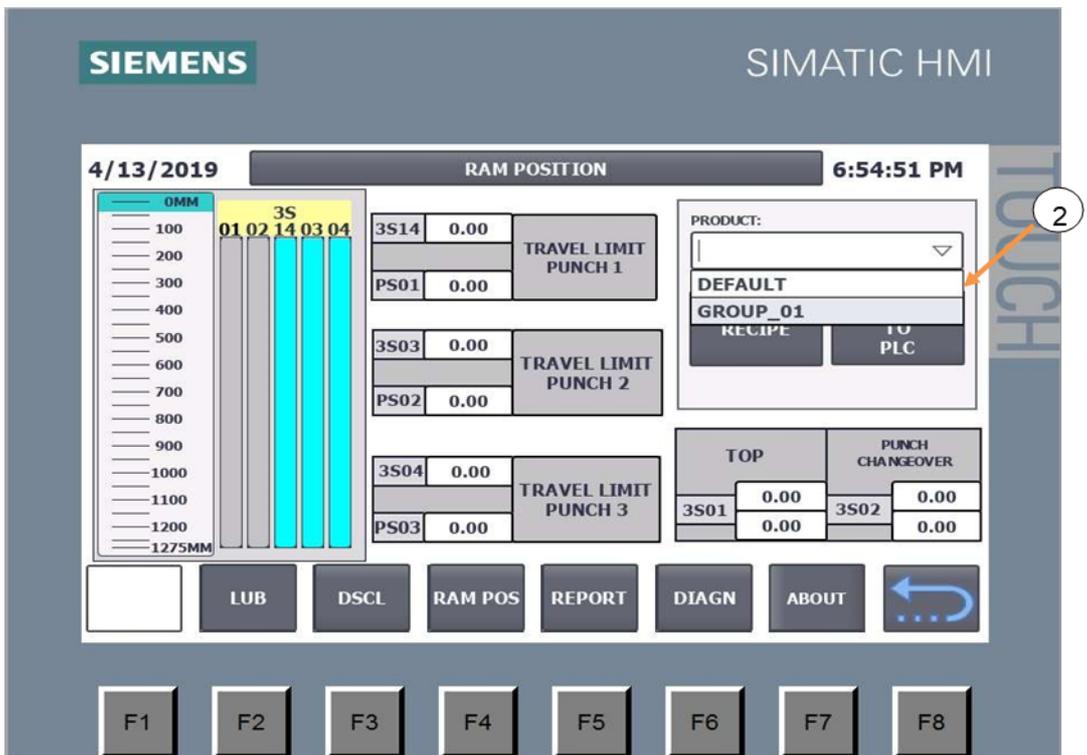
Steps in Manual Mode:

Step 1: Operator has to enable the Manual On/Off Buttons, then, motor operation can be turned on and off using Descaling motor on/Off button,

3.1.4 RAM Position Management Screen:



Picture: RAM_Pos_0



Process:

The RAM travel having five level of positions namely top, punch changeover, Punch 01, punch 02, Punch 03 positions, each level of position can be identified using the analog wire draw encoder mounted with RAM, operator will have start and end limit for top positions, Also for Punch change over limit. Remaining position will only have start limit, the end limit will be a fixed value. During operation whenever the RAM reaches the limits provided by the operator PLC will trigger cut of cycle signal to the existing relay logic according to the identified position.

Procedure:

Step 1: Initially The I/O field will have either old values or zero. To load the parameters operator will access the **Recipe button** since the parameters are managed by recipe,

Step 2: he can create multiple parameter group with different names, then he **can save it**,

Step 3: loading any of the parameter group into active parameter set can be done by choosing the available **recipe drop down list** and press-> "**Download to PLC**" function,

Step 4: Picture RAM_Pos_0 shows initial state of the screen, same time RAM_Pos_1 shows the available recipe list. Operator can choose it and must press "download to PLC" button,

Step 5: If operator want to do further changes directly on the I/O field, He can do it and at the end he must press-> **download to PLC button**,

PS01, PS02, PS03 inputs are the pressure setpoints of Punch 01, 02, 03.

Functions:

Top: Whenever the RAM position analog input value within the setpoint provided in "top" start and end limit, active region of RAM will be considered as TOP position,

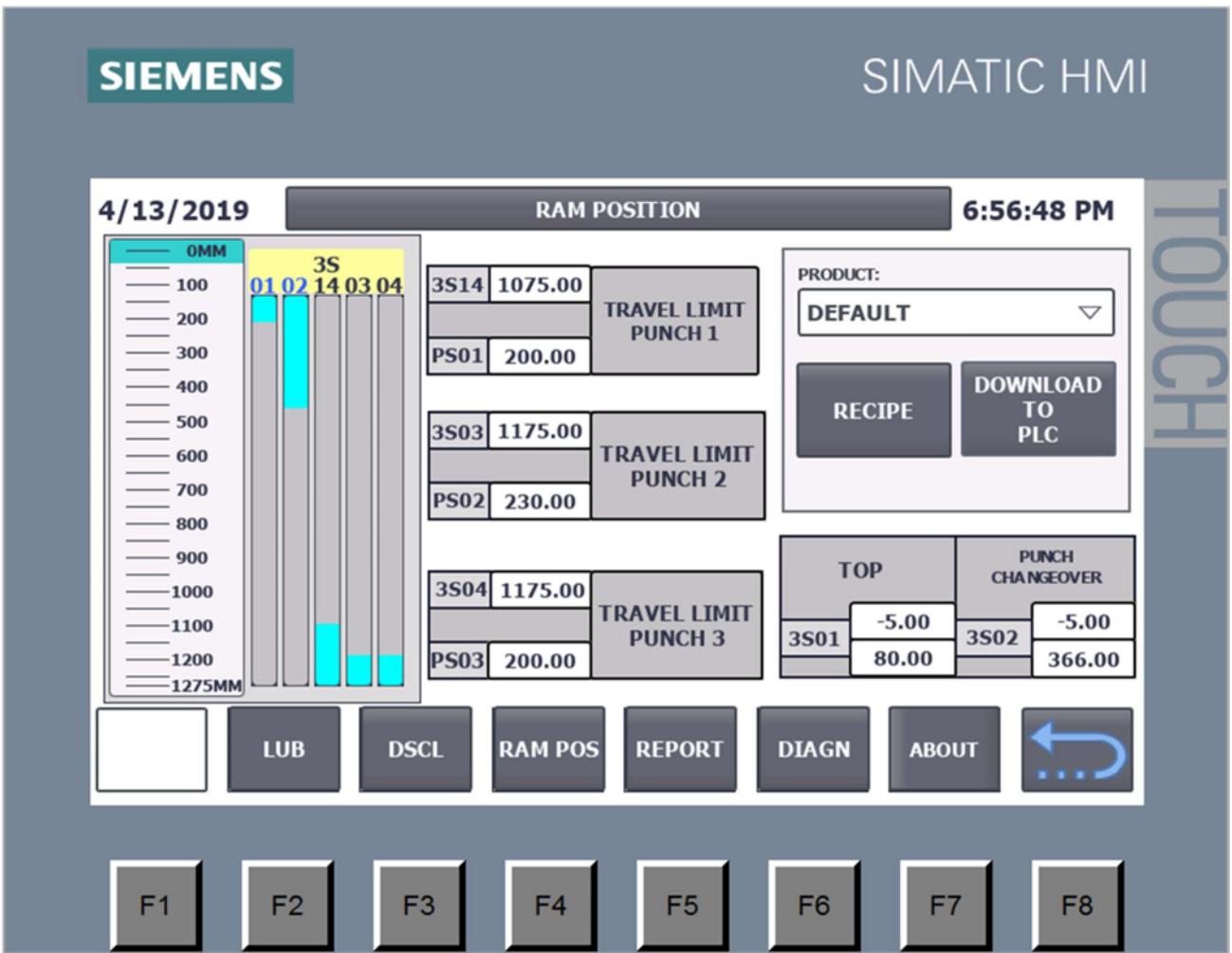
Punch Change Over: Whenever the RAM position analog input value within the setpoint provided in Punch change over start and end limit, active region of RAM will be considered as Punch change over position,

During the beginning of auto cycle, The RAM should cover the TOP and Punch change over position. Otherwise, it will not start the process,

Punch 01: It will have two criteria, either ram position in mm or Pressure setpoint. During the RAM operation which ever satisfy the condition first will generate the cut off output signal to the existing relay logic, I/O field 3S14, PS01 is used for this process,

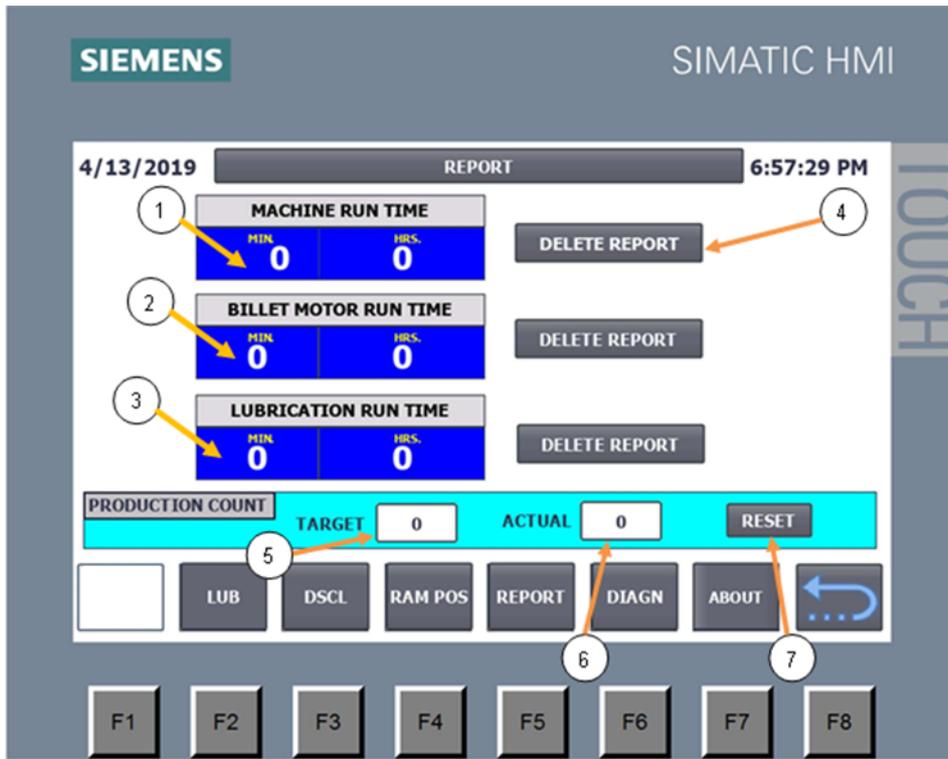
Punch 02: I/O field 3S03, PS02 is used to provide setpoint for this process, if ram position input reaching the setpoint will enable the Cut off contactor signal, otherwise if provided pressure reaching the setpoint that will enable the Cut off contactor signal. But, cut off signal can only be triggered in Ram forward movement,

Punch 03: I/O field 3S04, PS03 is used to provide setpoint for this process, remaining process is same as punch 01, 02 steps.



Picture RAM_Pos_2 shows as the complete view of RAM_POS screen with all the parameters,

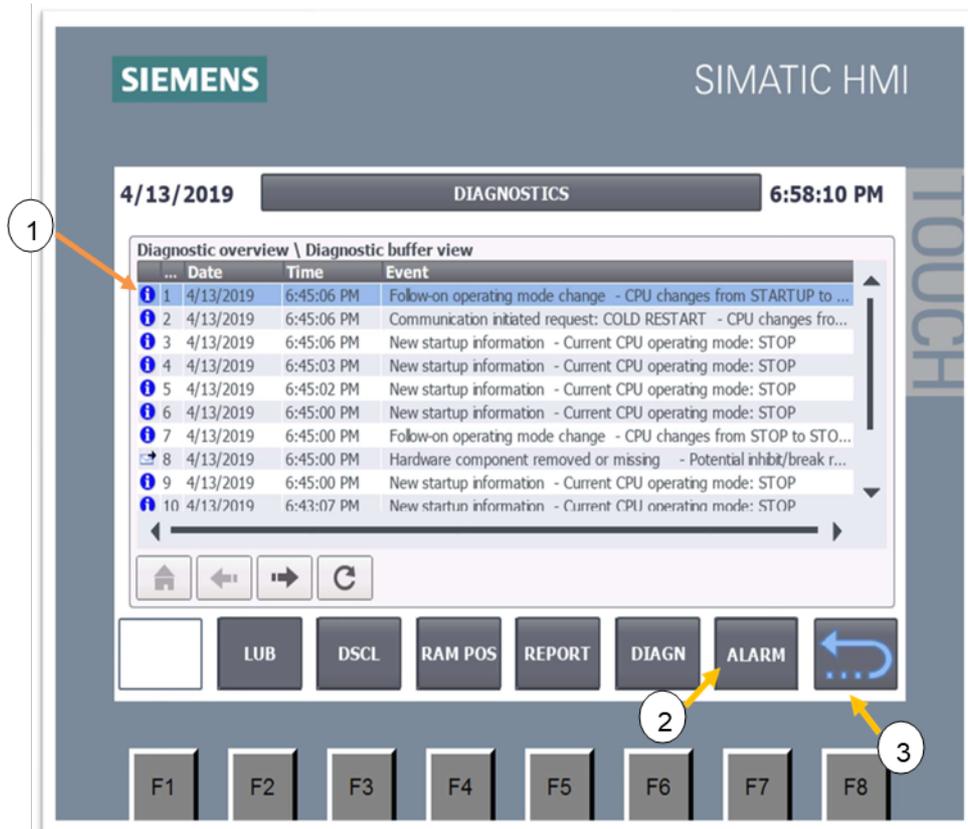
3.1.5 Report Sections Screen:



Description of screen navigations:

S.N O	CONTENTS	COMMENTS
1	Machine Run Time	It shows the machine overall runtime
2	Billet motor Run time	It shows the Descaling motor overall runtime
3	Lubrication Run time	Lubrication solenoid output ON time
4	Delete report	Operator button to delete the reports
5	Target	To feed the required Billet to be produced
6	Actual	It shows the Number of billets produced
7	Reset	Button to reset the entire product count

3.1.6 Diagnostics Screen:

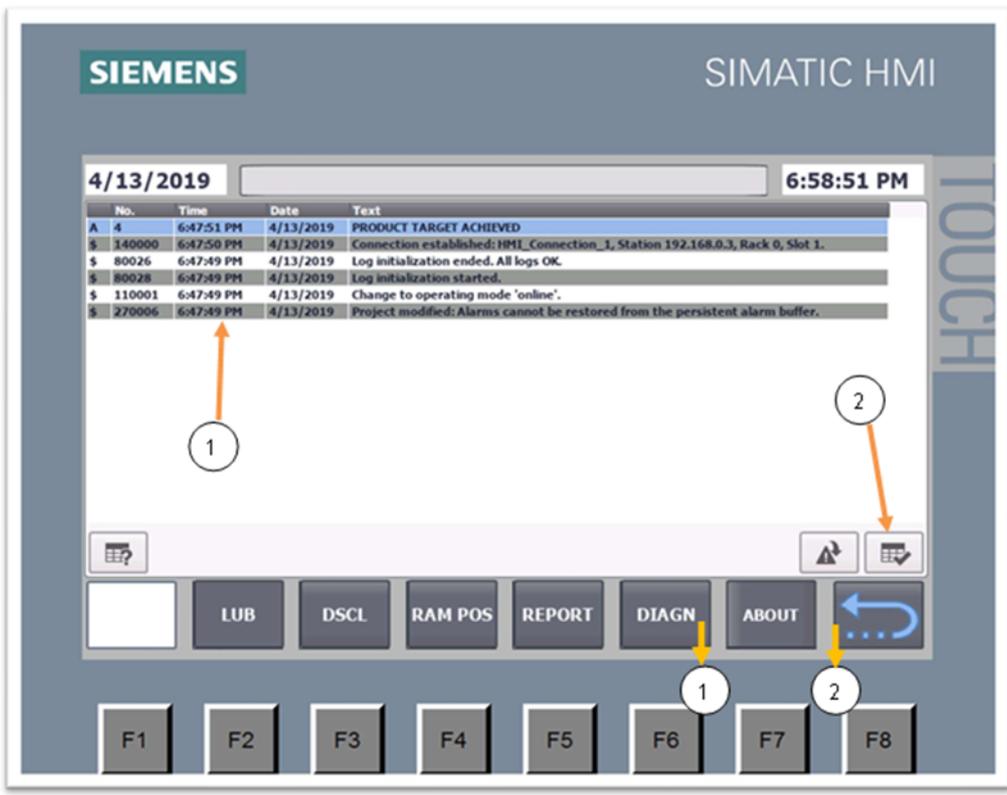


Description of screen

S.NO	CONTENTS	COMMENTS
1	Diagnostic Buffer view	Shows the system diagnostics logs
2	Alarm window button	It can show the Active alarm list
3	Previous screen Button	Common button for all the screens to go back to the previous screen

Diagnostic screen can show us the CPU, HMI hardware details, active status, error, communication failure etc., Also an alarm button is used to look at the active alarm list.

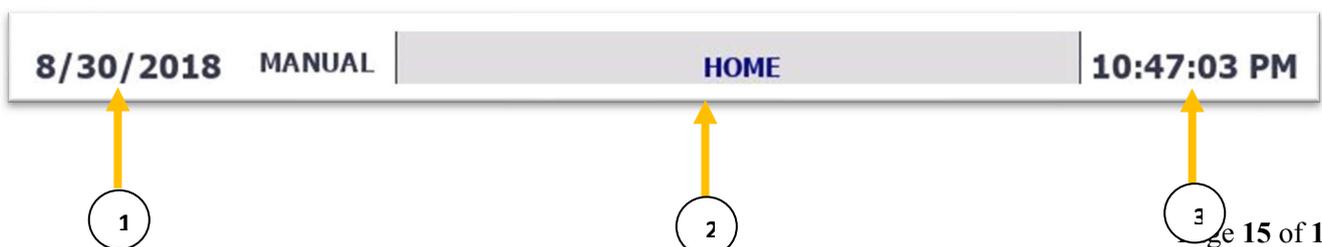
3.1.7 Alarm Log Screen:



3.1.8: Description of screen navigations:

S.N O	CONTENTS	COMMENTS
1	Active Alarm List	Picture shows the Active alarm list window,
2	Acknowledge Alarm	Operator can acknowledge the alarm using this button

3.1.8 Top toolbar:



Description:

1. - This field displays the Date. This toolbar will display on all the screens on the HMI.
2. - This field displays the title of screen.
3. - This field displays the time. This toolbar also displays on all the screens.