

Main Parts of Belling Machine				Main parts of belling machine.		
Ref. COMPONENT DESCRIPTION						
		A- Pipe transferring unit		Control pa	anel cabinet (D)	
A1	Conveyor channel	Facilitates the forward movement	of pipes that arrive	Lifting equipment		
		from the upstream* machine.		Litting equipment v	VIUT HOOK (F) ·····	
A 2	Pipe transferring bench	It receives the pipe from the extrus	sion line, transfers	Channel (Ad)		
		it to the work stations and unloads	it at the end of	Channel (A1)		
	Dine have aff daviag	the work cycle.	and in a line and	Infrared oven (B2)		
A 3	Pipe naui-on device	stops it in the transferring position	eeding line and			
		B. Dine heating unit		Pipe haul-off device (A3)		
B 1	Pine rolling mould	It rotates the nine in the oven to e	nsure uniform			
	. ipe roung in ourie	heating.		Pipe rolling mould (B1)		
B 2	Infrared oven	It heats the end of the pipe to be n	noulded			
		C- Socket moulding unit		- / / ×		
C 1	Pipe clam p	it blocks the pipe during the mould	ing phase.			
C 2	Moulding devices	They mould sockets and comprise:	<u>-</u>			
		<ul> <li><u>Carriage</u>: it supports the bell</li> </ul>	ing fittings.			
<b> </b>		- <u>Mandrel</u> : it is introduced ins	ide the pipe and		Main control nanel (E)	
		bells the socket. It can be dif	ferent types and		i Main control panel (E)	
		- Mandrel supporting flange: i	it supports and			
		guides the mandrel during b	elling operations.	Pipe transferring bench		
		<ul> <li>E.P. cham ber*: a container of</li> </ul>	rany closed area		E:R: chamber Carriage	
		where the socket isformed u	sing E.P.			
D	Controlpanelcabinet	Houses the control panels for the c	oil-hydraulic,			
		water, and pneumatic systems.				
E	Main control panel	It contains the electrical power cor	nponents of the			
_		machine.		- X.		
F	Lifting equipment with	It makes format change operations	seasier in the	P	pe clamp (C1)	
	nook	bening unit and in the oven unit.		Belling		
<b>N</b> IS	indrei metallic mould	It is introduced inside the pipe and		Dennig	Mandrel Flange	
	bells the socket. It can be d	ifferent types and sizes.	Types of FORMING PROC	ESSES:- Pressurized air&cooling by water		
	and the second se	Sagmant	"Solvent cement socket mand	drel" Cycle: 🔥 📕 🗼 📕 🛦 📕 🛦	الدورة التشغيلية OPERATIVE CYCLE	
		Segment	بالة يكون عن طريق وضع مادة لاصقة والدس عن	تدبيع ليرايد في هذه لد	* *	
	· ////	11 million	the set of	mont socket	Family and set in such	
		K		ement sucket	Forming preparation cycle	
			formingprocess entails th	ne use of a Pipe Mandrelmould		
			metalmandrel. The sock	et is formed	"Solvent cement "TM inserts in" for- "TM inserts out"	
			correctlydue to the pressu	rized air acting	mandrel" ming cycle forming cycle	
			outsideof the socket an	nd cooling by	خاص بالماكينة التي نعن	
			waterenrinklare		بصنددها	
		A MARKED AND A MARKED AND A DATE	watersprinklers.	· · · · · · · · · · · · · · · · · · ·	"TM inserts out" avalar	
			" I M Inserts In" cycle	B) - I I I I I I I I I I I I I I I I I I	مذا النوع هو الموجود في الماكينة حيث ان القالب	
10			The processused to form	n a socket with 🔰 💺 💆 📜	المعدني يدخل على الماسورة و الجروف	
			a applicat cost optaile unit		expanding segments) في حالة تمدد.	
			a yasket-seat entails using a metai		The process used to form a socket with	
			mandrel with expanding inserts. The		a gasket-seat entails using a metal	
	Mandrel with expanding seg	ments or (inserts)	inserts protrude from the	mandrel once	mandrel with expanding inserts. The	
1000		1 812 MI 102 MI	this has entered the nir	The socket	inserts protrude from the mandrel	
تخرج منه عن طريق حركة نصف دائرية ل(shaft) هذه القطاعات عندما تخرج تاخذ سَكَل مكان			this has entered the pipe. The source		before it enters the nine. The socket is	
الجوان(gasket) الى سوف يدّم تركيبه في الماسورة.			is formed correctly due to	o pressurized	formed correctly due to the pressurized	
J. Oil	- بتحداق الالماد و بدخل داخل الحز ع ا	in in Sur I (mandral) le us in	air acting out sideof the s	socket, and 🕴 🔺 🔹 👗 🔹	air acting outside of the packet and	
<u>ت مرجع مرام ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (</u>			cooling by waterenrinkler	c 7 7	an acting outside of the socket, and "TM inserts out"	
		تسخينه في الماسورة (أول الماسورة)	cooling by watersprinkler	a.	cooling by watersprinklers.	



ALL OUTPUT SOLENOIDS OF VALVES LI	ST:-		19 State19 M2.4 Stop lifter2-3 (M5-off)
No. Name Function	Address	PLC & LAD ASSIGNIVIENE TABLE: It includes	20 State20 M2.5 Beam 2 upward (extract Cyl. E & D) (Y3)
1 Y1 Coil Sol. Cyl. A	Q0.3	<b>1. Definition of each step in machine sequence in very</b>	21 State21 M2.6 Move lifter2-3 (M5.2) to backward up to zero position
2 Y2 Coil Sol. valve Blowing or cleaner	Q0.4	details and called in Assignment table as "state"	22 State22 M2.7 Stop lifter2-3 (M5.2-off) + beam 2 downward (Y6-off)
3 Y3 Coil Sol, Cvl, B & C-lifter 1	Q0.5	details and called in Assignment table as state .	23 State23 M3.0 Lowering rotary 2 extract Cyl. P (Y8)+run rotational
4 Y4 Coil Sol. Cyl. M- oven 1	Q0.6	2. Determine all conditions of each state and called in	24 State24 M3.1 Start delay time to extract Cyl. oven2 (TM7)
5 Y5 Coil Sol, Cvl. O-rotary 1	Q0.7	Assignment table as "transition"	25 State25 M3.2 Extract Cyl. N for oven 1 (Y7)
6 Y6 Coil Sol. Cvl. D & E-lifter 2	Q1.0	3 We give # for each state according to sequence then	26 State26 M3.3 Start heating timer (TM3)
7 Y7 Coil Sol. Cvl. N	Q1.1	sive # for each transition according to ite state	27 State27 M4.4 Retract oven2 (Y 7-off) + retract rotary 2 (Y8-off) +
8 Y8 Coil Sol. Cvl. P	Q1.2	give # for each transition according to its state.	stop rotational motor (M4-off)
9 Y9 Coil Sol. Cvl. H	Q1.3	4. Use these states & these transition as mark in PLC.	29 State29 M4.6 Stop lifter2-3 (M5.0ff)
10 Y10 Coil Sol Cvl I	014	CTATES IN ASSIGNMENT TADLE WITH ADDDESS.	30 State30 M4.7 beam 3 upward (extract Cyl. G & F) (Y11)
11 Y11 Coil Sol Cyl F&G	015	STATES IN ASSIGNMENT TABLE WITH ADDRESS.	31 State31 M5.0 Move lifter2-3(M5.2) to backward up to zero position
12 V12 Coil Sol Cyl 18 K 8 I	01.6	1 Statel M0.2 Start machine	32 State32 M5.1 Stop lifter2-3 (M5) +lifter3 complete it's stroke to
13 V13 Coil Sol. Insert grove of mandrel	017	2 State2 M0.3 Start time delay for haul off (TM1	moulding unit with (extract Cyl.H)(Y9)
14 V14 Coll Coll information	01.7	3 State3 M0.4 Wait	S5 State55 M5.2 Deam5 downward (Y11-011 Betreat Cyl. H. (V0. eff) + Closed hydron lie Cyl. fer
14 114 Coll Sol. Inlet water valve	Q2.0	4 State4 M0.5 Open clean air solenoid valve (Y2) + Encoder start to count.	34 State34 M5.3 clamps (V28)
15 Y15 Coll Sol. drain water valve	Q2.1	5 State5 M0.0 Expand hauloff Cyl. A (Y1) & run motor of hauloff (M1	35 State35 M5.4 Waiting
16 Y16 Coil Sol. air inlet valve 1	Q2.2	7 State7 MI 0 Retract have off Cyl A (V) off)	36 State36 M5.5 Expand hydraulic Cyl. for mandrel (y25
17 Y17 Coil Sol. air inlet valve 2	Q2.3	8 State8 M11 Ream Junward extract Cyl (R & C)	37State37M5.6 Stop mandrel carriage with poppet valve (V29)
18 Y18 Coil Sol. air inlet valve 3	Q2.4	9 State9 M1.2 Move lifter1 (M2.1) to right to oven1 direction	38State38M5.7 Open inserts of mandrel pneumatically (Y13)
19 Y20 Coil Sol. unloading hyd. valve	Q2.5	10 State10 M1.3 Stop lifter1 (M2)	39State39M6.0 Expand hydraulic Cyl. For chamber (Y23)
20 Y21 Coil Sol. for expand lock hyd. cyl.	Q2.6	11 Statel1 M1.4 Beam 1 downward (Y3 off)	40State40M6.1 Close hydraulic locks (Y21)
21 Y22 Coil Sol. for retract lock hyd. cyl.	Q2.7	12 State12 M1.5 Move lifter 1(M2.2) to backward up to zero position	41State41M6.2 Waiting
22 Y23 Coil Sol. for expand chamber hyd. cyl	Q3.0	13 State13 ML6 Lowering rotary 1(extract Cyl. O) (Y5) + start rotational	42State42M6.3 Open three compressed air valves on the
23 Y24 Coil Sol. for retract chamber hyd. cyl.	Q3.1	motor (M3)	chamber(Y16)&(Y17)&(Y18)
24 Y25 Coil Sol. for expand mandrel hyd. cyl.	Q3.2	14 State14 M1.7 Start delay time to extract Cyl. oven1 (1M0)	45State45M0.4 Start compressed air timer (1M2_1)
25 Y26 Coil Sol, for retract mandrel hvd, cyl.	Q3.3	16 State16 M21 Start preheating timer (TM2)	44State44M6.5 & (V18-off)
25 Y26 Coil Sol. for retract mandrel hyd. cvl. 26 Y27 Coil Sol. for open clamps hyd. cvl.	Q3.3 Q3.4	16 State16 M2.1 Start preheating timer (TM2)	44State44M6.5 & (Y18-off) 45State45M6.6 Open automatic drain valve (Y15)
<ul> <li>25 Y26 Coil Sol. for retract mandrel hyd. cvl.</li> <li>26 Y27 Coil Sol. for open clamps hyd. cvl.</li> <li>27 Y28 Coil Sol. for close clamps hyd. cvl.</li> </ul>	Q3.3 Q3.4 Q3.5	15       State15       M2.0       Extract (V), M for oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven 1 retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off)	44State44 M6.5       & (Y18-off)         45State45 M6.6       Open automatic drain valve (Y15)         46State46 M6.7       Open automatic cooling water valve (Y14)
<ul> <li>25 Y26 Coil Sol. for retract mandrel hyd. cyl.</li> <li>26 Y27 Coil Sol. for open clamps hyd. cyl.</li> <li>27 Y28 Coil Sol. for close clamps hyd. cyl.</li> <li>28 Y29 Pope valve for cartridge valve</li> </ul>	Q3.3 Q3.4 Q3.5 Q4.7	16       State15       M2.0       Extract (X), M for oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)	44State44 M6.5       & (Y18-off)         44State44 M6.5       & (Y18-off)         45State45 M6.6       Open automatic drain valve (Y15)         46State46 M6.7       Open automatic cooling water valve (Y14)         47State47 M7.0       Start cooling water timer (TM2_2)
<ul> <li>25 Y26 Coil Sol. for retract mandrel hyd. cyl.</li> <li>26 Y27 Coil Sol. for open clamps hyd. cyl.</li> <li>27 Y28 Coil Sol. for close clamps hyd. cyl.</li> <li>28 Y29 Pope valve for cartridge valve.</li> <li>TRANSITION IN ASSIG. TABLE WITH AD</li> </ul>	Q3.3 Q3.4 Q3.5 Q4.7 DRESS	16 State15       M2.0       Extract (Q), M for oven 1 (14)         16 State16       M2.1       Start preheating timer (TM2)         17 State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18 State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)	Decompressed an valves (110-01) & (117-01)         44State44 M6.5 & (Y18-off)         44State44 M6.5 & (Y18-off)         44State45 M6.6 Open automatic drain valve (Y15)         46State46 M6.7 Open automatic cooling water valve (Y14)         47State47 M7.0 Start cooling water timer (TM2_2)         48State48 M7.1 Close automatic cooling water valve (Y14-off)
25       Y26       Coil Sol. for retract mandrel hyd. cyl.         26       Y27       Coil Sol. for open clamps hyd. cyl.         27       Y28       Coil Sol. for close clamps hyd. cyl.         28       Y29       Pope valve for cartridge valve.         TRANSITION IN ASSIG. TABLE WITH AD         1       T1_2       M8.3         (start)*(SL1)*(PH1)	Q3.3 Q3.4 Q3.5 Q4.7 DRESS	15       State15       M2.0       Extract (M, M 107 oven 1 (14))         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)	decompressed an valves (110-01) & (117-01)         44State44 M6.5 & (Y18-off)         44State44 M6.5 & (Y18-off)         45State45 M6.6 Open automatic drain valve (Y15)         46State46 M6.7 Open automatic cooling water valve (Y14)         47State47 M7.0 Start cooling water timer (TM2_2)         48State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*/(MS1)*(DH2)*(MS7)
25       Y26       Coil Sol. for retract mandrel hyd. cyl.         26       Y27       Coil Sol. for open clamps hyd. cyl.         27       Y28       Coil Sol. for close clamps hyd. cyl.         28       Y29       Pope valve for cartridge valve.         TRANSITION IN ASSIG. TABLE WITH AD         1       T1_2       M8.3         2       T2_3       S       M8.4         3       T3_4       M8.5       PHI off	Q3.3 Q3.4 Q3.5 Q4.7 DRESS	16       State15       M2.0       Extract (M, M for oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1         State1 Start machine	decompressed an valves (110-01) & (117-01)         44State44 M6.5 & (Y18-off)         44State45 M6.6 Open automatic drain valve (Y15)         46State46 M6.7 Open automatic cooling water valve (Y14)         47State47 M7.0 Start cooling water timer (TM2_2)         48State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)
25       Y26       Coil Sol. for retract mandrel hyd. cyl.         26       Y27       Coil Sol. for open clamps hyd. cyl.         27       Y28       Coil Sol. for close clamps hyd. cyl.         28       Y29       Pope valve for cartridge valve.         TRANSITION IN ASSIG.       TABLE WITH AD         1       T1_2       M8.3       (start)*(SL1)*(PH1)         2       T2_3_5       M8.4       TM1=set value         3       T3_4       M8.5       PH1 off         4       T4_6       M8.6       ENC1 on after count	Q3.3 Q3.4 Q3.5 Q4.7 DRESS	16       State15       M2.0       Extract (X), M 107 oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (Start)*(SL1)*(PH1)	decompressed an valves (110-01) & (117-01)         44State44 M6.5 & (Y18-off)         45State45 M6.6 Open automatic drain valve (Y15)         46State46 M6.7 Open automatic cooling water valve (Y14)         47State47 M7.0 Start cooling water timer (TM2_2)         48State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8
25       Y26       Coil Sol. for retract mandrel hyd. cyl.         26       Y27       Coil Sol. for open clamps hyd. cyl.         27       Y28       Coil Sol. for close clamps hyd. cyl.         28       Y29       Pope valve for cartridge valve.         TRANSITION IN ASSIG. TABLE WITH AD       1       T1_2         1       T1_2       M8.3       (start)*(SL1)*(PH1)         2       T2_3_5       M8.4       TMI=set value         3       T3_4       M8.5       PH1 off         4       T4_6       M8.6       ENC1 on after count         5       T6_7       M8.7       M1 off	Q3.3 Q3.4 Q3.5 Q4.7 DRESS	15       State15       M12.0       Extract (X), M 107 oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State16       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (Start)*(SL1)*(PH1))	44State44 M6.5       & (Y18-off)         45State45 M6.6       Open automatic drain valve (Y15)         46State46 M6.7       Open automatic cooling water valve (Y14)         47State47 M7.0       Start cooling water timer (TM2_2)         48State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG.         TABLE WITH AD           1         T1_2         M8.3           (start)*(SL1)*(PH1)         2           2         T3_4         M8.5           PH1 off         4         T4_6           4         T4_6         M8.6           5         T6_7         M8.7           6         T7_8_9         M9.1           (PH2)*(MS2)*(MS7)*(PH3)*(PH3)*(PS1)*(PH3)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1)*(PS1	Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS7) H4)	15       State15       M12.0       Extract (X), M 107 oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2	44State44 M6.5       & (Y18-off)         45State45 M6.6       Open automatic drain valve (Y15)         46State46 M6.7       Open automatic cooling water valve (Y14)         47State47 M7.0       Start cooling water timer (TM2_2)         48State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG TABLE WITH AD           1         T1_2         M8.3           27         Y28         SM8.4           1         T1_2         M8.3           2         T2_3_5         M8.4           3         T3_4         M8.5           9         TH1 off           4         T4_6           5         T6_7           7         T8_9           M9.1         (PH2)*(MS2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(MS7)*(PH2)*(PH2)*(MS7)*(PH2)*	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 4(57) H4)	15       State15       M12.0       Extract (X), M 107 oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State16       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State1 off (TM1)	Decompressed an valves (110-on) & (117-on)         44 State44 M6.5 & (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State46 M6.7 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG TABLE WITH AD           1         T1_2         M8.3           (start)*(SL1)*(PH1)           2         T2_3_5         M8.4           3         T3_4         M8.5           PH1 off         4         T4_6           4         T4_6         M8.6           5         T6_7         M8.7           6         T7_8         M9.0           7         T8_9         M9.1           9         T10_11         M9.3           9         T10_11         M9.4	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 4(\$7) H4) 3)	15       State15       M12.0       Extract (X), M 107 oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State1 of the off (TM1)	Decompressed an valves (110-on) & (117-on)         44 State44 M6.5 & (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State46 M6.7 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1.2         M8.3           3         T3.4         M8.5           9         TH1 off           4         T4.6           5         T6.7           7         T8.9           9         T10           10         T11.2           9         T10           11         M9.2           PH3           9         T10           11         M9.3           (M2.1&M2.2 off)*(PH1)           11         T12.2	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 4(\$7) H4) 3)	15 State15 M2.0 Extract (X), M 107 oven 1 (14)         16 State16 M2.1 Start preheating timer (TM2)         17 State17 M2.2 Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State2         State1 of (TM1)	44 State44 M6.5       & (Y18-off)         45 State45 M6.6       Open automatic drain valve (Y15)         46 State46 M6.7       Open automatic cooling water valve (Y14)         47 State47 M7.0       Start cooling water timer (TM2_2)         48 State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD         1           1         T1.2         M8.3           (start)*(SL1)*(PH1)         2           2         T2.3.5         M8.4           3         T3.4         M8.5           PH1 off         4         T4.6           4         T4.6         M8.6           ENC1 on after count         5           5         T6.7         M8.7           7         T8.9         M9.1           (PH2)*(MS2)*(MS7)*(PE2)*(0         7           8         T9_10         M9.2           PH3         9         T10.11           9         T10.11         M9.3           11         T12.13         M9.5           11         T12.13         M9.6           (MS7)*(Y5)         13         T14.15	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 4457) H4) 3)	15 State15 M2.0 Extract (X), M 107 oven 1 (14)         16 State16 M2.1 Start preheating timer (TM2)         17 State17 M2.2 Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State2         State3         State3         Wait	Decompressed ar valves (110-off) & (117-off)         44 State44 M6.5 & (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State45 M6.7 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direct fion         PH3
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for catridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1 2         M8.3           3         T3 4         M8.5           9         TM1=set value           3         T3 4           4         T4 6           5         T6 7           7         T8 9           9         M9.0           (Y1 off)*(MS1)*(PH2)*(0           7         T8 9           9         T10           11         M9.2           PH3           9         T10           11         T12.2           13         M9.5           MS1           11         T12.13           14         T15_16           13         T14_15           M9.7         TM6 off state           14         T15_16	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 457) H4) 3)	15 State15 M2.0 Extract (Y, M 107 oven 1 (14))         16 State16 M2.1 Start preheating timer (TM2)         17 State17 M2.2 Cyl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State3         State5         State3         State5         State3         State3         Wait         PH1 off	Decompressed ar valves (110-01) & (117-01)         44 State44 M6.5 & (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State45 M6.7 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direct fion         PH3         State10
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD         1         T1           1         T1         2         M8.3           3         T3         4         M8.5           9         TM1=set value         3         T3           3         T3         4         M8.5           9         TM1=set value         3         T3           4         M8.5         PH1 off           4         T4         6         ENC1 on after count           5         T6         7         M8.7           9         M9.0         (Y1 off)*(MS1)*(PH2)*(0         Y1 off)*(PH2)*(0           7         T8         9         M9.1         (PH2)*(MS2)*(MS7)*(PE           8         T9_10         M9.2         PH3         PH3           9         T10         11         M9.5         MS1           11         T12         M9.4         MS1           11         T12 <td>Q3.3 Q3.4 Q3.5 Q4.7 DRESS 457) H4) 3)</td> <th>15       State15       M12.0       Extract (2, 1, M10) oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State5         State3         Wait         State5         Expand haul off Cyl. A (Y1)       Wait         % run motor of haul off(M1)       PH1 off</th> <td>Decompresser an valves (110-on) &amp; (117-on)         44 State44 M6.5 &amp; (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State45 M6.7 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B &amp; C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direct for pH3         State10         State10         (M2 off)*(PH3)</td>	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 457) H4) 3)	15       State15       M12.0       Extract (2, 1, M10) oven 1 (14)         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State5         State3         Wait         State5         Expand haul off Cyl. A (Y1)       Wait         % run motor of haul off(M1)       PH1 off	Decompresser an valves (110-on) & (117-on)         44 State44 M6.5 & (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State45 M6.7 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direct for pH3         State10         State10         (M2 off)*(PH3)
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1 2         M8.3           3         T3 4         M8.5           9         TM1=set value           3         T3 4           4         T4.6           7         T8 9           9         T0           10         T1           11         T4.6           12         T2.3.5           13         T3.4           14         T4.6           15         T6.7           16         T7.8           17         T8 9           10         T11           11         T12           11         T12           11         T12           11         T12           12         T3           13         T14           14         T4           15         T16           17	Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS7) H4) 3)	15       State15       M12.0       Extract (Y, M 107 oven 1 (14))         16       State16       M2.1       Start preheating timer (TM2)         17       State16       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1 Start machine         (State1 Start machine         State2         State2         State2         State5         Expand haul off Cyl. A (Y1)       State3         & run motor of haul off(M1)       State4	44 State44 M6.5       & (Y18-off)         45 State45 M6.6       Open automatic drain valve (Y15)         46 State45 M6.7       Open automatic cooling water valve (Y14)         47 State47 M7.0       Start cooling water timer (TM2_2)         48 State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direction         State10         Stop lifter1(M2)         (M2 off)*(PH3)         (M2 off)*(PH3)
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1_2         M8.3           3         T3_4         M8.5           PH1 off         4         T4_6           4         T4_6         M8.6           ENC1 on after count         5           5         T6_7         M1 off           6         T7_8         M9.0         (Y1 off)*(MS1)*(PH2)*(0           7         T8_9         M9.1         (PH2)*(MS2)*(MS7)*(P           8         T9_10         M9.2         PH3           9         T10_11         M9.5         MS1           11         T12_13         M9.5         MS1           12         T13_14         M9.6         (MS7)*(Y5)           13         T14_15         M9.7         TM6 off state           14         T15_16         M10.1         Y4           15         T16_17         M10.2         TM2 on state	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 4(S7) H4) 3) MS3)	15       State15       M12.0       Extract (Y, M 107 oven 1 (14))         16       State16       M2.1       Start preheating timer (TM2)         17       State17       M2.2       Cyl. Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off)         18       State18       M2.3       Move lifter2-3 to oven1 direction (M5.1)         SEQUENTIAL FUNCTION CONTROL (SFC)         State1         State1         State2         State2         State3         State5         Expand haul off Cyl. A (Y1)       %         %       run motor of haul off(M1)         State4         Open clean air solenoid valve (Y2)	44 State44 M6.5       & (Y18-off)         45 State45 M6.6       Open automatic drain valve (Y15)         46 State45 M6.7       Open automatic cooling water valve (Y14)         47 State47 M7.0       Start cooling water timer (TM2_2)         48 State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         diretion         State10         State11         Ream 1         Page Attention         (M2 off)*(PH3)         State11
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1_2           3         T3_4           4         T4_6           7         T8_9           9         T0           1         T1_2           10         T11           11         T1_2           12         T13           14         T14_5           15         T16_11           16         T11_12	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 457) H4) 3)	Is state15 M2.0 Extract (Y, M for oven 1 (14) 16 State16 M2.1 Start preheating timer (TM2) 17 State17 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1) State2 Start time delay for haul off (TM1) State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) Den clean air solenoid valve (Y2) + Encoder start to count.	Decompressed an valves (110-on) & (117-on)         44 State44 M6.5 & (Y18-off)         45 State45 M6.6 Open automatic drain valve (Y15)         46 State45 M6.6 Open automatic cooling water valve (Y14)         47 State45 M6.6 Open automatic cooling water valve (Y14)         47 State47 M7.0 Start cooling water timer (TM2_2)         (Y1 off)*(MS1)*(PH2)*(MS7)         48 State48 M7.1 Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1       diretion         H3         State10         State11         Beam 1 downward (Y3 off)         State11         Beam 1 downward (Y3 off)
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1_2         M8.3           3         T3_4         M8.5           4         T4_6         M8.6           5         T6_7         M8.7           4         T4_6         M8.6           5         T6_7         M8.7           7         T8_9         M9.0           (Y1 off)*(MS1)*(PH2)*(0         7           7         T8_9         M9.1           (PH2)*(MS2)*(MS7)*(P         8           8         T9_10         M9.2           9         T10_11         M9.5         MS1           11         T12_13         M9.6         (MS7)*(Y5)           13         T14_15         M9.7         TM6 off state           14         T15_16         M10.1         Y4           15         T16_17         M10.2         TM2 on state           16         T17_18         M10.3	Q3.3 Q3.4 Q3.5 Q4.7 DRESS 457) H4) 3)	Is state15 M2.0 Extract (Y, M for over 1 (14) 16 State16 M2.1 Start preheating timer (TM2) 17 State17 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1) State2 Start time delay for haul off (TM1) State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) (ENC1-On) after count.	44       State44       M6.5       & (Y18-off)         45       State45       M6.6       Open automatic drain valve (Y15)         46       State45       M6.6       Open automatic cooling water valve (Y14)         47       State46       M6.7       Open automatic cooling water valve (Y14)         47       State47       M7.0       Start cooling water timer (TM2_2)         48       State48       M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)       (Y1 off)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1       dire         dire       PH3       get a.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1_2         M8.3           (start)*(SL1)*(PH1)           2         T2_3_5         M8.4           3         T3_4         M8.5           9         T0         I M8.6         ENC1 on after count           5         T6_7         M8.7         M1 off           6         T7_8         M9.0         (Y1 off)*(MS1)*(PH2)*(MS7)*(P           8         T9_10         M9.2         PH3           9         T10_11         M9.3         (M2.1&M2.2 off)*(PH           10         T11_12         M9.4         MS1           11         T12_13         M9.5         MS1           12         T13_14         M9.6         (MS7)*(Y5)           13         T14_15         M9.7         TM6 off state           14         T15_16         M10.3         (Y4off)*(Y5off)*(PH4)*(1           17         T18_19         M10	Q3.3 Q3.4 Q3.5 Q4.7 DRESS DRESS 33 MIS3)	Is state15 M2.0 Extract (Y, M for over 1 (14) 16 State16 M2.1 Start preheating timer (TM2) 17 State17 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1)) State2 Start time delay for haul off (TM1) State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) (ENC1-On) after count.	44       State44       M6.5       & (Y18-off)         45       State45       M6.6       Open automatic drain valve (Y15)         46       State45       M6.6       Open automatic cooling water valve (Y14)         47       State47       M7.0       Start cooling water timer (TM2_2)         48       State48       M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.(B & C)       (Y1 off)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1       dire fion         Brain       State10       (M2 off)*(PH3)         State11       Beam 1 downward (Y3 off)       (M2 off)*(PH3)         State12       MS1       j.z.
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for catridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1_2         M8.3           3         T3_4         M8.5           9         T0_1         T1_2           1         T1_2         M8.3           3         T3_4         M8.5           9         T10_1         M8.6           1         T1_6         M8.6           6         F7_8         M9.0           9         T10_1         M9.2           9         T10_1         M9.3           9         T10_1         M9.4           10         T11         20           11         T12_13         M9.5           12         T13_14         M9.6           (MS7)*(Y5)         13           13         T14_15           15         T16_17           18         T19_20           10         T11           14         T15_16 </td <td>Q3.3 Q3.4 Q3.5 Q4.7 DRESS DRESS 3) MS3)</td> <th>Is statels M2.0 Extract (V), M 107 oven 1 (14) 16 Statel6 M2.1 Start preheating timer (TM2) 17 Statel7 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 Statel8 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1) State2 State2 State5 Expand haul off Cyl. A (Y1) &amp; run motor of haul off(M1) (ENC1-On) after count. State6 State6 State6 State6 State6</th> <td>44       State44       M6.5       &amp; (Y18-off)         45       State45       M6.6       Open automatic drain valve (Y15)         46       State45       M6.6       Open automatic cooling water valve (Y14)         47       State47       M7.0       Start cooling water timer (TM2_2)         48       State48       M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.(B &amp; C)         (Y3)       (PH2)*(MS2)*(MS7)*(PH4)         State9       Move lifter1 (M2.1) to right to oven1         direction       PH3         State10       State10         State11       Beam 1 downward (Y3 off)         Beam 1 downward (Y3 off)       MS1         State12       Move lifter 1(M2.2) to backward up</td>	Q3.3 Q3.4 Q3.5 Q4.7 DRESS DRESS 3) MS3)	Is statels M2.0 Extract (V), M 107 oven 1 (14) 16 Statel6 M2.1 Start preheating timer (TM2) 17 Statel7 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 Statel8 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1) State2 State2 State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) (ENC1-On) after count. State6 State6 State6 State6 State6	44       State44       M6.5       & (Y18-off)         45       State45       M6.6       Open automatic drain valve (Y15)         46       State45       M6.6       Open automatic cooling water valve (Y14)         47       State47       M7.0       Start cooling water timer (TM2_2)         48       State48       M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.(B & C)         (Y3)       (PH2)*(MS2)*(MS7)*(PH4)         State9       Move lifter1 (M2.1) to right to oven1         direction       PH3         State10       State10         State11       Beam 1 downward (Y3 off)         Beam 1 downward (Y3 off)       MS1         State12       Move lifter 1(M2.2) to backward up
25       Y26       Coil Sol. for retract mandrel hyd. cyl.         26       Y27       Coil Sol. for open clamps hyd. cyl.         27       Y28       Coil Sol. for close clamps hyd. cyl.         28       Y29       Pope valve for cartridge valve.         TRANSITION IN ASSIG. TABLE WITH AD       1         1       T1_2       M8.3         3       T3_4       M8.5         9       T6_7       M8.4         3       T3_4       M8.5         9       T6_7       M8.7         10       T1       12         12       T2_3_5       M9.0         (Y1 off)*(M51)*(PH2)*(M52)*(M57)*(P)         8       T9_10       M9.2         9       T10_11       M9.3         9       T10_11       M9.3         9       T10_11       M9.4         10       T11_12         11       T12_13         14       M9.6       (M57)*(Y5)         13       T14_15       M9.7       TM6 off state         14       T15_16       M10.1       Y4         15       T16_17       M10.4       PH5         18       T19_20       M10.5       (MS3)*(PH5)*(MS9)*	Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS7) H4) 3)	Is statels M2.0 Extract (Y, M 107 oven 1 (14) 16 Statel6 M2.1 Start preheating timer (TM2) 17 Statel7 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 Statel8 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1) State2 State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) State4 Open clean air solenoid valve (Y2) + Encoder start to count. State6 Stop motor M1 + stop air cleaner (Y2-off)	44 State44 M6.5       & (Y18-off)         45 State45 M6.6       Open automatic drain valve (Y15)         46 State45 M6.7       Open automatic cooling water valve (Y14)         47 State47 M7.0       Start cooling water timer (TM2_2)         48 State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.(B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direftion         PH3         State10         State11         Beam 1 downward (Y3 off)         State12         Move lifter 1(M2.2) to backward up         to zero position
25       Y26       Coil Sol. for retract mandrel hyd. cyl.         26       Y27       Coil Sol. for open clamps hyd. cyl.         27       Y28       Coil Sol. for close clamps hyd. cyl.         28       Y29       Pope valve for cartridge valve.         TRANSITION IN ASSIG TABLE WITH AD         1       T1_2       M8.3         (start)*(SL1)*(PH1)       2       T2_3_5         1       T1_2       M8.4       TM1=set value         3       T3_4       M8.5       PH1 off         4       T4_6       M8.6       ENC1 on after count         5       T6_7       M8.7       M1 off         6       T7_8       M9.0       (Y1 off)*(MS1)*(PH2)*(MS7)*(PE)*(MS7)*(PE)         8       T9_10       M9.2       PH3         9       T10_11       M9.3       (M2.1&M2.2 off)*(PH1)         10       T11.2       M9.4       MS1         11       T12_13       M9.5       MS1         12       T13_14       M9.6       (MS7)*(Y5)         13       T14_15       M9.7       TM6 off state         14       T15_16       M10.1       Y4         15       T16_17       M10.4       PH5	Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS3) (S7) PH10)	Is state15 M2.0 Extract (Y, M for over 1 (14) 16 State16 M2.1 Start preheating timer (TM2) 17 State17 M2.2 Cvl Oven1 retract (Y4-off) + retract rotaryl (Y5 off) + stop rotational motor (M2-off) 18 State18 M2.3 Move lifter2-3 to oven1 direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1) State2 Start time delay for haul off (TM1) State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) (ENC1-On) after count. State6 Stop motor M1 + stop air cleaner (Y2-off) Motor (M1- off)	44       State44       M6.5       & (Y18-off)         45       State45       M6.6       Open automatic drain valve (Y15)         46       State45       M6.7       Open automatic cooling water valve (Y14)         47       State47       M7.0       Start cooling water timer (TM2_2)         48       State48       M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)       (Y1 off)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1       dire from PH3         State10       (M2 off)*(PH3)       etaels         State11       Beam 1 downward (Y3 off)       MS1         State12       Move lifter 1(M2.2) to backward up       to zero position         Move lifter 1(M2.2) to backward up       to zero position       MS1
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG_TABLE WITH AD           1         T1_2         M8.3           (start)*(SL1)*(PH1)           2         T2_3_5         M8.4           3         T3_4         M8.5           PH1 off         4         T4_6           4         T4_6         M8.6           ENCI on after count         5           5         T6_7         M8.7           M1 off         6         T7_8           6         T7_8         M9.0           (Y1 off)*(MS1)*(PH2)*(MS2)*(MS7)*(PE           8         T9_10         M9.2           PH3         9         T10_11           9         T10_11         M9.5           11         T12_13         M9.5           13         T14_15         M9.7           14         T15_16         M10.1           14	Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS3) IS7) PH10) 8 off)	Is staters with the other (14) Is staters with the other (14) Is stater with the other with the other (14) Is stater with the other (15) Is stater with the other (14) Is stater with	44       State44       M6.5       & (Y18-off)         45       State45       M6.6       Open automatic drain valve (Y15)         46       State45       M6.7       Open automatic cooling water valve (Y14)         47       State47       M7.0       Start cooling water timer (TM2_2)         48       State48       M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.( B & C)       (Y1 off)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1       dire from         dire from       PH3       exp.         State10       (M2 off)*(PH3)       state1         State11       Beam 1 downward (Y3 off)       MS1       fixe, and
25         Y26         Coil Sol. for retract mandrel hyd. cyl.           26         Y27         Coil Sol. for open clamps hyd. cyl.           27         Y28         Coil Sol. for close clamps hyd. cyl.           28         Y29         Pope valve for cartridge valve.           TRANSITION IN ASSIG. TABLE WITH AD           1         T1 2         M8.3           (start)*(SL1)*(PH1)           2         T2 3.5         M8.4           3         T3 4         M8.5           PH1 off         4         T4 6           4         T4 6         M8.6           ENC1 on after count         5           5         T6 7         M8.7           M1 off         6         T7 8           6         T7 8         M9.0           (Y1 off)*(M51)*(PH2)*(0         7           7         T8 9         M9.1           (PH2)*(MS2)*(MS7)*(PE         8           7         T8 9         M9.1           9         T10         11           11         T12 13         M9.5           13         T14 15         M9.7           14         T15 16         M10.1           7         T18         M10.3 <td>Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS3) IS7) PH10) 8 off)</td> <th>Is Statel's M2.0 EXtract C.Y. M for oven I (14) I6 Statel M2.1 Start preheating timer (TM2) Cyl. Oven I retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off) I8 Statel M2.3 Move lifter2-3 to oven I direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1)) State2 State5 Expand haul off Cyl. A (Y1) &amp; run motor of haul off(M1) State6 Stop motor M1 + stop air cleaner (Y2-off) Motor (M1- off) State7 Detect by 66 (A (Y1, 57))</th> <td>44 State44 M6.5       &amp; (Y18-off)         45 State45 M6.6       Open automatic drain valve (Y15)         46 State46 M6.7       Open automatic cooling water valve (Y14)         47 State47 M7.0       Start cooling water timer (TM2 2)         48 State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.(B &amp; C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direction         Move lifter1 (M2.1) to right to oven1         State10         State11         Beam 1 downward (Y3 off)         State12         Move lifter 1(M2.2) to backward up         it o zero position         MS1         ctate13         Lowering rotary 1(extract Cyl. O) (Y5) +start</td>	Q3.3 Q3.4 Q3.5 Q4.7 DRESS MS3) IS7) PH10) 8 off)	Is Statel's M2.0 EXtract C.Y. M for oven I (14) I6 Statel M2.1 Start preheating timer (TM2) Cyl. Oven I retract (Y4-off) + retract rotary1 (Y5 off) + stop rotational motor (M2-off) I8 Statel M2.3 Move lifter2-3 to oven I direction (M5.1) SEQUENTIAL FUNCTION CONTROL (SFC) State1 Start machine (Start)*(SL1)*(PH1)) State2 State5 Expand haul off Cyl. A (Y1) & run motor of haul off(M1) State6 Stop motor M1 + stop air cleaner (Y2-off) Motor (M1- off) State7 Detect by 66 (A (Y1, 57))	44 State44 M6.5       & (Y18-off)         45 State45 M6.6       Open automatic drain valve (Y15)         46 State46 M6.7       Open automatic cooling water valve (Y14)         47 State47 M7.0       Start cooling water timer (TM2 2)         48 State48 M7.1       Close automatic cooling water valve (Y14-off)         (Y1 off)*(MS1)*(PH2)*(MS7)         State8         Beam 1upward-extract Cyl.(B & C)         (Y3)         (PH2)*(MS2)*(MS7)*(PH4)         State9         Move lifter1 (M2.1) to right to oven1         direction         Move lifter1 (M2.1) to right to oven1         State10         State11         Beam 1 downward (Y3 off)         State12         Move lifter 1(M2.2) to backward up         it o zero position         MS1         ctate13         Lowering rotary 1(extract Cyl. O) (Y5) +start



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IB 3 IB 4 QB 2 QB 3

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## Operating voltage of 24 Vdc

Configuration BLC ViewBelde Hel

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## Siemens S7-200 Base Units - 3rd Generation

The S7 brings to the user a powerful solution to a host of control applications, which is easy to adapt and expand the system. The S7 is a family of PLCs which allows the user to tailor their selection of components which best suits their requirements, and is the long term successor to the highly successful S5 range. Whatever the S5 can do, the S7 can do more quickly and more easily. The 3rd generation of S7-200 now builds on the success of the original range and exploits new CPU's in order to produce even faster and more powerful range of PLC's. The range of CPU's available has been increased with the introduction of the new 224XP, as has the range of digital, analogue and communications expansion modules. For the faster type of application real time control is easily achieved by use of the comprehensive range of built-in interrupts. Timed, Communication, High Speed Counter, High Speed Pulse Output, and hardware interrupts are all available, and the implementation of a priority table means that all the interrupts can work simultaneously. Communications with S7-200 is built in. Inter PLC communications is achieved using two wire network which can be up to 1200 meters and can have up to 126 nodes. In "Freeport" mode the PLC's RS-485 port runs in free ASC11 mode making it possible to communicate with other devices. In line with Siemens objective to make the programming of S7-200 as user friendly as possible MicroWin programming software has been further improved. These improvements all help minimise program development time. This has been achieved by including more and improving existing "wizards". These help program developers with the more routine/complex parts of their programs, e.g. TD200 configuration, PID loop configuration, High Speed Counter configuration, etc. Inclusion of context sensitive help also means that all the information required is at the users fingertips

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IB 3 IB 4 QB 2 QB 3



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SIMATIC S7-200, DIGITAL I/O EM 223 SIMATIC S7-200, DIGITAL I/O EM 223, FOR S7-22X CPU ONLY, 4 DI / 4 DO RELAY. 5-30V DC, 250V AC

يوجد في المشروع عدد كبير من نماذج محاكاة لتشغيل البرنامج There are Simulations Runs for PLC LAD diagram

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Hydraulic circuit:-it services the moulding unit only and is consisting of:-

1-complete hydraulic unit (hydraulic tank &hydraulic pump type variable vane pump& 4 accumulators &heat exchanger ).

## **Pipe clamps circuit:-**

As shown in diagram the upper clamp moves with the single cylinder, the under clamp moves with double cylinders. Item 54 uses as counter balance valve for cylinders.





This is bigger cylinder in machine and is responsible of movable of the mandrel. PLC energize solenoid of 4/3 D.C.V to movable mandrel and energize solenoid of poppet valve to stopping the mandrel at any position of the long stroke. Item 52 is a cartridge valve to resist of the force generated of air pressure in the chamber.





<u>– clamp</u>

locks:-

These

cylinders

lock onto

used to



