

## 2. Specification for Pallets and Pickup Table (with Motorized Mandrels)

### FOR 270MW and 150MW LAMINATIONS

#### **Description:**

Pallets and Pick-up tables are required for robotic technology process that will pick up the laminations from pick-up table (de-stacking) and place (assemble) it in a circular manner on a circular assembly table (outer table).

Initially, the laminations will be stacked on the pallet manually and two mandrels will be used for alignment of laminations. Once the desired numbers of laminations are stacked, the mandrels will be removed and the pallet will be transported to the pick-up table by crane.

The pallet is then put on the pick-up table. Two locating pins shall be used for locating of the pallet on the pick-up table. Two motorized mandrels mounted below the pick-up table shall then move up till the tapered part of the mandrel is in level with stack of laminations.

As the robot picks up laminations from pick-up table, and the stack height decreases, two mandrels used for alignment of laminations will gradually travel down.

#### **A. Specification of the Pallet:**

<b>SR. No.</b>	<b>DESCRIPTION</b>	<b>BHEL Specification</b>	<b>Vendor Specification/Remark</b>
1	<b>Scope</b>	To design, manufacture and supply 6 pallets for 270MW laminations and 6 pallets for 150MW laminations including 12 mandrels for 270MW pallets and 12 mandrels for 150MW laminations.	
2	<b>Dimensions</b>	To suit the laminations	
3	<b>Material</b>	a. For table – MS b. For Mandrel – As specified in drawing	
4	<b>Surface Finish</b>	a. For pallet – Vendor to specify. The surface should be treated such that no rust formation takes place. Means of preventing rusting formation of the surface should be specified by vendor. b. For mandrel – High grade stainless steel finish	
5	<b>Mandrel positioning</b>	One set of two mandrels are required for 270MW lamination and another set of two mandrels are required for 150MW laminations. The mandrel	

		diameters of these vary and hence provision shall be made such that only one set of mandrels can be mounted on the designated pallet i.e. mandrels for 270MW laminations should be mounted on 270MW pallet and mandrels for 150MW pallet should be mounted for 150MW pallet.	
6	<b>Locating Holes</b>	Locating holes are required for positioning the pallets on the pick-up tables. Locating holes should be designed such that only designated pallet can be placed in locating pins on the pick tables.	
7	<b>Supporting Weight</b>	3000 Kg i.e. 1980 laminations (enough for 2 stacks of 55 layers of laminations i.e. 2 x55 X 9 = 990 laminations i.e. 990 x 2.5 kg. = 2475 Kg. Say 3000 Kg.)	

**B. Specification of the Pick-up Table:**

SR. No.	DESCRIPTION	BHEL Specification	Vendor Specification/Remark
1	<b>Scope</b>	To design, manufacture and supply 6 pick-up tables common for 270MW laminations and 150MW laminations including 12 mandrels for 270MW pallets and 12 mandrels for 150MW laminations and mechanism to vertically move the mandrels.	
2	<b>Dimensions</b>	To suit the pallet	
3	<b>Height</b>	Mandrel height above pallet surface =2 stacks x 55 layers x 9 segments x 0.65 mm = 643.5 mm, say 650 mm.	
4	<b>Material</b>	a. For Table - MS b. For Mandrel – As specified in the drawing	
5	<b>Surface Finish</b>	a. For Table – Vendor to specify b. For mandrel – High grade stainless steel finish	
6	<b>Pallet positioning</b>	There shall be locating pins for two different pallet designs i.e. for 270MW pallet and 150MW pallet. Design of locating pins w.r.t. pallet design should	

		be such that wrong pallet cannot be placed in locating pin.	
7	<b>Supporting Weight</b>	Should be able to support weight of pallet and laminations. Consideration should be given to any resistance the mandrels will encounter while traveling up or down.	
8	<b>Speed of mandrel travel</b>	The mandrels should be able to travel at 90 mm/min in automatic and manual modes.	
9	<b>Mechanism of mandrel travel</b>	To be specified by vendor.	
10	<b>Duty Cycle of mandrel actuation mechanism</b>	100% Continuous	
11	<b>Mandrel positioning</b>	Two mandrels are required for 270MW lamination and two mandrels for 150MW lamination. The mandrel diameters of these vary and hence provision shall be made such that only one set of mandrels can be mounted at a time.	
12	<b>Controls</b>	Automatic control triggered by robot or PLC output and manual controls through up and down push buttons.	
13	<b>Safety</b>	Mechanical dead limits and adjustable electrical non-contact type switch/sensors for up and down travel.	
14	<b>Position Feedback</b>	Position of mandrel should be known through encoder.	
15	<b>Sensors</b>	One sensor each for 'pallet present' for 270MW pallet and 150MW pallets. One sensor for 'lamination present' on pallet.	
16	<b>Wiring</b>	All sensing devices to be wired to a junction box and wires and terminals to be clearly labeled.	

RESPRESENTATIVE PALLET FOR LAMINATIONS

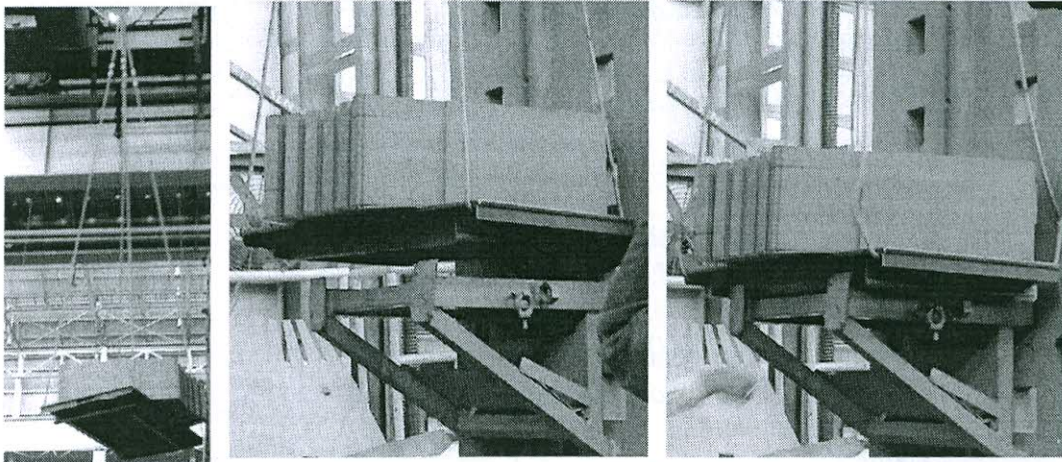
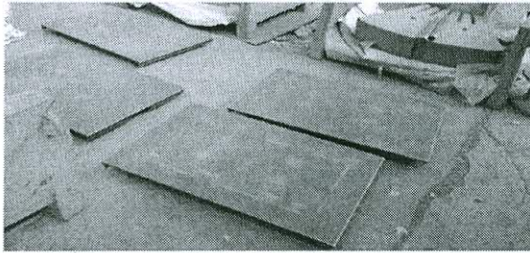
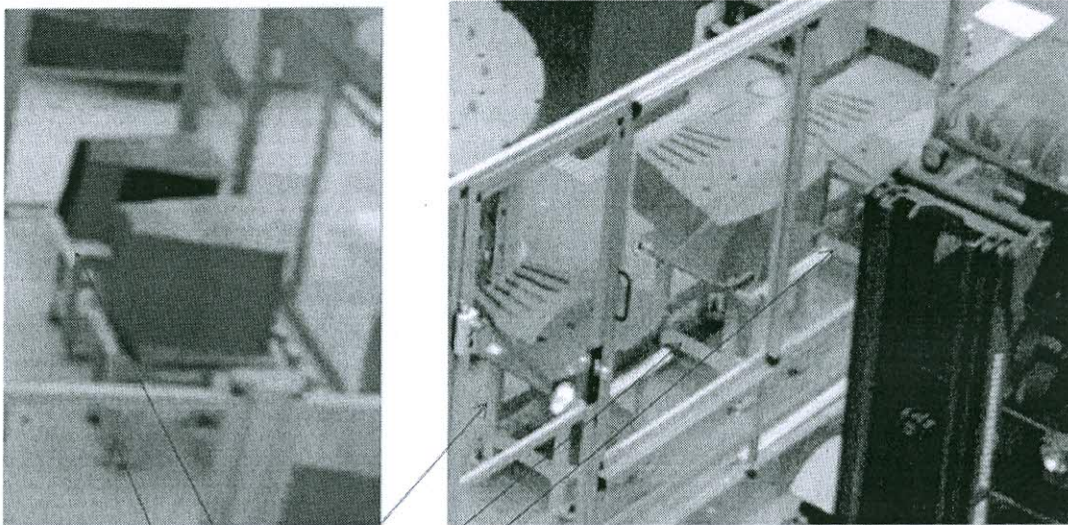


Figure 3

Pick-up Tables for Laminations



Pick-Up Tables

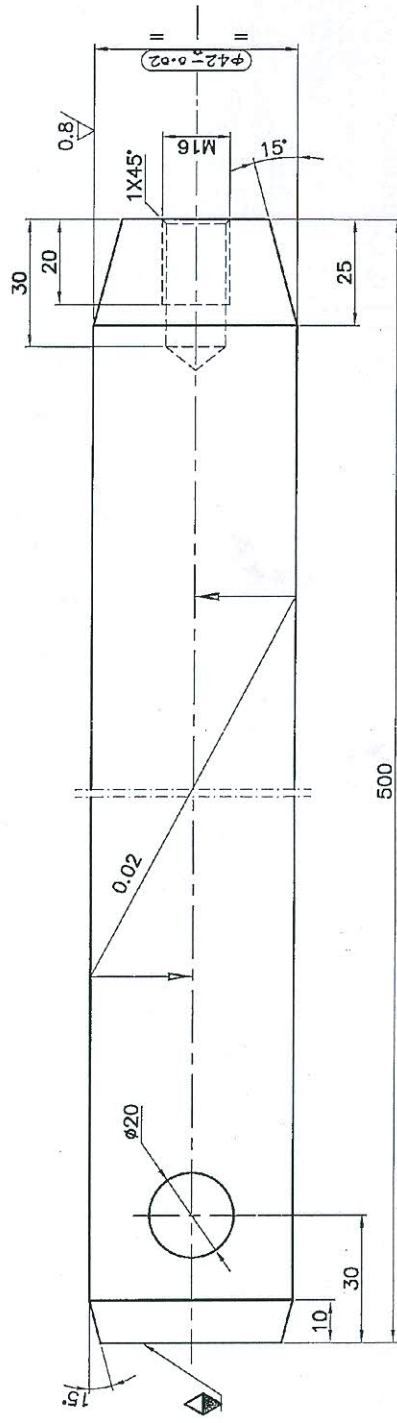
Motorized mandrels (two)  
to be placed below pick-up  
tables

Figure 4

**Mandrel drawing for reference only**

6.3 / THE REST

DRAWING No.



<b>MARK</b>
DRG. NO:
PRODUCT
COMPONENT DRG. NO:

**NOTE:-**

1. DIM. IN  $\square$  IS CTQ (CRITICAL TO QUALITY).
2. HARDEN TO HR:55±60 AS PER 912.008
3. ROUND OFF SHARP EDGES.
4. TO BE CONSERVED AS PER TL\_3000Z.

VAR.00	REMARKS	ITEM No.	DESCRIPTION	CLS	DRAWING No.	VAR.	MATERIAL SPECN.	C	UNIT WEIGHT	QTY.
							XT215Cr12			
							AA10822 / S:57H6			

DATE: 20/08/2018