

Tube Products of India

Gearing for Growth



Endurance 30.25x24x555.5 - Updates

Complaint Details

Customer : M/s Endurance

Complaint Date : 13th Mar'23

Invoice No : 3023010015034 /35 / 36

Invoice Date : 9th Mar'23

Invoice Qty : 6203nos

Rejected Qty : 3 nos





Supply Details Plant to Customer

TPI Avadi to TPI Aurangabad

TPI Aurangabad to TPI Shirwal

TPI Shirwal to TPI Aurangabad

TPI Aurangabad to Endurance

Invoice : PAH-STN-10157, 10164, 10200, 10207, 10242
Date : 8-11-23, 9-11-23, 17-11-23, 19-11-23, 26-11-23
Qty : 8250, 6660, 3000, 4770, 2250

Invoice : PAT-LST-390/91/92, PAT-LST-393/94
Date : 06-03-2023, 08-02-2023
Qty - 16530 nos, 8400nos

Invoice : PSH-LST-16462 /16476
Date : 10 /11 -02-2023
Qty - 6450

Invoice : 3023010015034 /35 / 36
Date : 09-03-2023
Qty - 6203

TUBE INVESTMENTS OF INDIA LTD UNIT : TUBE PRODUCTS OF INDIA MANUFACTURERS OF QUALITY 'TRU WEL' STEEL TUBES AND CRICRCA STRIPS		Invoice No : PAT-LST-390 Date : 06-FEB-2023 Mode of Payment : TPI 30 Days WJF Mode of Type : JDTC-ROAD-GROUND Delivery No : 21819269 Trip No : 11375531 Total Page/No : 0 L.R./RR /AWB No : Road Permit No & Date : Routing Documents : E Way Bill No : 271545220996 Transporter Name : JAI DURGA TRANSPORT CD : MH48F0495		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm : PAN : AADCT1398N		Gross Wt : 7.919 Tare Wt : Net Wt : 7.919						
PLOT NO. 04, GATE NO. 32, RANJANGAON S.P., MIDC WALLUJ, AURANGABAD - 431136 CIN : L35100TN2008PLC069496 State Code : 27		Ship to Consignee 12826 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India Place Of Supply : MAHARASHTRA & 27 Vendor code :		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm :		Ship to Consignee 96325 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India State Code : 27						
Bill to Customer 12826 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India Place Of Supply : MAHARASHTRA & 27 Vendor code :		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm :		Ship to Consignee 96325 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India State Code : 27		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm :						
SI	Sale Order No	HSN Code	Item Code/Cust Part No/ Package/Desc.	UOM	QTY	Item Rate	Item Value	CGST %	Value	SGST %	Value	Total
1	197755	96/FEB/2023	73063090 3D1788963255001T	BOLS	Ea	6660	122.04	812786.40	0	0.00	0	812786.40
			STEEL TUBES-CDW-ROUND-30.25 X 24.00 X .00 X 555.50-TEMPERED									
Total							812786.40	0	0.00	0	0.00	812786.40
Whether the Tax is payable on reverse charge basis: No Remarks: Invoice Amount (In Words) Indian Rupee Eight Lakhs Twelve Thousand Seven Hundred Eighty-Six And Forty Paise Only Date & Time of Preparation: 06-Feb-2023 17:20												

TUBE INVESTMENTS OF INDIA LTD UNIT : TUBE PRODUCTS OF INDIA MANUFACTURERS OF QUALITY 'TRU WEL' STEEL TUBES AND CRICRCA STRIPS		Invoice No : PSH-LST-16470 Date : 11-FEB-2023 Mode of Payment : JDTC-ROAD-GROUND Mode of Type : Delivery No : 21845168 Trip No : 114021377 Total Page/No : 1610 L.R./RR /AWB No : 123568 Road Permit No & Date : Routing Documents : E Way Bill No : 231547745297 Transporter Name : JAI DURGA TRANSPORT State Code : 27		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm : PAN : AADCT1398N		Gross Wt : 19.48 Tare Wt : Net Wt : 12.98						
SHIRWAL POST, KHANDALA TALUK, SATARA DIST, MAHARASHTRA, 412801 240405 CIN : L35100TN2008PLC069496 State Code : 27		Ship to Consignee 96325 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India Place Of Supply : MAHARASHTRA & 27 Vendor code :		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm :		Ship to Consignee 96325 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India State Code : 27						
Bill to Customer 96325 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India Place Of Supply : MAHARASHTRA & 27 Vendor code :		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm :		Ship to Consignee 96325 TPI SHIRWAL UNIT OF TUBE INVESTMENTS OF INDIA LTD. SHIRWAL POST, KHANDALA TALUK, SATARA DISTRICT, SHIRWAL, MAHARASHTRA, 412801, India State Code : 27		GSTIN : 27AADCT1398N1ZQ Range : Division : Comm :						
SI	Sale Order No	HSN Code	Item Code/Cust Part No/ Package/Desc.	UOM	QTY	Item Rate	Item Value	CGST %	Value	SGST %	Value	Total
1	195958	07/FEB/2023	73063090 3D1734963255603T	BOLS	Ea	600	166.41	96246.00	0	0.00	0	96246.00
			STEEL TUBES-CDW-ROUND-33.25 X 27.00 X .00 X 595.00-TEMPERED									
2	197852	24/FEB/2023	73063090 3D1788963255001T	BOLS	Ea	9500	143.26	1360976.00	0	0.00	0	1360976.00
			STEEL TUBES-CDW-ROUND-30.25 X 24.00 X .00 X 555.50-TEMPERED									
Total							1457216.00	0	0.00	0	0.00	1457216.00
Whether the Tax is payable on reverse charge basis: No Remarks: Invoice Amount (In Words) Indian Rupee Fourteen Lakhs Fifty-Seven Thousand Two Hundred Sixteen Only Date & Time of Preparation: 11-Feb-2023 16:25												



Production Detail at Avadi Plant

Final Inspection

Cutting

Eddy Current Testing

DATE & SHIFT	HOUR/TIME	SIZE	RIC CARD
9/1/22 A Shift	08:35 - 12:55:30	45330 nos	05
Total		1630 00	

ROUTE CARD NO.	CUSTOMER	OD	ID	THICK	LENGTH	DATE
AF238D30105	...	48	30	2.4	...	...
AF238D30106	...	48	30	2.4	...	...
AF238D30107	...	48	30	2.4	...	...
AF238D30108	...	48	30	2.4	...	...
AF238D30109	...	48	30	2.4	...	...
AF238D30110	...	48	30	2.4	...	...

SL. NO.	JOB ORDER NO.	R.C.NO.	MATERIAL	SIZE IN MM (OD ID THICK)	LENGTH (MTR)	ACCEPTED (STG ECT)	BEND LEVEL (MIDDLE TAIL)	REJECTIONS (TAG)	REMARKS	ERP
1	AF238D30105	45330	AF238D30105	48 30 2.4	...	...	...	...	...	...
2
3
4
5
6
7
8
9	AF238D30105	45330	AF238D30105	48 30 2.4	...	...	...	...	...	...
10
11

**OD, ID, Length and Surface checking
Mech. properties one no./ Job order**

Inspected Qty	26084nos
OK Qty	25560nos
Rej Qty	524nos

Cutting & Chamfering

Cutting Qty	26084nos
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100% NDT checking for Crack

Inspected Qty	1821nos
OK Qty	1753 nos in Log length = 26295Cut length
Rej Qty	68nos in Long length



Production Detail at Avadi Plant

Straightening

Tempering

Drawing

TUBE PRODUCTS OF INDIA TFF CELL 16 ROOL STRAIGHTENING & ECT PRODUCTION REPORT														
BL NO.	JOB ORDER NO	RC NO	MATERIAL	SIZE IN MM OD ID THICK	LENGTH (MM)	ACCEPTED		RENG		DEF		REMARKS		ESP
						STD	ECT	TAG	IN	TAG	OUT	ECT		
1	AF123800055004	AS2380004	304L	24										
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														

REMARKS

TUBE PRODUCTS OF INDIA TFF CELL-TEMPERING FURNACE PRODUCTION REPORT									
PARAMETERS			UOM	READING					
POWER	KW	320		Raw water inlet temp					
TEMPERATURE	DEGREECENTIGRADE			Raw water outlet temp					
SPEED	MPM	24		DM water inlet temp					
				DM water outlet temp					

RC NO	JOB ORDER NO	TUBE SIZE	MATERIAL	TOTAL	QTY	REJECTED	PENDING	TEST REPORT NO	ESP
AS2380004	AF123800055004	304L 24	TD-A7	111	111				
AS2380004		304L 24		111	111				
AS2380004		9		104	104				
AS2380004				111	111				
AS2380004				111	111				
AS2380004				111	111				
AS2380004				106	106				
AS2380004	AF123800055004	304L 24	TD-A7	111	111				
AS2380004				111	111				
AS2380004				110	110				

TUBE PRODUCTS OF INDIA TFF CELL 16 TON DRAW BENCHES PRODUCTION CURR INSPECTION REPORT															
DATE	SHIFT	RC NO	DRAWN TUBES	TAX CUT	MIDDLE CUT	BANK	JAMMING	BEND	REWORK	ID	WELDING	TAX MARK	BANK	TOTAL	ESP
10/01/2022	A	AS2380004	111											111	
10/01/2022	A	AS2380004	111											111	
10/01/2022	A	AS2380004	111											111	
10/01/2022	A	AS2380004	111											111	

Bend checking at initial setup

Production Qty	1821nos
OK Qty	1821nos = 27315nos cut length
Rej Qty	0

OD and ID checking during setup approval

Production Qty	1821nos Long length = 27315 nos cut length
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Production Qty	1887nso Long length
OK Qty	1821 nos in Log length = 27315 cut length
Rej Qty	66nos in Long length



Containment Action

Date	Raw + Ind+m/c @ ETL				Grinded @ETL				Plated @ ETL				Raw + IH @ Divya				Overall			
	OK	Suspected	Rej	Total	OK	Suspected	Rej	Total	OK	Suspected	Rej	Total	OK	Suspected	Rej	Total	OK	Suspected	Rej	Total
14-03-2023	674	135	0	809	152	10	0	162									826	145	0	971
15-03-2023					2312	129	2	2443									2312	129	2	2443
16-03-2023					356	29	3	388	5554	230	3	5787					5910	259	6	6175
17-03-2023									5322	162	0	5484					5322	162	0	5484
18-03-2023									3494	154	0	3648					3494	154	0	3648
19-03-2023													1419	776	0	2195	1419	776	0	2195
20-03-2023					3711	200	0	3911	0	0	0	0	3603	1103	0	4706	7314	1303	0	8617
21-03-2023					4553	220	0	4773	2952	87	0	3039	3308	776	0	4084	10813	1083	0	11896
22-03-2023					5450	337	0	5787	0	0	0	0	0	0	0	0	5450	337	0	5787
22-03-2023					5029	162	0	5191	0	0	0	0	0	0	0	0	5029	162	0	5191
	674	135	0	809	21563	1087	5	22655	17322	633	3	17958	8330	2655	0	10985	47889	4510	8	52407

Note: From Suspected qty 4510Nos , 75nos verified for Hardness and found ok

Date	Assembly @ Banglore WH				Cumulative
	OK	suspected	Rej	Total	
27-03-2023	476	0	0	476	476
28-03-2023	1367	0	0	1367	1843
29-03-2023	1366	0	0	1366	3209
30-03-2023	1506	0	0	1506	4715
31-03-2023	300	0	0	300	5015
				5015	

Customer : Endurance
Size : 30.25x24x555.5mm

Date : 25-03-2023

C - Deteced at ETL during Eddy sorting

B - Deteced at ETL during Eddy sorting

A -Detected at ETL during bend removal



Sample	Testing	A1	A2	A3 (IH&T) Area	A4	A5	Inference	
Sample A Tube + IH	Surface Hardness (along the Length)	<p>Groove Side | Hardness ok | IH area | Low Hardness | Thread side</p> <p>Sample A Tube + IH | 26.5, 26.2, 27.7, 27.3, 25.6, 28.7, 29.3, 27.3, 25.9, 25.1, 25.0, 27.4, 26.3 | 34.2, 40.6 | 11.0, 12.5, 12.3</p>					<ol style="list-style-type: none"> 1. Low hardness observed thread side 2. Groove side hardness observed OK 3. Partial Decarb observed 0.02 - 0.05mm. 4. Peralite and ferrite structure observed and no significant difference seen both Low hardness and OK hardness area 	
	Surface HRC	<ol style="list-style-type: none"> 1. 25.6, 26.4, 24.5, 24.7 , 2. 27.3, 26.8, 27.0, 28.4 		25.4, 27.2, 27.6, 26.0	Off cut sample	11.3, 10.4, 10.8, 9.7		This portion with Customer
	Micro at 200X							
	Decarb- (mm)	0.015 -0.05						0.02 - 0.05
Sample B Plated	Surface Hardness (along the Length)	<p>Groove Side | Low Hardness | IH area | Low Hardness | Thread side</p> <p>Sample B Plated | 14.5, 13.5, 11.5, 16.4, 10.3, , 10.7, 10.8, 11.1, 11.0, 13.4, 13.2, 13.3 | 41.2, 41.3, 41.5 | 12.1, 12.3, 11.5, 12.2, 12.5, 12.7, 12.4, 14.7, 11.2, 10.2</p>					<ol style="list-style-type: none"> 1. Low hardness observed both thread and Groove side 2. No Decarb observed 3. Peralite and ferrite structure observed and no significant difference seen in the microstructure 	
	Surface HRC	<ol style="list-style-type: none"> 1. 10.7, 13.3, 11.2, 12.6 2. 10.1, 10.5, 11.0, 10.3 		10.8, 11.5, 12.3, 11.7	39.5, 40.4, 40.1, 39.6	12.1, 11.4, 11.8, 12.9		12.8, 13.2, 11.8, 12.7
	Micro at 200X							
	Decarb- (mm)	No decarb						No decarb

Analysis report

	C1	C2	C3 (IH&T area)	C4	C5	
Surface Hardness (along the Length)	Groove Side Hardness ok		IH area	Low Hardness	Thread side	
Sample C Plated	25.1,25.8,25.3,25.6,25.0,25.2,27.5, 25.9,25.3, 26.0, 27.7, 25.5,26.2,25.8,25.2		41.5,41.8,41.3,40.9	14.0,14.5,10.8,11.1,11.0,11.6,11.1,12.2,10.8, 11.5, 13.4,11.6		
Surface HRC	1. 25.6,26.0,26.3,25.8 2. 26.7,25.8,27.2,28.2		25.3,26.4,27.0,25.8	39.8,40.1,39.5,39.2	10.9,11.4,11.6,11.1	12.2,12.1,11.6,11.4
Sample 3 Plated						
Micro at 200X						
Decarb-	No decarb				No decarb	
Summary :	<p>Out of 3 samples , 2 sample hardness low at thread side area only and Hardness ok at groove side area</p> <p>One plated sample found hardness less throughout the length of the tube</p> <p>Black scales or burn type surface not seen in the Sample A tube condition</p> <p>No relation found between decarb and the hardness in the given sample</p>					
Conclusion :	Simulation to be carried out at Induction tempering furnace (TPI) and Induction Hardening process at customer end to confirm the root cause					
K. S. Murali Ast.Mgr - Lab					A.Mohan (Sr.Mgr -Metallurgist)	
Prepared By					Checked by	

1. Low hardness observed thread side
2. Hardness found ok at Groove side
2. No Decarb observed
3. Peralite and ferrite structure observed and no significant difference seen both Low hardness and OK hardness area

Simulation trials

Hardness results for the Simulation trial samples

Specification : Power -200 +/- 10KW , Speed - 20mpm +/- 2

Hardness Spec : 24 +/- 4HRC

Date : 29-03-2023

Trial No.	Trial Details	Description	Location 1 (HRC)				Location 2 (HRC)				Location 3 (HRC)				Location 4 (HRC)				Location 5 (HRC)				Inference	Significant Status
			28	29	30	28	28	31	29	30	30	30	28	29	29	29	28	29	28	28	29	28		
1	Speed -20mpm , Power -203KW	Regular condition	28	29	30	28	28	31	29	30	30	30	28	29	29	29	28	29	28	28	29	28	Hardness found ok	Insignificant
2	Power - 203kw , Speed 16 MPM	Speed reduced by 4 MPM	24	22	25	25	24	25	24	24	26	24	23	23	26	23	22	25	25	25	25	24	1. Hardness found 22-25HRC and not matching with failed part Hardness 2. No visual difference	Insignificant
3	Power -200kw , Speed 14 MPM	Speed reduced by 6 MPM	24	23	23	24	24	25	25	24	22	23	24	23	24	24	22	22	23	24	24	24	1. Hardness found 22-25HRC and not matching with failed part Hardness 2. No visual difference	Insignificant
4	Tube Jerk	Tube holding 2 - 3 sec and repeat the same for 3 times in same tube	28	26	24	26	29	29	29	27	29	27	30	28	29	28	29	25	26	27	29	29	Hardness found ok	Insignificant

Simulation trials

Trial No.	Trial Details	Description	Location 1 (HRC)				Location 2 (HRC)				Location 3 (HRC)				Location 4 (HRC)				Location 5 (HRC)				Inference	Significant Status
5	Tube Stuck-up	Tube holding time 5- 6 sec	15	15	14	15	16	15	14	14	18	16	15	18	13	14	16	15	26	27	24	26	1. Hardness found 14-15 HRC and matching with failed part Hardness 2. end portion is hardness found ok because normal heating portion 3. Dark Black colour after tempering 4. Grey patch type surface observed after straightening operation and it is as like as failed sample	Significant
6	Power - 230 KW ,Speed -20MPM	Power increased by 30KW	26	27	25	28	26	26	28	25	27	27	27	25	27	28	25	27	28	29	27	28	1. Hardness found 24-28HRC and not matching with failed part Hardness 2. No visual difference	Insignificant
7	Power -241KW , Speed -20MPM	Power increased by 40KW	26	27	26	24	28	27	26	25	25	25	25	27	25	25	24	27	27	26	26	28	1. Hardness found 23-28HRC and not matching with failed part Hardness 2. No visual difference	Insignificant

Conclusion from Simulation Trials

Out of 7 simulation trials , Trial Number 5 Tube struck up more than 5 sec in tempering line is matching with defective part Hardness and surface condition

Other simulation trials like power and Speed variation trials are not matching with failed part sample condition

Corrective Action

- 1. Separate bucket provided at tempering stage to quarantine the NG tubes – Completed 29-03-2023**
- 2. Auto paint spray system introduced during tube struck up in tempering line more than 3 sec -Completed 29-03-2023**
- 3. Interlocking of Tube struck up (more than 3 sec) and Tempering coil power off is provided - Completed -30-03-2023**
- 4. Hardness verification point added at tempering stage for each job order– implemented form 27-03-2023**

Corrective Action –Evidences

Separate bucket provided at tempering stage to quarantine the NG tubes



Corrective Action –Evidences

Auto paint spray system introduced for tube struck up more than 3sec



Corrective Action –Evidences

Hardness verification point added at tempering stage for each job order

HARDNESS READING

Date	Shift	RC No	Size	Hardness Range 24-32 (HRC)		
				Angle -1	Angle -2	Angle -3
27/3/23	B	A72330844	41.10x36.40x52.85	30	31	29
"	"	A92330650	30.10x23.95x30.70	29	29	30
"	C	A62330534	30.10x24x29.50	28	30	27
28/3/23	A	A9233643	30.10x23.95x30.70	26	28	25
"	"	A72330638	41.10x36.40x52.85	26	26	28
"	"	A62330485	30.10x24x29.50	27	27	29
TEM 28/3/23	B	A62330746	30.10x23.95x30.70	29	28	26
"	"	A62330479	30.10x24x29.50	30	29	29
"	C	A62330721	30.10x24x29.50	24	27	26
"	"	A62330590	30.10x23.95x30.70	28	27	28
29/2/22	A	A92330644	30.10x23.95x30.70	27	29	25

Standardization - SOP

Standard Operating Procedure (SOP)

Process Name :Stress relieving.	Module / DIV : M3-FFC	Original date : 05-FEB-2019																																							
SOP Number : FFC/online tempering/01	Machine Name : Online tempering Machine	Revision Date : 30/03/2023																																							
	Machine No : 13A106	Revision Number : 3																																							
Before starting	Operation : Regular Run	Control																																							
<p>1.Hand over discussion Running size details & Input material availability</p> <p>Balance quantity to complete the order (Today's production plan)</p> <p>2. Check the Machine & RM condition</p> <p>3. RM surface free from Dent mark, Line Mark, weld line chattering mark and etc.</p> <p>4. Check the Cooling Tower Fan Motor ON.</p> <p>5. Check the Cooling Tower Pump ON.</p> <p>6. Check the Cooling Tower water level.</p> <p>7. Main switch ON Tempering main panel board.</p> <p>8. Check the DM water level Tempering DM water tank.</p> <p>9. Check the Coil water flow Hardening & Tempering valve ON .</p> <p>10. Check the Coil sleeve condition.</p> <p>10. Check the Coil ID clean.</p> <p>11. Check the Parameter in Monitor.</p> <p>12.Cam block lobe permanently positioned upward</p> <p>13. Ensure the paint availability in the auto paint spray bottle</p>	<p>1. Press MASTER switch button ON.</p> <p>2. Press RAW WATER PUMP & COOLING TOWER button ON.</p> <p>3. chiller switch on .</p> <p>4. Press the cycle start button and run continuously.</p> <p>5. Ensure the tube cooling fan good condition in unloading stand.</p> <p>6. Ensure the tube in safety limits on unloading stand.</p> <p>7. After Complete the tempering tubes in Respected unloading stand with Route card.</p> <p>8. Each job order one sample to be cut and verified for surface hardness and record in hardness verification sheet . Hardness Specification -24+/- 4 HRC.</p> <p>8. If the tube get struck up in the coil during running, coil power will off and particular tube will be moved to NG bucket automatically</p> <p>9. Continuously follow in process record the power and Speed in the production log book</p> <p>10. If the straightening machine breakdown, switch off the tempering machine after conveyor getting full.</p>	<p>Process</p> <p>Coil selection</p> <table border="1"> <thead> <tr> <th>Tube Size</th> <th>Coil size</th> </tr> </thead> <tbody> <tr> <td>30.08 - 31.08</td> <td>40 mm</td> </tr> <tr> <td>33.10 - 41.20</td> <td>60 mm</td> </tr> </tbody> </table> <p>Safety:</p> <p>1.Wear hand gloves avoid skin Allergy cut injury.</p> <p>2.Not use compressor air for Human body cleaning.</p> <p>3.Wear Helmet avoid hit injury</p> <p>4. Ensure the safety while operating the machine</p> <p>5.Dont operate the M/c with out operating Knowledge</p> <p>6.Wear personal protective equipment with out fail</p> <p>Vital Operation</p> <p>1. Monitor tempering speed & power</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Power(KW)</th> <th>Speed(MPM)</th> <th>Coil</th> </tr> </thead> <tbody> <tr> <td>30.08x24</td> <td>200 ± 10</td> <td>20 ± 2</td> <td rowspan="5">40 mm</td> </tr> <tr> <td>30.10x23.95</td> <td>200 ± 10</td> <td>20 ± 2</td> </tr> <tr> <td>30.25x24</td> <td>200 ± 10</td> <td>20 ± 2</td> </tr> <tr> <td>31.08x24</td> <td>200 ± 10</td> <td>20 ± 2</td> </tr> <tr> <td>31.08x25</td> <td>200 ± 10</td> <td>20 ± 2</td> </tr> <tr> <td>33.10 X 27</td> <td>220 ± 10</td> <td>20 ± 2</td> <td rowspan="4">60 mm</td> </tr> <tr> <td>35.10 X29</td> <td>220 ± 10</td> <td>20 ± 2</td> </tr> <tr> <td>41.10 X35.80</td> <td>275 ± 10</td> <td>20 ± 2</td> </tr> <tr> <td>41.10 X36.40</td> <td>275 ± 10</td> <td>20 ± 2</td> </tr> </tbody> </table>	Tube Size	Coil size	30.08 - 31.08	40 mm	33.10 - 41.20	60 mm	Size	Power(KW)	Speed(MPM)	Coil	30.08x24	200 ± 10	20 ± 2	40 mm	30.10x23.95	200 ± 10	20 ± 2	30.25x24	200 ± 10	20 ± 2	31.08x24	200 ± 10	20 ± 2	31.08x25	200 ± 10	20 ± 2	33.10 X 27	220 ± 10	20 ± 2	60 mm	35.10 X29	220 ± 10	20 ± 2	41.10 X35.80	275 ± 10	20 ± 2	41.10 X36.40	275 ± 10	20 ± 2
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Sr No	Requirements.
1	Why horizontal action deployment not done. – Management side action required.
2	Submitted thickness variation FTA not at all satisfactory, Need detailed FTA with CFT approach.
3	NG parts analysis was not satisfactory. Need in-depth analysis like micro structure variation, Decarb level & does case depth wise hardness variation? etc.
4	Stage wise process parameters & implemented controls comparison required between Shirwal & Avadi plant
5	Q guarantee from Top management yet not received.
6	Being process expert we were expecting some more/ new trial by you for potential reasons , have you simulated all potential reasons of FTA ?
7	What is exact root cause for tube stuck up that is not clear from your PPT , pl. confirm
8	Status at Avadi against shrival MOM & trial.
10	Onsite verification date confirmation required for Etl representatives.

1. Why Horizontal action deployment not done – Management action required :

Mr. Santhosh Chalikwar is the customer centric person for Endurance who will ensure all actions Horizontal deployment across PAN TPI (Old and New Complaints)

During monthly quality review meeting with Endurance , the status of Implementation of HD will be shared

2. Submitted thickness variation FTA not at all satisfactory , Need detailed FTA with CFT approach :

FTA for the thickness variation arrived based on brain storming with all relevant Teams and all probable causes with respect to thickness variation identified and shared.

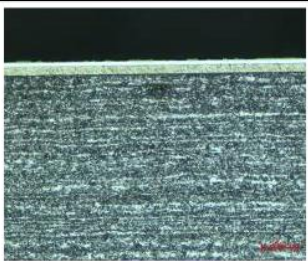
3. NG parts analysis was not satisfactory .Need in-depth analysis like microstructure variation , decarb level and does case depth wise hardness variation ? Etc.

No microstructure variation observed in the given sample and decarb level 0.025mm max observed

Endurance 30.25 X 24 X 555.5 Report															
Sample ID	Microstructure (200X magnification)		Distance in mm from OD -Hardness HV0.3											0.05 from (ID)	Remarks
	OD	ID	0.05	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3		
A1 (OK Hardness Portion)			274	305	307	309	314	306	319	315	314	216	302	286	Microstructure shows ferrite and pearlite structure. OD decarb 0.015mm, ID decarb 0.012mm observed
A3 (IH &T portion)			357	396	402	408	414	406	425	416	416	412	416	388	Tempered martensite structure observed
A4 (Low hardness Portion)			225	228	231	236	233	229	240	228	250	243	230	228	Microstructure shows ferrite and pearlite structure .ID decarb observed 0.022mm

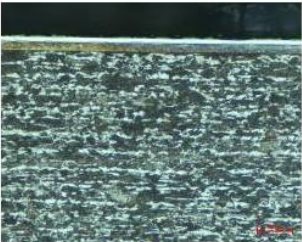
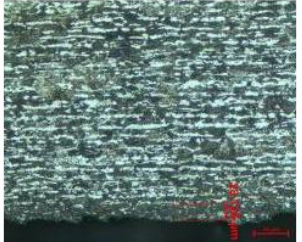
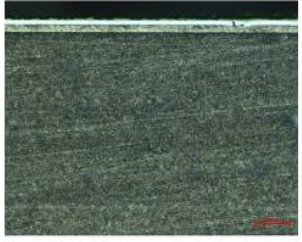

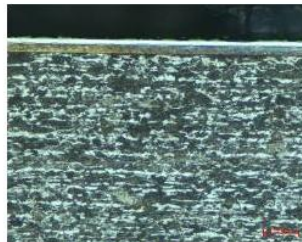
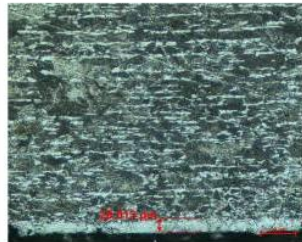
3. NG parts analysis was not satisfactory .Need in-depth analysis like microstructure variation , decarb level and does case depth wise hardness variation ? Etc.

No microstructure variation observed in the given sample and decarb level 0.025mm max observed

B1 (Low hardness portion)			227	227	229	231	234	242	227	231	239	228	225	223	Microstructure shows ferrite and peralite structure
B3 (IH&T portion)			421	414	421	439	432	423	419	418	432	436	402	418	Tempered martensite structure observed
B5 (Low hardness portion)			224	227	229	221	231	242	227	226	233	226	218	221	Microstructure shows ferrite and peralite structure .ID decarb observed 0.013mm

3. NG parts analysis was not satisfactory .Need in-depth analysis like microstructure variation , decarb level and does case depth wise hardness variation ? Etc.

No microstructure variation observed in the given sample and decarb level 0.025mm max observed

C1 (OK hardness portion)			306	305	301	309	311	308	313	317	314	317	301	296 Microstructure shows ferrite and peralite structure
C3 (IH&T portion)			436	443	434	441	443	441	441	436	443	432	418	436 Tempered martensite structure observed
C5 (Low hardness Portion)			221	222	217	215	212	218	218	222	219	232	217	216 Microstructure shows ferrite and peralite structure . Decarb in ID observed 0.012mm

4. Stage wise process comparison between Shirwal and Avadi plant ?

Stage wise process parameters and implemented controls comparison between Shirwal and Avadi plant available and same can be audited during ETL person visit

5. Q-guarantee not received from Top management

6. Being Process expert we are expecting some more /new trials by you for potential causes , have simulated all probable causes ?

Probable causes are identified and addressed in FTA

7. What is the rootcasue for the tube stuck up that is not clear in the PPT ? PI confirm

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8. Status at Avadi against Shirwal MOM and Trial ?

Trial at Shirwal	Trial at Avadi	Remarks
Purposefully tube hold in induction coil during tempering process	Tube stuck-up trial -Trial no -5	Low hardness observed in both plant trials
Conveyor speed reduced to 18 MPM against spec. of 24 MPM :- (Power as per spec. 85% only)	Speed reduced to 16MPM & 14MPM .trial no -2 &3	Low hardness not observed in Shirwal trial Hardness observed 22-25HRC in Avadi Trial
Air pressure drop below 5 Kg/cm ² against spec of 5 to 7 Kg/cm ²	Kicker pressure reduced to < 4 bar .Trial No- 8	Kicker is working in 1 bar also and no tube to tube hitting in Avadi plant
Induction furnace power reduced to 65% against spec of 85% :- (Speed of conveyor is 24 MPM)	Power increase trial taken with same speed	Low hardness not observed in Shirwal trial Hardness observed 22-25HRC in Avadi Trial
Past action:- Short length tube controls.	No short length produced in Avadi Plant	

8. Status at Avadi against Shirwal MOM and Trial ?

Controls :-

1. After tube red hot tempering furnace stop immediate (Programmer control)
2. Tempering furnace will not operated till rejection part(red hot) put in to rejection bucket. (Programmer control)
3. Separate pneumatic arm proved during off loading unloading & same operated through furnace controls panel.
4. Spray paint arrangement provided for rejected tube.

1. If tube struck up >3 sec heating will stop
2. Once the red hot tube moved to NG bucket then the loading bucket kicker will work
3. Not applicable because no off line unloading
4. Spray system introduced.

THANK YOU