MANUFACTURING / PROCESS FLOW CHART

Doc No.: F/01/06
Issued Date : 20/01/2010
Rev No : 01,01.07.2018

Part Name : Planetart Gear	**Key Contact : Mr. Vinod Kuntal**	**Code No:**	
Part No. : 4475_480_053_DES001 — **PART Rev. No. :- None (....)**	**Drg. no. : 4475_480_053_DES001**	**APQP Ref. No:**	
Customer : ZF India	**Drg. Rev no. - None (....)**	**Orign Date ; 05.11.22**	**PFD Rev. no./date - 03/27.06.2024**

Process No.	Process Description	Process Flow Symbols						Incoming Source of Variation	Process Characteristics	Product Characteristics	Risk Assessment Level
10	Raw Material Incoming & Inspection						If material found not ok → RM send to supplier Ok PART Move to next opn	Incoming Size & Material	Check Heat No. & Material Grade etc with documents	As per Forging Drawing Material - ZF7B RM Dia. - Ø65.0 PR | 3	High
20	Billet Cutting						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Weight Variation	Digital Weighing Scale	As per Forging Drawing	Medium
30	Billet Heating						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Over Heating / Under Heating	Infrared Pyrometer	Temp. = 1200˚C To 1250˚C	Medium
40	Forging (NHF-1000 ton)						If material found not ok → Reject Ok PART Move to next opn	Crack, Mismatch, Dimensions Variation	Die Setting / Tool Wear & Tear	As per Forging Drawing	High
50	ISO thermal Annealing						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Different heat variation	As Per ZFN-15-93/B1 for ISO thermal Annealing	Hardness and Microstructure Study	High
60	Shot Blasting						If part found NG → Rework If part found Not OK Ok PART Move to next opn	Heavy Scaling on Part Shot Size / Grade	loading, cycle time & Shot flow	free from scaling	Medium
70	Pre Machining						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Dimensions Variation	Spindle Speed : 750 RPM Cutting Speed: Manual	Dim. As Per Pre M/c Drawing	Medium
80	CNC First						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Dimensions Variation from Pre M/C Hardness Variation	**For Bore & Height** Spindle Speed:2200rpm Cutting Speed: 280mm/min Feed rate: 0.15 mm/rev	Dim. As Per CNC M/c Drawing	High
90	CNC Second						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Dimensions Variation from Pre M/C, Hardness Variation	**For FACE:** Spindle Speed:2200rpm Cutting Speed: 280 mm/min Feed rate: 0.15 mm/rev **For OD,Bore & Height** Spindle Speed:2200rpm Cutting Speed: 280 mm/min Feed rate: 0.15 mm/rev	Dim. As Per CNC M/c Drawing Bal #7_Run Out 0.02 MM PR | 1 Bal #16_Bore 71.80 H7 (+0.030) MM PR | 2	High
100	Marking						If part found NG → Rework If part found Not OK → REJECT Ok PART Move to next opn	Heat code Year & Week of production GT Logo N CNH Part No. vender logo.	As Per SOP for Marking	Marking Should be free from Burr & Marking Depth	High

110	MPI						If material found not ok Rework REJECT Ok PART Move to next opn	Powder con. Liquid, Light-UV, Holding time, Amp.	UV-1000, MPI Liquid con. - 4/5 %, Amp.	Crack on Face and OD	High
120	Final inspection						If part found NG If part found Not OK Rework REJECT Ok PART Move to next opn	Unproper Finish Turned Parts from CNC, Crack , tool marks and etc.	Visual inspection not proper	free from Burr and Rust & Scaling	High
130	100% visual Insp.						If part found NG If part found Not OK Rework REJECT Ok PART Move to next opn	Inadequate Inspection of All perameter as per Drawing	Trained Inspection & Calibrated Measuring Instruments	Dim as per final Inspection Drawing	High
140	Apply Rust Preventive (As per customer required)							Rust Handling Damage, Deeping Time Rust Preventive Type Concentration	Rust Dents	Material Handling Diping & Stacking Discarding of Rust Preventive	Medium
150	Packing							Part Without rust preventive oil	Packing Method Packing Standard Material Handling Sticker	No. of Pcs / Box with Part no., Heat No.	Medium
160	PDI						If part found NG If part found Not OK Rework REJECT Ok PART Move to next opn	Unproper Finish Turned Parts from CNC, Crack , tool marks and etc.	Visual inspection not proper	free from Burr and Rust & Scaling	High
170	Dispatch							Unidentified Part Boxes	Transportation Channels	Wrong Material Dispatch	High
						Process Type	**Transport** **Storage**	**Loading / Unloading**	**Inspection**	**Operation**	

Prepared By: Sonu jangid

Approved By: Deven Bhatia

Amendment History			
Rev. No.	Rev. Date	Process Revised	Revision Description
1	03.05.2024	All	Revised againest ZF observation (Mr. Chockklingam)
2	14.05.2024	All	SPC with Control charts added for Special Characteristics in process, PDI checking frequency changed for SLP- PCM Specifications , FI and PDI process Seperated
3	27.06.2024	All	MPI Process shifted after marking