

		Operation Process Chart (OPC)		Project: GT21		
				Doc. No.: AEC_512478_1A		
Part No.: 7800F20P40		Part Des.: BOLT-MACHINE, HEX, DRILLED		Date: 1402/12/07	REV: 1A	
OP. No.	Manuf. Process	Description (Short Text)	Activity Type	Control Type	Total time	Activity Unit
1	Cutting	Cutting from Raw material	Labour	Cont & Manuf.	10	M (Minute)
2	Turning	manual turning of raw material (billet) for preparing part to be inserted in the forging die (according to dimension of billet, this stage can be removed)	Machine	Cont & Manuf.	30	M (Minute)
3	Cutting	sizing the billet according to the dimension of final part	Machine	Cont & Manuf.	30	M (Minute)
5	Hot Forming	Hot forging the head of bolt via 250 ton press machine The temperature of the part reaches to 950 °C (heating is done via induction method) The temperature of the die reaches to 350-400 °C.	Machine	Cont & Manuf.	10	M (Minute)
6	Solutioning	Solution process is performed on the forged part 1 h to 1/5 h in 954°C and fast cooling is done in the water.	Machine	Cont & Manuf.	1.5	H (Hour)
7	Aging	Aging process is performed on the forged part 4h to 8h in 538 °C. Cooling process is done in air.	Machine	Cont & Manuf.	8	H (Hour)
8	Turning	Manual turning shall be done on the forged part to remove flashes and oxidized places. Tail stock center is drilled in this stage.	Machine	Cont & Manuf.	30	M (Minute)
9	Milling	Hex head of the bolt is machined via milling machine.(The shank of the part is fixed in the three jaw chuck)	Machine	Cont & Manuf.	1	H (Hour)
10	Turning	The part is fixed via hexagonal head and then according to tolerances and features manual turning or CNC turning is done and in this step the length of the part will be finalized. In this step, the central hole of the head is drilled.	Machine	Cont & Manuf.	30	M (Minute)
11	Cylindrical Grinding	Cylindrical grinding is done on the above part of the thread.	Machine	Cont & Manuf.	1	H (Hour)
12	Rolling	The head-to-shank radius is applied on the part via cold working with grinded roller (8 ton rolling machine)	Machine	Manufacturing	15	M (Minute)
13	Roll Forming	Threading is done via rolling method (8 ton rolling machine)	Machine	Cont & Manuf.	10	M (Minute)
14	EDM	The part is fixed from HEX side and safety-wire holes are produced via super-drill machine.	Machine	Cont & Manuf.	1	H (Hour)
15	Cleaning	deburring and cleaning	Labour	Manufacturing	15	M (Minute)
16	Marking	Marking	Machine	Manufacturing	10	M (Minute)
17	Packaging	packaging	Labour	Manufacturing	10	M (Minute)

Notes:		Created	Checked	Approved
		Employee ID: 5135	Employee ID: 1466	Employee ID: 1724
		Date:1402/12/07	Date: 1402/12/07	Date: 1402/12/07