


|  | | Operation Process Chart (OPC) | | | Project: GT21 | |
|---|----------------|--|---------------|---------------|------------------|---------------|
| | | | | | Doc. No.: | AEC_512812_1A |
| Part No.: 7850F20P07 | | Part Des.: NUT-PLAIN, DRILLED HEX | | | Date: 1403/02/18 | 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 | Cutting the billet longer than final part to grip the part from this excess side in the turning step. | Machine | Cont & Manuf. | 30 | M (Minute) |
| 4 | Solutioning | Solution annealing is performed on the raw material 1 h in 980 °C and fast cooling is done in the water. | Machine | Cont & Manuf. | 1 | H (Hour) |
| 5 | Hot Forming | Hot forging the cylinder (compressing the cylinder) 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 surfaces. In this step, central through-all hole is drilled. | Machine | Cont & Manuf. | 30 | M (Minute) |
| 9 | Threading | manual threading | Labour | Cont & Manuf. | 30 | M (Minute) |
| 10 | 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. | 2 | H (Hour) |
| 11 | Turning | finalizing the length and removing the excess side is done in this step via turning machine. | Machine | Cont & Manuf. | 1 | H (Hour) |
| 12 | EDM | The part is fixed from HEX side and safety-wire holes are produced via super-drill machine. | Machine | Cont & Manuf. | 1 | H (Hour) |
| 13 | Cleaning | deburring and cleaning | Labour | Manufacturing | 15 | M (Minute) |
| 14 | Marking | Marking | Machine | Manufacturing | 15 | M (Minute) |
| 15 | Packaging | Packaging | Labour | Manufacturing | 10 | M (Minute) |

| Notes: | | Created | Checked | Approved |
|--------|--|-------------------|-------------------|-------------------|
| | | Employee ID: 5135 | Employee ID: 1466 | Employee ID: 1724 |
| | | Date:1403/02/18 | Date: 1403/02/18 | Date: 1403/02/18 |

