



Process Plan for Shaft Part

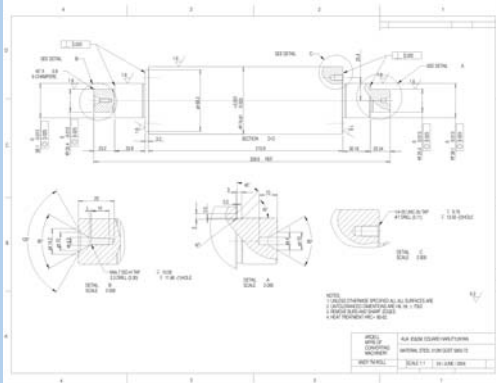
Author: Eduard Harutyunyan

Akian College of Science and Engineering & Arqell CJSC

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Introduction

Process planning is one of the key activities of the production company that specifies the processes, machines, and process parameters to transform the blank material into the desired shape. Alternatively, it can be defined as the act of preparing detailed work instructions to produce a part. The modern CAE programs allow to automate this process. This project was done jointly with Arqell CJSC, a manufacturer of components for printing machines. The goal of the project was to prepare a process plan based on the technical drawing provided by the company. For some of the processes, CNC programs were also generated.



The production drawing was provided by the design department of the company. Besides the views and sections, it contains dimensions, dimensional and geometric tolerances, surface finish, and heat treatment requirements. The drawing also specifies the material of the part. The technical information provided by the design engineer via production drawing should be as complete as possible because it predetermines nearly all the decisions made by the process planner.

- ### Process Flow
- 005 **Blanking**
 - Cutting a workpiece to 78 X 331
 - 010 **Turning screw cutting**
 - Facing the w-piece to 328.6 through 2 installations
 - Drilling central holes and screw cutting M4 through 2 installations
 - Turning of surfaces 25.4_{±0.015} to 27 through 2 installations
 - 020 **Turning screw cutting**
 - Initial turning of surfaces with 0.8 mm allowance through 2 installations
 - 030 **Radial drilling**
 - Drilling and screw cutting of 4 holes 1/4" 20 UNC final through 2 installations
 - 040 **Control**
 - Controlling dimensions
 - 050 **Thermal**
 - Hardening to HRC 60...62
 - 060 **Turning screw cutting**
 - Fetting of central holes through 2 installations
 - 070 **Round grinding**
 - Grinding of surfaces final
 - 080 **Control**
 - Controlling dimensions

We developed the manual draft process plan together with the process planner of the company. This plan lacks information about cutting parameters and work-holding accessories added later in the computer-aided process plan (CAPP).



Based on the manual process plan, the author defined the process sequences, including them in the corresponding setups. The new setup is created when there is a need to change the work-holding accessory or to reposition the workpiece. In the pictures, the surfaces of the workpiece in progress are in green. Completely machined and ready surfaces are in grey.

To document the process plan and develop a manufacturing database, the author generated the drawings of each process, which included workcells (machine tools), fixtures, cutting tools, cutting parameters, and, if necessary, toolpaths generated in the previous stage.