# "Analysis of the Technological Sketch of the Shaft, Developed using the Program Corel Draw"

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At first sight, the "Shaft" part would seem to have a simple structure in relation to other machine parts. But, sometimes Shafts are found with a very complex design. Their complexity is explained by the presence in their design of such surfaces as: grooves, chamfers, threaded surfaces, flats, beads, grooves, groove holes, fillets, etc., the images of which are shown below.

The shaft part itself is a moving part of the machine (rod), which rotates in supports (bearings) to transmit rotational motion and torque using gears, pulleys, etc.
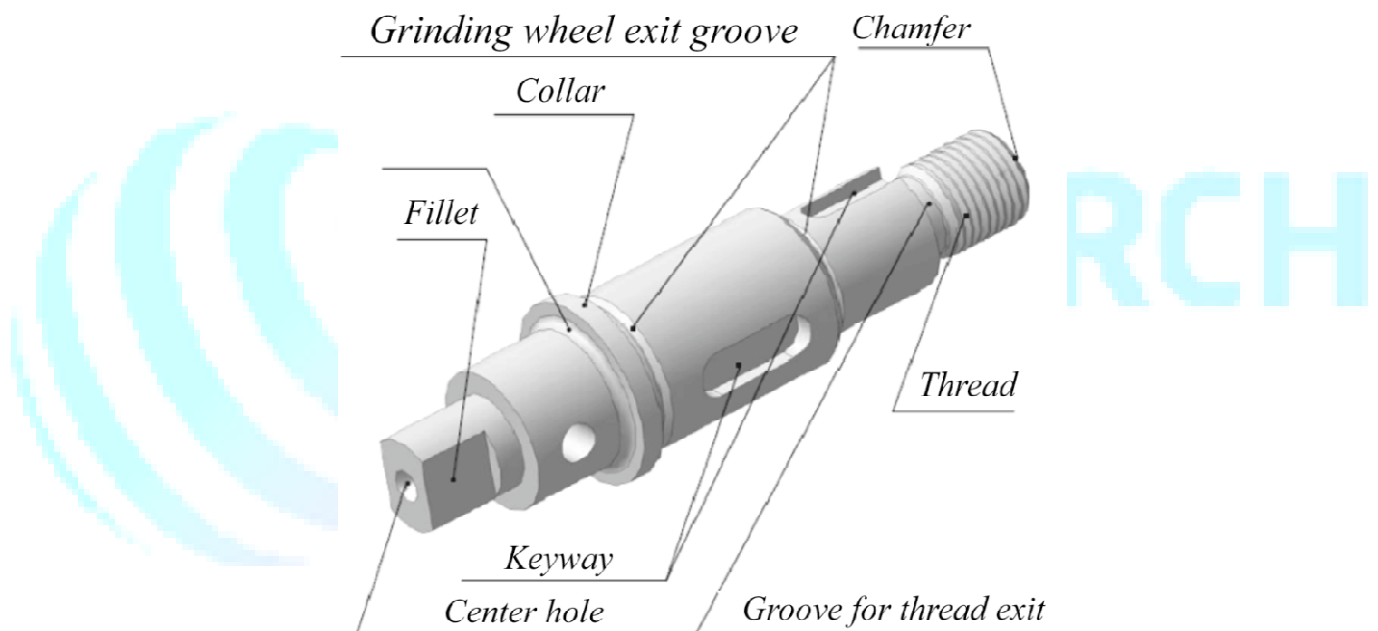
Structural and technological elements of the shaft

Regardless of its complexity, the shaft is depicted as a collection of the simplest geometric bodies or parts.
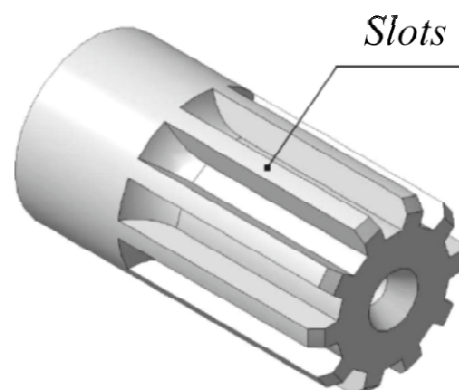
Splined shaft part

The structural and technological elements of the shaft are center holes, chamfers, fillets, grooves, grooves, keyways, flats, beads, threads, splines, made in accordance with the relevant state standards.

Sketching a shaft-type part from nature

Before proceeding with the sketch, you need to familiarize yourself with the construction of the detail and determine its structural and technological elements: center holes; grooves for the exit of the grinding wheel; thread grooves for thread exit; chamfers; flats; keyways; fillets; collars, etc.

For ease of sketching, the Corel Draw program was chosen, the work in which will not be difficult even for beginners. The program has many features and conveniences. The main elements from the Corel Draw toolbar that were used to create this Shaft sketch were: line through three points, straight guide, modification, circle, intersection, symbol, leader, dimension line. The toolbar of this program is not overly complicated.

When making sketches and working drawings, one should be guided by GOST 2.109-73 "Basic requirements for drawings".

The main view is positioned so that its axis is parallel to the title block of the drawing, since the "shaft" type part occupies a horizontal position during machining on a lathe. The image of the shaft in the drawing is placed on the right side, which is more difficult for turning, towards the binding format.
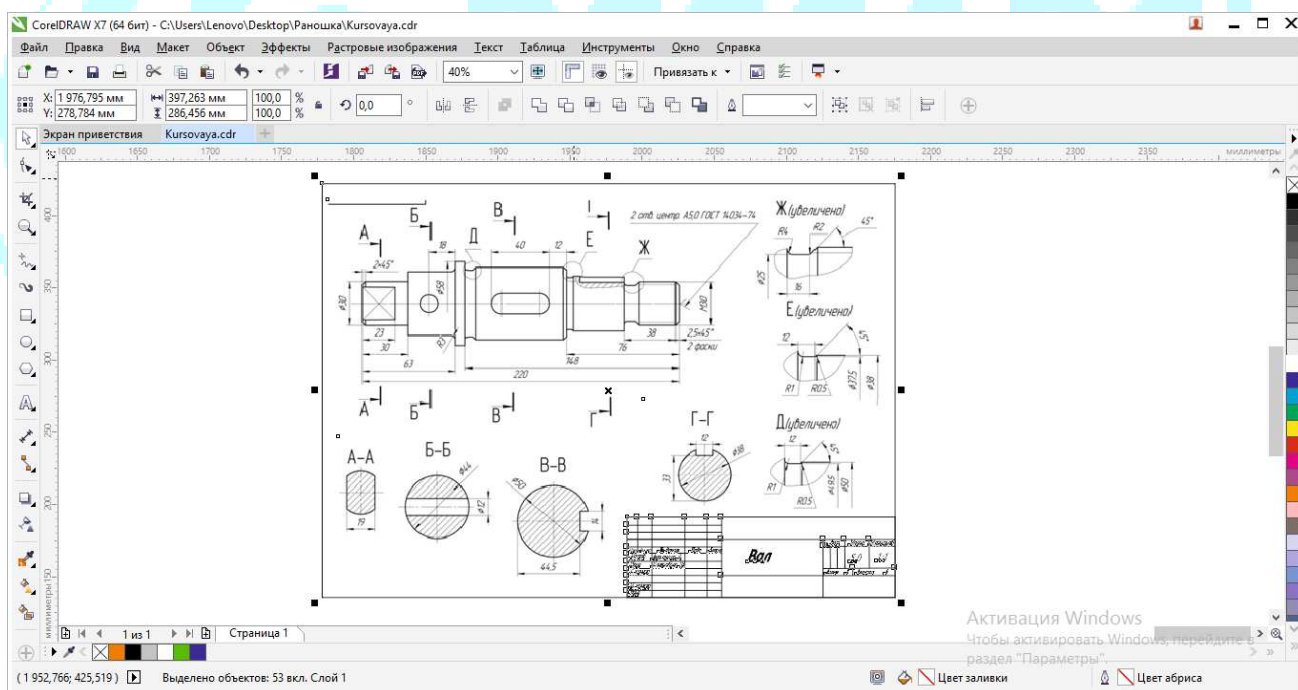
Shaft sketch

The sheet format is chosen based on the maximum linear dimensions of the shaft.

Then the necessary images (except for the main view) are determined: local views, sections, sections and detailing elements. The size of the image is set on the selected paper size.

Next, the ratio of the dimensions of the part and the location of the image on the sketch are determined. The image should be such that it is not difficult to read the sketch and dimension.

Then draw the axis of symmetry and the outer contours of the main view.

You can start sketching a shaft from the end of the shaft.

It is recommended to use standard ends: cylindrical - in accordance with GOST 12080-66 or conical - in accordance with GOST 12081-72. Cylindrical shaft ends are easier to manufacture, but require additional axial fixation of the fitted parts. Tapered shaft ends are more difficult to manufacture, but provide an easy, tight fit. They are recommended for high speed shafts.

If the shaft has holes, cuts, keyways, splines, grooves, grooves, then the main image must be supplemented with cuts, sections that reveal the shape of these elements, as well as extension elements and local views in accordance with the relevant GOST.

If the section of the shaft is intended for the fit of the part, then it is necessary to provide a chamfer at the beginning of the section: at an angle of 45º - when landing with a gap or transitional fit; at an angle of 30º - when landing with interference fit.

The lengths of the shaft sections are determined by drawing, taking into account the dimensions of the fitted parts, their relative position, the size of the required gaps between them, etc.

The sketch is outlined with a solid thick main line and hatching of cuts and sections is performed, as shown in Fig. 34.

Then the part is measured (the main tools for measuring parts are a steel ruler, a caliper, an inside gauge, a vernier caliper, a micrometer, an angle, radius and thread gauge).

Dimensional numbers, determined by measuring parts, when making a sketch, must be consistent with the numbers regulated by standards. Dimensional numbers are applied, choosing from a number of normal ones according to GOST 6636-69

Further, extension and dimension lines are applied. Dimensions are applied from the ends of the part.

The dimensions and shape of the center holes are selected from the table. 13-19 in accordance with GOST 14034-74. Examples of designation of center holes.

The dimensions of the chamfers and radii of curvature are selected from the table in accordance with GOST 10948-64.

The shape and dimensions of the keyways are selected depending on the diameter of the shaft from table. 21-23 in accordance with GOST 23360-78, GOST 24068-80, GOST 24071-97. Examples of images and dimensions of keyways in the drawing.

Having determined the profile, pitch, diameter of the thread, choose its designation from the table. 4. Examples of images and application of dimensions of the thread in the drawing.

The image and dimensions of the grooves for the exit of the grinding wheel are selected depending on the diameter of the shaft from the table. 27 in accordance with GOST 8820-69. An example of the image of the extension elements of the grooves.

The main dimensions and number of teeth of straight-sided splines on the shaft, according to the requirements of GOST 1139-80, must correspond.

Finally, you need to carefully check the sketch and eliminate errors and inaccuracies.

Literature:

1. Levyatov D.S., Soskin G.B. Calculations and design of machine parts: Textbook: for universities. M .: Higher school, 1986. - 280 p.

2. Maslov D.P. Mechanical engineering technology: Textbook. manual for tech. uch-sch. L.: Mashgiz, 1958.424 s

3. Tutorial training Corel Draw: https://tct.ru/upload/elekt_uchebnik/Corel/index.html