Automotive transmissions, like any other product, are in a constant state of competition, both between different transmission manufacturers and between different transmission designs. The product “transmission” must therefore not only satisfy its function but must also be economically producible and reach the desired level of quality. Basic requirements of product development are therefore knowledge of the manufacturing process and consideration of this even in the design phase.

In this chapter, mechanisms of several manufacturing methods in industrial transmission production will be presented in order to provide insight into geometry-generating processes. Several successive manufacturing processes (process chains) are required to produce component properties such as tolerances, surface qualities, strengths etc. If the obtainable accuracies of a method are insufficient to create the required tolerances, a further, more exact method must be connected to the process chain. For this reason, component-specific process chains are also represented, the design and optimisation of which as a whole can lead to much higher economical and technological savings than simply improving individual methods.

In addition, the later sections of the chapter will present organisational and methodical aspects of manufacture, e.g. work preparation, production systems or statistical process control. As a whole, the field of manufacturing technology is very broad, and knowledge thereof can be considerably deepened by pursuing the given literature.

Figure 16.1 shows the classification of manufacturing methods into 6 main groups in accordance with German standard DIN 8580 [16.1]. With respect to manufacturing chains, the components of a vehicle transmission can basically be divided into 5 classes:

1/ **Steel parts**: e.g. shafts, planetary gear carriers etc.
2/ **Cast parts**: housings, hydraulic valve plates, small cast components etc.
3/ **Geared components**: spur gears, geared shafts, bevel gears, sun gears, planetary gears, ring gears etc.
4/ **Sheet metal parts**: fine-blanked parts, formed parts etc.
5/ **Other parts**: sealing elements, filters, standardised parts, add-on parts etc.
In the following, process chains of the previously mentioned component classes 1/ to 4/ will be considered using the example of passenger car automatic transmissions.

### 16.1 Process Chains for Steel Part Processing

In the case of steel parts, especially shaft components (Figure 16.2), the process chain is generally composed of the following steps:

![Fig. 16.2. Typical shaft parts of an automatic gearbox (see also Figure 12.25)](image)