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Operational training · Metal working

Manual material processing

Chiselling

Text book

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Manual Material processing
Chiselling
3. Auflage 2013
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1. General information

This booklet is part of the METINA (methodenintegrierte Ausbildung (English: method-integrated training)) training concept for IMBE developed by RUHRKOHLE AG. The concept includes the following written documentation for each stage of the occupational training plan at RUHRKOHLE AG:

1. Theoretical information

2. Trainer manual

3. Documentation for practical exercises

4. Documentation for trainees

The training concept is based on the premise that the qualifications required in the Training Ordinance are taught from systematically organised documents and/or in the form of learning processes that are similar to training courses in their nature.

Chiselling belongs to the "Manual material processing" part of the training programme. It is offered as a training course.

Other skills included in this part of the training programme:

- **Scribing, punching, marking**
- **Measuring and checking**
- **Drilling, countersinking, reaming**
- **Sawing**
- **Filing**
- **Thread production**

The training course is self-contained. It teaches skills and shares knowledge in a practical setting as part of an occupational training framework designed to meet the needs of industrial mechanics. In completing the exercises, trainees will learn basic skills and recognise and consolidate fundamental work techniques.

The theoretical information contained in this booklet is part of a comprehensive multimedia resource library and is readily available to both trainers and trainees in the training location.

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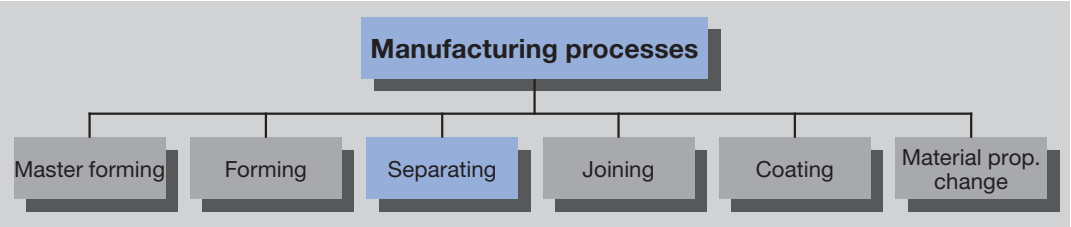
2. Categorisation of chiselling

2.1 Manufacturing processes

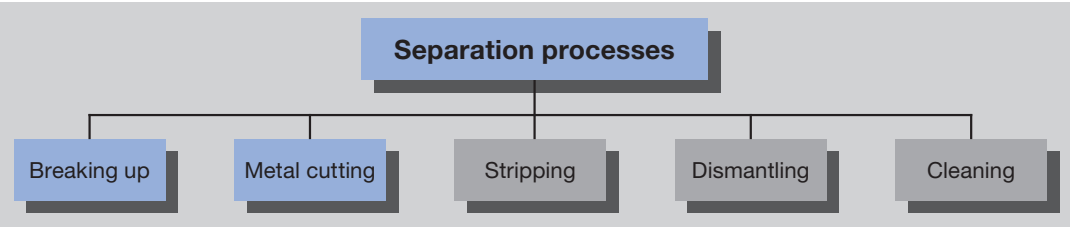
The manufacturing processes have been divided into 6 main groups according to DIN 8580.



F I

2.2 Separation processes

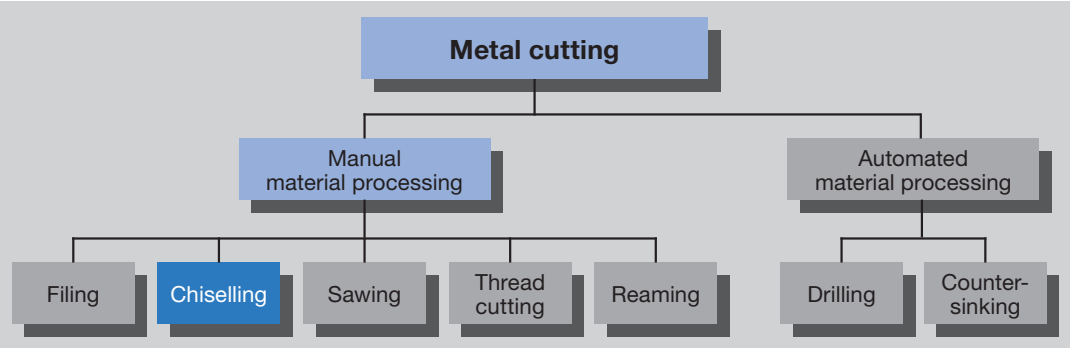
Separation processes are divided into 5 sub-groups according to DIN 8580.



F II

2.3 Metal cutting

Metal cutting processes are divided into the following skills:



F III

In the field of manual material processing, chiselling is a cutting or parting process depending on the particular application. According to DIN 8580, it is a separation process.

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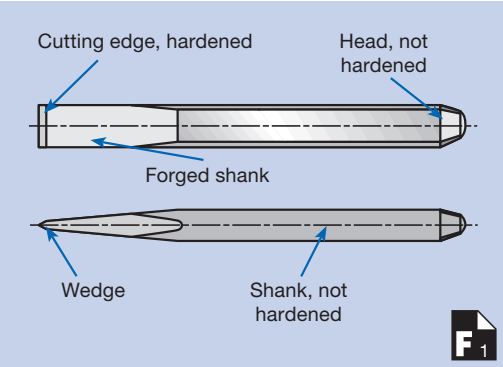
3. General principles

3.1 Components of the chisel

Chisel components



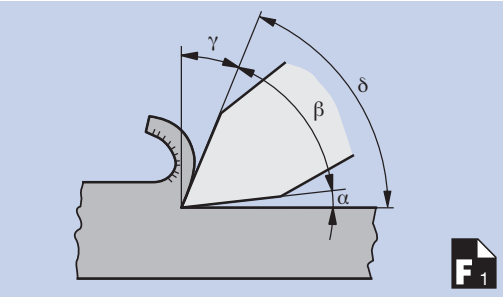
A chisel consists of:

- The cutting edge
- The shank
- The head

In order that they can penetrate the material, the cutting edges of chisels are hardened. However, shanks and heads must not be hardened, otherwise small metal parts could splinter off when chisels are used in conjunction with hammers.

3.2 Angle at the chisel cutting edge

Cutting geometry



α = clearance angle (alpha)

β = wedge angle (beta)

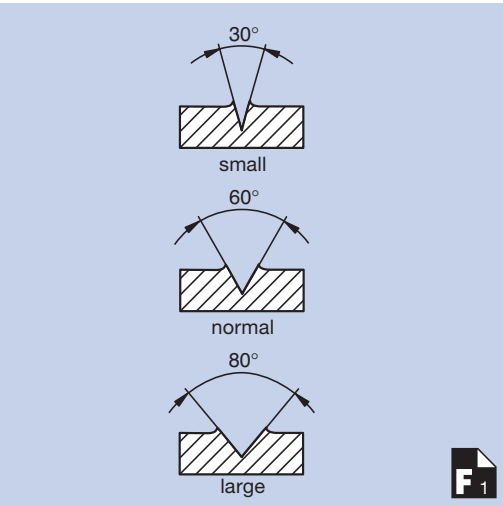
γ = rake angle (gamma)

δ = cutting angle (delta)

The clearance angle and the wedge angle combined equal the cutting angle.

3.3 Wedge angle for different materials

Wedge angle



Wedge angles between 30° and 80° are typical, where:

- 30° e.g. for wood, lead, aluminium, copper
- 60° e.g. for medium hardness steel, brass
- 80° e.g. for semi-hard and hard steels

are guide values.

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3.4 Factors influencing chip formation

Chip formation is determined by the material, the angles at the cutting edge, the cutting depth and the speed at which chips are removed.

The more brittle and harder a material, the smaller the chip fragments will be.

The greater the rake angle, the more the chip fragments will stick together (continuous chip). Buckling prior to shearing off decreases significantly at $\gamma = 10° \ldots 30°$.

The greater the cutting depth, the thicker the chip fragments are and the further they travel when removed. A rough cutting surface is formed.

Increasing the cutting speed makes chip removal flow more smoothly (the chips glance off the workpiece). This improves the surface quality of the workpiece.

Chip formation