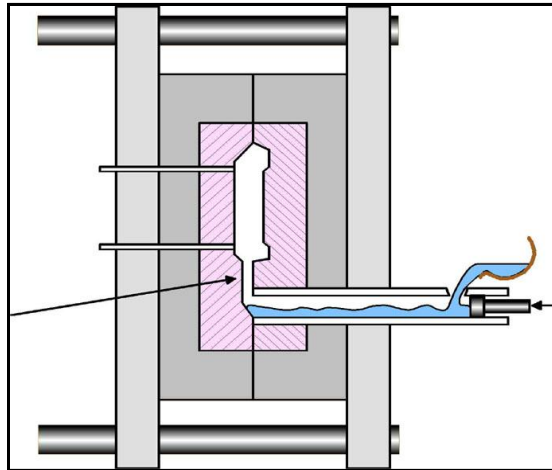


Manufacturing – What to find in this section

See also:

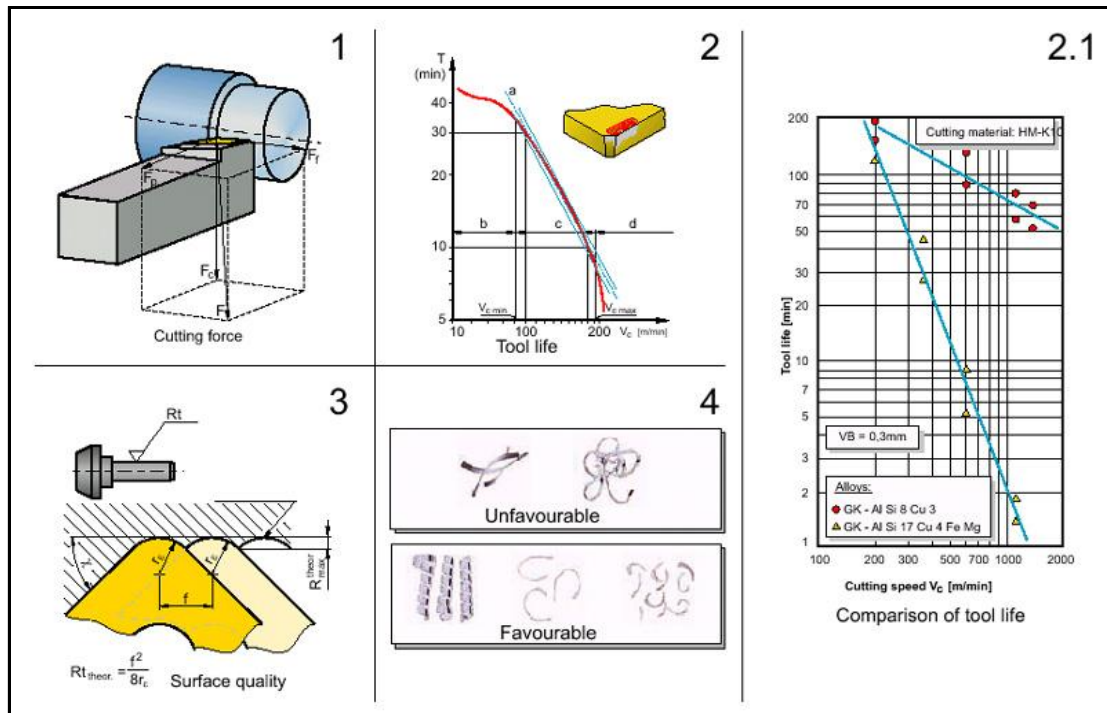
▲ AAM - Joining

A decisive factor in designing aluminium castings is the knowledge of the **characteristics of the casting process**. These are described for the most interesting casting methods.



An example of the numerous aluminium casting methods: High pressure die casting (schematic)

While tool life is no apparent problem in **machining aluminium**, chip formation, minimizing lubrication and cooling are important, particularly with regards to **HSC machining**. For optimum results tool materials and tool design must be properly selected.

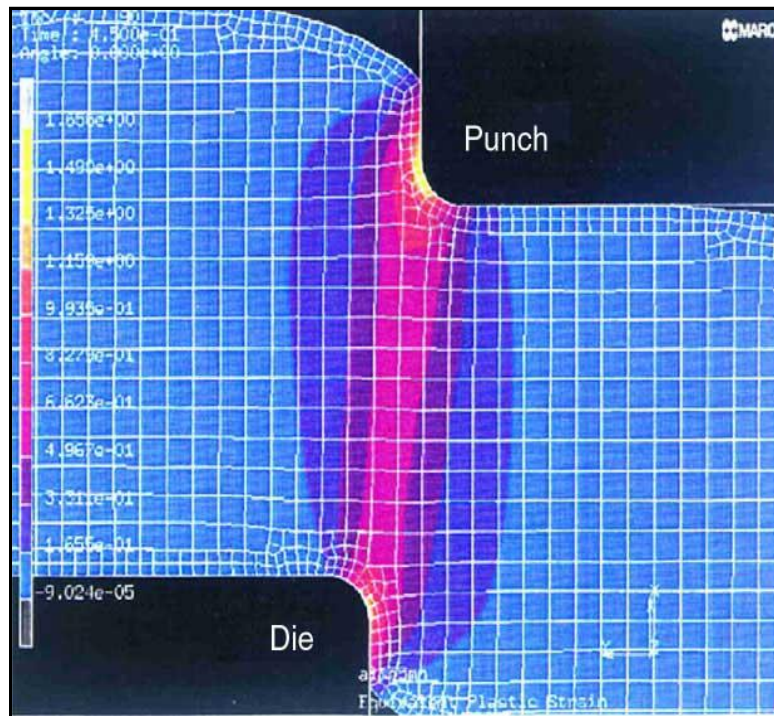


Machinability criteria for aluminium

Source: Plansee TIZIT, 2001

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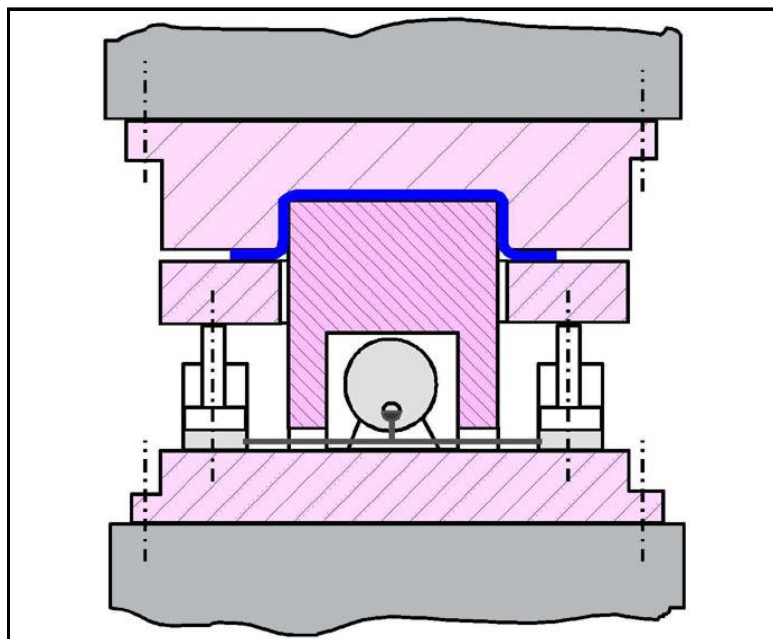
In **blanking** and **trimming** special care must be taken to select optimum parameters - especially die and punch radii and gap - to obtain good cut edge qualities and to avoid burrs and slivers.



Simulation of shear cutting of 1.2 mm 5182-0

Source: IFKM, Dresden, 1999

In **drawing aluminium body panels** special care must be taken with respect to press tool design, tribology and selection of the right press equipment. Recommendations are given.

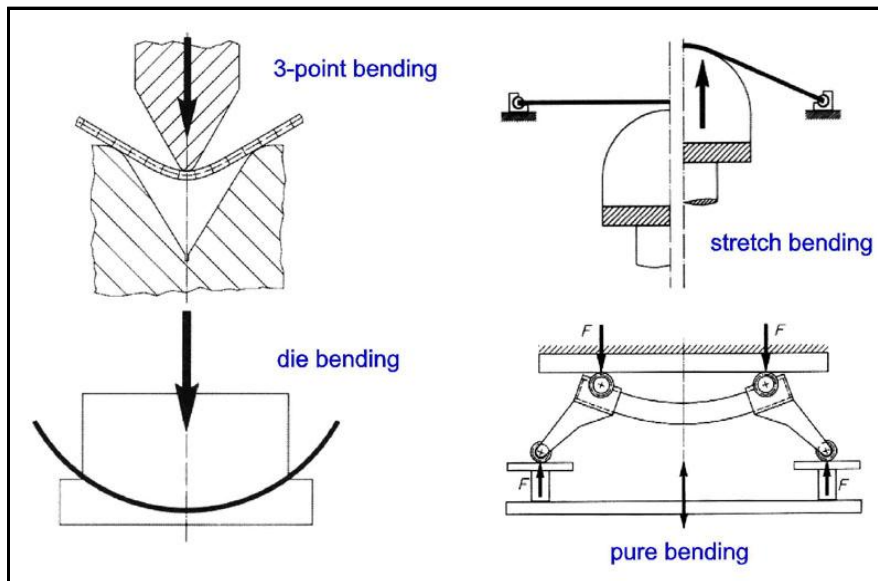


Drawing of sheet parts with nitrogen gas cushion (schematic)

Source: IfU Stuttgart

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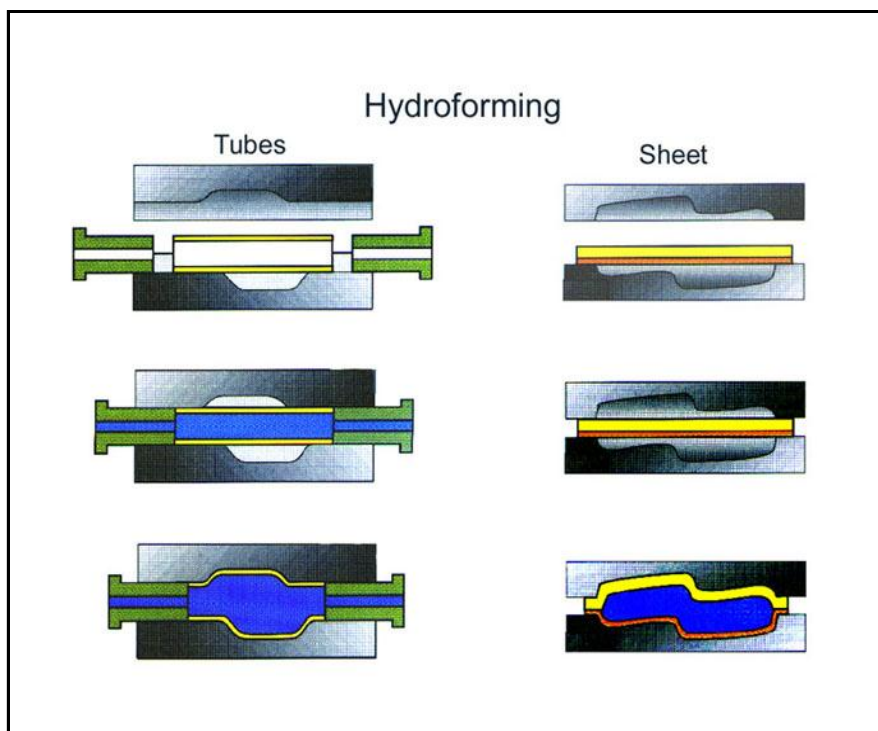
Basically, **bending of tubes and profiles** is one of the most demanding forming operations. Various bending methods are described, which give satisfactory results for aluminium. Extrusion design has to be tailored to the bending method for optimum results.



Principle bending methods for sheet, tubes and profiles

Source: Schnaas, VAW 1992

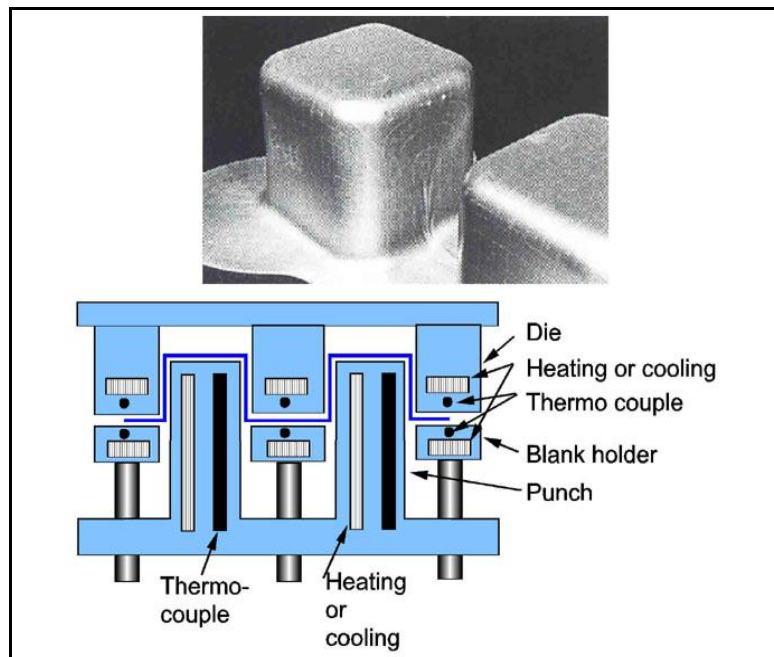
Hydroforming is particularly suited for aluminium, since it allows larger degrees of formability with little decrease of wall thickness. It is often used to calibrate bent tubing and hollow profiles.



Hydroforming methods for aluminium tubes and sheet (schematic)

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The formability of aluminium increases significantly at temperatures above 50°C. **Semi-warm forming** has a large potential for aluminium, especially in conjunction with coated blanks.



Semi warm forming of 5182-0 sheet

Source: Y. Abe und M. Yoshida, JILM, 1994

Surface finishing of semis supplied by the aluminium producer as well as of components or of the BIW assembly at the carmaker or supplier are described in this section. Emphasis is put on surface conditioning of aluminium semis and mixed metal assemblies.

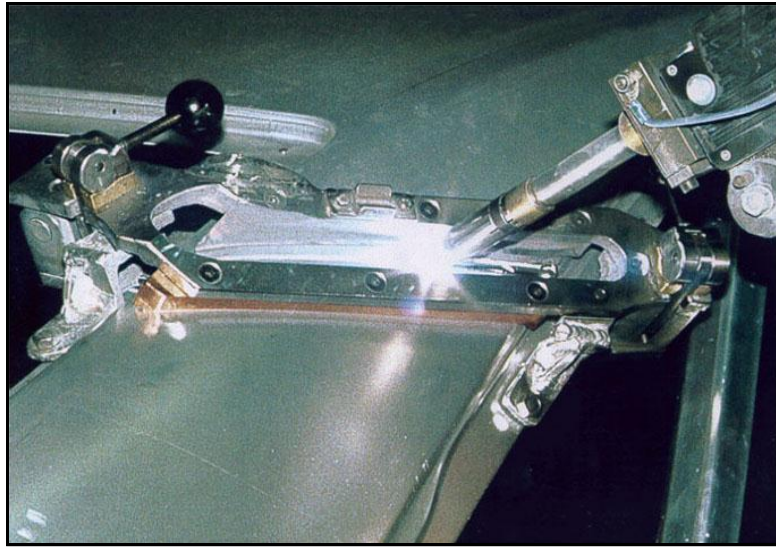


Methods of surface treatments for aluminium

Source: Alusuisse

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Joining methods are key technologies for the application of aluminium to automotive structures and components. All important joining methods are reviewed in this section.



Welding of exterior body panel

Source: Audi AG 2000