FIGURE 2.1

Survey of designers' knowledge of manufacturing processes. (Adapted from Bishop, R. *Huge Gaps in Designers' Knowledge Revealed*, Eureka, October 1985.)

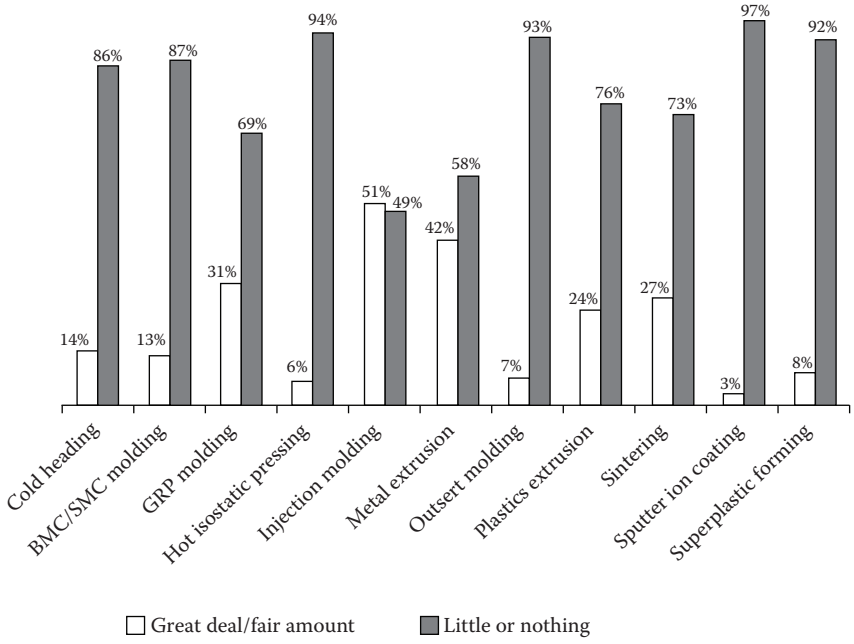


FIGURE 2.2

Survey of designers' knowledge of polymer materials. (Adapted from Bishop, R. *Huge Gaps in Designers' Knowledge Revealed*, Eureka, October 1985.)

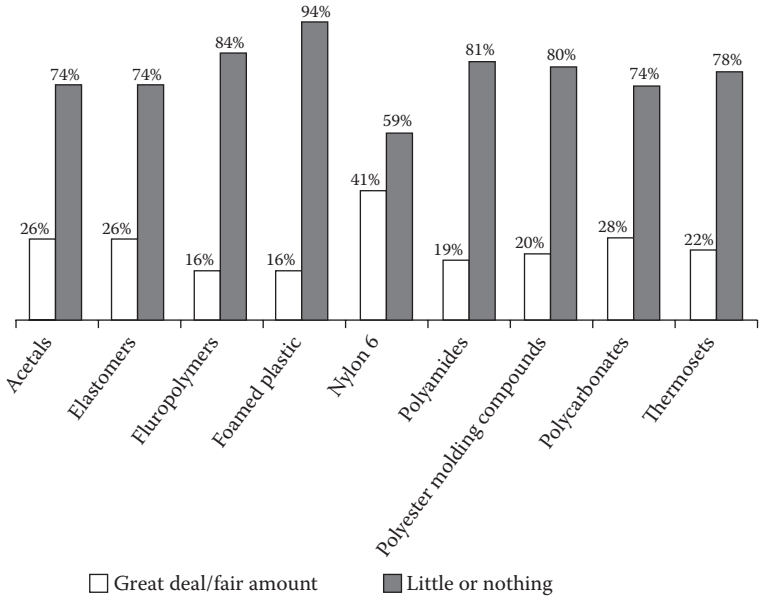


FIGURE 2.3

Compatibility between processes and materials.

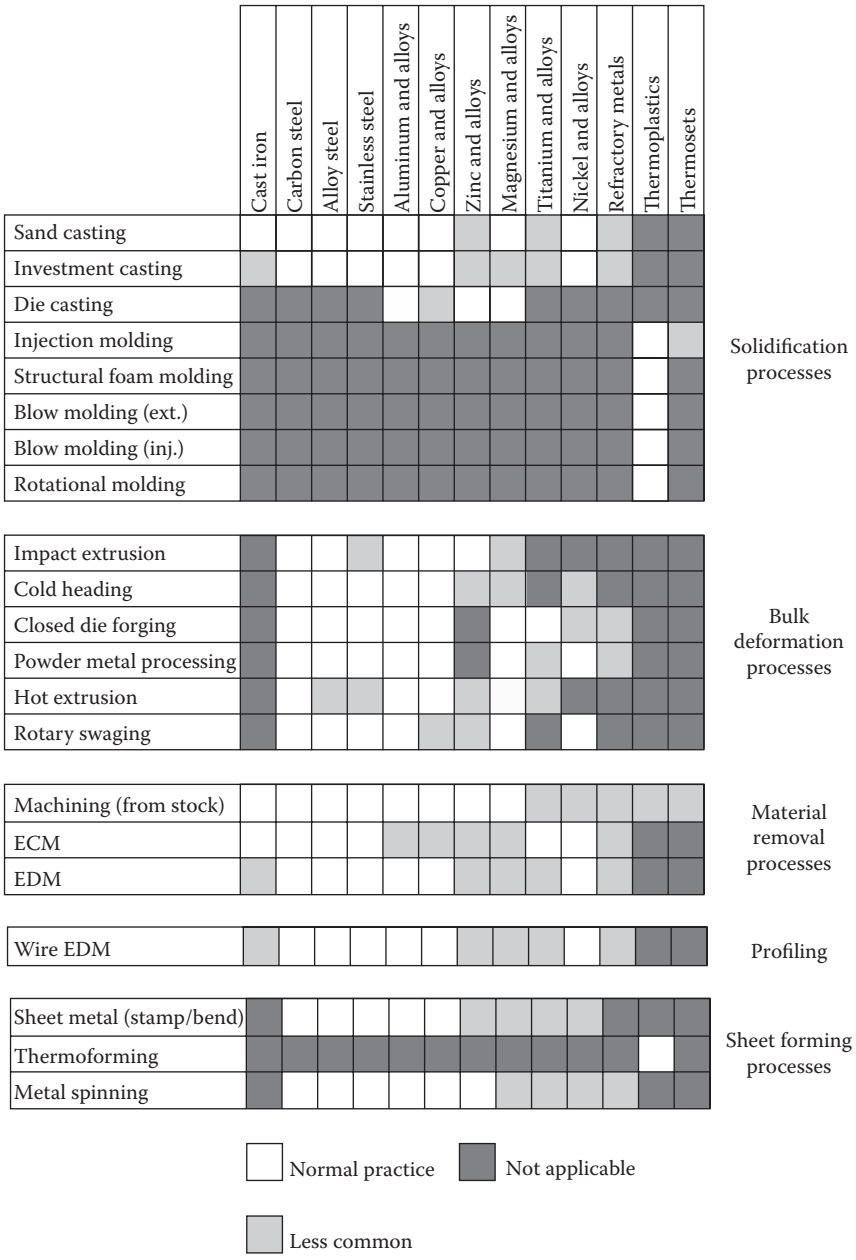


FIGURE 2.4

Membership functions for material and process selection.

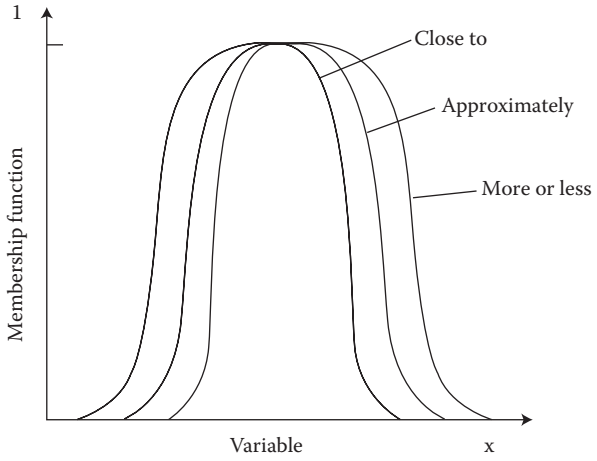


FIGURE 2.5

Selection of sintered powder materials by membership function modification. (Adapted from Farris, J. *Selection of Processing Sequences and Materials During Early Product Design*, Ph.D. Thesis, RI, 1992.)

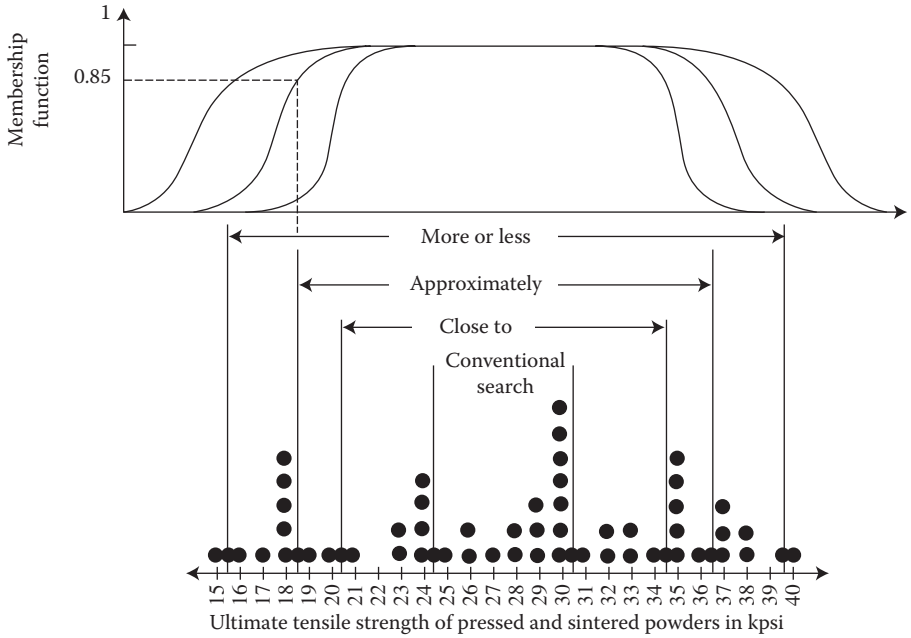


FIGURE 2.6

Elastic modulus for classes of materials plotted on linear scales. (Adapted from Dewhurst, P. and Reynolds, C.R. *Journal of Materials Engineering and Performance*, 6(3), 53–62, 1997.)

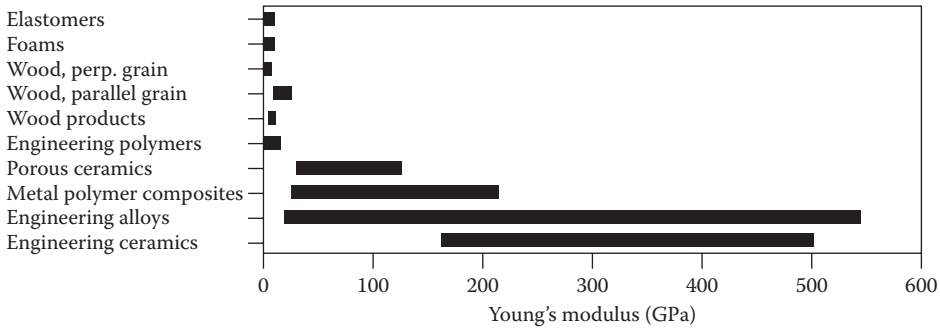


FIGURE 2.7

Elastic modulus for classes of materials plotted on logarithmic scales. (Adapted from Dewhurst, P. and Reynolds, C.R. *Journal of Materials Engineering and Performance*, 6(3), 53–62, 1997.)

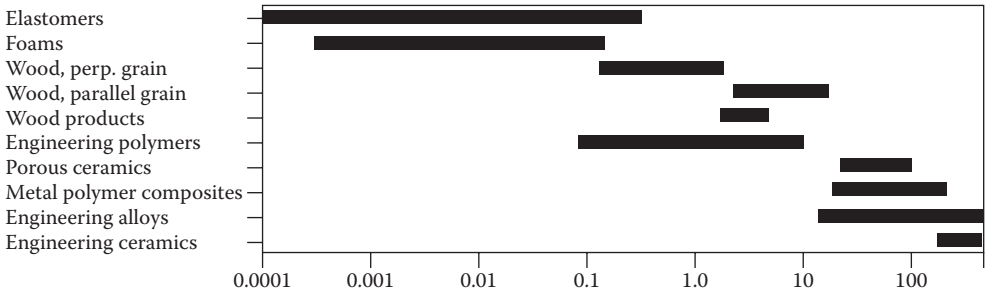
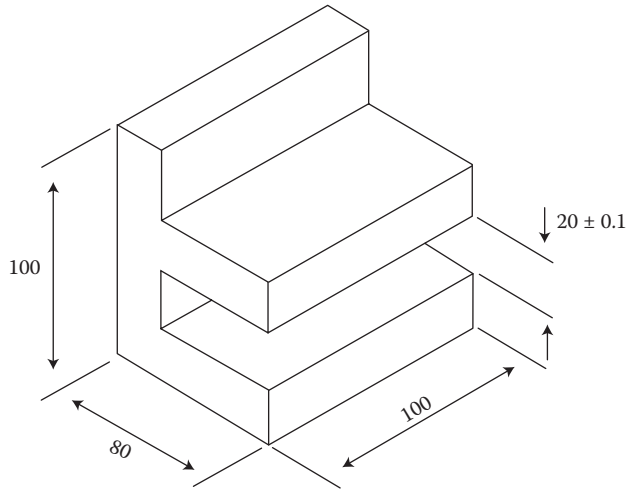


FIGURE 2.8

Oven bracket part.



Dimensions in mm

FIGURE 2.9

Process elimination based on four geometric attributes of the part in Figure 2.8.

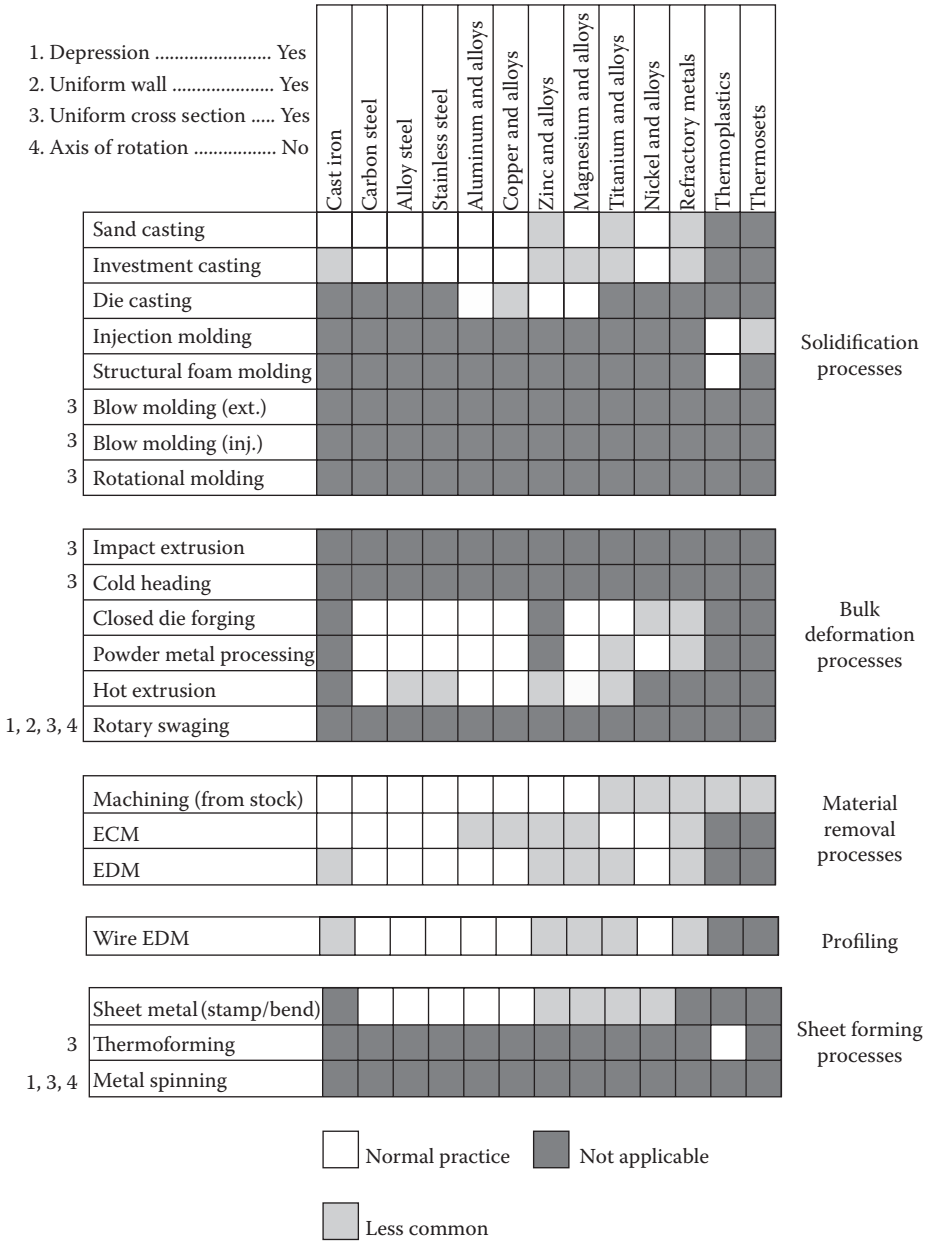


FIGURE 2.10

Process elimination based on further four attributes of the part in Figure 2.8.

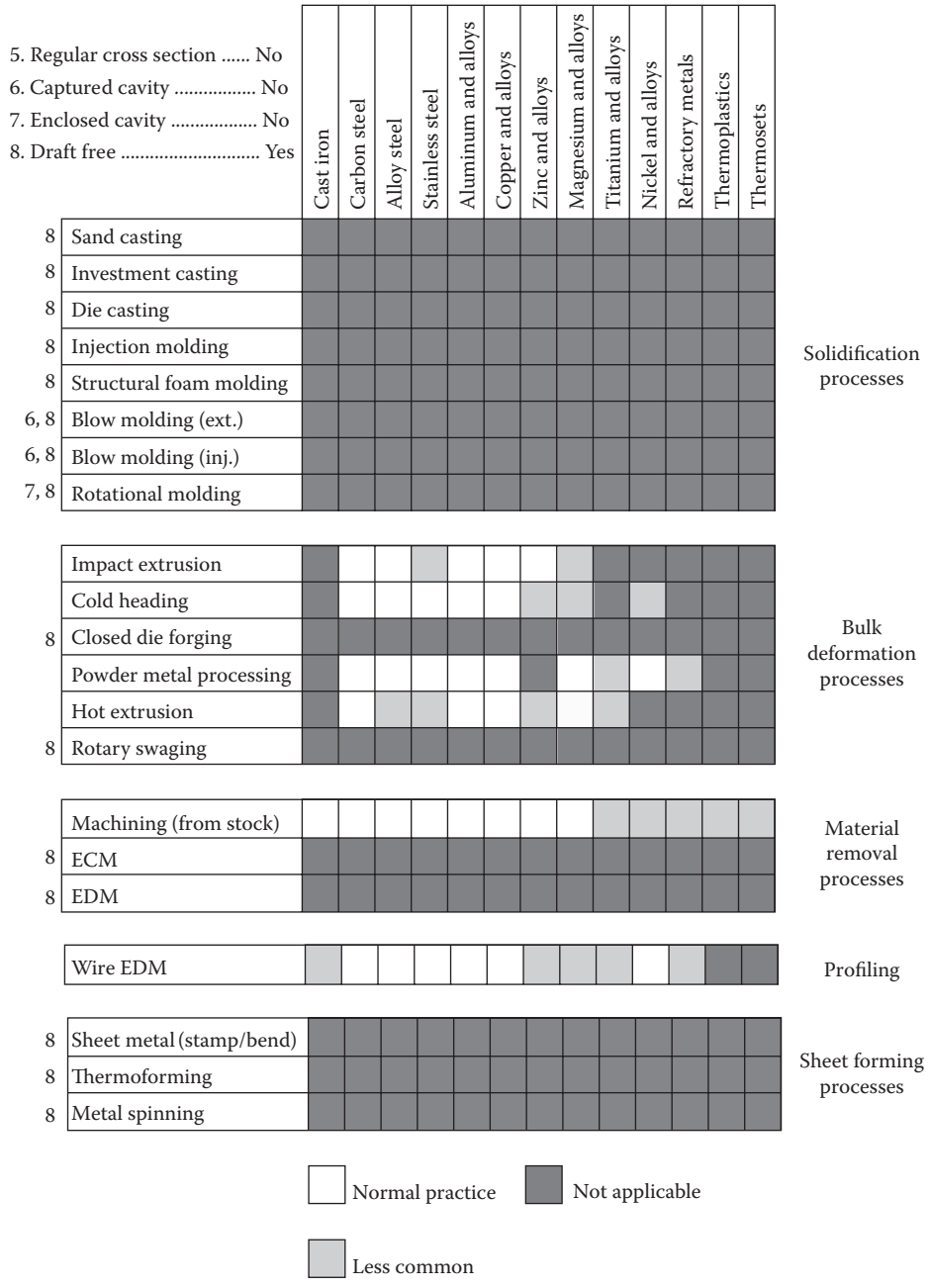


FIGURE 2.11

Final process selection based on geometric attributes of the part in Figure 2.8.

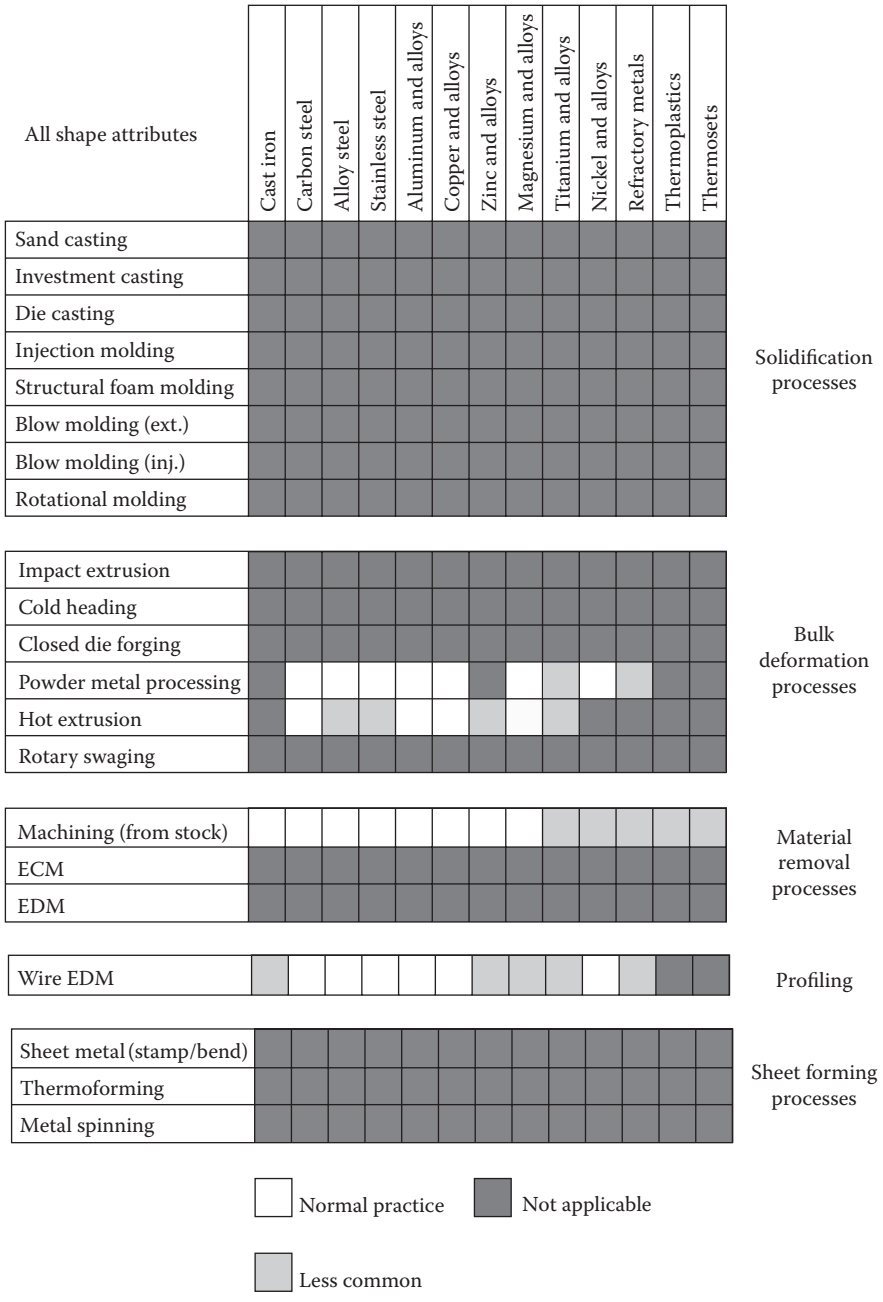


FIGURE 2.12

Final selection based on process/material combinations of the part shown in Figure 2.8.

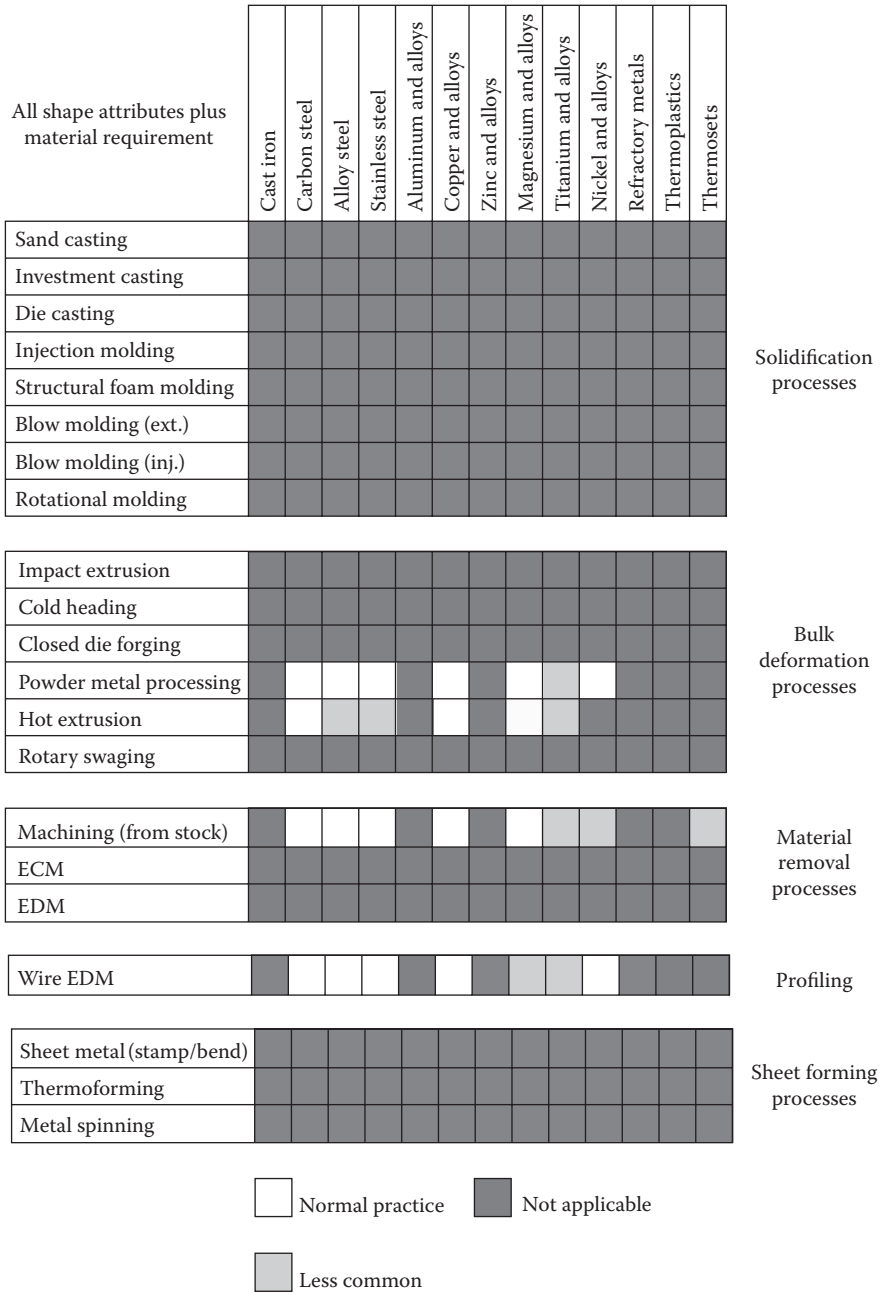


FIGURE 2.13

General description of proposed part.

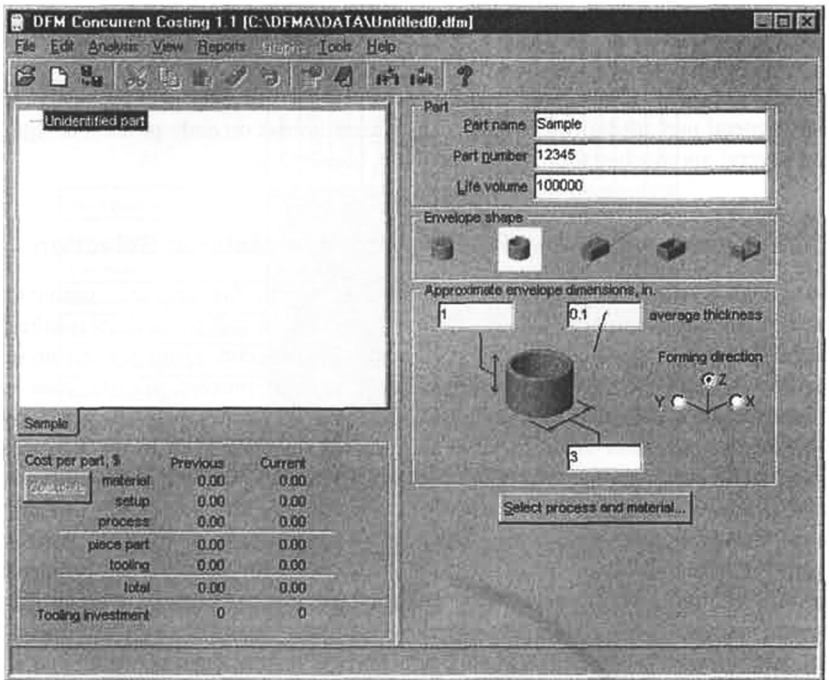


FIGURE 2.14

Material classes compatible with cold-chamber die casting.

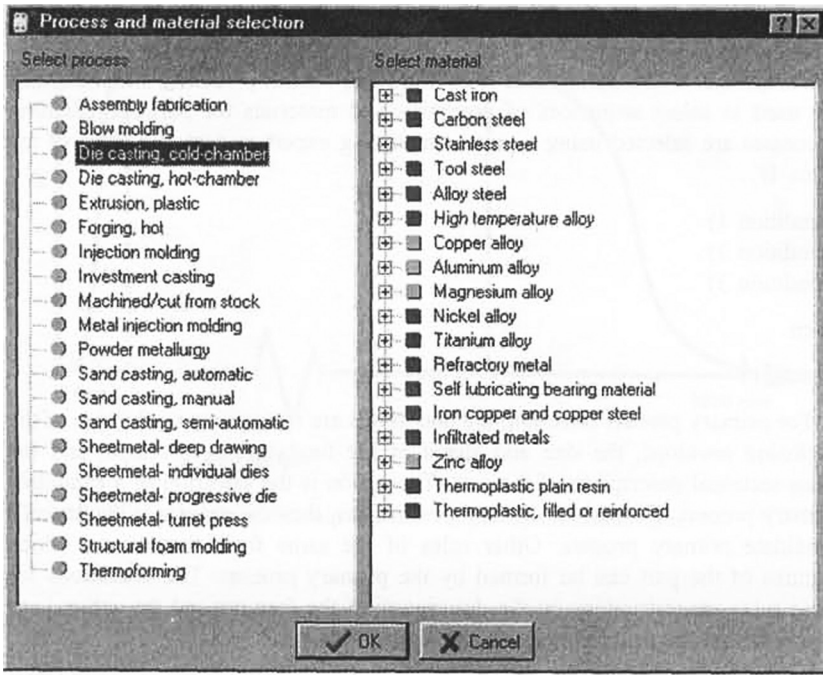


FIGURE 2.15

Example of membership function for process selection rules.

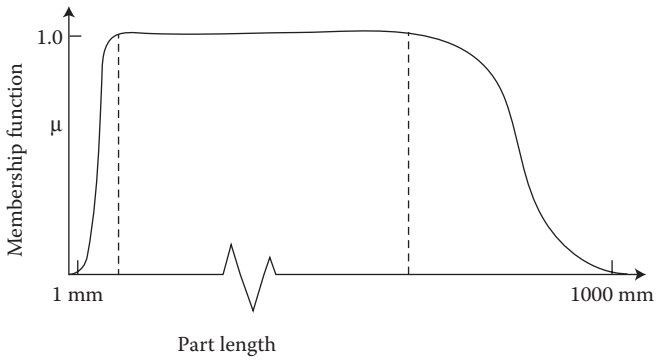


FIGURE 2.16

Procedure for processing sequence selection.

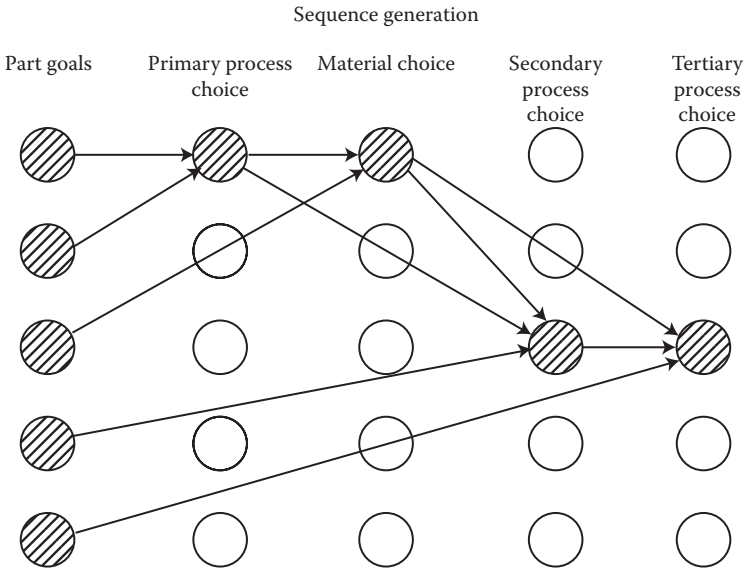


FIGURE 2.17

Seven basic categories of machines' component parts. (Adapted from PERA, *Survey of Machining Requirements in Industry*, PERA, Melton Mowbray, UK.)

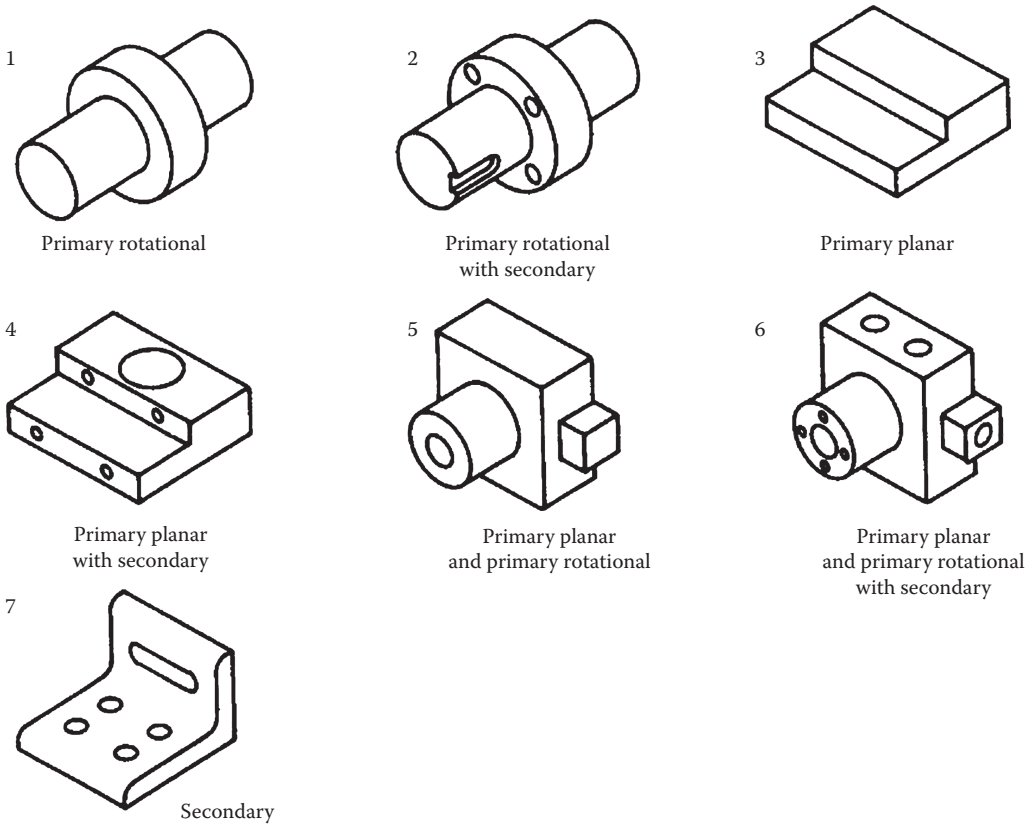
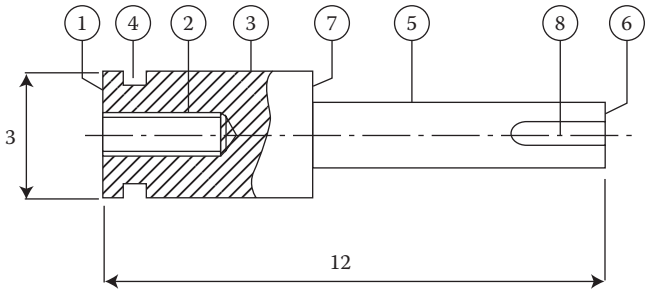


FIGURE 2.18

Category 2 part—rotational with secondary features.



Aluminum shaft

Machine	Feature	Operations
Horizontal band saw	–	Cut off workpiece
CNC lathe	1	Finish face
	2	Center drill, drill, tap
	3	Finish tum
	4	Groove
	–	Reclamp
	5	Rough and finish tum
	6	Finish face
	7	Finish face
Vertical miller	8	End mill keyway

FIGURE 2.19

Comparison of machining cost estimates. The cost indicated next to each part drawing is the material cost for the part, ▨, detailed analysis; □, estimate; ▧, initial estimate.

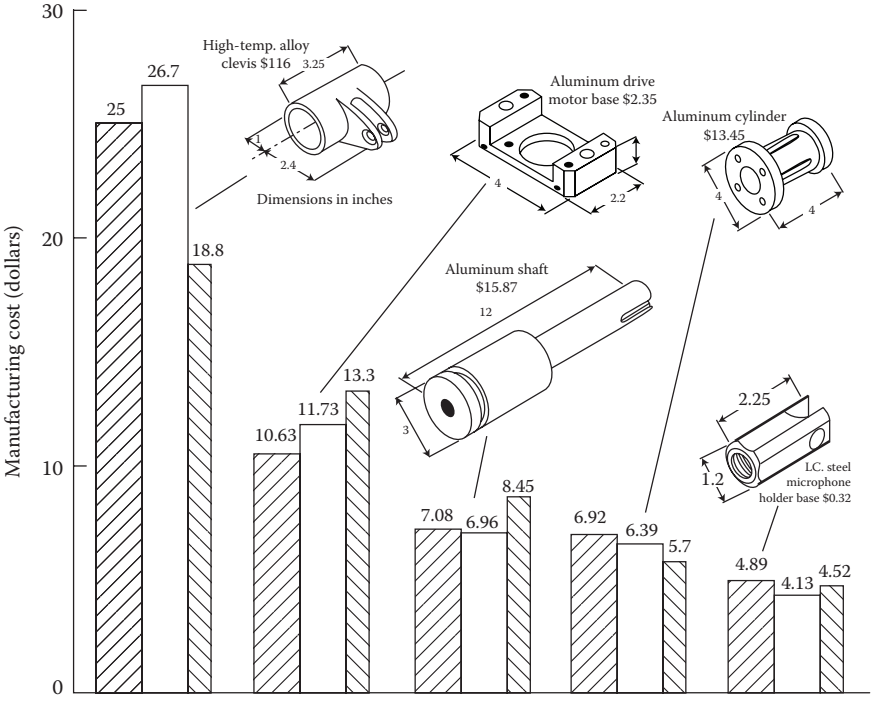


FIGURE 2.20

Connecting rod.

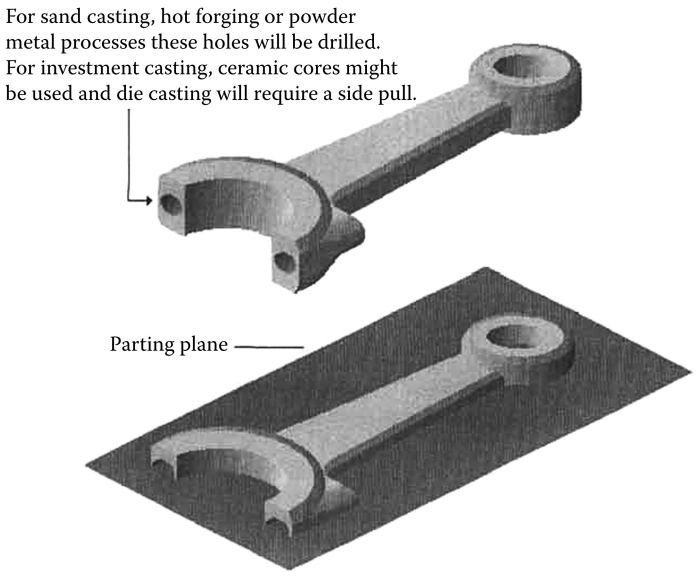


FIGURE 2.21

Connecting rod costs for different processes and production volumes.

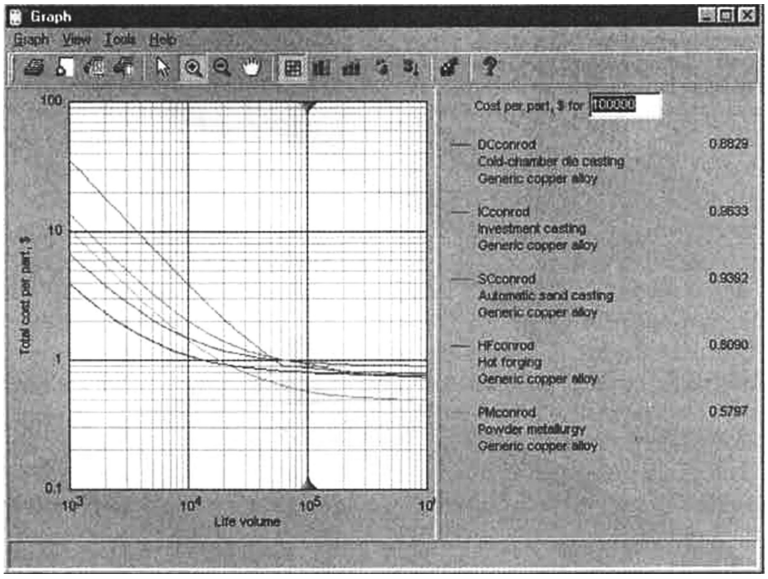


FIGURE 2.22

Cost breakdown for production volume of 100,000.

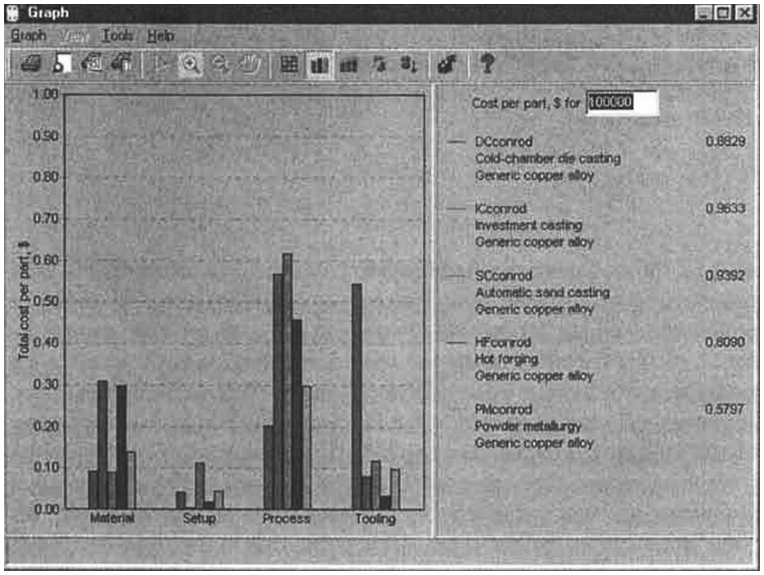


FIGURE 2.23

Cost comparisons for production volume of 100,000.

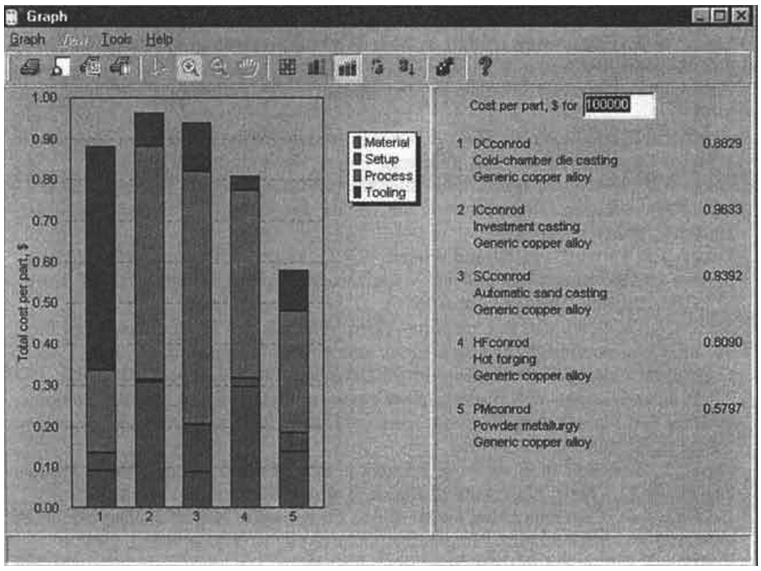


FIGURE 2.24

Hollow metal golf driver head construction.

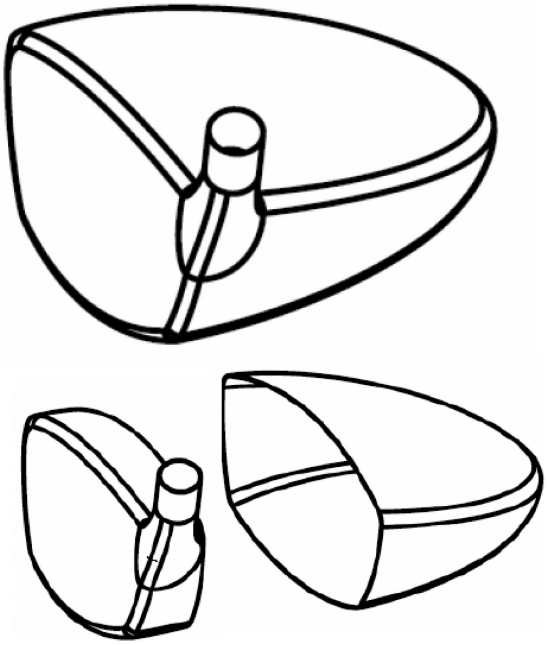


FIGURE 2.25

Electrical instrument support platform.

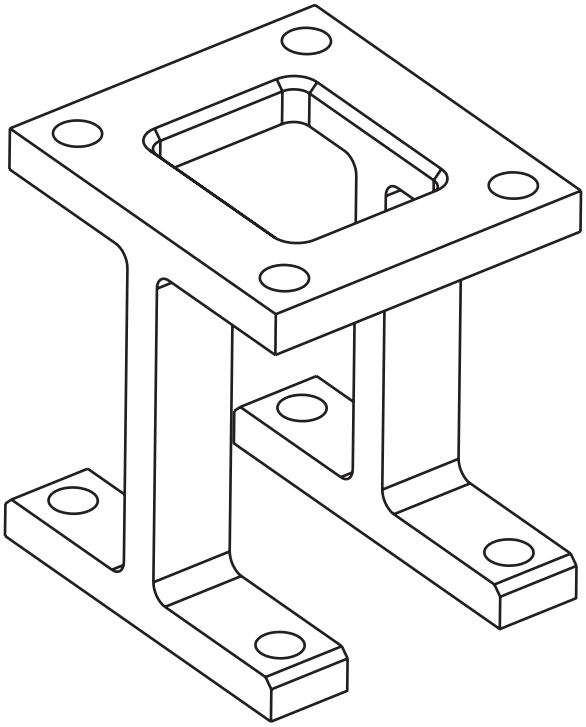


FIGURE 2.26

Rotor housing.