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Several electrochemical methods are employed in the metals-processing industry because of their ability to manufacture or surface-finish metal articles, fabrications and components which are difficult or impossible to produce by traditional mechanical workshop techniques. The most important methods are electrochemical forming, machining, grinding, deburring and etching.

The principles of electrochemistry are foreign to industries based on mechanical engineering and the electrolytes necessary for an electrochemical process cause corrosion in the workshop. Therefore, electrochemical methods have generally been developed by specialist companies or sections. This situation has minimized their impact on the engineering industry as a whole and their full potential has yet to be realized.

Rapid and diverse advances in semiconductor fabrication have also provided an incentive for the development of electrochemical etching of some such materials.

9.1 ELECTROFORMING

Electroforming is the complete manufacture of an article or component by electrodeposition. An early application of the method was the production of thin foils. Their cost when manufactured by conventional rolling is inversely proportional to thickness; in direct contrast the cost of producing the foil by electrodeposition is expected to increase with the weight of metal and therefore the thickness of the foil and it is therefore not surprising to find that it is economic to produce thin foil by electroforming. Electroforming is now used to produce a range of foils and gauzes, seamless perforated tubes (for printing materials) and endless plain or perforated bands as well as objects of more complex shape such as waveguides, audio and video stampers, moulds and dyes. Figure 9.1 illustrates the complex shapes which may be electroformed.

As in electroplating, the physical, chemical and mechanical properties of the electrodeposited metal must be controlled (in electroforming, the hardness,
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