Electroforming Supplies
Hart Materials Limited

Specialised supplier to the electroforming industry

Which products do Hart Materials supply for electroforming?

For over 30 years the company has supplied consumable materials and equipment to customers involved in this industry. This enables us to advise customers in relation to the most suitable products for their needs. Both nickel and copper electroforming are covered.

Typical consumable products include:-

- **Anode materials**
  - Sulphur-activated Nickel Pellets (‘S’ Nickel)
  - Non-activated Nickel Pellets and Nickel Chips
  - P.D.O. Copper Slugs

- **Additives**
  - Boric and sulphamic acids
  - Wetting agents
  - Deposit hardening agents
  - Brighteners

- **Proprietary Processes**
  - Solutions for chemical silver spraying

- **Metal Salts**
  - Nickel sulphamate
  - Nickel sulphate
  - Nickel chloride
  - Copper sulphate
  - Cobalt sulphamate

Electroforming Plant

For general electroforming operations equipment can be relatively simple, as in the plant illustrated. It is, therefore, relatively inexpensive compared to machinery for alternative metal forming operations. For specialised uses more complex, dedicated, plant is necessary.

Ancillary Equipment

- Filters, heaters, anode baskets & bags
- Twin nozzle spray guns

If this sounds interesting then read on for more information about this remarkable technology and Hart Materials activities in the industry.
What is Electroforming?

It is a process for manufacturing metallic articles by electrodeposition. In general it is used to make solid metal objects that cannot be produced by any other metal forming process.

Why is electroforming used?

It is used principally because the precision that can be achieved is unique and cannot be matched by any other manufacturing technique. This is particularly important in respect of surface topography where sub-micron features can be reproduced with complete accuracy.

Which metals can be electroformed?

Relatively few of the metals that are used in electroplating can actually be employed for electroforming since the internal deposit stress must be very low to avoid distortion of the final product. Unfortunately this rules out metals such as chromium which in many ways has desirable properties such as hardness and corrosion resistance.

As a result, **nickel** is used for the vast majority of electroforming applications. Not only does it have very good corrosion resistance and mechanical properties but the processes used for nickel deposition can be closely controlled and the internal deposit stress minimised.

**Copper** plating processes can also produce low stress deposits but the corrosion resistance and mechanical properties of copper are inferior to those of nickel. Copper is, however, used where electrical conductivity is critical, such as in thin foil used to manufacture printed circuit boards.

**Gold** and **silver** are also electroformed for both functional and decorative applications. However, the limitation is obviously expense.

What is involved in electroforming?

The basic principles of electroforming are similar to those involved in electroplating. Two electrodes, an anode and a cathode, are immersed in an electrolyte that contains a dissolved salt of the metal to be deposited. (For example, nickel sulphamate solutions are used to deposit nickel.) When a direct current is applied across these electrodes nickel metal deposits onto the cathode whilst a similar amount of nickel dissolves from the anode.

The metal is deposited onto a suitably shaped former, known as a mandrel, constructed to ensure that the product conforms exactly to the shape and dimensions and surface detail necessary for its intended use. It is obviously vital that the metal does not adhere to the mandrel surface in order that the product can be removed after electroforming. Thicker deposits are normally required so that the product is rigid and tough enough to exist as a free standing item.
What are the most important applications of electroforming?

The process is absolutely vital in many modern, high technology, industries. However, it is largely unrecognised, even by trained scientists and engineers, because the majority of electroforms are intermediate devices used in the manufacture of other articles for the manufacture of:

- Moulds for Compact disc and D.V.D. production
- Moulds for the manufacture of mass produced holograms
- Cartridges for ink-jet printers
- Ultra-thin nickel or copper foils
- High-precision screens and meshes
- Very complex three dimensional structures
- Large thin shell moulds

What is the size limit of electroforming?

Bigger than a two story building

Small enough to fit inside the eye of a needle

Why come to Hart Materials Limited?

- We have acquired over 30 years of experience supplying consumable materials and equipment to companies involved in electroforming - so we know the technology intimately
- We sell precisely the products you need for electroforming
- You will get personal service as a valued customer and be guided towards the most effective solution for your operation
- We provide reliable back-up and support for your day-to-day operations because of the experience of our highly qualified support team
- We believe in prompt delivery and personal service all along the line
- We can train your staff to operate the electroforming process
Hart Materials Limited
Supplies high specification products for other technologies

**Standard Nickel Powders**
- Vale Type 255
- Vale Type 123

**Special Nickel Powders**
- Conductive Ni Flake Grade HCA-1
- Permalloy Magnetic Flake
- Stainless Steel Decorative Flake

**Green, Black & Brown Nickel Oxides**

**NOVAMET Metallic Flakes**

**About Hart Materials Limited**

The business was founded in 1981 by the current Chairman & Managing Director Dr. Tony Hart and traded until 2008 as Hart Coating Technology. In April 2008 the business was registered as a private limited company under the name Hart Materials Limited to reflect the broadening of the its activities. The company is situated in the small town of Wombourne about 4 miles (6 Km) south west of Wolverhampton - in the West Midlands of the UK.

Hart Materials Limited operates not just in the U.K. but supplies companies in all European countries and also a number of non-European locations.

**Key Personnel**
- Dr. Tony Hart Chairman and M.D.
- Dr. Paul Lansdell Operations Director
- Mrs Nikki Davies Sales Co-ordinator
- Mrs. Maxine Bramley Accounts