

Stork Veco



Metal precision

Electroforming: A technology you should know more about!



Stork Veco 

Content:

- Company profile Stork Veco
- Google results on “Electroforming”.
- Advantages of Electroforming
- Explanation of the process.
- Galvanic coatings.
- Product examples & Applications.

Company Profile Stork Veco B.V.

- Production in the Netherlands
- Founded in 1934
- 120 employees
- Part of the SPGPrints Group
- Export world-wide (> 50 countries)
- 2 production technologies:
 - Electroforming
 - Photo-etching
- ISO 9001, 14001 and 18001
- TS16949



Electroforming – E-forming – Electroplating

Google search results.

Electroforming is a specialized additive process, for building high precision products, atom by atom.

Electroforming is ideal for applications where stamping, photochemical etching and laser cutting simply cannot achieve the required tight tolerances.

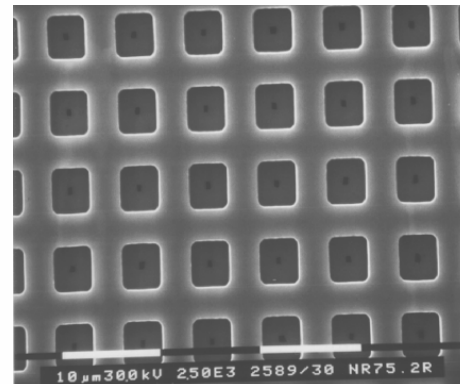
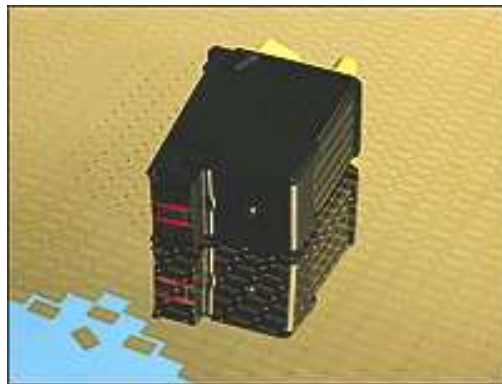
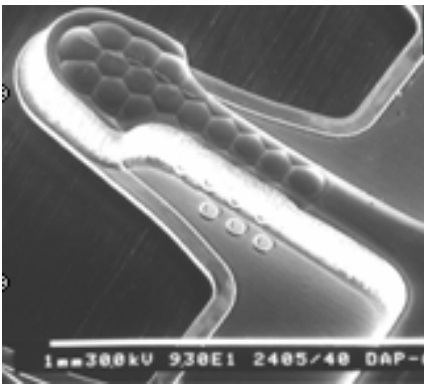
Electroforming is an ideal fabrication method for products with requirements for very thin, very fine or very precise dimensions and patterns.

Electroforming is a highly specialized process for fabricating a metal part. The process creates an electroform piece through electro-deposition of a metal over a mandrel (base form) in a plating bath.

Electroforming should be thought of as a basic manufacturing process when considering alternatives best suited for making any particular item.

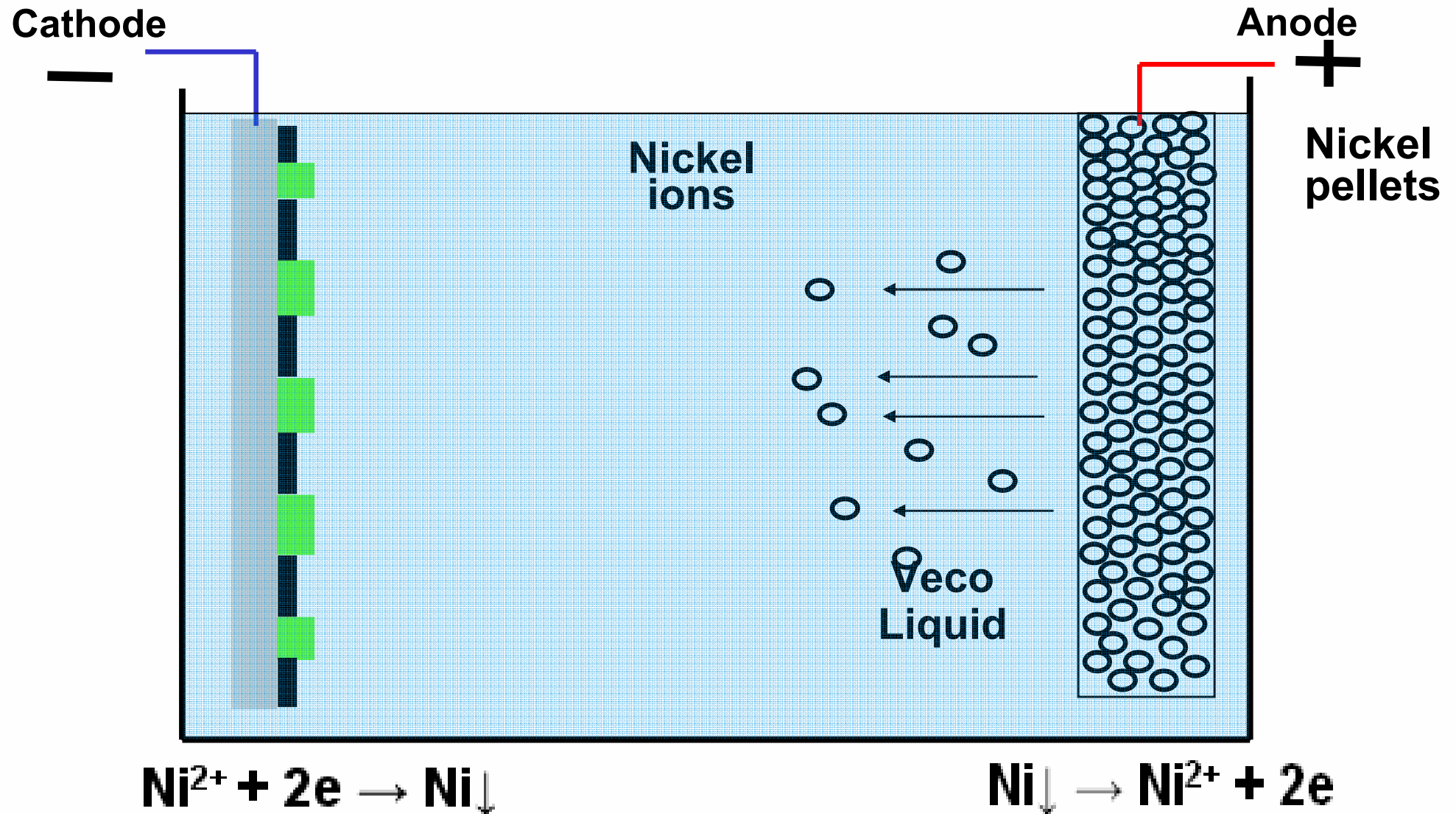
Advantages of Electroforming

- Very **high volumes** with high detail density possible.
 - *Stork Veco currently produces approx. 1.2 billion holes/day .*
- Electroforming is capable of very **high resolution**.
 - *Micro sieves with 9.000.000 holes /dm² are no exception.*
- **Complex shapes** are possible.
 - *Please challenge our R&D engineers.*
- Process capable of very **tight tolerances**.
 - *Inkjetnozzles, tolerances down to +/- 1 micron.*

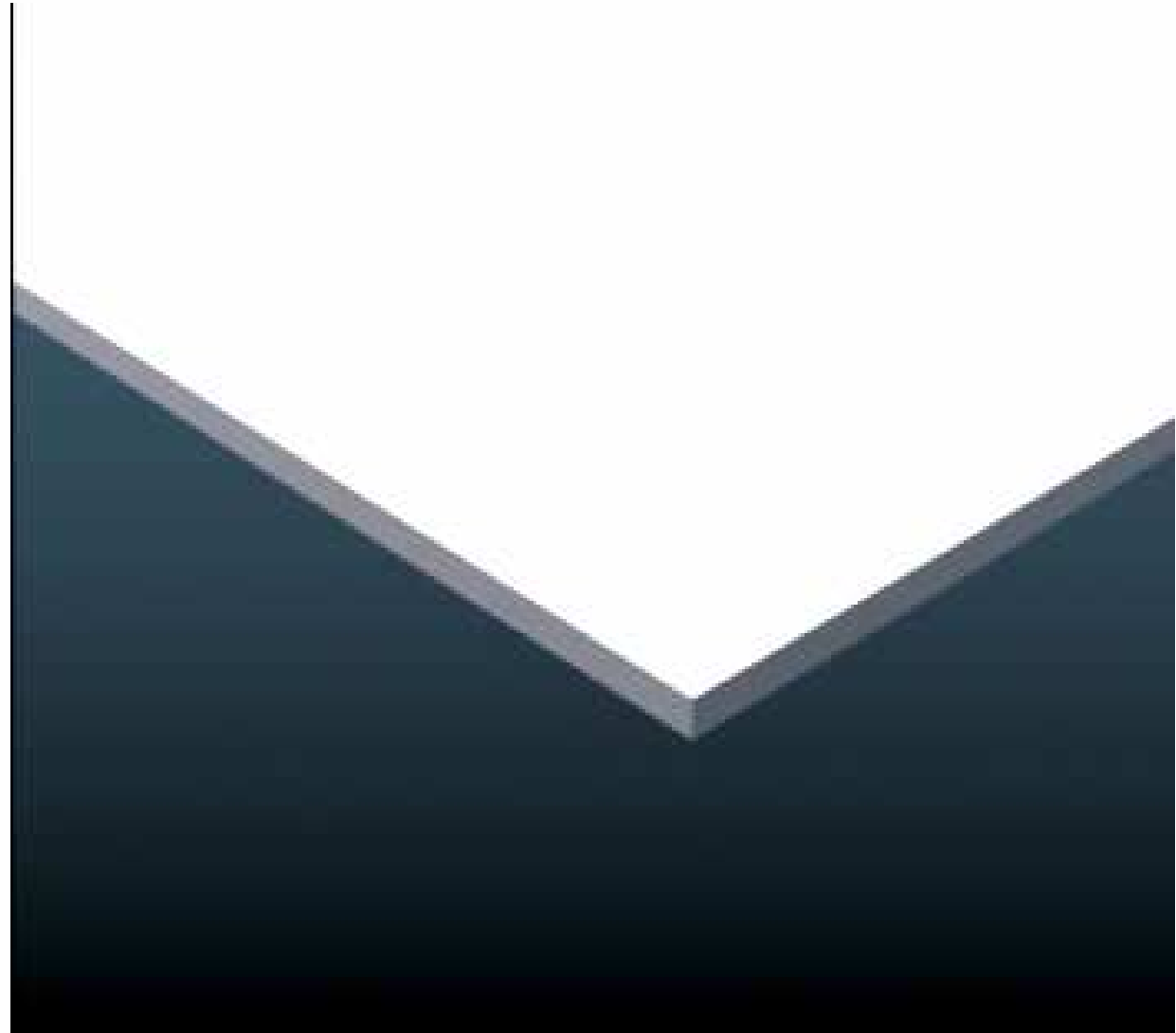
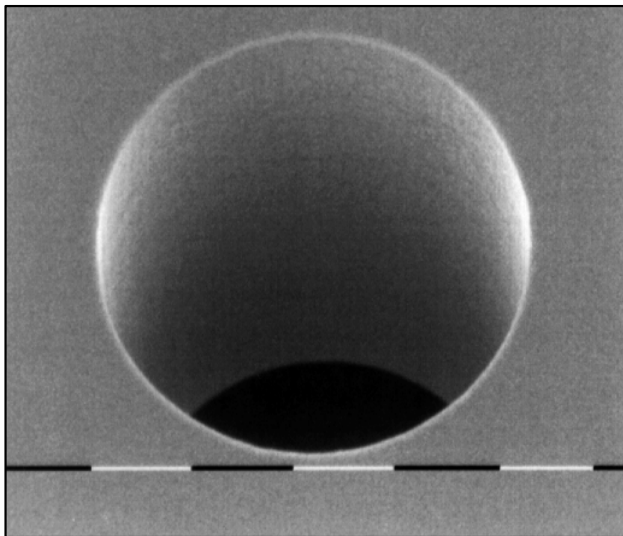
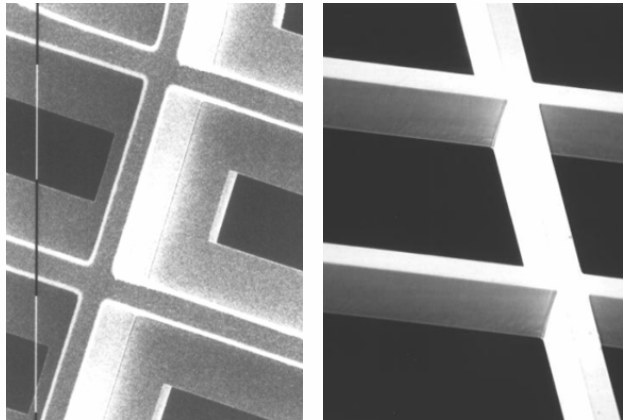


Mesh 3826, 23000 holes/mm²

Base principle of the electroforming process



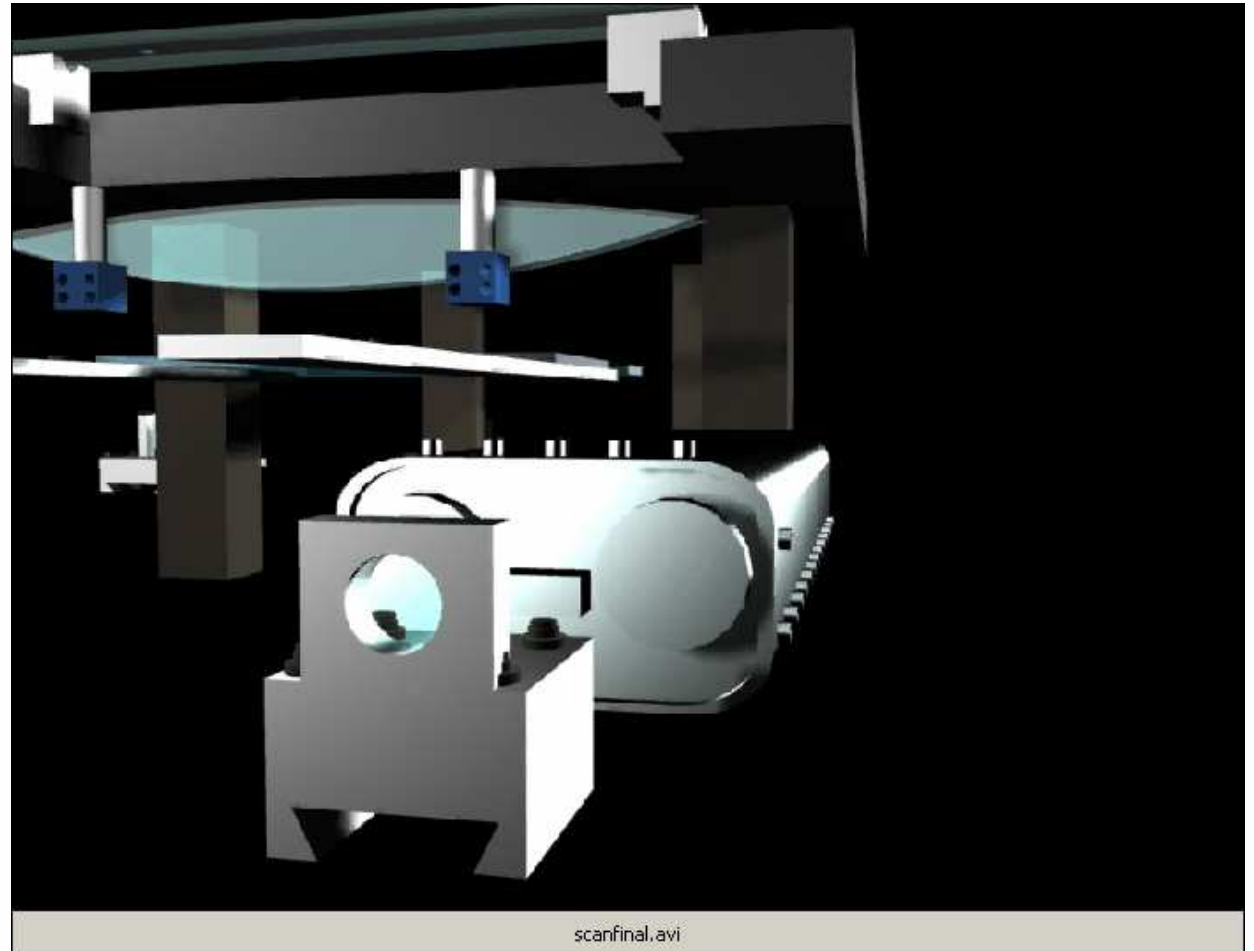
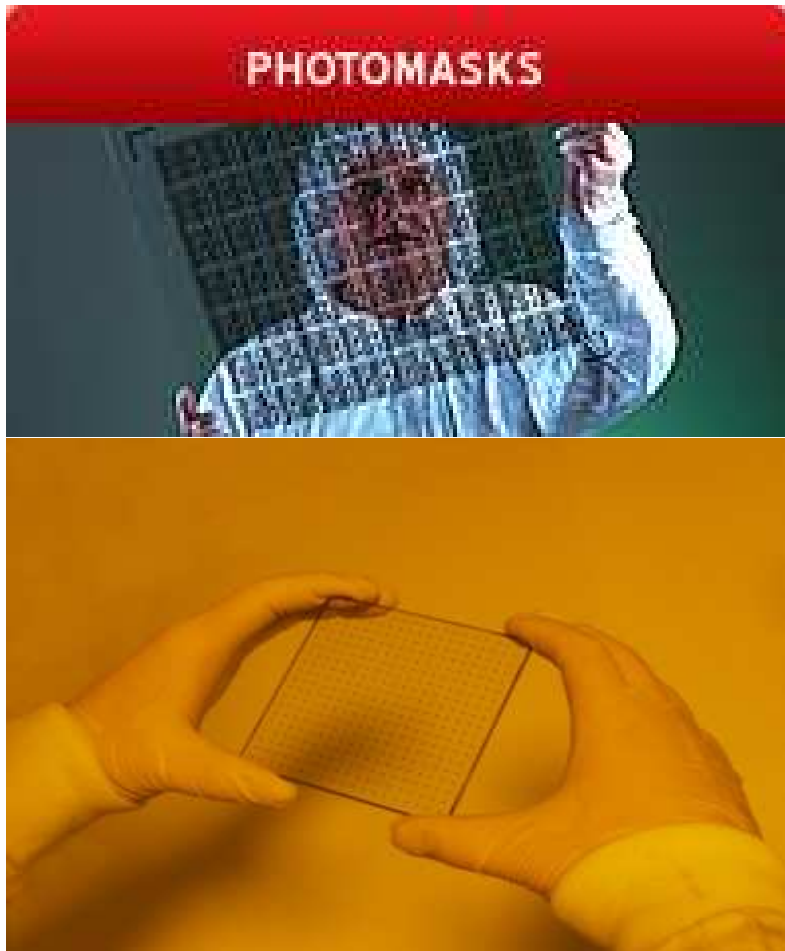
Electroforming Thick-film



Animation

Patterning the image on a mandrel

- Mylar Mask (40.000 DPI)
- Glass tooling
- LDI (Laser Direct Imaging)



Overgrowth Cross Section

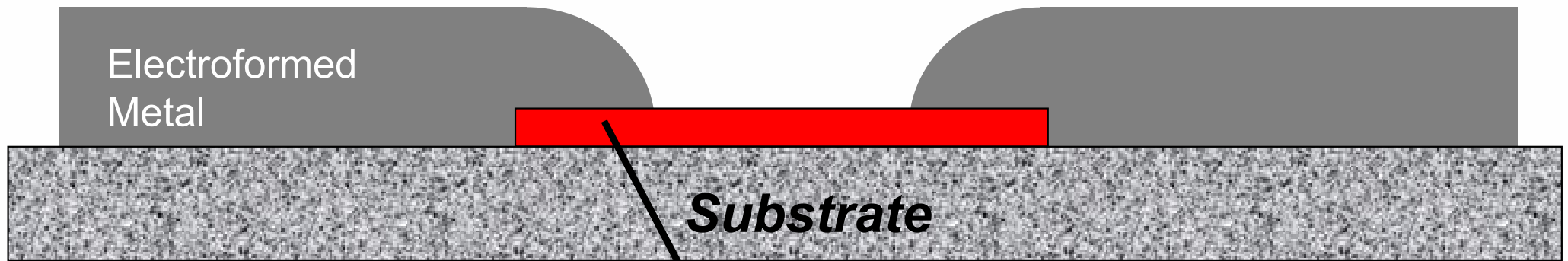
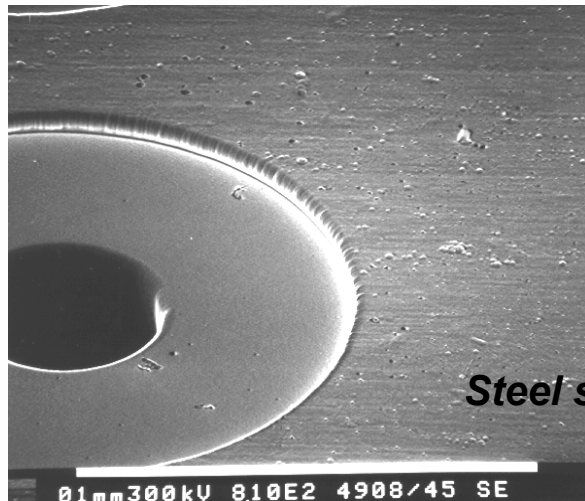
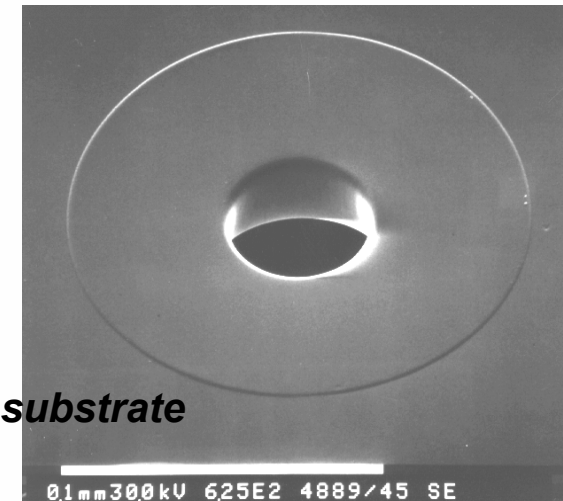


Photo resist



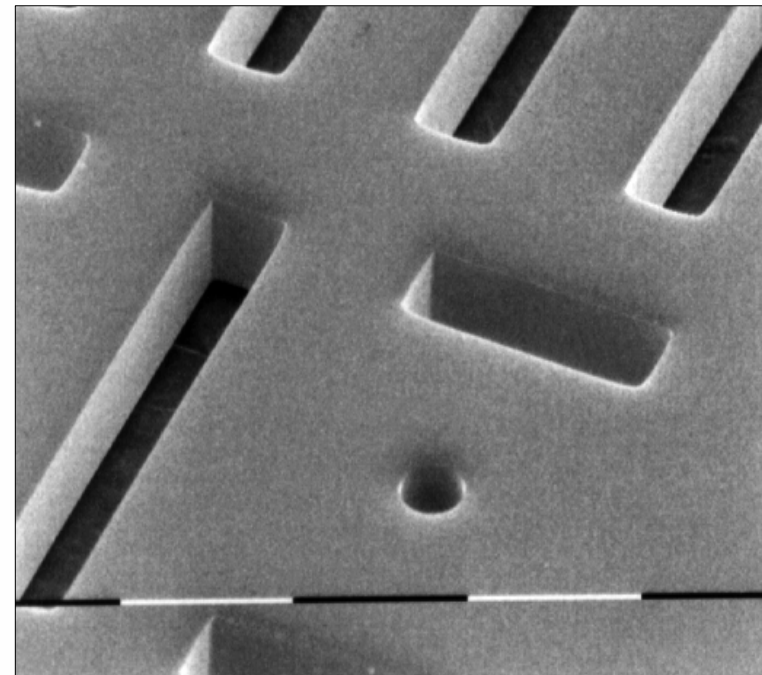
Steel substrate



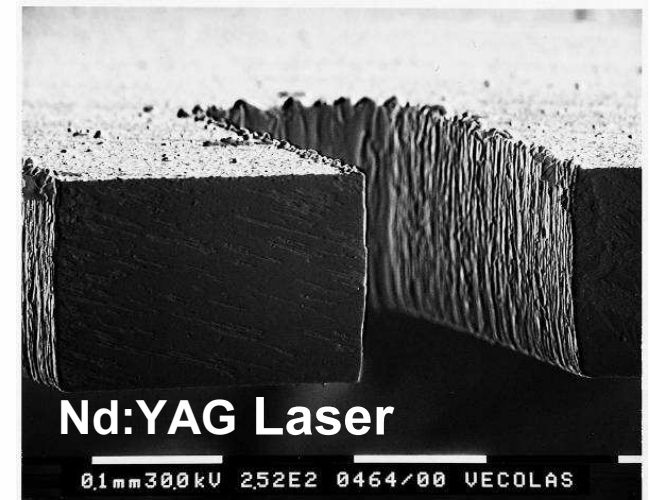
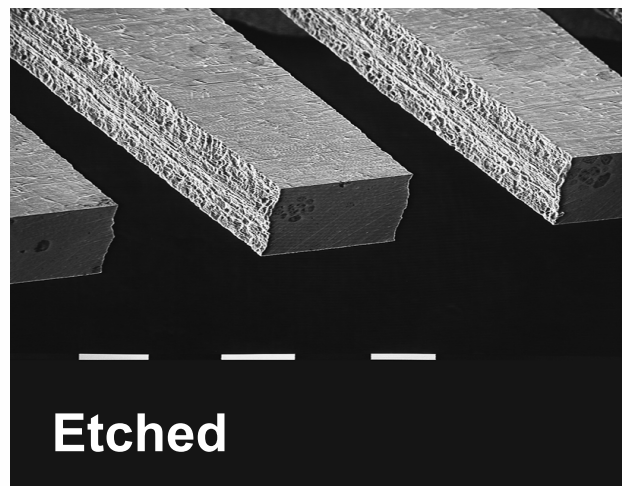
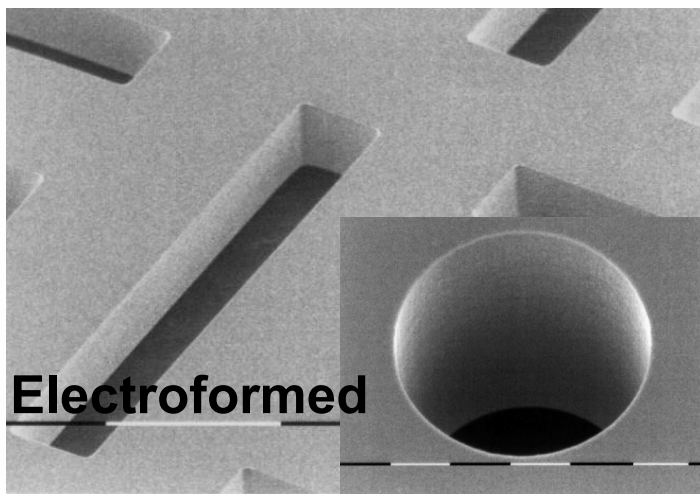
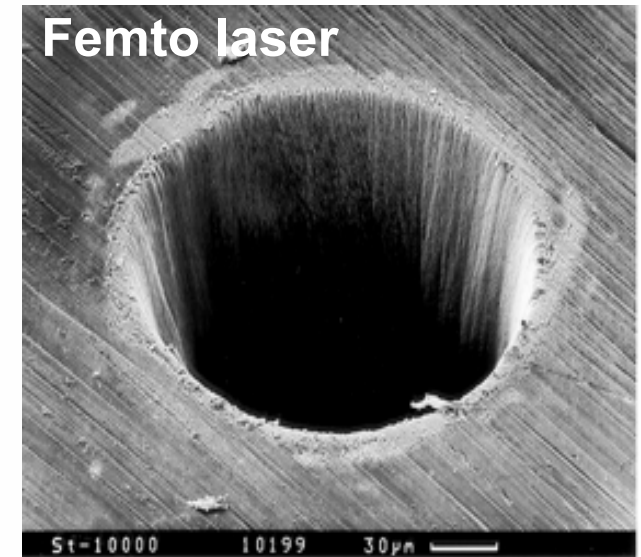
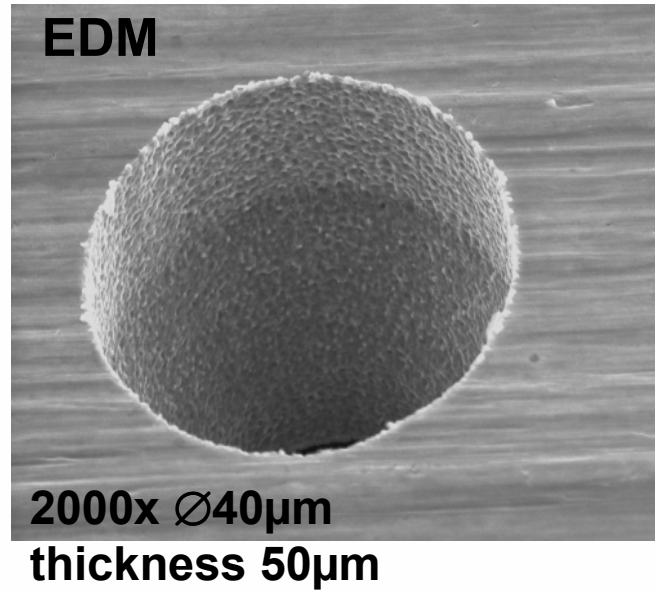
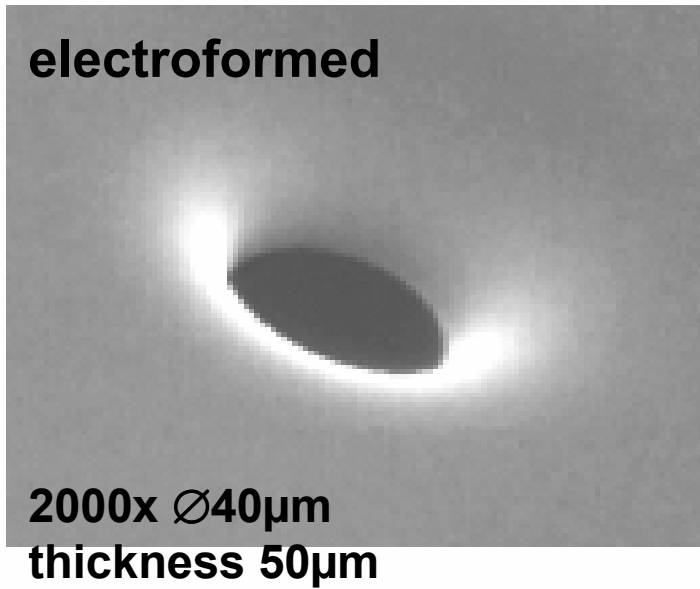
Glass substrate

Characteristics Electroformed Precision Products

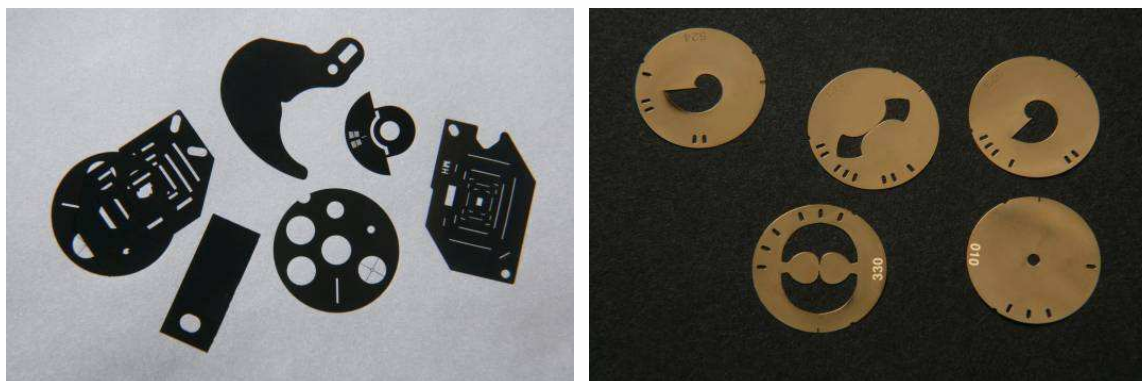
- Complex shapes possible
- Very high precision
- Sharp edge definition
- Burr free, naturally flat products
- Economical tooling and parts
- Excellent reproducibility
- Conical or straight sides



Superiour edge definition



Galvanic coatings



Plating layers Precision parts

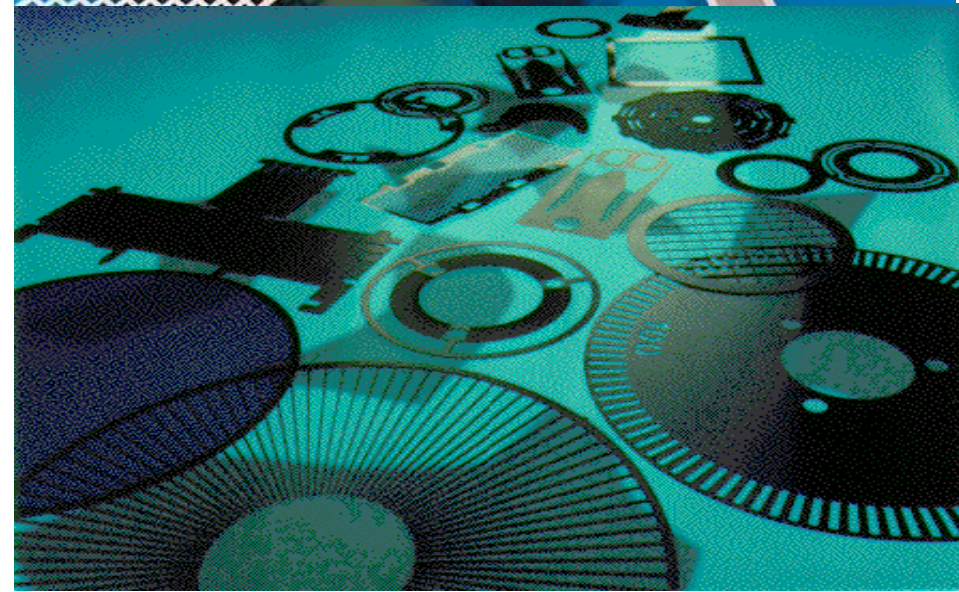
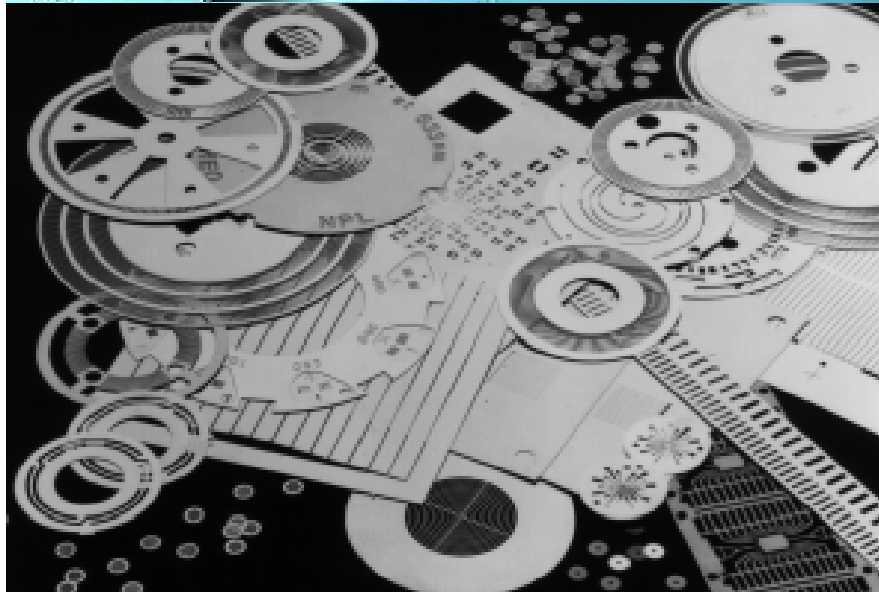
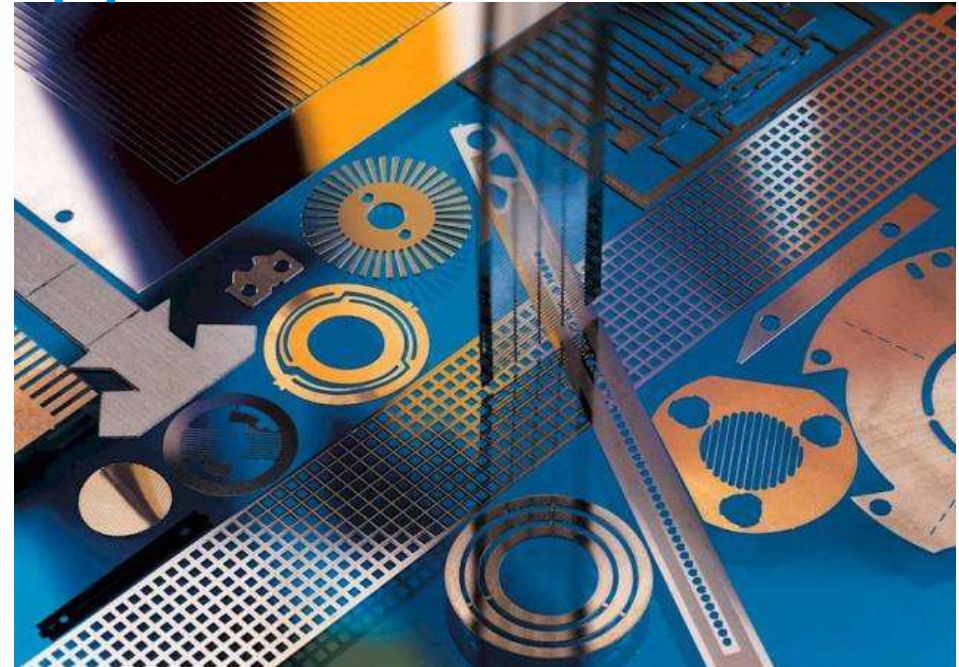
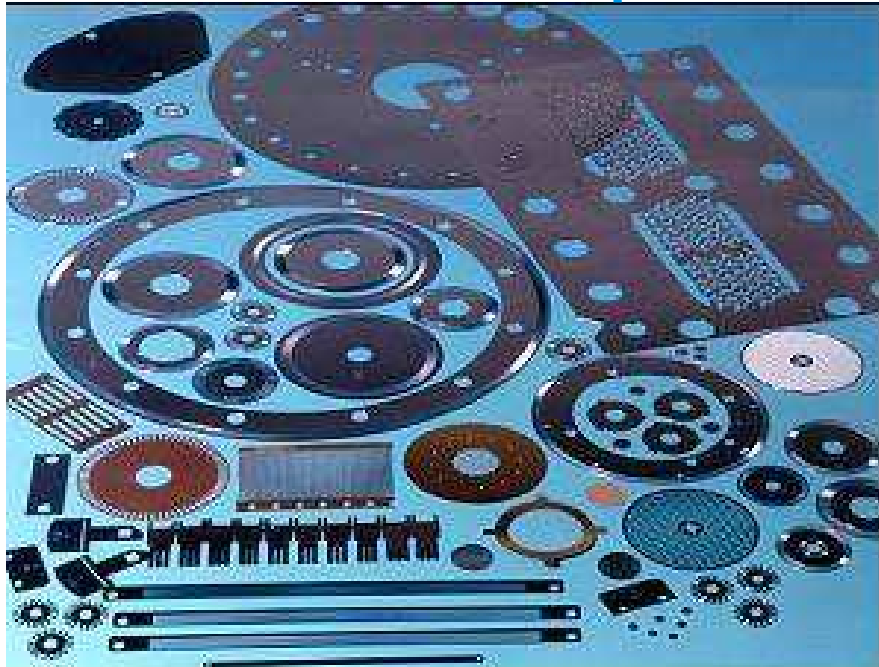
Plating metal		Composition		Thickness	Purpose
Gold	Au	99.99% gold		1-3 μm	Corrosion resistance
Gold Cobalt	AuCo	99.5% Au	0.5% Co	1-3 μm	Corrosion resistance
Paladium nickel	PdNi	80% Pd	20% Ni	1-3 μm	Corrosion resistance
Black chromium	Cr			+/- 1 μm	Optical black (anti reflection)
Black nickel	Ni			+/- 1 μm	Cosmetic black (anti refelction)
Electroless nickel	P-Ni	88% Ni	12% P	1-5 μm	Corrosion resistance
Tin	Sn	100% Sn		2-10 μm	Welding layer

Remarks:

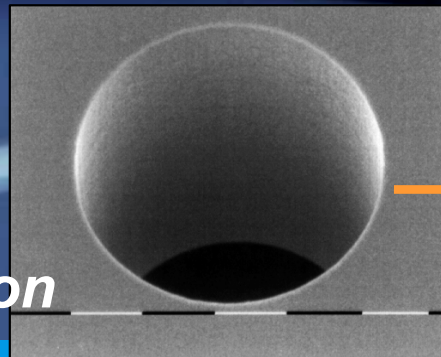
Plating layers can be put on either one or both sides

For determing the reflectivity SV has a gloss measurement systemen

Product examples & Applications



Fuel Nozzles
> 2.000.000 pieces/year



Tolerances +/- 3 micron



Aerosol Orifice Plates



*Product Ø 6mm
Holesize Ø 3µm (~100 holes/piece)
Tolerance +/- 0.5 micron*



- *drug inhalation*
- *pesticides*
- *perfumes*



>> 10.000.000 pcs/yr



Coffee filters

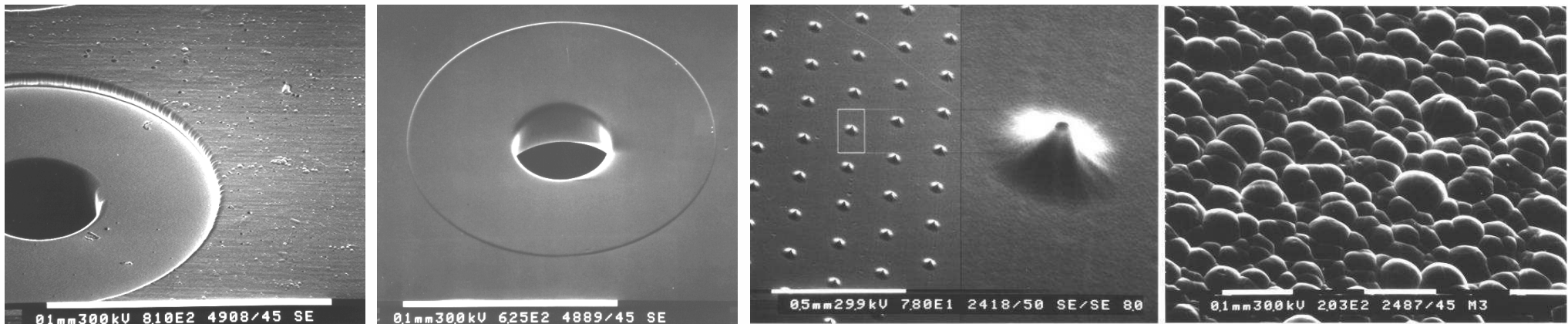
Product:	Coffee filter
Application:	Used in various coffee machines
Function:	Filter
Functional demands:	Holes shape is important
Material:	Soft Nickel + galvanic coating
Tolerances:	$\pm 10 \mu\text{m}$ on hole size.
Production method:	Electroforming
Thickness:	up to 200 micron





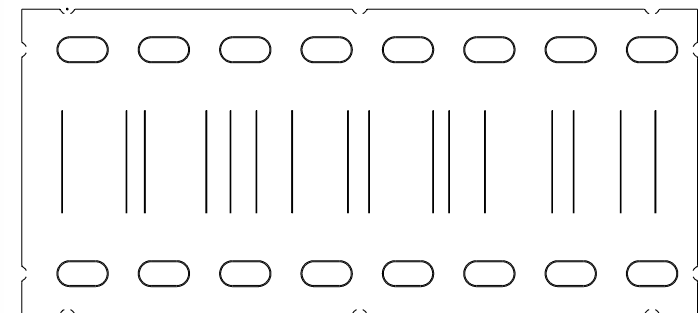
Replicating surfaces

Electroforming is a process in which the product is build on a conductive surface. Atom by atom!
Due to this the mandrel side of the product will become an exact (negative) copy of the mandrel itself.
Because of this, the process can be used to replicate surfaces with even the smallest details.



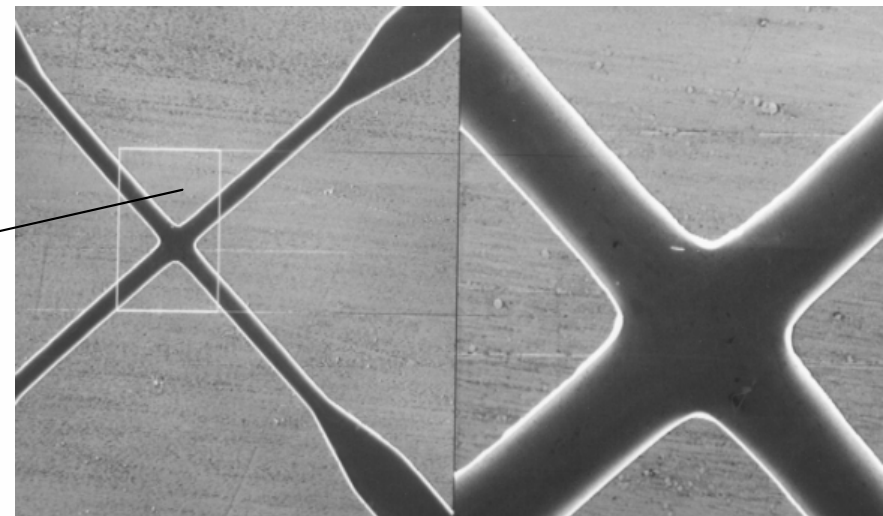
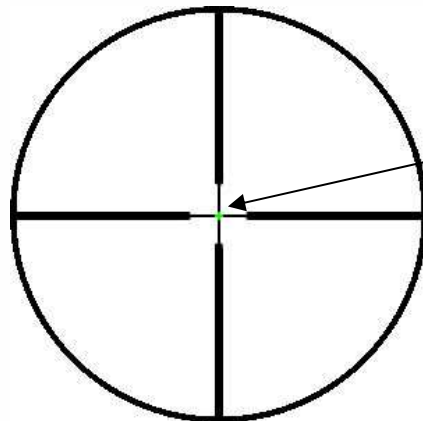
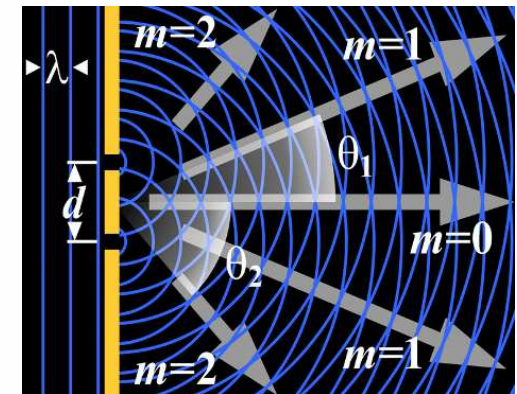
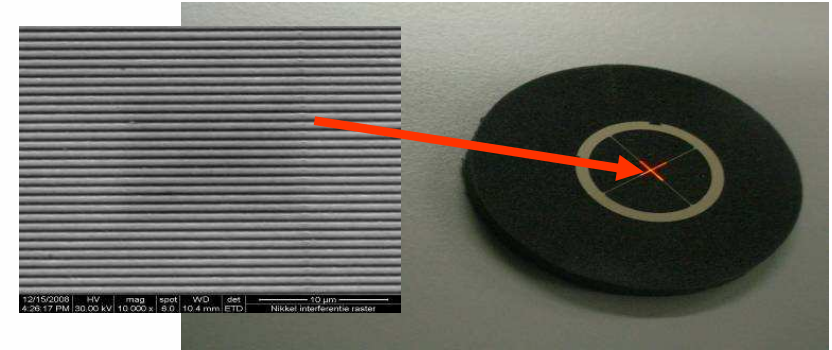
Spectrophotometer parts; slit plates

Product:	Slit plate
Application:	Used in spectrophotometer
Function:	Guiding light in determination of the elements in certain substance
(spectrography)	
Demands:	High tolerance on slit; perfect configuration
Material:	Hard Nickel
Thickness:	First layer 25 micron Second layer 80 micron
Tolerances:	$\pm 2.5 \mu\text{m}$ till $\pm 1 \mu\text{m}$ on slit width
Production method:	Electroforming
Remarks:	Two sided black chromium Double layer product Slits are measured 100%



Reticle for rifle scopes

Product:	Reticle
Application:	Used for rifle scopes
Function:	Cross wire for aiming the target
Demands:	Fine and perfect lines
Material:	Hard Nickel
Thickness:	First layer 25 micron Second layer 80 micron
Tolerances:	± 2.5 µm
Production method:	Electroforming
Remarks:	Double layer product



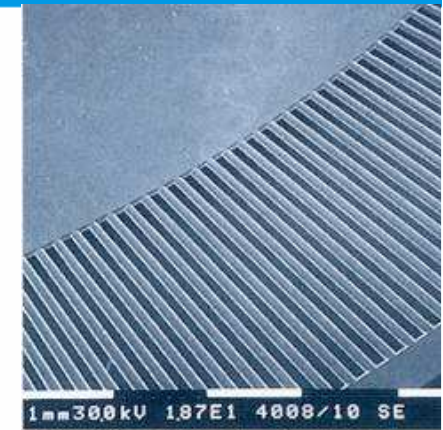
Spraying applications

Product:	Nozzle Plate.
Application:	Spraying applications.
Function	Controlling the size of the ejected drop.
Functional demands:	High accuracy, dead flat parts.
Material:	Hard Nickel (+ coating.)
Tolerances:	$\pm 1\mu\text{m}$ on the hole size.
Production method:	Electroforming.
Remarks:	Doming is an option.

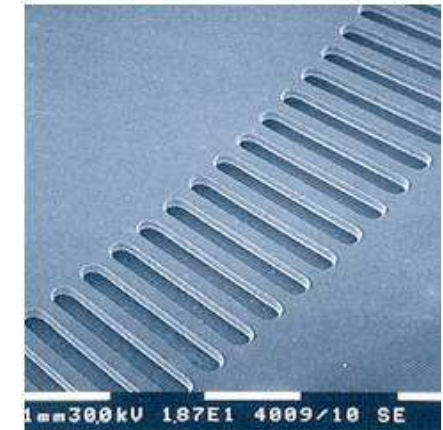


Encoders

Product:	Metal Encoder Disc
Application:	Used in various equipment
Function:	Motion Control
Functional demands:	Flat and high stability
Material:	Hard Nickel
Tolerances:	± 5µm on slit width
Production method:	Electroforming
Thickness:	up to 100 micron



1mm300kU 1.97E1 4008/10 SE
Electroformed encoder disc, single layer



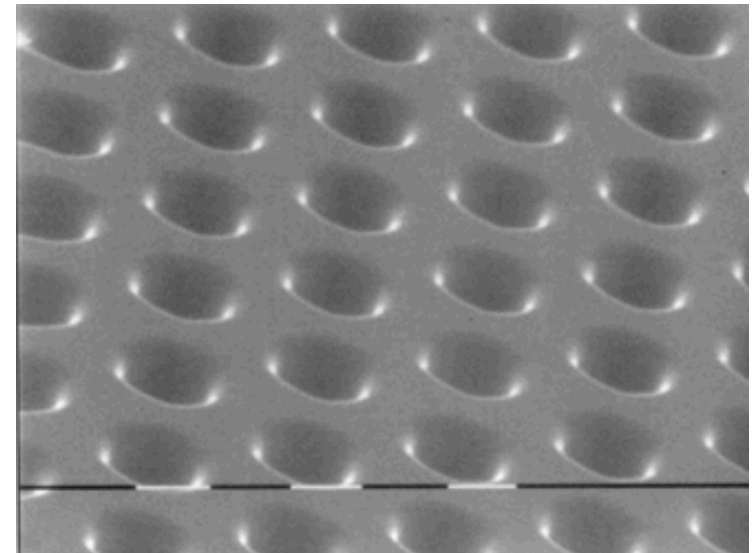
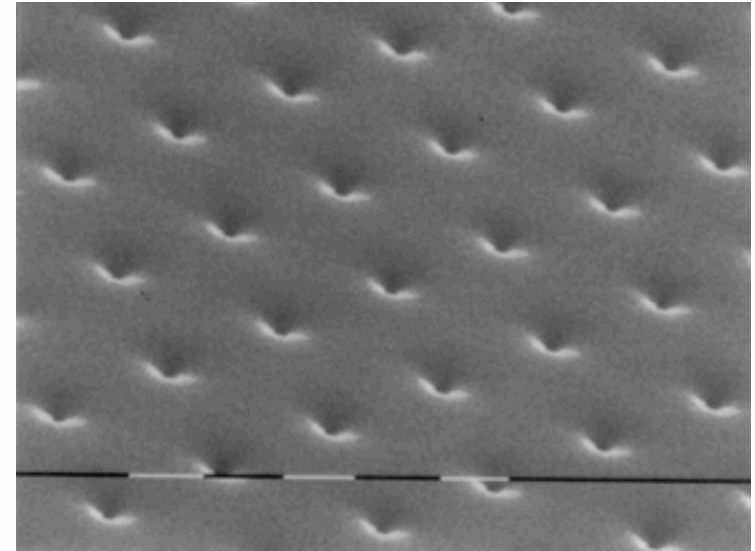
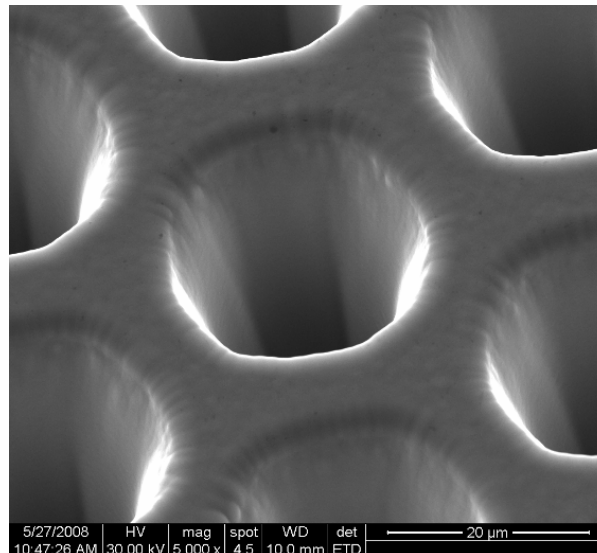
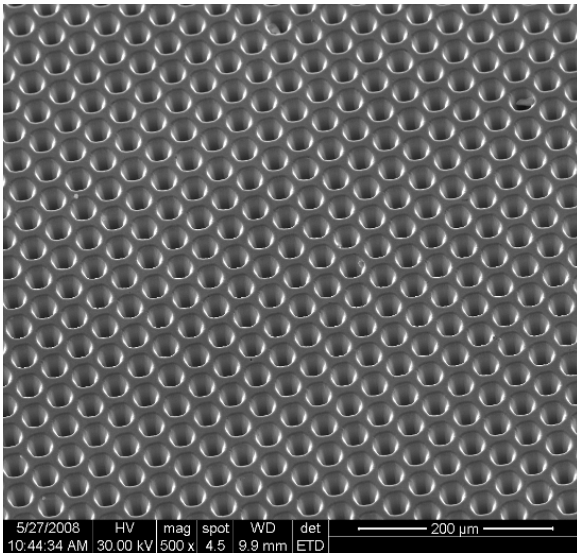
1mm300kU 1.97E1 4009/10 SE
Etched encoder disc



1mm300kU 1.97E1 4007/10 SE
Electroformed encoder disc, double layer

Microfiltration: VecoMicro

- Thick resist (up to 25 micron)
- Hole size 2-3 micron
- Applications: -Spraying nozzles
 - -Air filtration



End of presentation.
Questions?

Meet us at the **IVAM**
(Micro Technology Network)

Hall 6: Stand H16/B4



Stork Veco 