

At Electromold one of our plating processes is called Nicocover™. This is an Electroless Nickel Plating (ENP) process and as its name suggests, requires NO electric current to make it plate. Our Nicocover™ has a deposit that is one of the most accurate in reproducing surface texture and shape. It is also one of the best corrosion resistant plating processes available today. On most substrates the deposit is pore free and unlike electrolytic plating, the thickness of electroless deposits are plated evenly over the entire surface even on complex parts. Blind holes, threads, small diameter holes, recesses or internal areas receive the same amount of plating as sharp corners, edges or external surfaces. Therefore, very close tolerances can be maintained and although Nicocover™ deposits can be machined, in 90% of cases machining to size is frequently eliminated.

Some of Nicocover's™ properties include a hardness of between 50 to 70 Rockwell C, excellent lubricity and wear resistance, 100% uniformity, an excellent bond to base materials and a superior corrosion resistance. It may be deposited onto many different materials including High and Low Carbon Steels, Cast Iron, Aluminium, Copper and Copper Alloys, Brass and Brass Alloys, Nitrided and other hardened Steels, Stainless Steels and many more.

Due to its hardness, lubricity, wear resistance, and uniform deposit thickness, Nicocover™ should be considered whenever there is a need for a hard, smooth, corrosion resistant, and uniformly plated coating.

Some of the advantages of Nicocover™ are:

- Superior Corrosion Resistance
- High hardness. Between 50 to 70 Rockwell C. (Even on Aluminium)
- Excellent wear resistance, superior to Hard chrome
- Free from porosity, lamination, cracking and other defects
- Completely uniform deposit - reproduces the finish of the substrate being plated
- Hard surfacing of Aluminium parts and other soft materials
- Can easily be soldered
- No corner or edge build up
- Replaces exotic and more expensive materials
- The deposit is ductile so NO chipping or flaking will occur
- Self lubricating property, providing excellent release and anti-galling properties
- Self polishing surface for moulding operations
- Eliminates post machining and minimises handling



Aluminium drive pulley – 15 microns of ENP

- Salvages worn or mis-machined parts
- Improves equipment performance and reliability
- Reduces investment and operating costs

CORROSION RESISTANCE

Nicocover™ deposits have greater corrosion and chemical resistant properties than any other surface coating. The low porosity combined with the characteristic uniformity of the deposit and its high inherent corrosion resistance, results in an excellent coating for use in corrosive environments.

ADHESION

Nicocover™ coatings have passed the 180° bend test specified by MIL-C-26074B without any signs of flaking. There will usually be microscopic cracks in the coating parallel to the direction of bending. This cracking is normally not accompanied by flaking and demonstrates that the adhesion and ductility of the coating is greater than most other surface treatments.

THERMAL SHOCK

Nicocover™ coatings have passed the thermal shock test where a sample is heated to 250°C in an oven and quenched in cold water. Under 4x magnification there will be no signs of blistering or loss of adhesion.

PUNCH TEST

Nicocover™ coatings have passed the punch test where a sample is subjected to an indentation made by a spring-loaded centre punch which has a ground point with a 0.2mm radius. There will be no blistering or flaking as the nickel is ductile and will flex with the base material.



SPECIALISING IN Electroless Nickel Plating – Nicocover™ • Nickel Teflon Plating®
Hard Nickel Plating – Nicobuild™ • Hard Anodising • Colour Anodising • Chromate Conversion/Alodine
Stainless Steel Passivation • Copper Plating
Custom Coatings Nicoshine™ • Colourshine • Decorative Anodising • Metal Polishing
Spray Painting • Sand Blasting



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Aluminium blow moulding bottle dies

HARDNESS

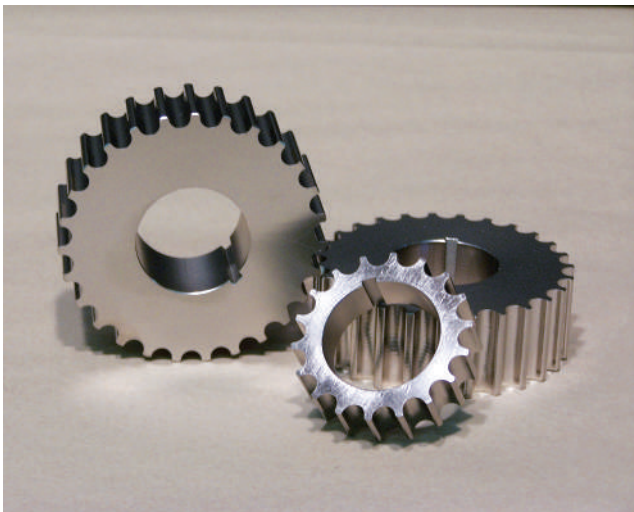
As plated, the Nicocover™ deposit has a hardness of approximately 50 Rockwell C. This can be increased to approximately 70 Rockwell C (1000 Vickers) by heat treating at 350 to 400°C for one hour. This is a very stable form of heat treating as there is no quenching or sudden temperature change involved. Further heating above 400°C tends to reduce the hardness, but at the same time increases the ductility due to the growth in crystal size. A minimum deposit thickness of 0.025mm (.001") is necessary for maximum hardness.

The hardness of electroless nickel coatings can be determined using ASTM B-578 "Micro Hardness Testing of Coatings".

What Can Be Plated With NICOCOVER™

Niocover™ deposits have many and varied useful properties which generally are functional as well as decorative. So due to its hardness, lubricity, wear resistance, and uniform deposit thickness, Nicocover™ should be considered whenever there is a need for a hard, smooth, corrosion resistant, and uniformly distributed coating.

Examples of some typical parts that can be plated with Nicocover™ are given below. Naturally, no such list can include all of the possible uses for Nicocover™. At best, such a list can present a cross section of the various uses.



Drive pulleys for race cars with a hardened 25 micron surface coating of ENP

BRIGHTNESS

Niocover™ deposits duplicate the brightness, texture and finish of the substrate surface 100%. This is critical in the plastic moulding industry on their product areas of the moulds, for restoration work on vintage cars and motor cycles. It is also important to obtain the correct surface finish on parts that are being plated for not only corrosion protection and hard facing but the plating must also look good to enhance their selling properties.

TYPES OF SUBSTRATES

Excellent results have been obtained plating with Nicocover™ on the following substrates: Aluminium Alloys, Copper Alloys, Beryllium, Low Carbon Steels, High Carbon Steel, Cast Iron, Nickel and Nickel-Chrome Alloys, Stainless Steel, Hardened Tool Steels and Nitrided Steels. Some of the above materials will require special pre-treatments.

SPECIFICATIONS

Electroless nickel deposits are covered by MIL-C-26074E entitled "Coatings, Electroless Nickel, Requirements for" and by SAE specifications AMS 2404A and AMS 2405. These specifications spell out the requirements for the final coating and not the requirements of the solution or the process used to obtain the coating. When used in accordance with the operating instructions, electroless nickel solutions will produce electroless nickel deposits which will meet all the requirements of MIL-C-26074B, ASTM B733, ASTM B656, AMS 2404B and AMS 2405.

ENGINEERING

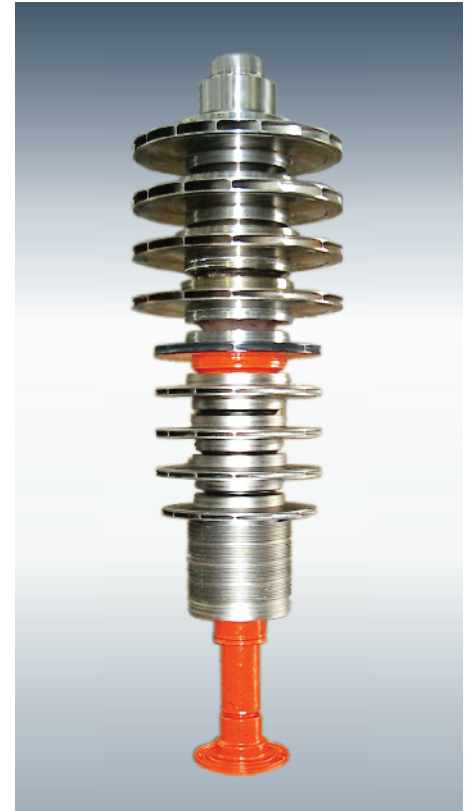
Aluminium Blow Moulding Dies
Extrusion Dies & Press Screws
Aluminium Machine Parts
Backhoe Turret
Blow Moulding Dies
Brass Polyurethane Foam Cup Dies
Measuring Equipment
Calibrating Equipment
Cast Iron Machine Parts
Cope and Drag Patterns
Front End Loaders
Hydraulic Rams
Labelling Machines
Moulding Machine Parts
Plastic Injection Moulding Dies
Sand Casting Dies and Patterns

GENERAL INDUSTRIAL

Air-conditioner Components
Computer Discs
Build Up of worn parts
Conveyor Chains
Decorative Applications
Dies
Dry Cleaning Equipment
Flow Control Valves
Gun Parts
Heating Elements
Hydraulic Cylinders & Pistons
Printed Circuit Board
Marine Equipment
Medical Equipment
Oil Field Drilling Equipment
Oil Nozzles
Plastic, Glass and Foundry Moulds
Pneumatic Parts
Printing Rollers
Aluminium Printing Rollers
Bolts (High tensile)
Pumps
Steel Rollers



Steel and stainless steel ball valves for mining industry



Masking and 50 micron of ENP on compressor turbine

ELECTRONICS

- Bolts (High tensile)
- Bearing Journals
- Computer Housings
- Connectors
- Diodes
- Drive Mechanism
- Heat Sinks
- Laser Mirrors
- Memory Discs
- Microwave Components
- Resistors
- Transistors

AVIATION / AEROSPACE

- Flap Guides
- Engine Components
- Gyroscopes
- Missile System Parts
- Landing Gear Components

CHEMICAL PROCESSING

- Butterfly & Ball Valves
- Chemical Blending Tanks & Equipment
- Filters
- Fire Control Pumps (Ships)
- Heat Exchangers
- Impellers
- Pumps, Housings and Impellers
- Tubing
- Valve Components

FOOD INDUSTRIES

- Bakery Dough Trays
- Conveyor Chains & Rollers
- Donut Cutters
- Food Presses
- Forming Equipment
- Meat Hooks
- Mixing Bowls
- Steam Trays
- Troughs & Rollers
- Gang Knives
- Slicing Blades
- Mixing Blades
- Pumps
- Valves
- Packaging Equipment
- Hooks
- Presses

AUTOMOTIVE / RACING

- Aluminium Brake Discs
- Carburettor Components
- Cylinders
- Differential Pinion Cross Shafts
- Dyno Parts
- Gears and Gear Assemblies
- Brake Disc Adaptors
- Aluminium Tooth Pulleys
- Racing Car Parts (Aluminium)
- Aluminium Brake Callipers
- Exhaust Pipes
- Extractors
- Rocker Covers
- Inlet & Exhaust Manifolds
- Restoration Parts
- Bolts (High tensile)
- Pistons
- Turbine Blades
- Valves

PHYSICAL PROPERTIES OF NICOCOVER™

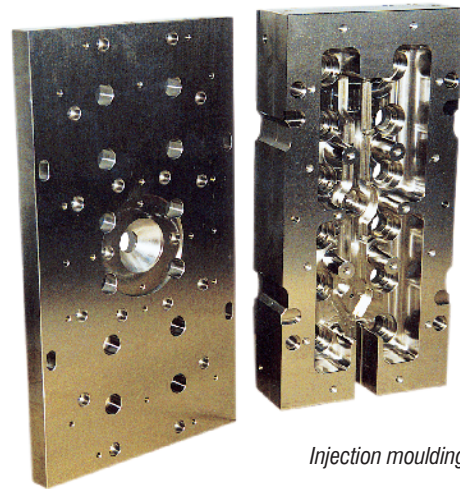
Phosphorous Content	10.0 to 12.00 Wgt, %
Melting Point (eutectic)	880 to 1400 °C.
Coefficient of Friction, ASTM D-2714	0.3 - 0.4 Dry
Thermal Conductivity	0.0105 to .0135 cal/cm/sec/°C
Electrical Resistivity	50 to 100 micron-cm
Bond Strength (Ring shear method)	
Carbon Steel	40,000 - 60,000 psi.
Aluminium	15,000 - 35,000 psi.
Magnetic Properties	Non Magnetic
Hardness Rockwell C	
75 um - 50g load, deposit, steel	
As plated	48 R C - 50 R C
Heat Treated @ 1 hr., 400°C	68 R C - 70 R C
Wear Properties	
Taber Abrasion Wear Test	
As plated	15 to 18 mg Wgt loss /1000 cycles
Heat Treated @ 1 hr., 400°C	3 to 6 mg Wgt loss /1000 cycles
Corrosion Related Properties	
Salt Spray Test * (ASTM B 117 or AS2331.3.1)	
35°C, 5% NaCl, 25 um deposit.	
Hours to first corrosion spot	
2024 Aluminium	1000+
1010 Carbon Steel	1000+
Nitric Acid Test	
Conc. nitric acid 42° Be'	
30 sec., room temp.	Pass **
25 um, steel	
Hydrochloric Acid Test	
50% HCl 3 min., room temp.	
25um, steel	Pass **

*Test is performed on a flat panel. More complex or rough parts may show initial spotting in fewer hours. Salt spray test is primarily a porosity test and is only effective as a screening tool to show the differences afforded by alternative processes. It is not, however, a quantitative corrosion test.

** Fail is indicated by any significant discolouration of the deposit.

Electromold's technical services are available at all times to ensure that the correct treatment is used for your particular application.

Our qualified staff will be pleased to visit you for any further on site technical support you may need without obligation.



Injection moulding die plates



Sand blasted finish