

## Mirror-Smooth Microfinish Coating Features Very Low COF and Eliminates Static Buildup

- Prevents scratching of films and foils
- Excellent corrosion and moisture resistance
- Temperature range from -250°F (-157°C) up to 950°F (510°C)
- Electrically conductive
- Excellent heat transfer
- None of the peeling, chipping, and cracking problems of chrome
- Meets FDA, USDA and AgriCanada codes for food and drug contact
- Reflective chrome-like appearance
- Excellent bond to parent metal
- Environmentally acceptable
- Increased hardness - can't cut it with a knife
- Less friction generation - low COF without polymers
- Permanent lubricity
- Maximum abrasion resistance
- Provides mold release
- For most base metals

HMF Provides a mirror-smooth microfinish with low coefficient of friction and eliminates static buildup. USDA/FDA/AgriCanada-compliant.

HMF is a proprietary, multi-step coating process that creates an extremely hard (up to an equivalent of Rc 68), mirror-smooth (down to 4RMS), highly-reflective microfinish on the surface of ferrous metal, copper or aluminium alloy components.

During the multi-step process, using specially developed application equipment, a series of nickel base alloys is co-deposited on the scientifically pre-cleaned and prepared surface of the metal part.

An exceptionally smooth, slippery surface with an amorphous, non-crystalline structure is created through subsequent steps of hardening and diffusion.

At various stages in the HMF coating process, a series of independent processing operations creates a unique microfinish that is mirror-smooth. Friction wear is reduced to a minimum.

The total process gives the part permanent lubricity along with improved surface hardness, exceptionally good abrasion resistance, and protection against common solvents and corrosion.

Proprietary engineering polymers may be added when needed for special requirements.

### Typical Applications:

- Pharmaceutical manufacturing
- Cosmetic manufacturing
- Paper, film, & foil production
- Plastic molding / extruding
- Closure devices
- Ball valves & seats
- Engine pistons & cams
- Calendaring
- Embossing
- Chutes
- Hoppers
- Folders
- Packaging
- Aerospace

## Engineering Data and Performance Characteristics

### Friction

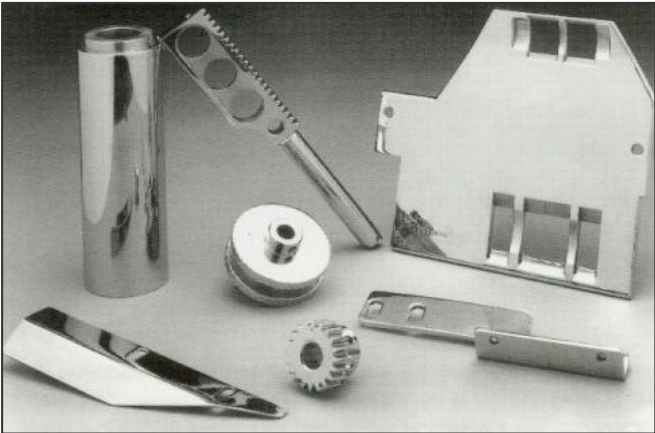
The surface of the part becomes smooth, slippery and mirror-like in appearance. Coefficient of friction: as low as 0.03 against burnished HI-T-LUBE. Eliminates "stick-slip" and undesirable vibration of higher break-away friction. Effectively ensures against galling and seizing. Eliminates generation of Lanier lines or similar stress lines in sensitive plastic film processing.

FRICTION COMPARISON TEST				
Material	Vs.	Material	COF	
			Static	Kinetic
Steel (4 – 8 RMS)		HMF	0.21	0.18
HMF		HMF	0.16	0.15
Teflon*		HMF	0.06	0.05
TUFRAM H-2		HMF	0.14	0.13
HI-T-LUBE		HMF	0.03†	0.03†

\*Teflon is a registered trademark of DuPont  
 †This ties the record for the lowest COF and can be found in the Guinness Book of World Records. It is tied with HI-T-LUBE against HI-T-LUBE also produced by GM



Because of its extremely low coefficient of friction, the HMF coating applied to the SS ball portion of a Worcester Controls valve containing a powdered metal seat, eliminates galling that could result in premature wear, leaking and, ultimately, total failure of the valve. In addition, use of the coating permits raising the operating temperature by over 200°F (93°C) and extends both the active life and shelf life of the valves by 50%.



Various packaging equipment parts are protected against abrasion and corrosion by HMF. In addition to eliminating static buildup, the mirror-smooth surface prevents scratching or "clouding" of film and foil package wraps on product surfaces as they flow through production lines.



Micro-smooth HMF is used on pharmaceutical segment blocks that fill capsules to reduce friction and wear and provide non-stick release. It also eliminates static buildup.

## Low Microfinish

HMF is capable of reaching a microfinish of 8 microinches or less. Since one of the most important variables in friction measurement is microfinish, these two properties are interrelated. In many cases, a lower microfinish will result in a lower COF. A low COF through a low microfinish is primary objective of HMF.

## Hardness

Surfaces of parts treated with HMF are super-hard. They can achieve an equivalent Rockwell hardness rating up to Rc68 – superior to that of hard chrome plate. The likelihood of galling or seizing is virtually eliminated. Equilibrium Wear Rates from Taber abrasion testing using a CS10 wheel indicate an extraordinarily low weight loss of 0.2 – 0.4 mg per 1000 cycles. This is far less than that of any conventional surface treatment or many other higher technology protective coatings.

## Temperature Resistance

HMF will function effectively within far wider temperature ranges than conventional protective coatings and at higher temperatures than previously available specialty high technology coatings. High strength, toughness, and self-lubricity are maintained down to -250°F (-157°C). At the other extreme, HMF has a temperature range up to 950°F (510°C). This is particularly advantageous when this high-technology coating is used to protect molds intended for use with plastics. The suggested useful operating range is up to 650°F (343°C).

## Chloride and Corrosion Resistance

Salt spray per ASTM B-117, exceeds 336 hours when thickness of coating is 0.001" or greater. HMF provides a level of chloride protection that is vastly superior to that of chrome plating. Chlorides will attack chrome but have no major effect on HMF. Chrome plating is susceptible to micro-cracking; HMF is virtually immune.

## Versatile

With few exceptions, HMF coatings can be uniformly applied to the exterior surfaces of most metals. Application is geometry dependent. Always contact S.E.C. Plating to verify applicability.

HMF is available from:-



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**General Magnaplate**

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