

MIC Markets

INNOVATORS IN TECHNOLOGY



**Metal Improvement
Company**

Subsidiary of Curtiss-Wright Corporation

Aerospace



Enhancing the performance
of metals and materials

www.metalimprovement.co.uk

**CURTISS
WRIGHT**

The Aerospace Industry

Metal Improvement Company (MIC) is a global organisation specialising in surface technologies to enhance performance and extend the life of critical components, enabling component designs to achieve their maximum potential.

MIC offers a quality controlled and cost effective service, working in partnership to meet its customers' needs.

Established in 1945, MIC has over 65 divisions operating in Europe, USA, Canada and Asia with on-site processing worldwide. In 2003, MIC added speciality coating capabilities to its services portfolio and today has coatings divisions in Europe, Asia and Ireland as well as E/M Coating Services facilities in the UK and USA developing and applying a wide range of engineered coatings.

MIC division approvals include: FAA, AS9100, NADCAP, ISO 9001:2008 plus other specific OEM, company and industry approvals as required.



Metal Improvement Company is a subsidiary of the Curtiss-Wright Corporation, a diversified international provider of highly engineered products and services to the Motion Control, Flow Control and Surface Technology industries

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**CURTISS
WRIGHT**

The aerospace industry demands high performance from lightweight materials capable of withstanding extreme loads often in an aggressive environment.

Surface treatments can extend these performance characteristics by protecting critical components from fatigue, fretting, stress corrosion and general corrosion, in addition to improving damage tolerance.

Metal Improvement Company (MIC) works closely with OEM designers, engineers and maintenance teams to understand their specific design and operating criteria. We are then able to offer high quality and cost effective solutions to achieve the best results.

Our surface treatments can be used independently or in combination and tailored to suit any material, operating in any environment and condition. This is the key value of working with MIC, we have the experience, capability and capacity to enhance the life and performance of products beyond present standards.

Controlled shot peening

Component failure is often related to residual tensile stress induced during manufacture. Controlled shot peening is a cost effective and practical method of inducing beneficial surface residual compressive stresses which enhance the performance and extend the life of critical components preventing premature failure. Controlled shot peening is a cold working process where the component's surface is bombarded with small spherical particles to yield the base material, relieving prior manufacturing stresses and inducing beneficial residual compressive stresses. This also reduces the effect of the applied load, thereby increasing the capability of the component to achieve longer life at higher loads.

On-site processing

Controlled shot peening is applied during original manufacture and it may be necessary during the lifetime of those components to re-introduce beneficial residual compressive stresses lost through corrosion, erosion, wear and potentially thermal or stress overload to the same

specification as initially applied ensuring identical performance. MIC has specialist field crews who are able to perform on-site work at customers' premises or in the field anywhere in the world to the same high quality standards as initially applied via fully mechanised or robotic processing.

Shot peen forming

Shot peen forming is the preferred method of forming complex aerodynamic contours. This process is ideal for forming wing skins and empennage panels for even the largest aircraft. The effect of pressure from the peening process causes local plastic deformation that manifests itself as a residual compressive stress. This combined with the localised stretching causes the material to develop a compound convex curvature on the peened side. An extension of this approach will also correct the form of complex parts distorted during machining and/or heat treatment.

C.A.S.E. (Isotropic Finishing)

C.A.S.E. superfinishing of components is critical in applications of metal to metal contact such as gears and bearings. The technique has been developed for surfaces that require both excellent bending and contact fatigue strength with enhanced surface properties to resist high loading. The process is generally applied after controlled shot peening to remove surface asperities resulting in improved performance and



lubrication and reducing critical factors such as wear, micro and macro pitting, noise and operating temperatures.

Laser peening

Laser peening can introduce residual compressive stresses in all engineering metallic materials up to 10 times deeper than other conventional cold working techniques with virtually no surface disruption. This clean and extremely controllable process is a production tool providing significant benefits where product performance is critical. Laser peening offers designers the ability to surgically place residual compressive stress into key areas of components to retard crack initiation and growth, enabling increased fatigue strength ratings.

Coatings

For many years we have been providing the aerospace and defence industry with a comprehensive range of coatings to enhance performance and extend the life of components. Selection of the appropriate coating can improve part life and reduce maintenance costs. Many of our coatings are qualified to aerospace and defence specifications.

In addition to our range of standard coatings we have the in-house ability to design and develop bespoke high performance coating products tailored to meet customers' individual requirements.

Our range of coatings provide:

- Resistance to corrosion, chemical and environmental attack
- Resistance to erosion and galling
- High lubricity / low friction
- High release / anti-stick
- Low noise / anti squeak
- Shielding to EM/RF radiation
- Aerospace aluminized coatings
- Parylene conformal coatings
- Pre-treatments including Ti anodising, phosphate conversion coating and chilled iron blasting, aluminum oxide blasting and vapour degreasing

PROVIDING SOLUTIONS

Most metallic components used by the aerospace industry, whether for airframe, aero engine, undercarriage, actuator systems or transmission components use key surface treatments to meet critical material performance targets.



These treatments have undergone thorough laboratory and field testing to ensure reliability in extreme conditions to deal with the following material failure modes:

Fatigue - the initiation and growth of cracks can be controlled by the tailored application of sustainable residual compressive stresses.

Fretting - fretting damage potentially leading to fretting fatigue, can be minimised by the protection of the base materials with appropriate coating and/or altering mating surface contact points and deep residual compressive stresses.

Galling - the adhesion of opposing surfaces when in contact, can be minimised by a coating protection and/or changes in material properties in the near surface area.

Stress corrosion cracking - the removal of surface tensile stresses or reducing them below threshold levels, can eliminate stress corrosion cracking.

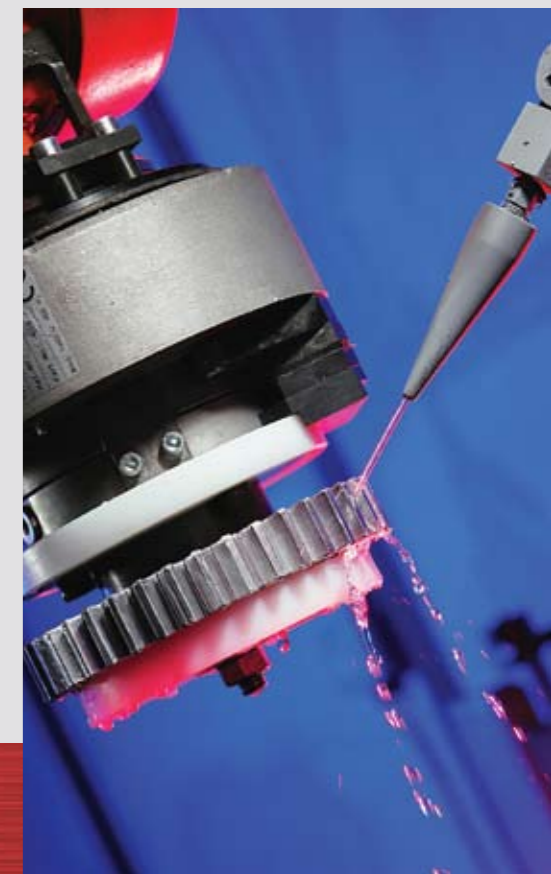
Corrosion - protection of the surface by coating, in combination with deep residual compressive stresses, is recommended to minimise this problem.

Wear - wear can be lessened by reducing friction characteristics and/or increasing or altering mating hardness.

Applications

- Airframe
- Aero engine
- Undercarriage
- Wings
- Actuator systems
- Transmission components
- Fasteners
- Valves
- Bearings
- Hydraulic fittings
- Seat belt mechanisms

Metal Improvement Company has been providing solutions to the Aerospace industry for over 60 years and through our network of dedicated international facilities and on-site work we are able to bring our experience and technical expertise wherever and whenever you need us.



INNOVATORS IN TECHNOLOGY

MIC MARKETS INCLUDE:

- **Aerospace**
- **Architectural**
- **Automotive**
- **Chemical & food processing**
- **General & structural engineering**
- **Marine**
- **Medical**
- **Military**
- **Off-road & earth moving equipment**
- **Oil, gas & petrochemical**
- **Power generation**
- **Railways**

MIC SERVICES INCLUDE:

- **Controlled shot peening**
induces engineered residual compressive stresses
- **Shot peen forming**
creates curvature and corrects distortion
- **Laser peening**
induces deeper residual compressive stresses
- **Engineered coatings**
improves performance, prevents corrosion and aids lubricity
- **C.A.S.E. (isotropic finishing)**
removes surface asperities reducing friction
- **On-site processing**
provides services on customers' own premises
- **Peentex (architectural finishing)**
creates decorative and aesthetic texturing
- **Surface texturing**
applies a textured engineered finish
- **Peenflex mouldings**
protects against processing and handling damage

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