

ADVANCED CHEMICAL ETCHING LTD

# TITANIUM

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Advanced Chemical Etching (ACE) has developed a Titanium etching process which produces high quality parts both dimensionally and with excellent cosmetic appearance, highly consistent and capable of serial production volumes.

ACE are the industry leader in Titanium etching and one of the only photo chemical etching companies capable of etching all grades of Titanium including Alpha and Beta grades as well as Nitinol.

*Titanium* is renowned for its *strength*, *light-weight properties* and *high-temperature performance*; however, Titanium etching is difficult due to the fact that Titanium rapidly forms a protective oxidized coating when exposed to air; a coating that is exceptionally hard to dissolve.

The industry-standard etching process for Titanium is a Hydrofluoric Acid (HF) and Nitric mix, chosen for its ability to remove this oxide layer. This is a highly dangerous, toxic material and one ACE has avoided, not wishing to put our employees at risk of injury.

ACE has developed a new, unique, *safer chemistry* that takes *Titanium Etching* to new levels of *quality* and *precision*. We are one of the few etching companies in the world that can *offer Titanium etching on a production scale*.

ACE has vastly increased the processing speeds and etch rate of Titanium; the ACE chemistry has a *higher etching capacity* than others.

#### BENEFITS OF THE ETCHING PROCESS SMOOTH EDGE PROFILE AND SMOOTH SURFACE ETCH PROFILE **NO SURFACE BURRS** TIGHT TOLERANCES POSSIBLE ±10% OF MATERIAL THICKNESS **COMPLEX GEOMETRIES AT NO EXTRA COST 1:1 APERTURE ASPECT RATIO POSSIBLE MICRO ETCHED CHANNELS WITH SMOOTH FINISH** $\square$ THICKNESSES FROM 0.010MM - 1.00MM $\square$ SHEET SIZE UP TO 300MM X 500MM **FAST TURNAROUND SERIAL PRODUCTION CAPACITY NO HEAT-AFFECTED ZONES** SAFER CHEMISTRY REDUCES PERSONAL AND ENVIRONMENTAL RISKS PULSE ETCHING FOR FINE LINE ETCHING

Contact ACE today on +44 (0)1952 416 666 to find out what we could produce for you – whether it's 1s or millions.

## **TYPICAL ETCHED COMPONENTS**

**Cooling Plates** 

**Fuel Cell Plates** 

**Automotive Speaker Grilles** 

Heat Exchanger
Plates and Shims
Dental Membranes

 » Pacemaker Battery Grids
» Medical Mesh and Filters

#### **INDUSTRY SECTORS**

○ Energy ○ F1 and Automotive ○ Aerospace ○ Medical

A PROCESS OF INNOVATION

#### **METAL GRADES FOR TITANIUM ETCHING**

#### TECHNICAL CAPABILITY

| GRADES                      | THICKNESS RANGE   | MAXIMUM SHEET SIZE |  |
|-----------------------------|-------------------|--------------------|--|
| Titanium (Alpha) grades 1-4 | 0.025mm – 1.000mm | 300mm x 500mm      |  |
| Titanium (Beta) grades 5-38 | 0.025mm – 1.000mm | 300mm x 500mm      |  |
| Nitinol                     | 0.025mm – 1.000mm | 300mm x 500mm      |  |
| Kapton Coated Titanium      | 0.010mm – 0.500mm | 300mm x 500mm      |  |

#### **PROCESS CAPABILITY**

| METAL<br>THICKNESS | MINIMUM<br>SLOT / HOLE | BAR     | MINIMUM<br>INTERNAL<br>RADIUS | MINIMUM<br>EXTERNAL<br>RADIUS | MINIMUM<br>TOLERANCE | ETCH<br>PROFILE<br>CUSP |
|--------------------|------------------------|---------|-------------------------------|-------------------------------|----------------------|-------------------------|
| 0.050mm            | 0.100mm                | 0.100mm | 0.050mm                       | 0.040mm                       | ±0.025               | 0.012mm                 |
| 0.100mm            | 0.110mm                | 0.110mm | 0.100mm                       | 0.080mm                       | ±0.025               | 0.025mm                 |
| 0.150mm            | 0.170mm                | 0.170mm | 0.150mm                       | 0.120mm                       | ±0.025               | 0.030mm                 |
| 0.200mm            | 0.220mm                | 0.220mm | 0.200mm                       | 0.160mm                       | ±0.025               | 0.040mm                 |
| 0.250mm            | 0.275mm                | 0.275mm | 0.250mm                       | 0.200mm                       | ±0.030               | 0.050mm                 |
| 0.500mm            | 0.550mm                | 0.550mm | 0.500mm                       | 0.400mm                       | ±0.055               | 0.100mm                 |
| 0.700mm            | 0.770mm                | 0.770mm | 0.700mm                       | 0.560mm                       | ±0.077               | 0.140mm                 |
| 1.000mm            | 1.100mm                | 1.100mm | 1.000mm                       | 0.800mm                       | ±0.110               | 0.200mm                 |

### **HIGHLY QUALITY STANDARDS**

- Etching can produce complex features and geometries in Titanium sheets. Thicknesses ranging from 25 µm to 1.0mm can be processed using the unique ACE Titanium etching process. Moreover, this process does not affect the chemical and mechanical properties of the metal.
- » The ACE process is more controllable and more repeatable than industry standard processes, and it produces parts that meet much higher quality standards. The ACE process has now become the standard etching process for all Titanium alloys at ACE, including Nitinol.



○ ACE – MAKING THE DIFFERENCE IN INNOVATION, TECHNOLOGY AND MANUFACTURING CONTACT THE TEAM ON +44(0)1952 416 666 | info@ace-uk.net | www.ace-uk.net