## 

## TITANIUM ETCHING

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 $\pm 10 \%$ OF MATERIAL THICKNESS

## COMPLEX GEOMETRIES AT NO EXTRA COST

## 1:1 APERTURE ASPECT RATIO POSSIBLE

MICRO ETCHED CHANNELS WITH SMOOTH FINISH
THICKNESSES FROM 0.010MM - 1.00MM

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 416666 to find out what we could produce for you - whether it's 1 s or millions.
*Automotive Speaker Grilles
»Fuel Cell Plates

Heat Exchanger
Plates and Shims
Dental Membranes

## »Pacemaker Battery Grids <br> »Medical Mesh and Filters

## INDUSTRY SECTORS

$\bigcirc$ Energy $\bigcirc$ F1 and Automotive $\bigcirc$ Aerospace $\bigcirc$ Medical

## METAL GRADES FOR TITANIUM ETCHING

## TECHNICAL CAPABILITY

| GRADES | THICKNESS RANGE | MAXIMUM SHEET SIZE |
| :---: | :---: | :---: |
| Titanium (Alpha) grades $1-4$ | $0.025 \mathrm{~mm}-1.000 \mathrm{~mm}$ | $300 \mathrm{~mm} \times 500 \mathrm{~mm}$ |
| Titanium (Beta) grades $5-38$ | $0.025 \mathrm{~mm}-1.000 \mathrm{~mm}$ | $300 \mathrm{~mm} \times 500 \mathrm{~mm}$ |
| Nitinol | $0.025 \mathrm{~mm}-1.000 \mathrm{~mm}$ | $300 \mathrm{~mm} \times 500 \mathrm{~mm}$ |
| Kapton Coated Titanium | $0.010 \mathrm{~mm}-0.500 \mathrm{~mm}$ | $300 \mathrm{~mm} \times 500 \mathrm{~mm}$ |

## 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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0.050 mm | 0.100 mm | 0.100 mm | 0.050 mm | 0.040 mm | $\pm 0.025$ | 0.012 mm |
| 0.100 mm | 0.110 mm | 0.110 mm | 0.100 mm | 0.080 mm | $\pm 0.025$ | 0.025 mm |
| 0.150 mm | 0.170 mm | 0.170 mm | 0.150 mm | 0.120 mm | $\pm 0.025$ | 0.030 mm |
| 0.200 mm | 0.220 mm | 0.220 mm | 0.200 mm | 0.160 mm | $\pm 0.025$ | 0.040 mm |
| 0.250 mm | 0.275 mm | 0.275 mm | 0.250 mm | 0.200 mm | $\pm 0.030$ | 0.050 mm |
| 0.500 mm | 0.550 mm | 0.550 mm | 0.500 mm | 0.400 mm | $\pm 0.055$ | 0.100 mm |
| 0.700 mm | 0.770 mm | 0.770 mm | 0.700 mm | 0.560 mm | $\pm 0.077$ | 0.140 mm |
| 1.000 mm | 1.100 mm | 1.100 mm | 1.000 mm | 0.800 mm | $\pm 0.110$ | 0.200 mm |

## HIGHLY QUALITY STANDARDS

»Etching can produce complex features and geometries in Titanium sheets. Thicknesses ranging from $25 \mu \mathrm{~m}$ to 1.0 mm 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 416666 | info@ace-uk.net | www.ace-uk.net

