Photo Etching + Diffusion Bonding

We offer fast delivery of fine processing products with outstanding durability and dimensional accuracy.

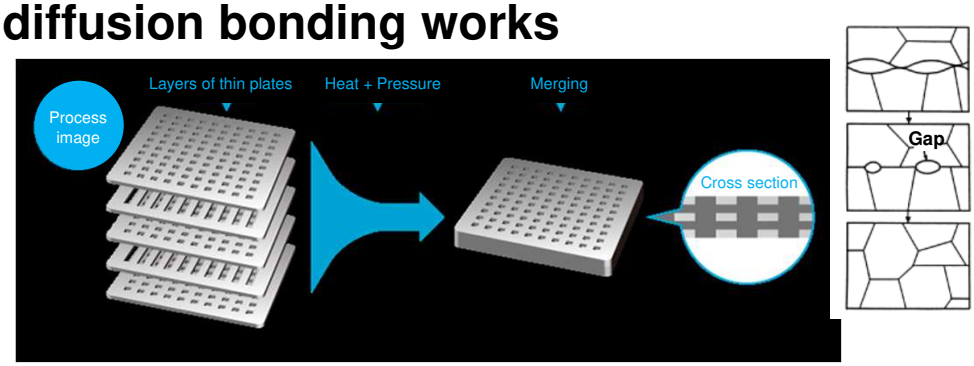
UPT
UNITED PRECISION TECHNOLOGIES

Photo Etching + Diffusion Bonding

What is diffusion bonding?

- Diffusion bonding is a solid-state welding technique where two metal surfaces are joined by bringing them together at the atomic level using heating and pressurizing methods. By carrying out diffusion bonding on layered photo-etched pieces that have been fine-processed, a range of micro designs become possible that weren't able to be made with traditional machinery.

How diffusion bonding works



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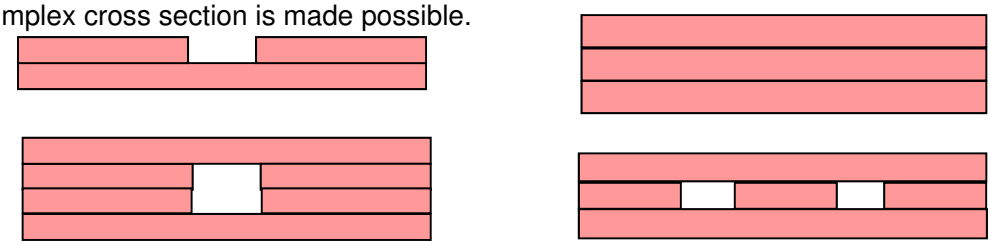
- Through applying diffusion bonding to multiple photo-etched metallic sheets, a more complex cross section is made possible.



UPT Group's photo etching + diffusion bonding

- Fine processing techniques used by world-leading companies
- Fast delivery option by request
- Mostly no deformations nor dimensional variations caused by bonding
- Strong bonding thanks to atomic-level adhesion
- Can produce deep holes and tapered holes that are not possible with traditional machinery, as well as complex shapes and micro channels, such as for parts with inner holes.

Features of photo etching + diffusion bonding

Comparison of bonding methods: Between two metals

	Diffusion bonding	Glue	Welding	Brazing
Heat tolerance	○	× as it's resin	○	○
Bond strength	○	△	○	○
Dimensional accuracy (when joining micro-machined parts)	○	×	× the material that's welded gets melted	×
Supports mass production	○	○	○	○

Comparison of solid modeling by difference in manufacturing method

	Etching + diffusion bonding	Cutting / machining	Laser machining	Press working
Supports micro designs	○ Photo-quality		○ Photo-quality	Within the scope of metal mold creation
Material deformations (burrs, etc)	○ None		Burrs	Burrs occur easily
Supports fast delivery	○ 1 week +	○ 1 week	○ 1 week	Takes 1 month + to produce metal molds
Supports mass production	○ Possible	Possible but costs time and money	Possible but costs time and money	○ Possible
Cost	○ Metal molds not needed	○ Metal molds not needed	○ Metal molds not needed	Metal molds needed

For example, with these products:

- Heat exchanger-related parts
- Fuel cell-related parts
- Nozzles for ink jets
- All kinds of conveyance trays
- Detailed metal masks / stencils
- All kinds of micro channels / sensors
- Large-sized meshes / different types of filters
- All kinds of jigs for different processes: for alignment, positioning
- All kinds of fixing disks
- Products with a high aspect ratio
- Products with tapers / holes
- Masks for sputtering (plating)
- All kinds of separators
- Other types of cuts / shapes that are impossible with machinery

- With photo etching + diffusion bonding, complex 3-dimensional designs that don't require metal molds are possible in all stages from trial manufacturing to mass production.
- We also do fast deliveries – talk to us about your needs.

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