Inertia Welding Applications
It is possible, by using proper procedures and with proper inertia/friction welding equipment, to generate repeatable full strength weld applications.
Bend and pressure tests show the strength of Inertia Welded transitions.
Bi-metal fittings used in pressure vessels, vacuum and heat pipe systems.
Stainless steel to aluminum in cryogenic applications.
Ordinance applications call for unique combinations.
### Bi-Metal Combinations to Aluminum

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9310</td>
<td>ZIRCONIUM</td>
</tr>
<tr>
<td>304</td>
<td>COPPER</td>
</tr>
<tr>
<td>1018</td>
<td>INCO</td>
</tr>
<tr>
<td>INVAR</td>
<td>6063 AL</td>
</tr>
<tr>
<td>6AL 4V TI</td>
<td>A286</td>
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<tr>
<td>3 AL 2.5 V TI</td>
<td>TUNGSTEN</td>
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<tr>
<td>MONEL</td>
<td>316 SS</td>
</tr>
<tr>
<td>PALLINEY</td>
<td>15-5 SS</td>
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<tr>
<td>MONEL</td>
<td>410 SS</td>
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## Bi-Metal Combinations to Inco

<table>
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<tr>
<td>316 SS</td>
<td>4140</td>
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<tr>
<td>RENE 41</td>
<td>2219 AL</td>
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<td>WASPALOY</td>
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<tr>
<td>MAR-M 247</td>
<td>6061 AL</td>
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<tr>
<td>UDIMET</td>
<td>TITANIUM</td>
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<tr>
<td>HASTELOY X</td>
<td>SILVER</td>
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<tr>
<td>ASTROLOY</td>
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Bi-Metal Combinations to Copper

- INVAR
- 6061 AL
- 4140
- 304 SS
- 4043
- INCO
- 15-5 SS
- KOVAR
- IRIDIUM

- 347 SS
- SILVER
- 316 SS
- 5 N 5 ALUM
- TITANIUM

INTERFACE
WELDING
Inertia Welding Specialists
Bi-Metal Combinations to Stainless

<table>
<thead>
<tr>
<th>4130</th>
<th>9310</th>
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<tbody>
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<td>NITRONIC</td>
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<td>LEDLOY</td>
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<td>ZIRCONIUM</td>
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<td>KOVAR</td>
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</tbody>
</table>
Bi-Metal Combinations to Titanium

- MOLYBDENUM
- 6061 AL
- 321 SS
- 304 SS
- 2219 AL
- NIOBIUM
- ZIRCONIUM
- COPPER
- BRONZE
- INCO
Bi-Metal Combinations of Miscellaneous Materials

MONEL TO VANADIUM
HIPERCO 50 TO AL 4750
TUNGSTEN TO ZIRCONIUM
PALLNEY 7 TO NICKEL
STELLITE 6B TO EVB4
TANTALUM TO NIOBIUM
NIOBIUM TO ZIRCONIUM
NIOBIUM TO MAR-M 247
15-5 SS TO MAR-M 247
SILVER TO INCO

NITRALLOY “N” TO MARAGING 250
Titanium to Aluminum NASA Component
Titanium to Stainless Bend Test
304 STAINLESS STEEL

6AL-4V TITANIUM

WELD

ACTUAL AREA | YIELD LOAD @.2% | YIELD LOAD @MAX | TENSILE LOAD @MAX | TENSILE PSI @MAX
---|---|---|---|---
.19644 | 11250 | 57300 | 18150 | 92400
Tantalum to Niobium to Zirconium Bend Test
Titanium to Aluminum to Tool Steel
Stainless to Aluminum Cryogenic Port Adapter
HYDRAULICS
Stainless to Aluminum Space Shuttle Fuel Cell Cap
Stainless to Aluminum Transition Fitting
Control Solenoid
Aircraft Transmission Gear
Titanium to 9310 Aircraft Gear
Weight Reduction Program
Inco to 2219 Aluminum
Titanium or Stainless to Aluminum VCR Fitting
Titanium to Aluminum NASA Component
Titanium or Stainless to Aluminum Fluid Coupler
Ø3.50 Copper to Ø4.250 Aluminum

Hi-Voltage Electrical Contact
Copper to Titanium or Stainless to Copper
Copper to Aluminum
Titanium to Aluminum Fluid Coupler
INCO or GMR Turbine to 4140 Shaft
NITRALLOY “N” to MARAGING 250
Hughes (Boeing) Helicopter
Main Rotor Drive Shaft
AH64 Apache
Inertia Welding
Metallurgy
Inertia/friction welding utilizes a high pressure forge force. Because of the high pressure, the metal, as it becomes heated by friction, is forged together with no melt product being produced, no chemical change and a very narrow heat affected zone. This allows for a variety of metals that have different melt or sensitive chemistries to be joined with resulting properties that are excellent and comparable to the base metal.
Turbine Wheel Weldment MAR-M-247 TO 4140
BI-METAL WELDMENT 8630 TO INCO 713C
BI-METAL Zirconium to Titanium
Bi-Metal Weldment 355 Stainless to 5083 Aluminum
Bi-Metal Weldment OFHC Copper to 6061-T6 Aluminum
Bi-Metal Weldment 6AL 4V Titanium to 6061-T6 Aluminum
Bi-Metal Weldment 6AL 4V Titanium to 304 Stainless
Bi-Metal Weldment Inco 718 to Mar-M 247