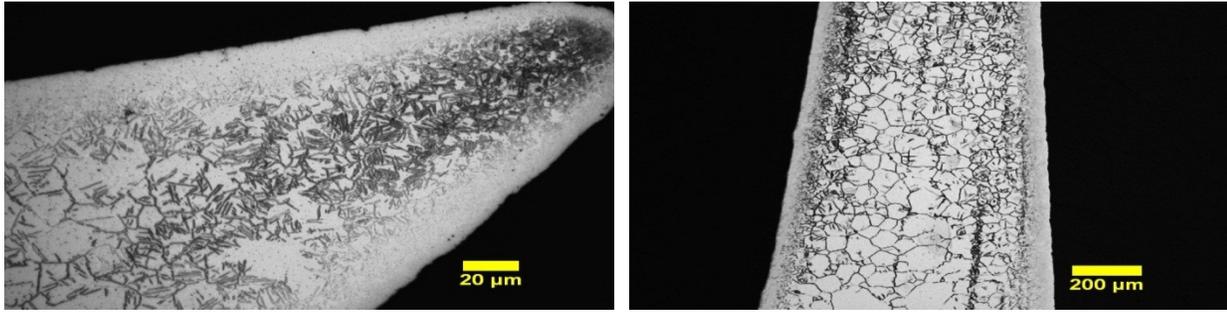




**BUEHLER**

An ITW Company

**ASM OC  
Aerospace Symposium  
November 5, 2012**



*Titanium-Columbium Alloy Shear Pin Rivet etched with 0.5% HF*

The fasteners on most aircraft play an integral part of the total manufactured part and may be required to handle high temperatures, high strength or close tolerances. According to the Boeing Corporation a 747-400 has six million parts, half of which are fasteners.

Fasteners play a critical role in the design of aircraft structures as they can define the longevity and structural integrity of various components. Aerospace fasteners that include bolts, nuts and washers can be made from titanium, aluminum alloy, stainless steel, super alloy or steel. Structural bolts are predominately made of titanium and are routinely tested for quality assurance or failure analysis. These analyses can include micro hardness evaluation, SEM/EDX and metallographic evaluation.

ATi-Cbaerospace fastener was prepared using the Buehler SumMet 3 - Step Method guideline for titanium alloys along with an attack polish of MasterMet Silica and 10% ammonium persulfate solution in a 5:1 ratio. The attack polish allows chemical mechanical polishing of the titanium by oxidation of the surface and mechanical removal the oxidation layer by abrasives.

### 3-Step Method for Ti Alloys

3-Step Method for Ti Alloys					
Surface	Abrasive/Size	Load lb. (N)/Specimen	Base Speed (RPM)	Relative Rotation*	Time (min:s)
CarbiMet S	320- (P400) Grit SiC	6 (27)	240-300	>>	<b>Until Plane</b>
UltraPad	9-µm MetaDi Supreme Diamond	6 (27)	150-200	<<	10:00
ChemoMet	0.02 – 0.06-µm MasterMet Silica**	5 (22)	100-150	<<	10:00
*>> = Complimentary (platen and specimen holder rotate in the same direction) << = Contra (platen and specimen holder rotate in opposite directions) **Attack polish may be used, 1 part ammonium persulfate solution (10 g ammonium persulfate per 100 mL distilled water) or 30% hydrogen peroxide to 5 parts silica.					



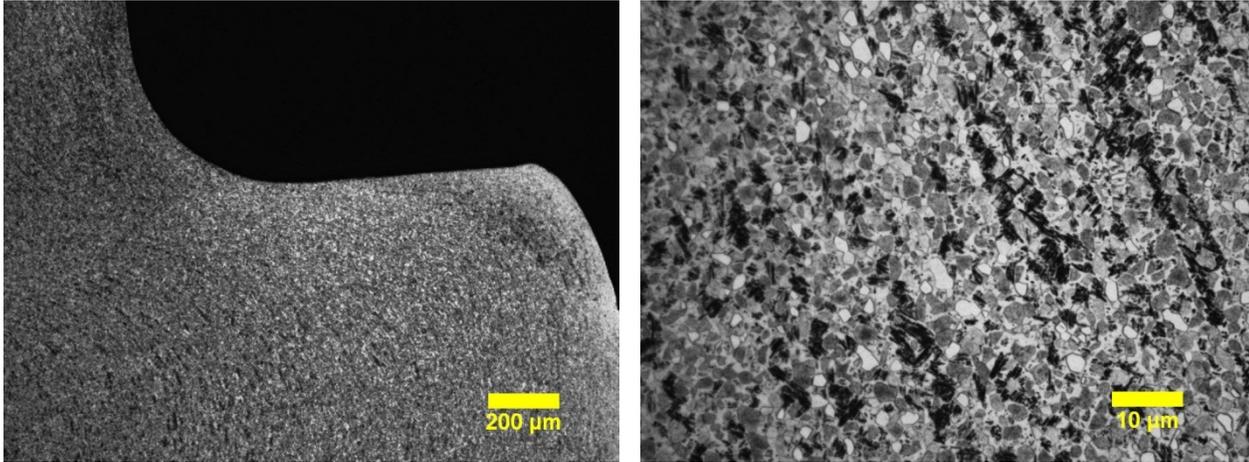
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Ti-6Al-4V Rivet *etched with 0.5% HF*

Titanium in commercially pure form is rather soft and ductile and very susceptible to damage during sectioning and grinding. Titanium alloys are typically easier to prepare but due to the low abrasion rates it is recommended to use silicon carbide for grinding steps versus diamond grinding discs. A Ti-6Al-4V aerospace fastener was prepared using the Buehler SumMet 3 - Step Method guideline for titanium alloys along with an attack polish of MasterMet Silica and 10% ammonium persulfate solution in a 5:1 ratio. The attack polish allows chemical mechanical polishing of the titanium by oxidation of the surface and mechanical removal the oxidation layer by abrasives.

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# Apex™ S

## Quick Change System for Grinder-Polishers

The Apex S Quick Change System improves productivity and usability of Grinding-Polishing machines through simple application and effortless removal of grinding surfaces to the working platen. The system includes the Apex S Carrier Film, CarbiMet™ 2 S and MicroCut™ S Abrasive Discs.

- Apply and remove grinding surfaces to and from the working platen without the hassle of PSA and its residue
- Tremendous efficiency and ease-of-use when changing grinding surfaces



### Apex S Carrier Film

- High friction surface with a PSA backing
- Adheres directly to Apex B, MagnoMet or MagnoPad to be used with the Apex Quick Change Magnetic System
- Adheres directly to any conventional platen

### CarbiMet 2 S and MicroCut S Abrasive Discs

- The same CarbiMet 2 and MicroCut abrasive surface manufactured with Apex S compatible backing
- Unchanged abrasive surface ensures seamless integration into preparation methods

### Ease-of-use and Versatility

- Apply abrasive discs and remove effortlessly
- Use with CarbiMet 2 S, MicroCut S, plain backed FibrMet Abrasive Discs, and plain backed UltraPrep™ Diamond Lapping Films
- Compatible with all 8-12in [203-305mm] Grinder-Polisher Equipment

### Performance and Durability

- Strong grip with no adhesive
- Maintain cleanliness with just water and a paper towel
- Use hundreds of abrasive discs with each Apex S Carrier Film

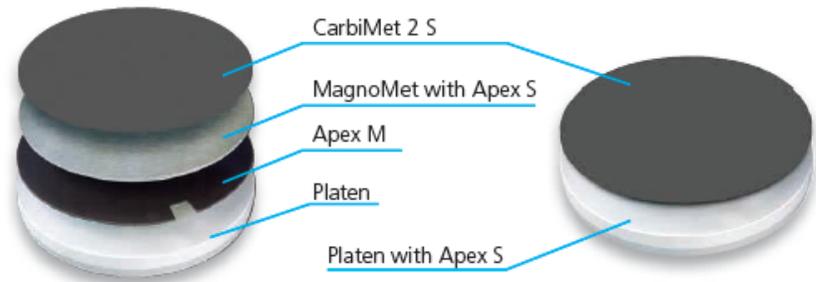


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## Ordering Information

### Apex™ S Carrier Films (qty 2)

16-2075 for 8in [203mm] platens  
 16-2575 for 10in [254mm] platens  
 16-3075 for 12in [305mm] platens



### CarbiMet™ 2 S & MicroCut™ S Abrasive Discs (qty 100)

Grit Size ANSI [FEPA]	Approx. Micron Size	8in [203mm]	10in [254mm]	12in [305mm]
60 [P60]	269	30-51281	30-51301	30-51321
120 [P120]	127	30-51282	30-51302	30-51322
180 [P180]	78	30-51283	30-51303	30-51323
240 [P280]	52	30-51284	30-51304	30-51324
320 [P400]	35	30-51285	30-51305	30-51325
400 [P800]	22	30-51286	30-51306	30-51326
600 [P1200]	15	30-51287	30-51307	30-51327
800 [P1500] MicroCut S Disc	13	30-51288	30-51308	30-51328
1200 [P2500] MicroCut S Disc	8	30-51289	30-51309	30-51329

The Apex S Quick Change System can be used in different configurations as shown above.

### Apex Bimetallic & Metallic Plates

- 41-2739-208-001 Apex B Bimetallic Plate, 8in [203mm] (qty 1)
- 41-2739-210-001 Apex B Bimetallic Plate, 10in [254mm] (qty 1)
- 41-2739-212-001 Apex B Bimetallic Plate, 12in [305mm] (qty 1)
- 16-2072 Apex MagnoMet Metallic Plates, 8in [203mm] (qty 5)
- 16-2572 Apex MagnoMet Metallic Plates, 10in [254mm] (qty 5)
- 16-3072 Apex MagnoMet Metallic Plates, 12in [305mm] (qty 5)
- 16-2073 Apex MagnoPad Teflon™ Coated Metallic Plates, 8in [203mm] (qty 5)
- 16-2573 Apex MagnoPad Teflon Coated Metallic Plates, 10in [254mm] (qty 5)
- 16-3073 Apex MagnoPad Teflon Coated Metallic Plates, 12in [305mm] (qty 5)



#### Aluminum Platens

- 40-4061 8in [203mm]
- 40-0500 10in [254mm]
- 49-1777 12in [305mm]



60-6075 Roller

Use the roller to apply Apex S Carrier Film to the platen

For a complete listing of consumables, please refer to Buehler Buyer's Guide or contact your local Buehler Sales Engineer. Buehler continuously makes product improvements; therefore technical specifications are subject to change without notice.

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# SimpliMet™ XPS1 Automatic Compression Mounting System

## Fast Total Cycle Times

- Makes 1.25in [30mm] mounted specimens in about 5 minutes
- Heating and cooling steps are optimized to maximize efficiency of the mounting process

## Intelligent Cooling Systems

- SmartCool™ intelligently ends the cooling step and completes the mounting process automatically once the sample is safe to handle
- Process time and water usage are optimized by SmartCool
- Thermoplastic feature controls process parameters for transparent TransOptic™ mounting media

## Intuitive User Interface

- Intuitive artwork on buttons used to control process parameters and bright, easy-to-read LED displays make the SimpliMet XPS1 easy-to-use
- Status bar monitors progress keeping operators informed throughout the mounting process
- Set and store temperature, pressure, and times

## Weightless Closure Mechanism

- Close chamber with very little downward force allowing for single-handed operation
- Lock/Unlock click-stops provide tactile feedback to operator when chamber is closed/opened
- Tapered opening mitigates against spillage of mounting media by acting as a funnel

## Safety

- Insulated mold assembly prevents exterior surfaces from getting hot during heating steps in the mounting process

## Compact Footprint

- Slim width 12.25in [311mm]



## SimpliMet XPS1

The SimpliMet XPS1 is an electrohydraulic Automatic Compression Mounting System that brings fast cycle times to the specimen mounting process. This efficiency is delivered by optimizing the typical heating and cooling steps in the mounting process.

The unit features intelligent cooling with SmartCool and Thermoplastic functions. SmartCool optimizes cooling time by monitoring sample temperature within the mold assembly, automatically terminating the process once samples have reached safe handling temperatures. Thermoplastic mode optimizes the temperature profiles required for transparent mounting media like TransOptic ensuring impeccably transparent mounted specimens every time.

The unit offers a best-in-class weightless closure mechanism which requires very little downward forces to close the mounting chamber.

Tactile feedback from the click-stops at the lock and unlock positions confidently informs the operator when the mounting chamber is closed and open.

Descriptive artwork on the intuitive controls, blue LED parameter displays, and a lighted status-bar make the unit easy-to-use and keeps the operator informed of progress throughout the entire mounting process.

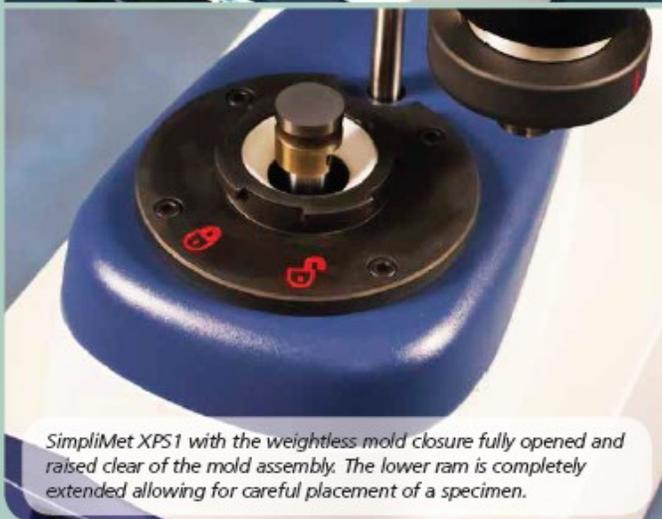
The exceptionally narrow footprint at 12.25in [311mm] minimizes the bench space required by this unit in the specimen preparation laboratory. The SimpliMet XPS1 excels in fast processing, ease-of-use, convenience, and size without ever compromising on performance. For best-in-class automated compression mounting of specimens the solution is the SimpliMet XPS1.



*SimpliMet™ XPS1 with the mold closure in the locked position. Intuitive symbols on the closure base-plate mark the click-stops at the lock and unlock positions.*



*Accessory holders on the housing are useful for storing relevant hand-tools keeping them accessible and visible to the operator at all times.*



*SimpliMet XPS1 with the weightless mold closure fully opened and raised clear of the mold assembly. The lower ram is completely extended allowing for careful placement of a specimen.*



*User interface with integrated status bar utilizes intuitive artwork on buttons and bright, easy-to-read displays that allow the user to effortlessly control process parameters and monitor progress throughout the mounting process.*

Specifications	SimpliMet XPS1
Operation	Automatic electrohydraulic
Power Source	85-264VAC, 50/60Hz, 1 phase
Molding Pressure	1000-4400psi [80-300bar] in 50psi [5bar] increments +/- 10%
Molding Temperature	120 - 430°F [50 - 200°C] in 10°F [10°C] increments
Heating Power	1500Watt @ 115/230VAC
Heating Time	1 - 20 minutes in 10 second increments
Cooling Time	1 - 30 minutes in 10 second increments
Mold Type	Cylindrical, including upper and lower rams
Closure Type	Insulated bayonet with piston indent
Mold Diameters	1in, 1.25in, 1.5in, 2in, 25mm, 30mm, 40mm, 50mm
Units of Measure	Pressure [psi or bar]; Temperature [°F or °C]
Preload Pressure	350psi [24bar]
Thermoplastic Function	Automatically sets correct parameters for thermoplastic resins such as TransOptic™ and cools the mount in a controlled, linear fashion appropriate for the mounting media
Compliance	CE, PSE, RoHS, WEEE

For more information, call toll-free 1-800-BUEHLER (1-800-283-4537) or visit our website at [www.buehler.com](http://www.buehler.com)

## SimpliMet™ XPS1

- Automatic electro-hydraulic compression mounting system
- User may define pressure, temperature, heating and cooling time
- Clear, easy-to-use interface
- Molds assemblies available in sizes from 1in [25mm] to 2in [50mm]

Part Number	Voltage/Frequency
20-1010-5001 with 1in Mold Assembly	85-264VAC, 50/60Hz
20-1010-5025 with 25mm Mold Assembly	85-264VAC, 50/60Hz
20-1010-5125 with 1.25in Mold Assembly	85-264VAC, 50/60Hz
20-1010-5030 with 30mm Mold Assembly	85-264VAC, 50/60Hz
20-1010-5150 with 1.5in Mold Assembly	85-264VAC, 50/60Hz
20-1010-5040 with 40mm Mold Assembly	85-264VAC, 50/60Hz
20-1010-5002 with 2in Mold Assembly	85-264VAC, 50/60Hz
20-1010-5050 with 50mm Mold Assembly	85-264VAC, 50/60Hz
20-1010-5000 without Mold Assembly	85-264VAC, 50/60Hz



Accessories	1in	25mm	1.25in	30mm	1.5in	40mm	2in	50mm
Mold Assembly	20-10106	20-10107	20-10108	20-10109	20-10110	20-10111	20-10112	20-10113
Chamfer Ram	20-10120	20-10121	20-10122	20-10123	20-10124	20-10125	20-10126	20-10127
Tapered Funnel (replacement)	20-10130		20-10131		20-10132		20-10133	



### Chamfered Lower Ram

Chamfered Lower Rams prepare mounted specimens with a beveled edge around the working face of the sample, thereby, eliminating any sharp edges that could adversely affect the grinding or polishing surface.

### Compression Mounting Media

20-3381-070	EpoMet™ F, fine filled epoxy, 4 lbs [1.84kg]	20-3200-080	PhenoCure Red, wood flour, 5 lbs [2.3kg]
20-3381-160	EpoMet F, fine filled epoxy, 10 lbs [4.5kg]	20-3200-080	PhenoCure Red, wood flour, 25 lbs [11.3kg]
20-3381-400	EpoMet F, fine filled epoxy, 25 lbs [11.3kg]	20-3300-080	PhenoCure Green, wood flour, 5 lbs [2.3kg]
20-3380-064	EpoMet G, regular filled epoxy, 4 lbs [1.8kg]	20-3300-400	PhenoCure Green, wood flour, 25 lbs [11.3kg]
20-3380-160	EpoMet G, regular filled epoxy, 10 lbs [4.5kg]	20-8185-002†	Release Agent, 2oz [6mℓ]
20-3380-400	EpoMet G, regular filled epoxy, 25 lbs [11.3kg]	20-8185-016†	Release Agent, 16oz [470mℓ]
20-3100-080	PhenoCure™ Black, wood flour, 5 lbs [2.3kg]	20-8185-032†	Release Agent, 32oz [950mℓ]
20-3100-400	PhenoCure Black, wood flour, 25 lbs [11.3kg]	20-3048	Powdered Mold Release, 1.6oz [45g]

† Restricted article, requires special packaging

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