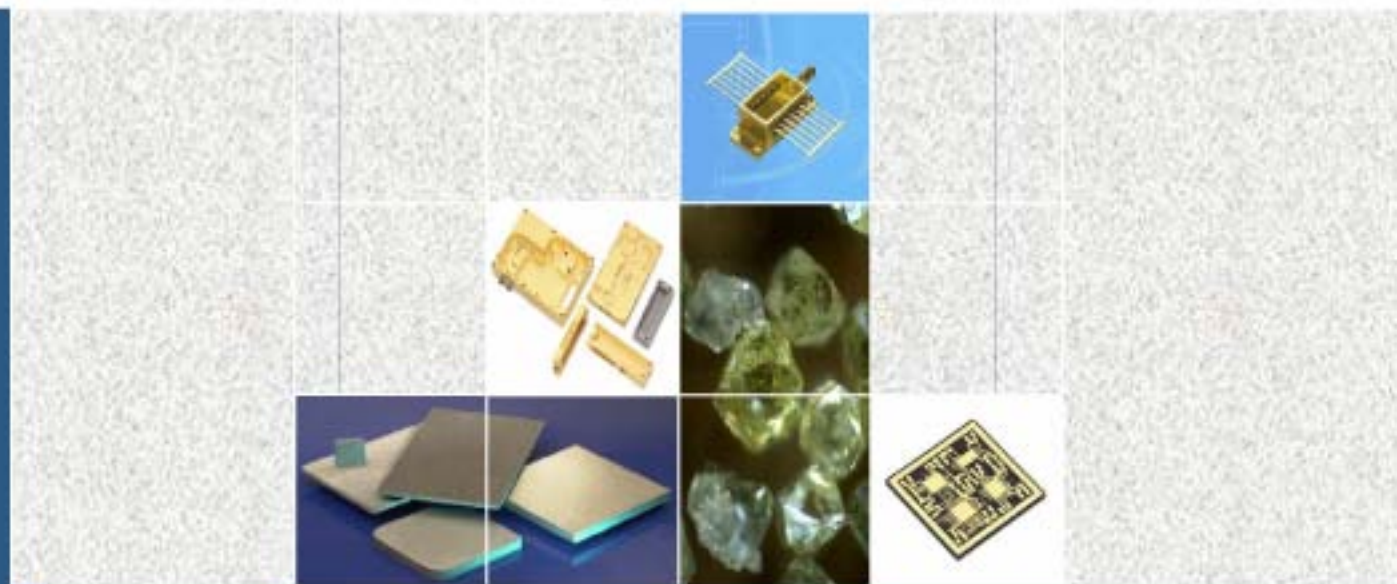


A STEP AHEAD IN TECHNOLOGY



PLANSEE
Thermal Management Solutions

About Us:

Polese Company is the world's leading manufacturer of Controlled Expansion High Thermal Conductivity Metal Matrix Composites for the Microelectronics Industry. Polese Company is owned by Schwarzkopf Technologies Corporation, an affiliate of Plansee Aktiengesellschaft.

Polese's products include thermal management materials for Wireless Communication, Internet Infrastructure, Military, Aerospace, and Industrial applications. Polese Company has leveraged its leading position in Thermal Management with Multi Layer Co-Fired Ceramics. This unique combination of capabilities along with its strong background in Brazing and Plating has enabled Polese to produce exciting new products in such fields as Wireless Communication and Fiber-Optics.

This unique vertical integration simplifies the supply chain offering its Customers more flexibility and interaction in the design and manufacture of its product. Whether you are manufacturing small quantity or high volume, Polese Company consistently offers high quality, at an exceptional value.

Contact us, we are waiting to help you make your product come to manufactured reality and anxious to have you join our family of satisfied and effective customers.



PLATING

As a recognized leader in high precision plating for microelectronic applications, Polese Company has two state of the art plating lines. One line is dedicated to electrolytic and electroless manual plating operations. The other is an automated line for high volume applications. Our manual line is capable of plating a wide range of Ni-Au and Ni-Ag components that are considered "Out-of-the-Norm" for most plating operations. We are known for our ability to work with our customers in solving plating related issues and assisting our customers in developing higher quality products.

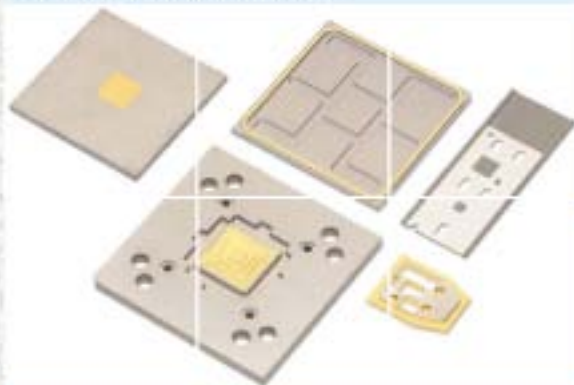


Our Electroless gold plating process allows the designers of electronic circuits to use isolated traces, thereby reducing the size and complexity of their substrates. This process can be used for copper, silver termination, and refractory metal circuitry. Selective silver plating can be used instead of a silver preform in certain ceramic substrate attachments. Selective gold plating and removal can be used when brazing a lid or other substrate to a thermally enhanced composite material for a device.

Our substrate capabilities include:

- Brass
- Copper
- Kovar (all alloy types)
- Refractory Powder Metal Matrix (WCu, MoCu)
- Ceramic with refractory metallization
- Stainless Steel
- Aluminum
- Circuitry (Cu, Ag Termination, W, Mo)
- Assemblies of listed substrates

Plating Specifications			
Nickel	MIL-C-26074E	Ni Phos	
	ASTM B 733-04	Ni Phos	
	AMS QQ-N-290	Ni Sulfamate	Pure Nickel
	AMS 2424E	Ni Sulfate	Pure Nickel
	AMS 2399	Ni Boron	
Gold	ASTM B 488-90	Type I	99.9% Au
	MIL-G-45204B	Type III	99.9% Au
Silver	QQ-5-365C		

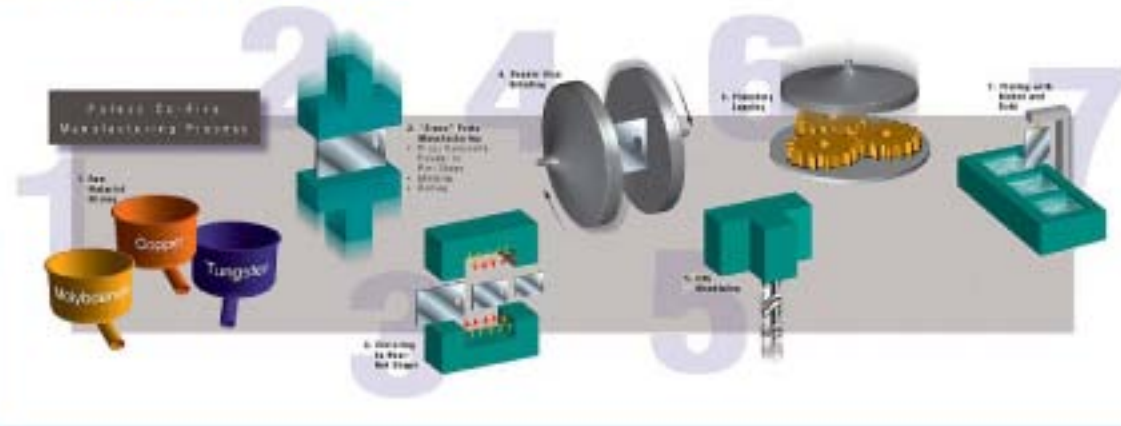


For more information:
Phone: (858) 271-1993
Fax: (858) 271-4376
sales@polese.com

PLANSEE

Thermal Management Solutions

THERMAL MANAGEMENT MATERIALS MANUFACTURE

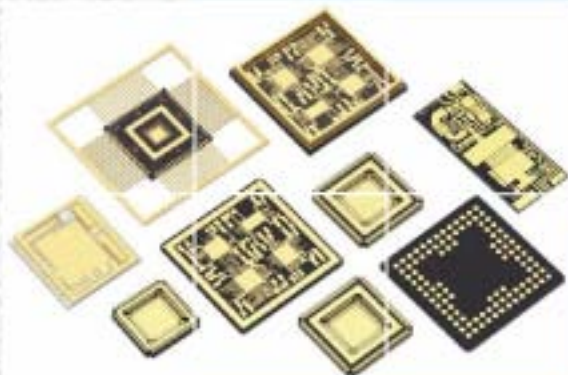
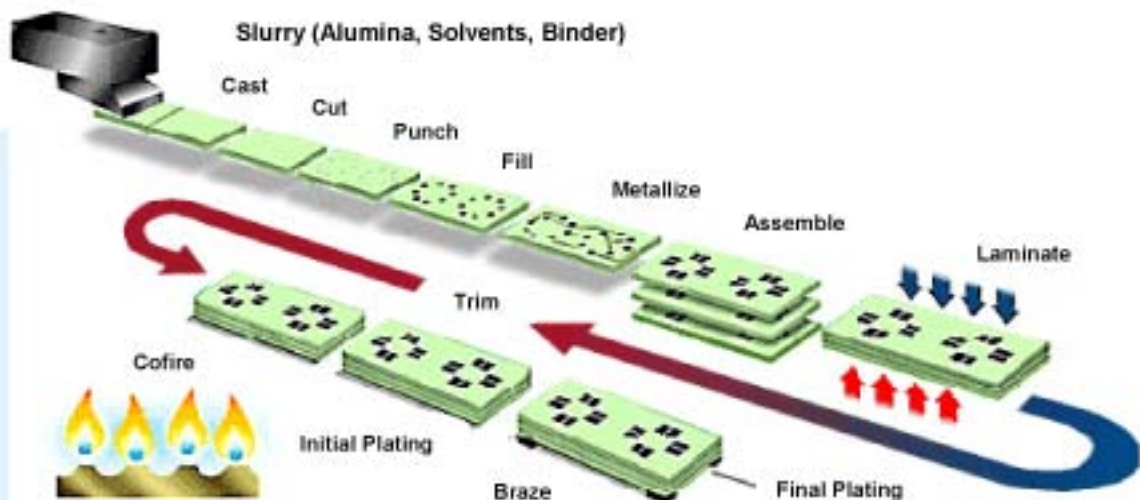


Polese Company utilizes state of the art powder metal technology. Whether the materials are blended in house or purchased to exacting specifications, Polese Company maintains uncompromising dedication to continuous improvement in its engineered materials.



CERAMIC MANUFACTURE

The Polese Ceramic manufacture process uses green tape technology as a building block to produce a variety of multilayer ceramic packages. Our packages utilize solid conductive vias for Z-axis connections as well as post fire metallization when needed to meet today's challenges.



For more information:
Phone: (858) 271-1993
Fax: (858) 271-4376
sales@polese.com

PLANSEE

Thermal Management Solutions

LAMINATE MANUFACTURE

Copper-Moly Copper-Copper laminate material is another step in higher thermal conductivity and low thermal expansion products.

Polese Company's Copper Laminate material was developed on a desired CTE core clad by two outer copper layers. The development efforts set a target for improving thermal conductivity by more than 25% when compared to CuW material. In addition to this improvement, certain component configurations can be stamped from the material where volume dictates this cost effective method.

While CuW material has been a dominant choice for semiconductor components, the integration of Copper Laminate has provided greater optimization of greater thermal conductivity and desired mechanical properties. Our material provides the critical and desired flatness with lower interfacial thermal resistance between the finished component and the next level heat sink.

For more information:
Phone: (858) 271-1993
Fax: (858) 271-4376
sales@polese.com

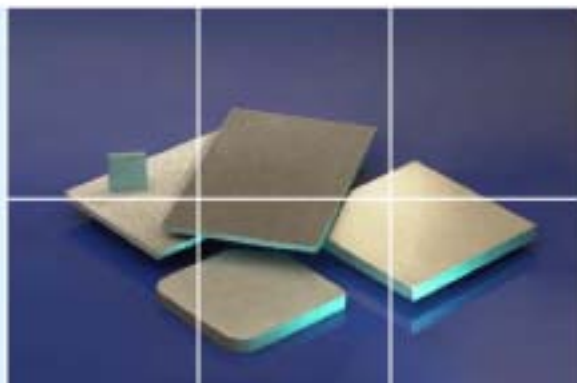


PLANSEE
Thermal Management Solutions

DIAMOND COMPOSITE MANUFACTURE

AcD Silver-Diamond Composites combine high thermal conductivity (greater than 600 W/m K) and low thermal expansion coefficient ranging from 6-9 ppm/K.

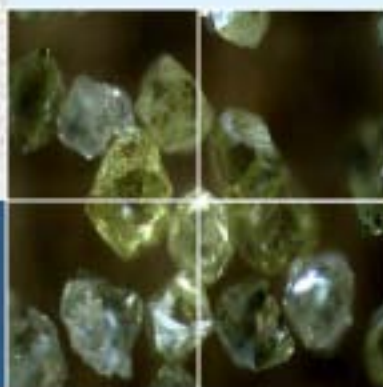
Our Metal Matrix Composites have been developed as permanent improvements in the semiconductor process technology as a response and solution to heat flex escalations at the semiconductor level in electronic packages. These are primarily driven by miniaturization and lower operating temperatures for desired devices.



The Diamond-Metal Composite can be an economical solution for the interface and for the heat spreader improvements. In order to significantly increase the thermal conductivity of a heat spreader, diamond has to be implemented into the heat sink.

The Diamond is made of covalent bonded carbon and owes its excellent thermal conductivity to its sp^3 hybridized stiff crystalline structure. Diamond is the best thermal conductor of all materials. The achievable properties as noted above can be attained in a pure state and also as an Ag/AcD/Ag sandwich that we produce.

The sandwich has advantages due to the economical and industrial production capability with surfaces controlled for flatness and roughness specifications. Coated surfaces pass temperature cycling tests and allow semiconductor attachments up to 450° C.



For more information:
Phone: (858) 271-1993
Fax: (858) 271-4376
sales@polese.com

PLANSEE

Thermal Management Solutions

BRAZING

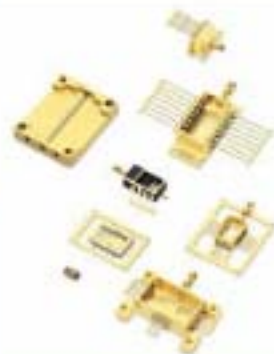
Whether it is low temperature or high temperature, Polese Company has the ability to braze metal to metal, ceramic to metal and ceramic to ceramic to exacting specifications and tolerances.

Our process incorporates void detection; utilizing Sonic Scanning and Helium Leak Detection Equipment. In addition, our technicians at Polese Company employ Scanning Electron Microscopes to achieve a sound fundamental understanding of the brazed joint to ensure reliability.

Polese Company also has the ability to control the braze flow through years of experience and a dedicated engineering group committed to excellence. Polese Company employs state of the art 3-D modeling CAD systems to precisely design and fabricate all brazing fixtures, significantly reducing lead time.



We routinely build and assemble difficult and tight tolerance packages. This leads to multiple brazing operations of various types being performed simultaneously. This can only be achieved by a company such as ours with the proper equipment, resources, knowledge, and monitoring systems in place.



For more information:
Phone: (858) 271-1993
Fax: (858) 271-4376
sales@polese.com

PLANSEE
Thermal Management Solutions

ENGINEERING AND R&D

Prototyping

Due to the vertical integration of Polese Company's offerings, prototyping of critical programs can be done with short lead times. This capability offers the customer the opportunity to confirm their design integrity before placing it into volume manufacturing. Additionally, this capability offers Polese Company the opportunity to work with its customers to ensure high yields when high volume manufacturing is introduced.

Design

By working with Polese design and development engineers in an open exchange under strict customer confidentiality, Polese Company has been a significant contributor to the final design of many of the packages used by our customers. We have a full range of capabilities to exchange design ideas and data via electronic transfer.

Laboratory

Polese Company has a multifaceted metallurgical and ceramic laboratory capable of full material characterization, failure analysis, and product development. By incorporating state of the art analytical equipment, Polese Company provides intensive support in analytical service to all Customers.



For more information:
Phone: (858) 271-1993
Fax: (858) 271-4376
sales@polese.com

PLANSEE

Thermal Management Solutions

POLESE COMPANY, INC.

10121 Carroll Canyon Road
San Diego, CA 92131

Phone: (858) 271-1993

Fax: (858) 271-4376

Email: sales@polese.com

www.polese.com

www.plansee.com

