The Lapping Process

Lapping produces components that are flatter and smoother than any other machining process. In fact, Lapmaster International Lapping/Polishing equipment routinely produces surfaces having:

- Flatness to less than one light band (0.0001 mil).
- Finishes of less than 1 Ra.
- Size control to .0001”.
- Parallelism within .0005”.

New Materials, New Technology

Advancements in material technology have produced a new generation of high-performance components. Materials such as ceramic, ferrite, tungsten carbide and sapphire are being used in the automotive, electronic and optical industries.

While the materials change, the need for precision does not. Optically flat surfaces and micro-inch finishes are still required. But what do you do when these “hard materials” have a rating of over 60 on the Rockwell “C” scale and they cannot be processed using standard abrasives? You turn to diamond abrasives.

Diamond Technology

Diamond is the hardest material on earth. With its 10000 rating on the Knoop hardness scale it is nearly three times as hard as silicon carbide or aluminum oxide, two of the most commonly used abrasives.

While diamond abrasive lapping and polishing is an easy answer for hard material processing, making it work while keeping it cost effective requires expertise.

Specialized equipment is needed. Lap plates of various compositions, specifically selected to suit the application and to make the best use of the octahedral-shaped diamond grains. Higher torque motors on the equipment counteract the friction caused by the diamond slurry.

And diamond slurry sprayers and slurry control slurry usage, prevent waste and optimize results.

Don’t limit diamond processing to just hard materials. Diamond should also be considered for use on “softer” materials such as conventional engineering metals, silicon carbides, laser rods and other exotic when stock removal and excellent surface finish characteristics are needed.

Lapmaster Diamond Lapping/Polishing Systems

Lapmaster machines have been producing excellent results in industry for over 40 years. Our full range of lapping/polishing equipment continues to set the standard for flatness, size control, parallelism and surface finish. Using our experience, we have now developed a new line of precision lapping/polishing machines specifically designed for use with diamond abrasives...the Lapmaster Diamond Lapping/Polishing System.
The Diamond Slurry Dispensing Unit
Research performed in our Application Laboratory will determine the exact amount and size of diamond abrasive to be applied to the plate to consistently meet your specifications. In production environments, where time is part of the cost equation, abrasives are sprayed onto the plate so absolute control is maintained and waste is held to a minimum.

The diamond slurry dispensing unit of the Lapmaster Diamond Lapping/Polishing System provides this control. The unit meters out exact amounts of diamond slurry and diamond lubricant. Spray frequencies can be set in 1 second increments up to 999 seconds and the spray duration can be set from 0 to 9 seconds in 1 second increments.

The amount of slurry applied to the plate is controlled by the spray frequency and the spray duration. Once this delivery rate has been programmed, the diamond slurry dispensing unit will provide consistent delivery, cycle after cycle.

Diamond is expensive. The dispensing unit is your best means of controlling your abrasive costs. The programmable accuracy of the unit reduces slurry use to a minimal level and keeps rejects and scrap down while maintaining maximum productivity.

The Lapmaster Application Laboratory
Application process technology — taking into account the application details and processing variables — is included with each Lapmaster Lapping/Polishing System we deliver. Performed within the Lapmaster Application Laboratory, the analysis identifies the diamond type, delivery rate, plate composition, plate speed and work pressure necessary to provide the uniformity of processing you require. Once our analysis is complete, we can supply you with the formula that will allow you to consistently obtain the same results.

The Diamond Slurry Stirrer Unit
Uniform dispersal of diamond on the lap plate requires slurries having uniform abrasive suspension. The diamond slurry stirrer unit provides this automatically. Working in conjunction with the dispenser, the slurry stirrer maintains the diamond slurry at the most appropriate suspension level for application to the plate.

The Correct System For Your Requirements
A Lapmaster Diamond Lapping/Polishing System includes:
- Benchtop or floor standing lapping machine
- Recommended composite lap plate and conditioning rings
- Diamond slurry dispensing unit
- Diamond slurry stirrer unit
- Recommended diamond slurry and lubricant

The size of the equipment is dictated by your component size and production requirements. Once we have established your application parameters, the Lapmaster technical sales team can propose a system that will best meet your processing requirements.

Lap Plates: The heart of the system is the lapping/polishing surface. Only by starting with the proper combination of plate and conditioning rings can you meet your dimensional, surface finish and flatness requirements.

Lapmaster offers a wide range of lap plate materials to accommodate virtually any processing application. We offer composite plates utilizing Ceramic, Copper, Tin and Tin/Lead as well as standard plates of Cast Iron and Stainless Steel.

Composite lap plates are specially formulated for diamond polishing. This type of plate consists of a homogeneous mix of powdered metal and non-metal material. This combination provides a uniform work surface which allows diamond grains to embed themselves into the plate in a controlled and consistent pattern. This control is important as loose diamond grains may cause surface imperfections and sub-surface damage.

Composite plates work well with either water or oil-base vehicles and provide a quicker diamond charge than natural metal plates. These are important considerations in production environments where processing time and multiple use are real issues.

Don't automatically discount natural metal plates. A Cast Iron lap plate can be used effectively with diamond slurry either for stock removal before final lapping/polishing. And a softer composite plate or in final polishing for materials such as tungsten and titanium carbide.

Advanced components
These are just a few of the advanced components processed on a Lapmaster Diamond Lapping/Polishing System. Part of today’s technologies, they perform in such industries as automotive, electronics, optical and medical.
Diamond Abrasives Lapmaster diamond abrasives are available in paste and slurry form in a variety of grades and sizes. Pastes are applied manually and are generally used in low volume production or lab and prototype processing. Slurries provide the consistency of performance necessary for production applications. Lubricants are used with diamond slurries to enhance cutting action and reduce the friction load on the lap plate and are available as either oil or water based depending upon your application needs. Lapmaster slurries are formulated for use with the diamond slurry dispenser and slurry stirrer to provide maximum control and economy during production.

The Leader in Lapping/Polishing Technology If you have a specific lapping/polishing application, or questions concerning the process, please contact a Lapmaster Technical Sales Representative by calling (708) 967-2375 or contact one of our local Lapmaster Sales Offices. For a specific application, supply us with component samples and your manufacturing specifications. We will process your samples at no charge or obligation and prepare a proposal detailing our recommendations for the most cost effective system that can reproduce our results.

Lapmaster International — setting the standard in lapping/polishing technology.