Engis® Fine Grinding, Lapping/Polishing Systems
Overview

With over 70 years of experience, and built around the Engis heritage of quality and durability, the introduction of the FastLap™ Series of machines marks another achievement in bringing additional innovations to our lapping, polishing and fine grinding customers.

Versatility and speed are hallmarks for Engis’ newest line of lapping and polishing machines. This new design is engineered to provide for tomorrow’s increasingly demanding customer tolerances, precision lapping and polishing performances.

A robust and rigid design gives the FastLap™ Series the long term durability you expect from Engis lapping and polishing systems.

Quality is never compromised. Every machine tool is engineered by Engis. Motors, spindles, transmissions, mechanical, electrical and computer components are selected from the world’s leading U.S., European and Asian manufacturers, to meet our exacting specifications.

Because of their engineered rigidity and high head pressure capabilities required by Superabrasive applications, the FastLap™ Series is also well suited for conventional abrasives and can handle these applications with ease.

Before delivery, every machine is 100% quality inspected, assuring our customers receive the exact specifications and performance they require and expect from Engis.

Features

- Heavy duty, high torque drive system...
- Heavy duty structure supports high processing pressures...
- Heads have precision radial adjustment feature...
- Pneumatic assist heads include safety lock in retract position...
- VSD™ (Variable Speed Drive) and SSD™ (Soft Start Drive) motors...
- User friendly touch screen control panel provides total machine control...
- Fully adjustable work surface height...
- Adjustable roller yokes with radial positioning capability use sealed roller bearings...
- Corrosion resistant work area, pressure plates and roller yoke arms...
- Large swarf drain...
- Accepts standard Engis lap plates...
- Designed with operator safety and ergonomics in mind.

Aerospace

PART: Mechanical Seal
MATERIAL: Alnico V
REQUIREMENTS: Parts required a flatness of 0.0000232” and a reflective finish of 4μ” or better. The customer was using a multi-step conventional lapping process, but was experiencing difficulty meeting the quality requirements and wanted to improve on productivity.
PROCESS: The new process utilizes our Engis FL-24VP single-sided lapping machine with diamond slurry and composite lap plates.
RESULTS: The process was reduced to a single-step providing a 0.7μ” finish with flatness within 0.0000116”. Significantly less waste is produced and the production potential more than doubled.

Compound Semi-Conductor
Engis® brings you “think tank” ingenuity, engineered quality, increased throughput, process efficiency and a complete Engis® “Systems Approach” – from the processing lab to the machine...

**FastLap™ Construction & Components**

**The Base**
- Solid steel, reinforced weldment base
- Supports the spindle and pneumatic structure
- Eliminates / reduces vibration
- Incorporates a swarf runoff drain
- Interlocked doors allow easy access to all machine components

**The Spindle**
- FastLap™ spindle is supported by a ribbed 20mm top plate
- Oversized, heavy duty nested tapered roller bearing
- Low vibration and heavy axial load support capability

**The Gear Box**
- Designed for extra horsepower and torque demanded from Superabrasive diamond lapping productivity
- Highest quality, European engineered and manufactured motor, inverter and gear box
- Proven, matched, precision ground, hardened steel worm and gear
- Heavy duty, sealed, gear box reducer housing
- Heavy duty, precision angular (axial and radial thrust) roller bearings generate low heat and provide for quiet operation

**Pneumatics & Drive**
- Tripod supported pneumatic structure
- Oversize cylinders allow up to 10 psi and more for maximum stock removal for Superabrasive diamond productivity
- Pressure range and speed setting of up to 1,100 pounds per head and 90 RPM, respectively
- Chrome plated, corrosion resistant pressure plates with sealed, angular roller bearings or high axial thrusts
- Screw-feed radial adjustment of pressure plates for accurate plate position and maximum flatness control
- Robust, durable Variable Speed Drive (VSD™) system, coupled with touch-screen digital controls for maximum manufacturing process control

**The Controls**
- Versatile PLC-based control
- Operator friendly interface through a touch-screen panel
- Timer, speed and pneumatics control built in standard
- Accessories and dispenser control also available
- Menu driven technology
- Optional integrated MINIMISER® function
- Two-hand start control for safety
- Reduced operator process intervention
- Enhanced for computer controlled manufacturing

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**Opto-Electronics**

**PART**: Wafer Epi-Polishing  
**MATERIAL**: Indium Antimoline  
**REQUIREMENTS**: Achieve a sub-nanometer (nm) Ra surface finish.  
**PROCESS**: Three-step process utilized EHG-150 Horizontal Grinder, followed by stock removal lapping and CMP polish on an Engis AM-15 lapping/polishing machine, P4 colloidal silica slurry and polishing pad.  
**RESULTS**: Achieved a surface finish of 0.7nm (Ra), at a material removal rate of 2.8 μm/hr.

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Coupled with our process development labs and full technical support, the FastLap™ Series can be customized for a customer’s specific materials and application needs...

### The FastLap™ Series

<table>
<thead>
<tr>
<th>Specifications</th>
<th>FL-24VP</th>
<th>FL-28VP</th>
<th>FL-36VP</th>
<th>FL-42VP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine Weight (lbs/kg):</strong></td>
<td>2,315 lbs. / 1050 kg</td>
<td>2,315 lbs. / 1050 kg</td>
<td>3,300 lbs. / 1497 kg</td>
<td>3,880 lbs. / 1746 kg</td>
</tr>
<tr>
<td><strong>Dimensions (in/mm):</strong></td>
<td>69&quot; x 43&quot; x 69&quot;</td>
<td>1752 x 1105 x 1752 mm</td>
<td>69&quot; x 43&quot; x 69&quot;</td>
<td>1752 x 1105 x 1752 mm</td>
</tr>
<tr>
<td><strong>Lap Plate Diameter (in./mm):</strong></td>
<td>24&quot; / 609.6 mm</td>
<td></td>
<td>28&quot; / 711.2 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Conditioning Ring OD/ID (in./mm):</strong></td>
<td>36&quot; / 914.4 mm</td>
<td></td>
<td>36&quot; / 914.4 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Work Station / Rings:</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Work Area Available (sq. in./sq. cm):</strong></td>
<td>224&quot; / 1449 cm</td>
<td>339&quot; / 2187 cm</td>
<td>495&quot; / 3149 cm</td>
<td>681&quot; / 4394 cm</td>
</tr>
<tr>
<td><strong>Standard RPM:</strong></td>
<td>0-90</td>
<td>0-90</td>
<td>0-70</td>
<td>0-70</td>
</tr>
<tr>
<td><strong>Work Table Height (in./mm):</strong></td>
<td>37&quot; / 939.8 mm</td>
<td>37&quot; / 939.8 mm</td>
<td>37&quot; / 939.8 mm</td>
<td>37&quot; / 939.8 mm</td>
</tr>
<tr>
<td><strong>Work Table Dimension (in./mm):</strong></td>
<td>40&quot; x 40&quot;</td>
<td>1016 mm x 1016 mm</td>
<td>40&quot; x 40&quot;</td>
<td>1016 mm x 1016 mm</td>
</tr>
<tr>
<td><strong>Main Drive Motor (H.P. / kw rating):</strong></td>
<td>5.5 H.P. / 4kw</td>
<td>5.5 H.P. / 4kw</td>
<td>7.5 H.P. / 5.5kw</td>
<td>7.5 H.P. / 5.5kw</td>
</tr>
<tr>
<td><strong>Operating Voltage:</strong></td>
<td>230-460 VAC-3 Phase</td>
<td>230-460 VAC-3 Phase</td>
<td>230-460 VAC-3 Phase</td>
<td>230-460 VAC-3 Phase</td>
</tr>
<tr>
<td>FLG @ 230VAC:</td>
<td>9A</td>
<td>15A</td>
<td>20A</td>
<td>20A</td>
</tr>
<tr>
<td><strong>Required Air Pressure:</strong></td>
<td>60 PSI / 4.2 kg/cm²</td>
<td>60 PSI / 4.2 kg/cm²</td>
<td>60 PSI / 4.2 kg/cm²</td>
<td>60 PSI / 4.2 kg/cm²</td>
</tr>
<tr>
<td><strong>Water Cooling Rate @ 10 PSI:</strong></td>
<td>2 GPM / 7.5 LPM</td>
<td>2.5 GPM / 9.5 LPM</td>
<td>3 GPM / 11.4 LPM</td>
<td>3.5 GPM / 13.25 LPM</td>
</tr>
<tr>
<td><strong>Pneumatic Pressure System:</strong></td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td><strong>Pneumatic Down Force Range (lbs./kg):</strong></td>
<td>0-500 lbs. / 0-226 kg</td>
<td>0-500 lbs. / 0-226 kg</td>
<td>0-600 lbs. / 0-272 kg</td>
<td>0-1100 lbs. / 0-498 kg</td>
</tr>
</tbody>
</table>

A 15”-3 spindle hand weight / pneumatic model is also available. 
All dimensions & weights are rounded. 
All FastLap™ models are available in pneumatic versions (VP) or hand weight versions (V). 
48” lap plate diameter machines and other sizes are also available upon request.

### Available Options

- Integrated slurry dispensing unit
- Color panel display
- Lap plate temperature control system
- Flatness gauge
- Stainless Steel work surface
- Non-standard Voltages
- Pressure ramping
- Work surface configurations
- Power driven roller yoke arms
- Load / unload systems
- Protective duct cover
- Custom interlock systems

### Accessories

Engis systems can be fitted with slurry dispensing to suit your application, whether it be spray, drip or pump.
Coupled with our process development labs and full technical support, the FastLap™ Series can be customized for a customer’s specific materials and application needs...

### Applications

<table>
<thead>
<tr>
<th>Ceramic</th>
<th>Glass</th>
<th>Carbon</th>
<th>Plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat sinks</td>
<td>LCD glass</td>
<td>Seals</td>
<td>Contact lenses</td>
</tr>
<tr>
<td>Hybrid substrates</td>
<td>Optical filters</td>
<td>Pump components</td>
<td>Fuel pump components</td>
</tr>
<tr>
<td>Seals</td>
<td>Quartz substrates</td>
<td>Carbon graphite seals</td>
<td>Engine components</td>
</tr>
<tr>
<td>Microwave substrates</td>
<td>Fiber optics</td>
<td>Chemical flow components</td>
<td>Printed circuit boards</td>
</tr>
<tr>
<td>Sensing devices</td>
<td>Copy machine mirrors</td>
<td>Heart valves</td>
<td></td>
</tr>
<tr>
<td>Valve components</td>
<td>Video disc masters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read-write heads</td>
<td>Optical flats</td>
<td></td>
<td></td>
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<tr>
<td>Sapphire windows</td>
<td>Optical memory discs</td>
<td></td>
<td></td>
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<tr>
<td>Ferrite recording heads</td>
<td>Glass ornaments</td>
<td></td>
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<tr>
<td>Ferrite components</td>
<td>Crystal glassware</td>
<td></td>
<td></td>
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<tr>
<td>Capacitors</td>
<td>View mirrors</td>
<td></td>
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<tr>
<td>Thermoelectric devices</td>
<td>Microscope slides</td>
<td></td>
<td></td>
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<tr>
<td>Fiber optic connectors</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Metals</th>
<th></th>
<th>Opto-Electronics</th>
<th>Semi-Conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer components</td>
<td>Cutting inserts</td>
<td>Mechanical seals</td>
<td>Sapphire substrates</td>
</tr>
<tr>
<td>Spacers</td>
<td>Piston rings</td>
<td>Pump Housings</td>
<td>CS substrates</td>
</tr>
<tr>
<td>Gage blocks</td>
<td>Valve plates</td>
<td>Valve lifters</td>
<td>High power devices</td>
</tr>
<tr>
<td>Fuel injectors</td>
<td>Bearing races</td>
<td>CD molds</td>
<td></td>
</tr>
<tr>
<td>Pump components</td>
<td>Heat sinks</td>
<td>Pendants &amp; metals</td>
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<tr>
<td>Slitter knives</td>
<td>I.C. boxes</td>
<td>Jewelry</td>
<td></td>
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<tr>
<td>Transmission components</td>
<td>Clipper blades</td>
<td></td>
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<tr>
<td>Compressor components</td>
<td>Brake pads</td>
<td></td>
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</tr>
</tbody>
</table>

Workholding and plate texturing handled by work rings and custom carriers, wax mount bonding equipment, thinning fixtures and diamond plated conditioning rings.

Your metrology needs are met with Engis flatness gauges, optical flats and mono-chromatic lamps.
Step 1 – Define Your Process Needs
Engis is the industry leader in pioneering new Hyprez®
diamond Superabrasive slurries, compounds and lubricants.
- We deploy internationally experienced technical staff
- We collaborate with your application engineers
- We formulate specific Superabrasive slurries
- We select/customize plate materials and geometries

Step 2 – Customize a Machine Tool
Depending upon your materials, engineering and throughput
requirements, Engis will help you select and customize a FastLap™
machine.
- We analyze your current needs
- We consider future expansion requirements
- We establish speed and head pressures

Step 3 – Formulate Your Hyprez® Slurries
Engis is the industry leader in producing diamond powders,
Superabrasive slurry, compound and lubricant formulations.
- Engis is vertically integrated
- We characterize our diamonds
- We engineer the slurry utilizing the ideal combination
  of abrasive and vehicle.

Step 4 – Select Your Plate Material
Engis is the industry leader in the variety of plates we can offer our customers.
- Hyprez® X08 Iron – most aggressive
- Hyprez® HY Iron – aggressive stock removal
- Hyprez® HY Copper – moderate to aggressive
- Hyprez® HY Ceramic – moderate removal
- Hyprez® TX-10A Tin Composite – lead free
Engis can offer the correct solution.

Step 5 – Define Your Plate Geometry
Engis is the industry leader in plate geometry design. With
a wide variety of standard offerings, and the capability
to design special geometries to meet specific needs, Engis
has the technical knowledge to maximize your production.

Step 6 – Offer a Turnkey “System”
Engis can offer the correct combination of diamond
Superabrasive and vehicle, plate materials and geometries,
advanced machine tools and a complete integrated
“process” for maximum production consistency.

Labs & Research
- Diamond characterization
- Testing of customer production variables
- 3D modeling systems

Chemicals
- Standard & specialty slurries
- Standard & specialty compounds
- Standard & specialty lubricants

Machine Tools
- Customized to production needs
- Advanced PLC process controls
- Heavy duty, high torque drive systems
- Extensive options & accessories

International Experience
- World leader of Superabrasive systems, technologies
  and applications
- We collaborate with international research, development
  and production teams
**Engis® Superabrasive Diamond Lapping and Polishing “Systems Approach”...**

**Diamond Cost Benefits**
- Reduced inventory costs
- Low cost delivery systems
- Optimized material removal rates
- Optimized surface finish generation
- Corrosion resistant machine tool components
- Matched slurries, compounds & lubricants
- Easy waste disposal
- Systems custom built to applications
- One step lapping / polishing processes

**Diamond Technical Benefits**
- Process virtually any material
- Aggressive material removal
- Single setup lapping / polishing process
- Uniform edge-to-edge flatness
- Surface finished to under 0.2 μ" (Ra)
- TIR flatness to 1/20th wavelength
- Products custom formulated for optimized production

**Hyprez® Powders and Slurries**

**Machine Tools**

**THE ENGIS PROCESS**

**Plates and Pads**

**Accessories**