

A Story of  
**QUALITY**



**FASTLAP™ SERIES**



Engis® Fine Grinding, Lapping/Polishing Systems



# 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...

## 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 to 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.



Model FL-24VP (pneumatic) shown with optional dust cover and Hyprez® MINIMISER® and Autostirrer Dispensing System

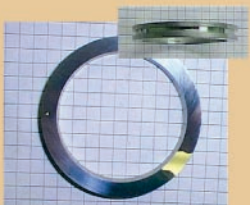
## Features

- 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.



Model FL-36VP (pneumatic) shown with optional dust cover

## Aerospace



**PART:** Mechanical Seal

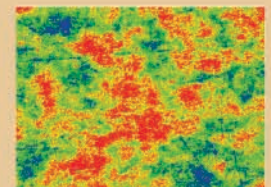
**MATERIAL:** Alnico V

**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

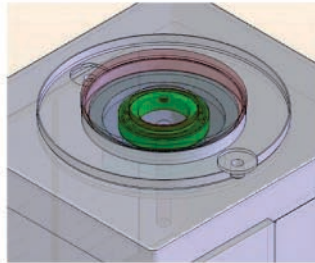


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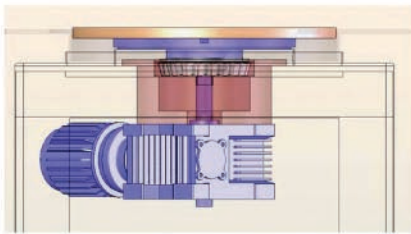
## FastLap™ Construction & Components

### 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



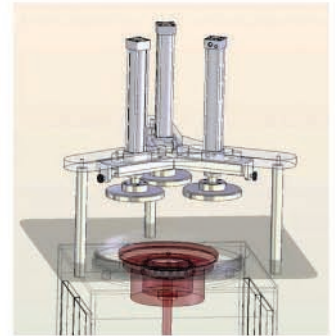
### The Spindle



- 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

### 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 for 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 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



### 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



**PART:** Wafer Epi-Polishing

**MATERIAL:** Indium Antimonide

**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.

### Opto-Electronics



**PART:** Laser Window

**MATERIAL:** Calcium Fluoride

**REQUIREMENTS:** The customer needed a process for “rough” sizing of parts. Current process was slow and labor intensive and left excessive sub-surface damage.

**PROCESS:** Parts were processed using a water based coolant.

**RESULTS:** The finish achieved off the pellet plates was 18.5 µ” (Ra) with maximum stock removal rate of 0.0137”/min. The customer tested parts (after a final polishing) for transmission degradation after 1 million laser shots and found the results to be superior to their old process (attributed to less sub-surface damage).

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

Specifications	FL-24VP	FL-28VP	FL-36VP	FL-42VP
Machine Weight (lbs/kg):	2,315 lbs. / 1050 kg	2,315 lbs. / 1050 kg	3,300 lbs. / 1497 kg	3,850 lbs. / 1746 kg
Dimensions (in./mm):	69" x 43" x 69" 1752 x 1105 x 1752 mm	69" x 43" x 69" 1752 x 1105 x 1752 mm	71" x 51-1/4" x 71" 1803.4 x 1301.75 x 1803.4 mm	71" x 51-1/4" x 71" 1803.4 x 1301.75 x 1803.4 mm
Lap Plate Diameter (in./mm)	24" / 609.6 mm	28" / 711.2 mm	36" / 914.4 mm	42" / 1066.8 mm
Conditioning Ring OD/ID (in./mm):	11.25" / 9.75" 285.75 mm / 247.65 mm	13.73" / 11.90" 348.74 mm / 302.26 mm	16.34" / 14.35" 415.04 mm / 364.5 mm	19.76" / 17.0" 502 mm / 432 mm
Work Stations / Rings	3	3	3	3
Work Area Available (sq. in./ sq. cm):	224" / 1449 cm	339" / 2187 cm	495" / 3149 cm	681" / 4394 cm
Standard RPM:	0-90	0-90	0-70	0-70
Work Table Height (in./mm):	37" / 939.8 mm	37" / 939.8 mm	37" / 939.8 mm	37" / 939.8 mm
Work Table Dimension (in./mm):	40" x 40" 1016 mm x 1016 mm	40" x 40" 1016 mm x 1016 mm	50" x 50" 1270 mm x 1270 mm	50" x 50" 1270 mm x 1270 mm
Main Drive Motor (H.P. / kw rating):	5.5 H.P. / 4kw	5.5 H.P. / 4kw	7.5 H.P. / 5.5kw	7.5 H.P. / 5.5kw.
Operating Voltage:	230-460 VAC-3 Phase	230-460 VAC-3 Phase	230-460 VAC-3 Phase	230-460 VAC-3 Phase
FLC @ 230VAC	9A	15A	20A	20A
Required Air Pressure: (PSI / kg/cm <sup>2</sup> )	60 PSI / 4.2 kg/cm <sup>2</sup>	60 PSI / 4.2 kg/cm <sup>2</sup>	60 PSI / 4.2 kg/cm <sup>2</sup>	60 PSI / 4.2 kg/cm <sup>2</sup>
Water Cooling Rate @ 10 PSI: / .70 kg/cm <sup>2</sup>	2 GPM / 7.5 LPM	2.5 GPM / 9.5 LPM	3 GPM / 11.4 LPM	3.5 GPM / 13.25 LPM
Pneumatic Pressure System:	Standard	Standard	Standard	Standard
Pneumatic Down-Force Range (lbs./kg):	0-500 lbs. 0-226 kg	0-500 lbs. 0-226 kg	0-600 lbs. 0-272 kg	0-1100 lbs. 0-498 kg

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 dust 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

### Ceramic

Heat sinks  
Hybrid substrates  
Seals  
Microwave substrates  
Sensing devices  
Valve components  
Read-write heads  
Sapphire windows  
Ferrite recording heads  
Ferrite components  
Capacitors  
Thermoelectric devices  
Fiber optic connectors

### Glass

LCD glass  
Optical filters  
Quartz substrates  
Fiber optics  
Copy machine mirrors  
Video disc masters  
Optical flats  
Optical memory discs  
Glass ornaments  
Crystal glassware  
View mirrors  
Microscope slides

### Carbon

Seals  
Pump components  
Carbon graphite seals  
Chemical flow components  
Heart valves

### Plastic

Contact lenses  
Fuel pump components  
Engine components  
Printed circuit boards

### Metals

Computer components  
Spacers  
Gage blocks  
Fuel injectors  
Pump components  
Slitter knives  
Transmission components  
Compressor components

Cutting inserts  
Piston rings  
Valve plates  
Bearing races  
Heat sinks  
I.C. boxes  
Clipper blades  
Brake pads

Mechanical seals  
Pump Housings  
Valve lifters  
CD molds  
Pendants & metals  
Jewelry

### Opto-Electronics

RF devices  
LEDs  
Laser diodes  
Solar cells

### Semi-Conductor

Sapphire substrates  
CS substrates  
High power devices



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

# The ENGIS® 6-Step Superabrasive “Systems Approach”...

## 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.

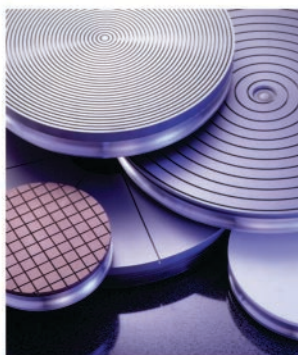


## Step 4 – Select Your Plate Material

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  $0.2 \mu\text{m}$  (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

# Leaders in Superabrasive Finishing Systems



## Engis (UK) Ltd.

Henley-on-Thames  
Oxfordshire, RG9 1DS ENGLAND  
Tel: 44-1491-411117  
Fax: 44-1491-412252  
Email: sales@engis.uk.com



## Engis Corporation

Wheeling, IL U.S.A.  
Tel: (847) 808-9400  
Fax: (847) 808-9430  
Email: info@engis.com



## Engis Japan K.K.

Yokohama, JAPAN  
Tel: 81-45-474-0666  
Fax: 81-45-474-0677  
Email: email@engis.co.jp



## Engis Asia Pacific Pte. Ltd.

SINGAPORE  
Tel: 65-6745-1923  
Fax: 65-6745-2907  
Email: sales@engis.com.sg



## Engis (Hong Kong) Ltd.

Kwai Chung, HONG KONG  
Tel: 852-26100903  
Fax: 852-24234509  
Email: sales@engis.com.hk



## Engis of Canada Ltd.

Burlington, Ontario, CANADA  
Tel: (905) 632-3016  
Fax: (905) 632-4250  
Email: engiscanada@engis.com

## THE ENGIS GROUP OF COMPANIES



## Engis (H.K.) Ltd., Beijing R.O.

Beijing, CHINA  
Tel: 86-10-64848398  
Fax: 86-10-64848396  
Email: lianje@engis.com.hk



## Helical Lap & Mfg. Company

Fraser, MI U.S.A.  
Tel: (586) 293-6900  
Fax: (586) 293-6903  
Email: info@helicallap.com



## Engis Korea Co., Ltd.

Gyeong Gi-Do, KOREA  
Tel: 82-31-354-1426  
Fax: 82-31-354-1430  
Email: mkkim@engis.co.kr

### Engis® Lapping/Polishing Systems

Beginning-to-end flat finishing systems – machines, plates, pads, diamond powders, slurries, lubricants and other accessories – plus customized equipment, specialized formulas, testing labs and technical support for process and technology development.

### Hyprez® DiaMold® Toolroom Products

Comprehensive line of diamond polishing compounds, abrasive stone, sticks, bobs, brushes and files – plus powered hand finishing systems for every toolroom application.

### Engis® SinglePass™ Bore Finishing System

SinglePass™ bore finishing system – standard models and custom machines – plus diamond and CBN plated finishing tools, parts holders/fixtures and integrated automation systems.

### Electrogrip® Grinding Systems

Advanced Superabrasive grinding, cutting and dressing systems utilizing diamond and CBN materials. Specializing in the aerospace, medical, ceramic, automotive and composite industries.

**ISO 9001:2000**  
REGISTERED



® Leaders in Superabrasive Finishing Systems

## ENGIS CORPORATION

105 W. Hintz Road, Wheeling, IL 60090-6038  
Phone: 847/808-9400 • Toll Free 1-800-99-ENGIS  
FAX: 847/808-9430 • E-Mail: info@engis.com  
Website: www.engis.com