

Metallographic Application Note

CAMEO[®] Magnetic Disc Application for Automatic Grinders/Polishers

Using a magnetic disc is nothing new to the metallographic industry. The difference between LECO's CAMEO[®] System and other systems are the special grinding and polishing discs that are used. These discs have a patented* alveolated construction which provides excellent cooling and multiple layers of diamond particles in a resin wheel that produces flatter samples and reduces mechanical and thermal damage to the samples. Diamond is the most efficient cutting tool available to the metallographic industry, and it will cut through most materials with ease.



Most diamond grinding wheels have a thin, widely dispersed diamond layer and these provide for excellent grinding. The CAMEO goes one step further. The key to the CAMEO system is that the concentration of diamond on the surface is uniform. A uniform surface finish allows constant material removal and improved surface roughness. This allows the operator to reduce preparation times with improved results. There is also a decrease in the number of steps that need to be performed. A typical metallographic procedure is shown in Figure 1. When using LECO's CAMEO system, the ease of changing wheels and the decreased amount of steps combine to significantly increase a laboratory's production and quality.

The CAMEO System is designed to produce excellent grinding and polishing results, while providing expanded wheel life. Specific time frames cannot be given due to the fact that different pressures and materials are used on every application. As an example, a steel application would provide longer wheel life than a tool steel application—the harder material matrix would affect the wheel's life. CAMEO grinding discs will last (conservatively) for well over 250 sample preparations.

The CAMEO system will work for a variety of materials. It is extremely effective on harder materials as well as some softer materials. A typical CAMEO operation is shown in Figure 2. The Silver disc polishing step represents approximately a six micron surface finish. A one micron polishing step after the intermediate polishing step will provide an excellent surface finish for examination at high magnification.

The CAMEO system is available in 8-, 10-, and 12-inch sizes and comes in kits or can be purchased individually. The installation process is quite easy. It involves placing the Fast Attachment System (FAS) magnetic disc onto the wheel using the Pressure-Sensitive Adhesive (PSA) backing. This disc stays on the wheel and the Platinum 0, Platinum 1, Silver, and Gold discs are applied as needed. An FAS Teflon disc is used to apply a polishing cloth to the magnetic disc. Select your favorite polishing cloth that has a PSA backing and simply place it onto the polishing platen. If multiple polishing cloths are needed, then extra polishing platens can be purchased at a minimal cost. Dressing sticks are included with each wheel for reconditioning the wheels.

Overall, the LECO CAMEO system provides effective material removal, reduced preparation times, multi-layer abrasive grinding discs, increased cutting life, and ease of replacing the grinding and polishing discs. The system provides the operator with higher productivity and better results at a reduced cost.

CAMEO[®] System

**Figure 1—Procedures for Grinding/Polishing Induction Hardened Samples
Using the Spectrum System 2000® Grinder/Polisher**

| Grinding | Wheel Speed (RPM) | Time (sec.) | Head Speed (RPM) | Direction (CW/CCW) | Pressure (lb.) |
|--|------------------------------|------------------------|-----------------------------|-------------------------------|---------------------------|
| 180 grit SiC | 250 | 60 | 150 | CW | 20 |
| 320 grit SiC | 250 | 60 | 150 | CW | 20 |
| 600 grit SiC | 250 | 60 | 150 | CW | 20 |
| Polishing | | | | | |
| Pan W cloth/6 micron diamond/extender | 200 | 540 | 125 | CCW | 50 |
| Red felt cloth/1 micron diamond/extender | 200 | 120 | 125 | CCW | 50 |
| Imperial cloth/colloidal silica/water | 150 | 120 | 75 | CCW | 30 |

**Figure 2—Procedures used to Grind/Polish Steel Mounted Samples
Using CAMEO Magnetic System**

| Grinding | Wheel Speed (RPM) | Time (sec.) | Head Speed (RPM) | Direction (CW/CCW) | Pressure (lb.) |
|---|------------------------------|------------------------|-----------------------------|-------------------------------|---------------------------|
| Platinum 1 | 200 | 120 | 100 | CCW | 35 |
| Polishing | | | | | |
| Silver disc/6 micron diamond suspension | 200 | 120 | 100 | CCW | 35 |
| 3 micron/Pan-W/extender | 200 | 90 | 100 | CCW | 35 |
| 1 micron diamond compound/red felt cloth/microid extender | 200 | 60 | 100 | CCW | 35 |

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