

“...a very cost effective,
general purpose grade with
an excellent wear ratio...”



Micro-graph[®] 4



Micro-graph[®] 5

“...can rough and finish
with the same grade,
and frequently
with the same
electrode.”

Intech Knows Graphite

INTECH EDM[®] 

Micro-graph® 4

A dense, fine-grained, strong grade of graphite, MG-4 is available in large blocks and is recommended for EDMing large areas and large radius molds where metal removal rate is paramount. An exceptional general purpose graphite, MG-4 has an excellent wear ratio and outstanding performance in "no wear" applications.

Applications:

- Large roughing electrodes
- Forging dies
- Jobs requiring less detail
- High-amp metal removal electrodes
- Large molds and dies

Let a successful mold shop tell you how they use MG-4:

Pelco Tool & Mold Inc. and Micro-graph 4

Pelco was started in 1963 by Emile Peluso with a few machines in the basement of his home. His original business was machining graphite electrodes for Electrotools, the predecessor to Intech EDM.

The company grew to become a mold making shop, purchasing their first EDM machine in 1972. After 25 years of continuous growth, Mr. Peluso retired and sold the company to three employees – Dick Truhlar, now President, Rob Suva, and Roger Wittersheim.

Pelco now employs 30 mold makers, utilizing both wire-cut and sinking EDM, including a new CNC sinking machine with automatic tool changer. The wire-cut machine is used primarily to manufacture precision graphite electrodes. The company specializes in making 3-D plastic injection molds, and supplies tooling for intricate container caps, called "closures", which are used by major packaged goods manufacturers.

Although they use MG-5 and some POCO graphite, their primary graphite grade for electrodes is Micro-graph 4 (MG-4), which is used on 90% of their jobs. They have found it to be a very cost effective, general purpose graphite grade, with an excellent wear ratio and outstanding performance in "no wear" sinking applications. MG-4 exhibits low wear on high amperage roughing operations, and yet can still hold details in finishing mode.

Following are some interesting examples of their work and how they effectively use EDM and MG-4.

"...a very cost effective, general purpose grade with an excellent wear ratio..."

Arrester Bracket

Shown is an arrester bracket for insulators used in electrical transmission installations, the compression mold halves, and the MG-4 electrodes used to make the molds. Pelco uses two identical 0.015" undersize electrodes to "rough" and "finish", with orbiting for both. Roughing is done in 12 hours at a high amperage, "no wear" setting; orbiting 0.005" per side. The finish electrode orbits to final size and finish. After EDMing, the molds are chrome plated to 0.002" tolerance.



Router Housing

These molds were a challenge to Pelco; they couldn't orbit the electrodes due to a concave bottom, and flushing was difficult due to depth and the intricate design. However, MG-4 held the detail necessary and had an excellent wear ratio in this difficult job. The molds were stone polished and textured after EDMing.



"Closures"

These "closures", or container caps, are a speciality of Pelco Tool. The company builds models, from which they then tracer mill electrodes. The 24 cavity molds are EDM'ed on a CNC sinking machine with 16-position automatic tool changer.



Seat Belt Cover and Toaster Base

The toaster base illustrates MG-4's ability to create extensive ribbing and fine detail.



The 4-cavity seat belt cover mold is produced using 5 electrodes, orbiting a total of 0.015" per side in a rough milled cavity. The first electrode uses a 0.004" orbit in "no wear" mode. The finishing electrodes create the final, EDM textured finish.



Pelco EDM Department

A partial view of Pelco's EDM department; machine inventory includes two CNC sinking machines with automatic tool changers. Not shown are two additional machines purchased since this photo was taken.

Micro-graph® is a registered trade mark of Intech Technology Corporation, and identifies the Intech brand of graphite grades manufactured specially for Intech EDM to their exacting specifications.

Micro-graph[®] 5

A widely used, multi-purpose isostatically molded (non-directional grain) graphite grade, MG-5 is suitable for both roughing and finishing, and is particularly appropriate for eroding large areas where surface quality and detail are important. It provides good strength, low wear, and can be easily machined without edge flaking or chipping.

Applications:

- Ribs and slots
- Large cavity molds
- Forging dies
- Large die casting dies
- Large extrusion dies
- Roughing electrodes
- Pressure molding tools

Here's how another successful mold shop uses MG-5:

Ballek Die Mold Inc. and Micro-graph 5

Founded more than 20 years ago by Stefan Ballek, Ballek Die Mold has recently expanded into a large, new building to accommodate their increasing number of EDM machines, both sinking and wire-cut, and a

rapidly growing business. Key contributors to the company's recent growth are Steven Ballek, son of the founder, and Len Stoltz, shop superintendent.

The company acquired EDM capability very early in their existence, and it has become a key part of their operation. At Ballek, every mold maker is experienced with EDM machining, and they have one EDM lead man who supervises all EDM jobs.

Ballek adopted Micro-graph 5 (MG-5) graphite as their standard approximately 10 years ago. Currently, they use MG-5 on about 98% of their mold sinking jobs, the vast majority of which use orbiting technology. They feel that MG-5:

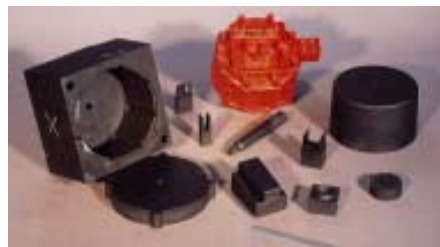
- Allows them to rough and finish with the same grade, and frequently the same electrode.
- Holds sharp corners and small radii very well.
- Is easy to wire-cut into precise, close tolerance shapes.
- Has proven excellent in high amperage, "no wear" cutting mode due to its high density.
- Has excellent wear characteristics on both older tube type and newer solid-state power supplies.

Following are some interesting examples of their work and how they effectively use EDM and MG-5.

“...can rough and finish with the same grade, and frequently with the same electrode.”

Distributor Cap

To create this mold, Ballek uses a single MG-5 electrode for roughing and finishing, orbiting to 0.012" per side. The small individual electrodes are used to EDM the ribs and corners.



Electrical Meter Base

These 2-cavity molds are roughed out by milling. They are then EDM'ed with single electrodes for both roughing and finishing, which keeps polishing and bench work to a minimum. Typically they use STD polarity with a negative electrode, and on occasion rough in "no wear" mode.



Automotive Distributor Cap

Shown are a 4-cavity, chrome plated mold and plastic piece parts. They use one round male electrode and one female electrode to EDM the core.



Automotive Pulley

These parts were made with a single cavity prototype mold which was rough milled. EDMing was accomplished using simultaneous rotation and orbiting to 0.150" per side. This job required 3 electrodes, and 5 extras were made for future use. Small electrodes for details were wire-cut and orbited to 0.010" per side.



Various Electrodes & Parts

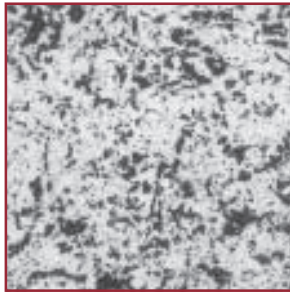
Included in the specialized electrodes and parts shown are:

- A threaded electrode, with finely detailed thread form.
- Halogen light housing and electrode.
- Fan-shaped electrode for pump component mold; illustrates MG-5's ability to be accurately machined with thin walled sections. This electrode exhibits excellent wear characteristics under very poor flushing conditions.



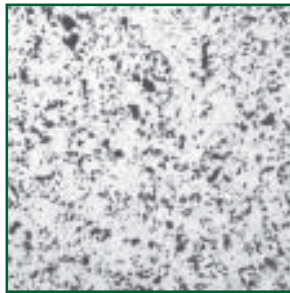
Ballek EDM Department

A section of Ballek's extensive EDM department.



Micro-graph[®] 4

Average Particle Size (microns / inches)		Flexural Strength (psi)	Average Apparent Density (g/cm ³)	Hardness (Shore)	Electrical Resistivity (0.000 ohm-in)
15	0.0006	7,112	1.75	53	492



Micro-graph[®] 5

Average Particle Size (microns / inches)		Flexural Strength (psi)	Average Apparent Density (g/cm ³)	Hardness (Shore)	Electrical Resistivity (0.000 ohm-in)
10	0.0004	9,000	1.80	65	531

Note: Specifications shown are average values.

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