

**Global Leaders
in MIM Innovation**



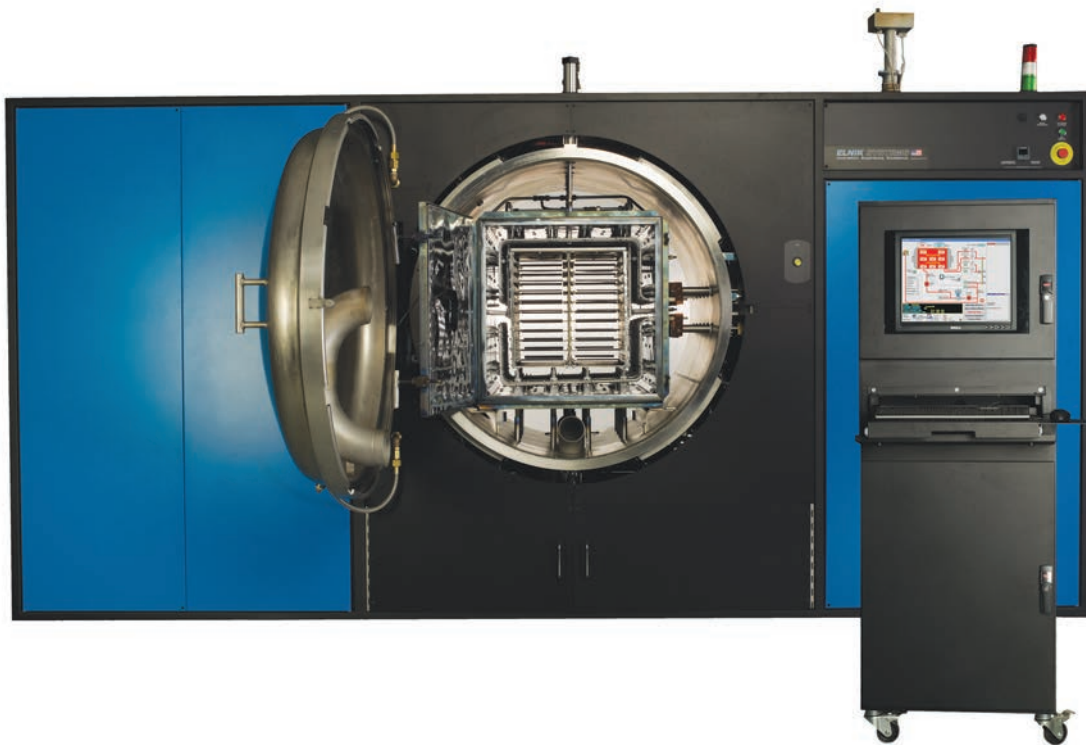
Innovation. Experience. Excellence.

For Quality & Performance that Lasts, Choose the
First in MIM Innovation... **Elnik Systems.**

It's a fact.

Elnik Systems developed the first all refractory metal 2nd stage Debind and Sinter furnace in the industry. By any engineering standards, this was no small feat. Its partial pressure operation for Hydrogen, Nitrogen or Argon with laminar gas flow via internal retort resulted in consolidating the process steps of second stage debinding and sintering of MIM parts into one step process. This shortened process time from typically 30+ hours to less than 20 hours.

And that was just the beginning. Their remarkable six zone temperature control with their proprietary **AccuTemp™** thermocouple correction enabled Elnik furnaces to have very tight temperature modulation and uniformity increasing overall density of MIM parts to the highest levels yet.





Metal Injection Molding (MIM)... Playing a big role in producing small parts

When the focus of your manufacturing needs is to produce large quantities of small complex parts, Metal Injection Molding is the answer. Fine metal powders are custom formulated with a binder (thermoplastics, waxes and other materials) into a granulated feedstock, then fed into an injection molding machine adapted for Metal Feedstocks. The first stage binder of the molded green part is then extracted by a thermal, solvent or catalytic processing step. Historically, the secondary binder was typically removed in a thermal debinding furnace which also pre-sintered the parts before they were moved to a conventional sintering furnace. Elnik's introduction of a partial pressure refractory metal furnace with laminar gas flow allowed these two separate steps to be combined without moving the parts, therefore saving 15+ hours processing time. Metal injected molded parts can be virtually unlimited in shape and geometric-feature. Capability of high production rates are possible through multi-cavity tooling. Elnik's leadership in MIM part processing has made it the preeminent name in MIM technology.

The Elnik "System" takes the risk out of buying MIM Technology

In most cases, when you purchase a refractory furnace or other MIM equipment, you never know what its capabilities are in meeting your production demands until AFTER you've made the purchase. Often, this can mean a loss of thousands or even millions of dollars when you discover it under performs. This is not the case with Elnik. Unlike its competitors, Elnik Systems offers **FREE "test" runs** in production sized MIM furnaces **BEFORE** you buy their product custom-tailored to meet your specific manufacturing requirements. The data and adjustments derived from these "test runs" will be transferred by Elnik into the product you purchase. As a result, you are assured maximum production efficiency from the day you receive the equipment to virtually eliminate this risk after final purchase.

Our products are in a class all their own...

Elnik engineering and performance speaks for itself. Cutting edge technology results in time saving, cost-efficient production unmatched in the industry.



CD 3000 – Catalytic Debind Oven

Designed exclusively for debinding any polyacetal or POM based feedstock. The CD 3000 series ovens are designed with controllability of nitric acid, nitrogen, blower speed, burner and temperature. Utilizing an Excel Spreadsheet, all process parameters are entered then downloaded into the ovens PLC controller. This allows the system to function without supervision. Designed with safety in mind, the CD Oven contains automatic process steps to help eliminate left over nitric acid fumes and acid in supply lines once the process is complete.

All process steps are recorded, trended and stored locally on the system. This allows the operator to recall former runs, reprint data and trends. It also offers traceability for heavily regulated industries. Elnik's CD3000 series oven is also capable of processing Ceramic Injection Molded parts. Modifications to the system related to Gas flow, Acid flow and Temperature ramp control provide repeatable results for a demanding industry.

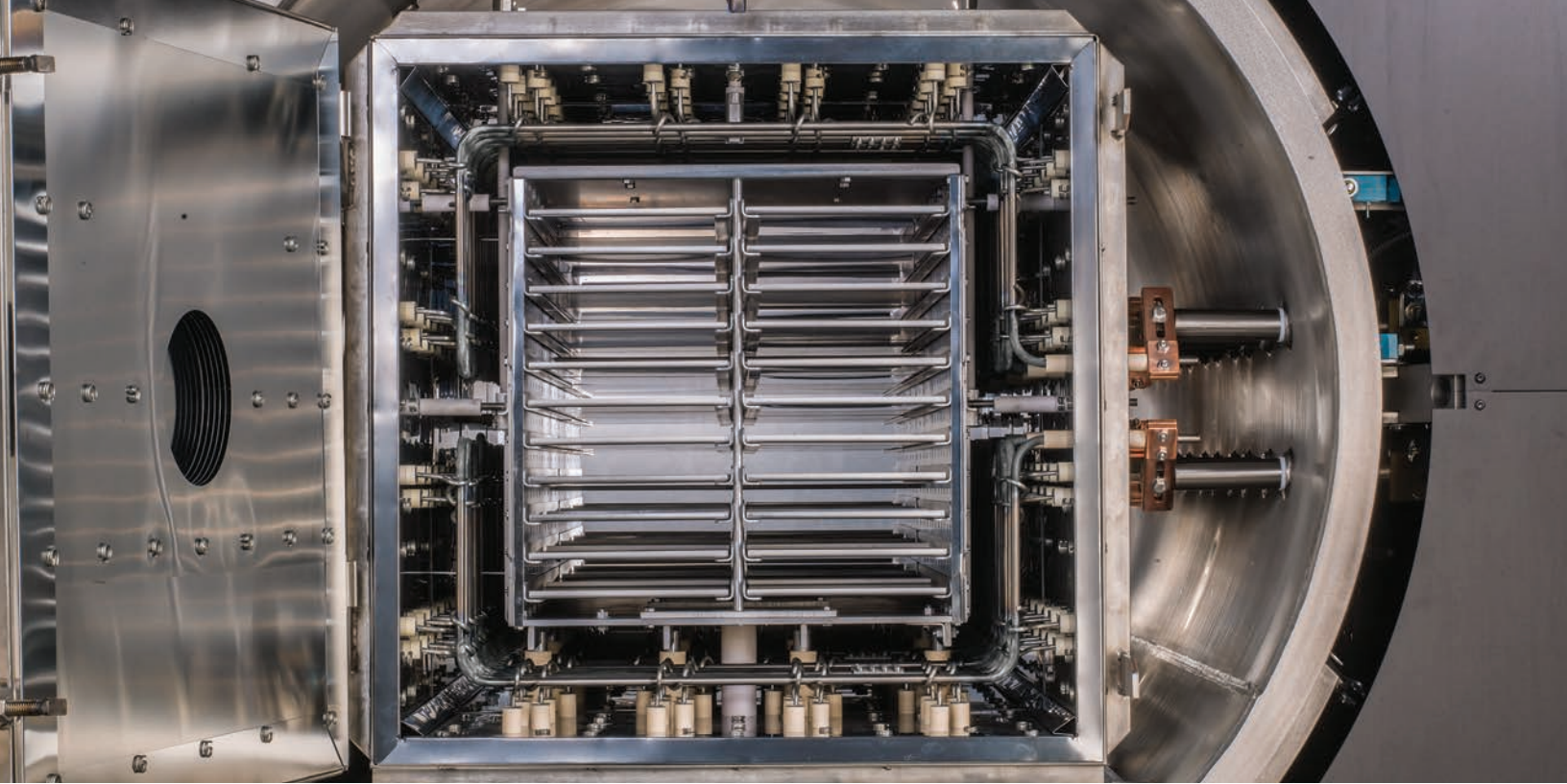
SD 3000 – Solvent Debind Oven

Designed exclusively for wax-based feedstocks.

Fully automated closed loop front loading system operated with any non-flammable and/or flammable solvents. Parts are fully immersed in solvent re-circulated inside the chamber during debinding.

After the debinding soak step, the used solvent is removed from the chamber then distilled to remove the wax so it can be reused for the next debinding cycle. Solvents which remain trapped in the parts evaporate and a vacuum is pulled in the heated chamber removing these remaining vapors. Emission amounts meet all national standards and CE requirements.





MIM 3000 Series Debind and Sinter Batch Furnaces

- Process ANY metal with ANY binder
- Process in nitrogen, argon, hydrogen or forming gas.
- Process in atmospheric pressure to partial pressure to high vacuum
- Program any control parameter in any segment during debinding and sintering via an easy to use Excel Spreadsheet
- Use less process gas, electricity, handling time, and floor space

Elnik's Refractory metal series furnaces are State of the Art. Processing inside a Double Walled Gas Tight TZM retort with a calibrated gas management system and using a partial pressure vacuum environment offers the best parameters to perform debinding and sintering of your MIM parts. The MIM 3000 series furnaces utilize multiple Mass Flow controllers, a throttling valve and a dry screw vacuum pump to manage the internal furnace pressures throughout any profile segment.

Elnik's proprietary *Accutemp*TM thermocouple technique allows for each of the 6 control zones in the furnace to run within +/- 1°C of the programmed setpoint. This furnace feature allows for much tighter temperature uniformity throughout the process workzone and provides the user the ability to develop profiles for the furnace with setpoints that are very close to the material's Solidus Temperature, without the risk of overheating the parts causing distortion. This innovative approach allows MIM parts makers to achieve high densities in their parts.

The MIM 3000 series furnace is loaded with automatic functions to allow more uptime on the equipment. An easy to use Excel Spreadsheet Recipe Builder with entries for Ramp/Soak temps, gas pressures and types, vacuum events, cooling events, etc. allows the user to easily program the furnace and let it run without supervision. Binder laden sections of the furnace are all heat traced with drain valves to allow the operators to remove trapped binder without having to breakdown any components. Service/Maintenance screens remind the operator of critical maintenance steps.

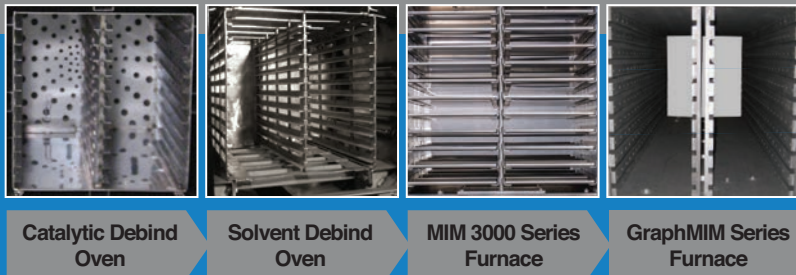
GraphMIM 2000 Series

- Process ANY iron based metal with ANY binder
- Process in nitrogen or forming gas
- Process in atmospheric pressure to partial pressure
- Program any control parameter in any segment during debinding and sintering
- Use less process gas, electricity, handling time, and floor space

Elnik's GraphMIM 2000 series furnaces have all the same automation, temperature control, gas managements, leak checking and service reminder features and functions of the MIM 3000 series. These units however, utilize Graphite material for the hotzone and retort. The retort being single walled, utilizes a similar gas plenum approach to ensure each shelf receives the same amount of process gas.

Staging parts can be extremely time consuming depending on your part geometry, as part of Elnik's philosophy of increasing furnace usability, we have designed out equipment with integration in mind.

This methodology offers operators the need to only stage parts once, significantly reducing the amount of labor time needed to produce parts.



Simply move the loaded Molybdenum/Graphite tray from one unit to the other.

Furnace Model	Usable Retort Size Based on Shelf Width and Depth	Usable Volume (Liters)	Number of Shelves Size (mm) - Inch	Total Load Area	Pump Speed
MIM 3001L T-50	220 x 292 x 305 mm	27	14	0.43 m ²	85 m ³ /h
	8.5 x 11.5 x 12 inch		(108 x 305) - 4.25 x 12	672 Sq In	50 CFM
MIM 3015 T-50	292 x 343 x 305 mm	32	16	0.74 m ²	85 m ³ /h
	12.25 x 13.5 x 12 inch		(156 x 305) - 6.13 x 12	1,152 Sq In	50 CFM
MIM 3025 T-50	292 x 343 x 610 mm	65	32	1.49 m ²	85 m ³ /h
	12.25 x 13.5 x 24 inch		(156 x 305) - 6.13 x 12	2,304 Sq In	50 CFM
MIM 3045 T-115	413 x 460 x 610 mm	117	44	2.73 m ²	85 m ³ /h
	16.25 x 18 x 24 inch		(207 x 305) - 8.13 x 12	4,224 Sq In	50 CFM
MIM 3675 T-115	413 x 460 x 915 mm	175	66	4.09 m ²	195 m ³ /h
	16.25 x 18 x 36 inch		(207 x 305) - 8.13 x 12	6,336 Sq In	115 CFM
MIM 3009 T-115	413 x 460 x 1220 mm	234	88	5.45 m ²	195 m ³ /h
	16.25 x 18 x 48 inch		(207 x 305) - 8.13 x 12	8,448 Sq In	115 CFM
MIM 3012 T-115	413 x 460 x 1524 mm	292	110	6.81 m ²	195 m ³ /h
	16.25 x 18 x 60 inch		(207 x 305) - 8.13 x 12	10,560 Sq In	115 CFM
GraphMIM 2045 G-50	395 x 460 x 610 mm	110	40	2.40 m ²	85 m ³ /h
	15.5 x 18 x 24 inch		(197 x 305) - 7.75 x 12	3,720 Sq In	50 CFM
GraphMIM 2009 G-115	394 x 460 x 1220 mm	220	80	4.80 m ²	195 m ³ /h
	15.5 x 18 x 48 inch		(197 x 305) - 7.75 x 12	7,440 Sq In	115 CFM
CD 3001L HT	220 x 292 x 305 mm	27	14	0.43 m ²	
	8.5 x 11.5 x 12 inch		(108 x 305) - 4.25 x 12	672 Sq In	
CD 3025 HT	292 x 343 x 610 mm	32	32	1.49 m ²	
	12.25 x 13.5 x 24 inch		(156 x 305) - 6.13 x 12	2,304 Sq In	
CD 3045 HT	413 x 460 x 610 mm	117	44	2.73 m ²	
	16.5 x 18 x 48 inch		(207 x 305) - 8.13 x 12	4,224 Sq In	

Innovative System Features

- **AccuTemp™** proprietary TC control resulting in tight temperature control (+/-1°C of set-point temperature in all six control zones)
- **Intelligent Process Control “IPC”** Assures Uniform Physical Properties of parts
- **Coldfinger™ Debind Trap** Forced Flow enhanced binder trapping
- **Automatic Cleaning Features** of binder trapping components and Dry Vacuum Pump
- **Gas Tight Retort Design** Superior gas control throughout process zone and eliminates “escaping” gas as compared to competitive designs.
- **Simple and easy to use** computer controls via Excel Spreadsheet
- **Ability to Trend** virtually all critical components
- **Service and Utilities** maintenance screens
- **Leak Check** functions
- **Laminar Gas Flow** efficient, effective gas management for debinding and sintering
- **Field Service Capability on a Global Level** Elnik’s Field Service team will deliver prompt,expert service to keep your process running smoothly.
 - **Annual Service**, Preventive Maintenance contracts and training
 - **On-site repair**, installation, evaluation and support
 - **Major upgrades** or refurbishments
 - **Machine Inspection and Evaluation**
 - **Furnace Relocations**
 - **Computer Upgrades**
 - **Spare Parts Orders**
- **Virtual Connectivity** Elnik’s Field Service team utilizes virtual remote connectivity to provide intelligent, quick support and troubleshooting. No matter where you are or we are in the world, we have the ability to help diagnose any issues you may have.

Furnace Options

Diffusion Pumps – For 10^{-5} or 10^{-6} vacuum inside furnace chamber

High Vacuum Flange – Future installation of diffusion pump for High Vacuum processing

Heat exchanger with (3,000 CFM) 5,097 m³/h blower, magnetically sealed rotary feed through, external motor and internal shutters, computer adjustable pressure and temperature set point to activate blower.

Set of 12 Flexible Survey Thermocouples – Type K or N, computer integrated with readout, trending and data acquisition.

Gas fired after burner with integrated hydrogen igniters mounted on top of the furnace.

Control Document Reporting – Extensive document control for highly regulated industries. A summary of all furnace functions, consumption data, programmer info, etc.

Air Conditioner – Temperature control of the furnace electrical cabinet

Argon Purifier – integrated system to ensure ultra-pure argon gas for specialty alloy processing



**When we put our “knows” in your MIM business,
you’ll save a fortune in money and time!**



No other MIM furnace manufacturer can offer you the Know-How of DSH Technologies. Elnik is the only company in its category with their own separate MIM laboratory with full sized production equipment. DSH provides comprehensive metallurgical assistance and turnkey production services to both current clients and new prospects. In short, partnering with DSH will help you avoid countless pitfalls that can unexpectedly arise in the MIM parts manufacturing process... **and we do it in many different ways:**

Try Before You Buy.* MIM parts processing runs. DSH offers free trial runs of MIM parts processing to prove our debinding and sintering equipment delivers the quality and performance you need before you purchase.

Consulting. DSH has helped clients set up complete MIM manufacturing companies with all required equipment from feedstock preparation to debinding sintering and all necessary lab tools.

R&D Work. DSH partners with existing or new potential customers involved in processing parts or materials including medical, aerospace and automotive high temperature materials.

Toll debind and sintering services. DSH can provide its customers, Elnik customers or any MIM parts producers with the option to rent DSH equipment by lot or contract for short term requirements or the occasional overcapacity run. In addition, new companies just entering the MIM industry will have DSH run their parts until their own production volume justifies the purchase of MIM equipment or while they wait for their furnace to be manufactured.

Partnering. DSH also partners with companies who want to establish turnkey solutions for all aspects of the MIM parts producing process:

At the helm of DSH Technologies is Dr. Satya Banerjee. With over 30 years of US industrial experience, Dr. Banerjee has had in-depth experience developing materials, processes and products for the MIM industry. His leadership in this industry has made DSH a vital and irreplaceable arm of Elnik Systems.

*DSH Technologies will charge for 2 trial runs on DSH equipment. Should a furnace be purchased within one year of these trial runs, Elnik will provide full credit for the 2 trial runs off the price of the purchased equipment.

We got our start in 1969 and the rest is history...

1969

Elnik Instruments was established as a wholly owned subsidiary of W.H. Joens & Co. in Germany marketing temperature controllers, recorders and programmers for industrial furnaces, vacuum furnaces plus a variety of plastic extrusion and injection molding machinery.

1982

Elnik Instruments entered the vacuum furnace industry with focused efforts on vacuum furnace systems for Raytheon Company, Waltham MA.

1986

Elnik Systems was formed to meet growing demand for custom vacuum furnaces primarily for the military industry.

1995

Elnik developed a "one-step" debind and sinter partial pressure furnace to meet the needs of the growing MIM market. The MIM 3000 furnace provides a very cost-effective alternative to the two-furnace technology being used at the time.

1999

Elnik Systems moves into a new state-of-the-art facility housing DSH Technologies, an Elnik affiliate, in Cedar Grove, NJ. Elnik began to standardize its MIM furnace line and continues to manufacture the most advanced MIM furnaces and debinding ovens in the world for one-step debinding and sintering processes.

2004

Elnik continues pushing innovation of its furnace capabilities, introducing *AccuTemp™* Temperature control allowing each temperature zone inside its furnace to be controlled within +/- 1° of its set point. Elnik Developed a Catalytic Debind Oven to be used to process BASF Catamold and Other POM based Feedstocks.

2005

Elnik added automatic cleaning features of its Vacuum Pump and Binder Traps significantly reducing the manual maintenance time required of its systems.

2006

Elnik introduces a full line of graphite MIM furnaces called the GraphMIM 2000 to its line for lower cost MIM processing of iron materials. This system contains all the same innovative functions as its MIM3000 series furnace.

2012

Elnik Develops a Metal and Ceramic debinding oven made for POM based metal and ceramic Feedstocks. This system has enhanced controllability of temperature, Nitric Acid flow and gas flow.

2015

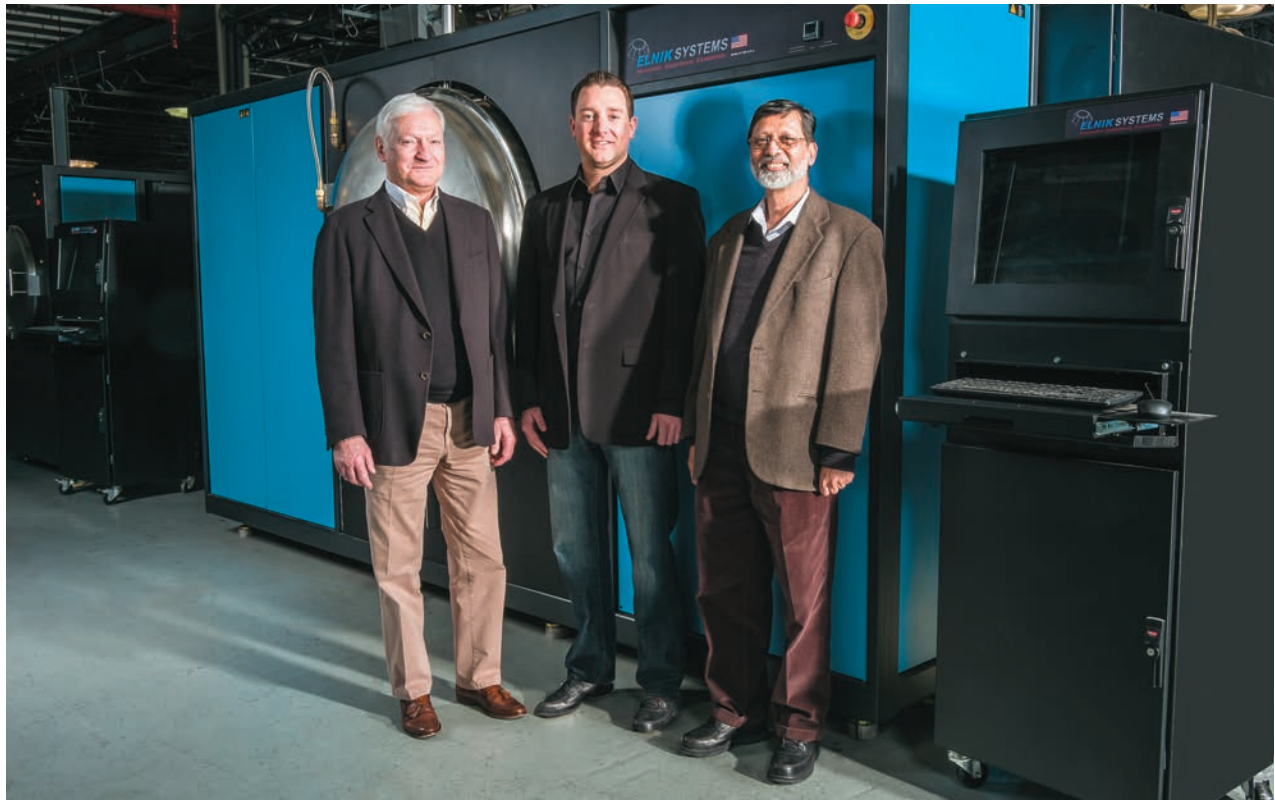
Elnik developed a laboratory furnace for the MIM industry, MIM3001L. Having all the same processing characteristics as its larger production furnace syblings, this LAB furnace allows for an easy scale up from R+D to Production processing without having to reinvent the wheel. This furnace is also sized and functional for the **Additive Manufacturing** world involved with binder based 3D printing.

2017

Elnik Systems establishes its first European based service and parts facility, Elnik Systems, GmbH. Located in Waldachtal, Germany, this facility will contain spare parts and a service technician.

Our people make all the difference.

The key management personnel at Elnik are what drives its success. There's no substitute for experience as you can see from their backgrounds...



Claus Joens, President

Founded Elnik in 1969 making/repairing temperature recording devices used on furnaces, twin screw extruders etc. Began and excelled in high temperature/high vacuum furnace business in 1980's. Entered MIM market in 1995 with introduction of first refractory 2nd stage debind and sinter furnace. Has since advanced the MIM industry process technologies and equipment capabilities.

Stefan Joens, Vice President

15+ years' experience at Elnik Systems manufacturing, engineering, servicing, coordinating and improving the process equipment used in the MIM industry. Trained at Fraunhofer Institute during 2011 in all metal injection molding process steps and affiliated metal part development processes.

Dr. Satyajit "Satya" Banerjee Project Manager/ Chief Metallurgist DSH Technologies

Over 30 years of US Industrial experience, more than 25 of which has been developing materials, processes and products as well as setting up laboratory and production equipment in MIM industry. Knowledge in a wide array of materials from steels, Stainless Steels, ferrous/nonferrous to precious metals, super alloys and intermetallics. He is widely published and holds one US patent.

Even more important, our 30+employees, who have been with us for many years, have continually helped to improve the design and manufacturing processes, making our MIM furnaces the most innovative production equipment in the industry.



**With Customers
Across the Globe**

Main Headquarters
107 Commerce Road
Cedar Grove, NJ 07009 USA
+1 973.239.6066 | www.elnik.com

Elnik Systems, GmbH
Robert-Bosch-Straße 3
72178 Waldachtal, Germany
+49 (0) 7486 9647000