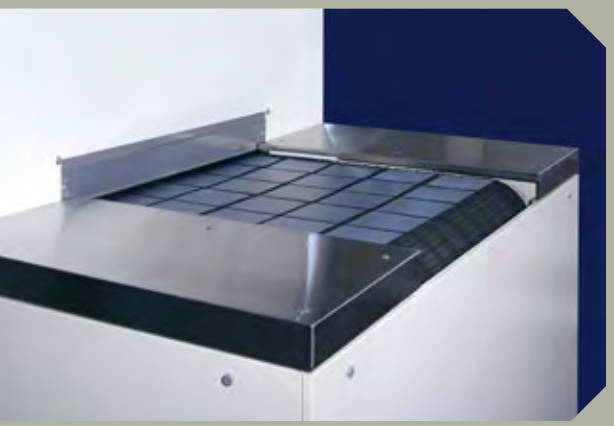
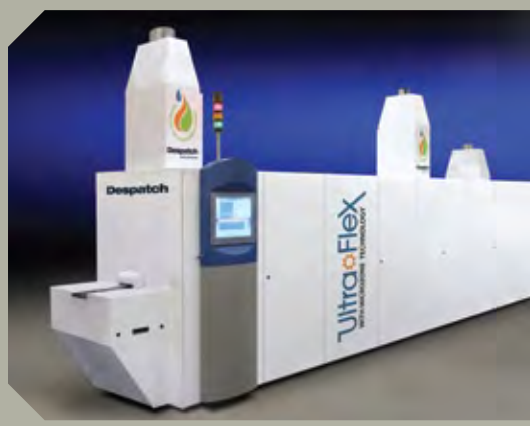
INSPIRED INNOVATION

Despatch
INDUSTRIES

THERMAL AND PROCESSING TECHNOLOGY FOR SOLAR PRODUCTION





INSPIRED INNOVATION

Despatch Industries has specialized in thermal processing for over 100 years and is actively using this technical expertise to provide innovative solutions to critical applications in a broad range of markets and cutting edge technology worldwide.

Our innovations are inspired by our customers. Through collaboration in design and engineering, we observe how our technology can best be applied to your needs, giving you a unique competitive advantage.

Despatch has three dedicated business groups to meet the demands of the rapidly expanding thermal, solar and carbon fiber markets. This focused commitment has allowed us to become experts in these industries.

Our extensive experience in engineering and manufacturing is backed by our international service and support network. We are truly a global partner that responds locally.

COMPANY FACTS

Founded: 1902

Global headquarters:
Minneapolis, Minnesota, U.S.A.

International offices:
Shanghai, Berlin, Singapore, Hsinchu, Tokyo, Seoul

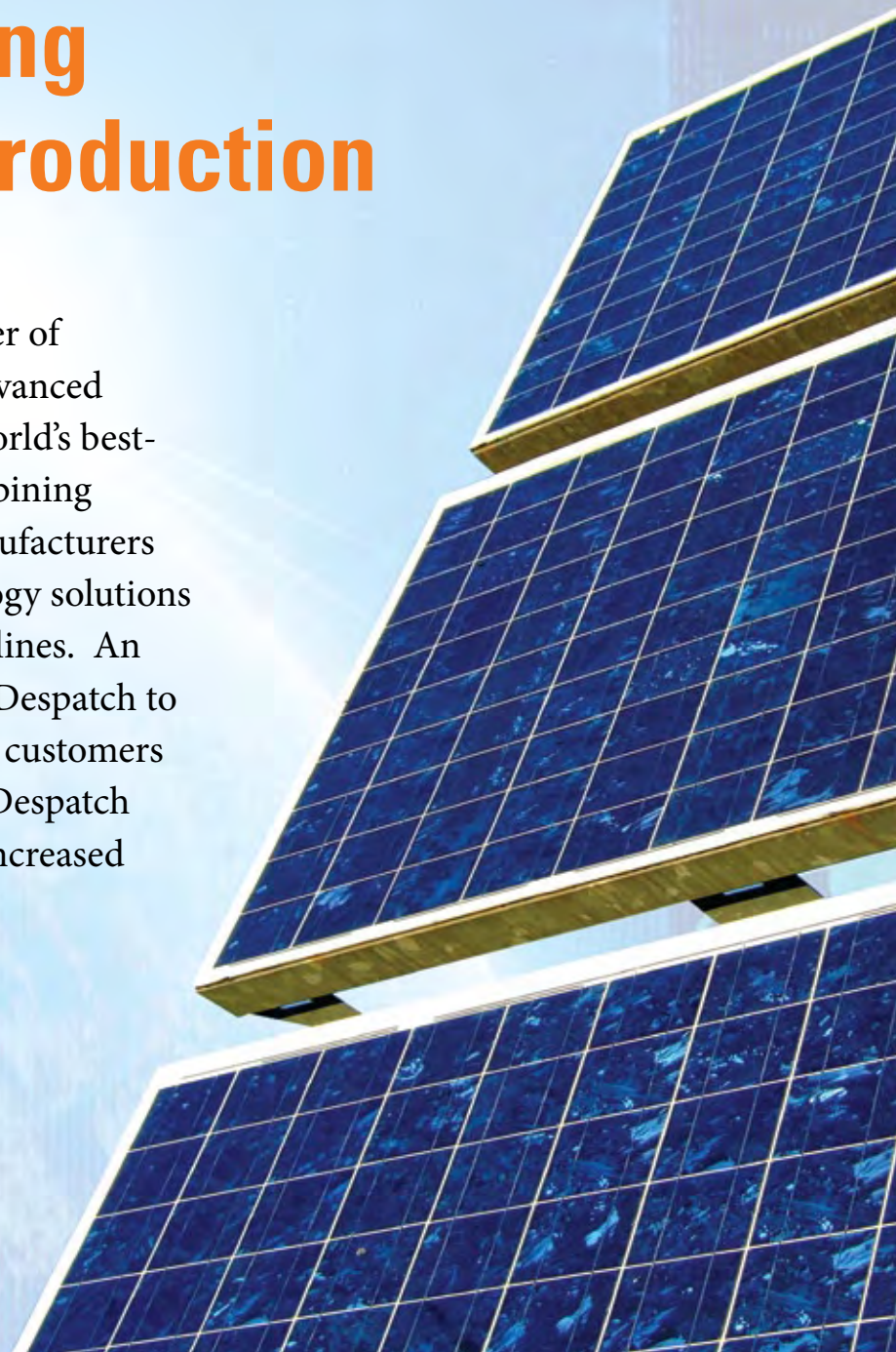
Ownership: Privately held

Primary markets: Photovoltaics, carbon fiber, healthcare, electronics, energy, materials

Certified: ISO 9001:2008

Thermal and processing technology for solar production

Despatch Industries is the leading provider of thermal and processing equipment for advanced photovoltaic production, including the world's best-selling metallization firing furnace. Combining Despatch expertise with that of solar manufacturers inspires flexible, next-generation technology solutions that integrate seamlessly into production lines. An expansive global support network allows Despatch to provide service and technical expertise to customers on a local level. Industry leaders rely on Despatch equipment for maximum cell efficiency, increased uptime and reduced operating costs.



CF-Series Metallization Furnaces

Proven reliability, proven performance

DUAL LANE

The dual lane CF-Series metallization furnace is capable of producing over 2,400 cells per hour.

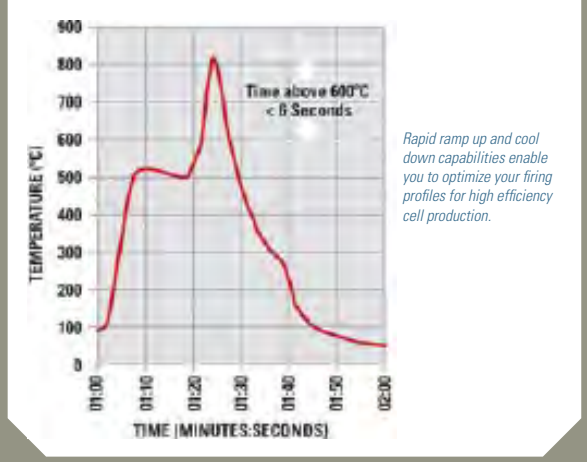
THE WORLD'S BEST SELLING METALLIZATION FURNACE

Despatch CF-Series metallization furnaces are designed for high throughput, consistent process repeatability and maximum equipment up-time resulting in consistently high yields, superior product quality and reduced cost of ownership.

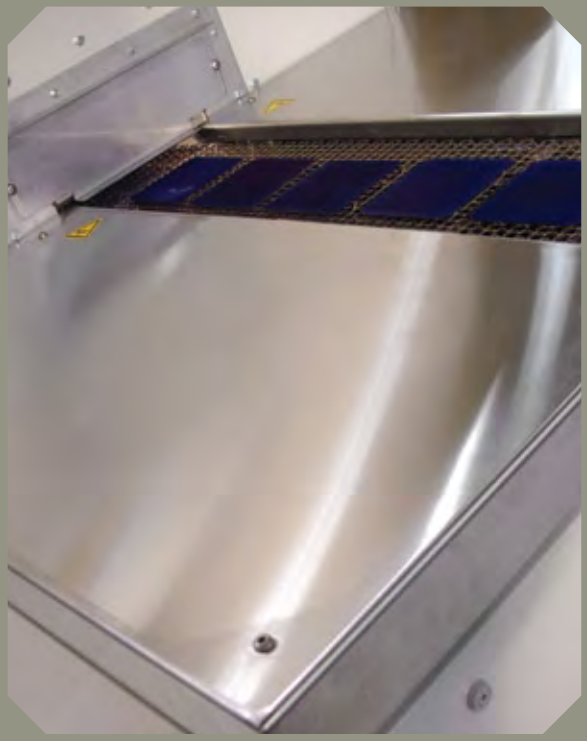
In addition to these exceptional performance capabilities, all models feature an enhanced graphical user interface, eye-level electronics access, and the first of its kind push-button chamber access. These innovations make the CF-Series easy to use, maximize performance and up time and allow you to continually improve your results.

FEATURES AT A GLANCE

- Rapid thermal ramping
- Enhanced thermal cooling
- Improved thermal response to intermittent loading
- Closed loop temperature controls
- Enhanced software recipe management
- Master production control interface
- Data logging
- Redundant over-temperature shutdown
- Minimized wafer shadowing design
- Gentle, uniform gas flow introduction
- Safe, simple chamber accessibility
- Eye-level electronics for easy maintainability
- Additional options are available to improve performance including a VOC Oxidizer.



Rapid ramp up and cool down capabilities enable you to optimize your firing profiles for high efficiency cell production.



UltraFlex™ Drying and Firing Furnace with Microzone™ Technology

THE NEXT GENERATION IN FIRING FURNACE PERFORMANCE

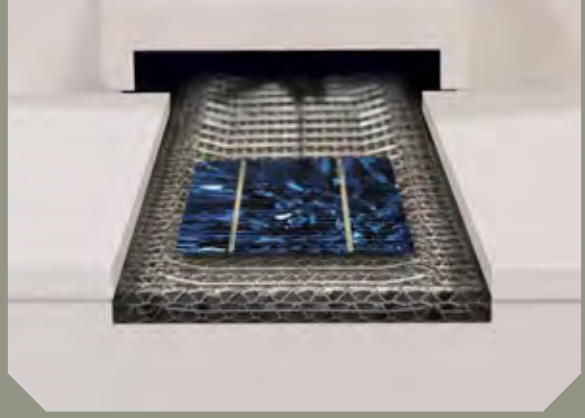
Despatch's UltraFlex™ is a state-of-the-art drying and firing furnace designed to provide next generation capabilities in performance, profile flexibility and reduced cost of ownership. The furnace features custom lamps and a furnace chamber design optimized for maximum absorption of energy into the cell. New Microzone™ technology enables infinite profile flexibility capable of adapting to ever-changing production needs. And the included Thermal Oxidizer provides virtually maintenance-free elimination of VOCs.

The 4-meter dryer section provides optimal drying time at faster belt speeds. Patented push-button access to the chamber minimizes maintenance time.

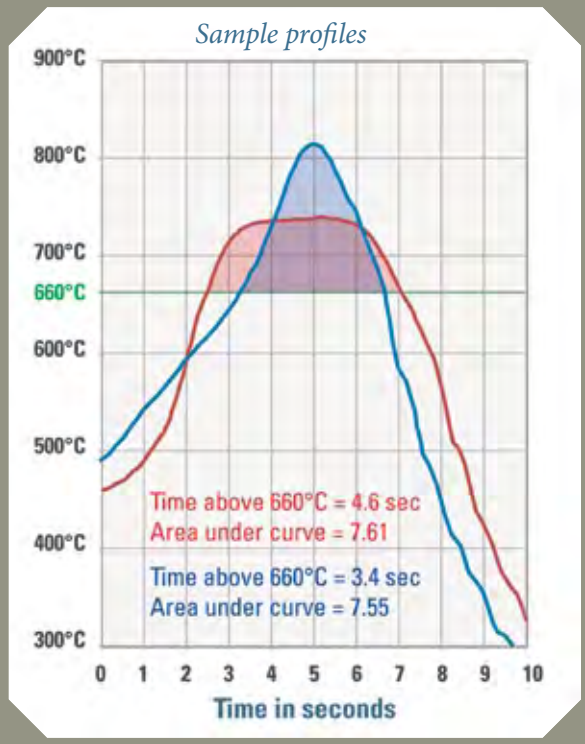
FEATURES AT A GLANCE

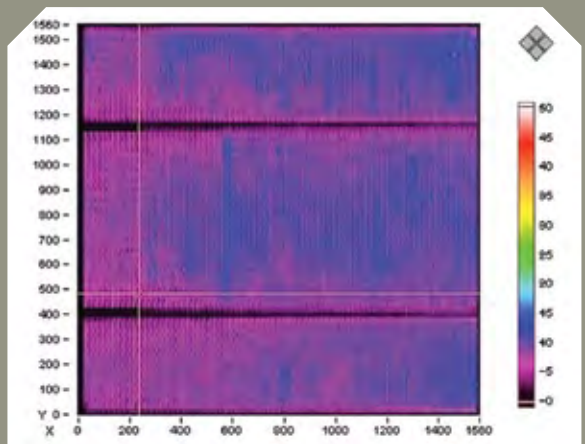
- Rapid thermal ramping (up to 175°C/sec)
- Enhanced thermal cooling (up to 250°C/sec)
- Uniform, stable, and repeatable cavity temperature (+/- 2°C)
- Wavelength tuned firing process
- Infinite profile flexibility
- 37% overall smaller footprint
- Four meter dryer length for optimal drying
- Maintenance-free elimination of VOCs
- Soft start with reduced connected load
- Wafer tracking
- Enhanced software recipe management
- Element monitoring
- Data logging
- Unique stand-off belt design carries cells on edges
- Safe, simple chamber accessibility

The new Ultraflex™ edge contact belt design results in less thermal transfer and no marking.



Sample profiles



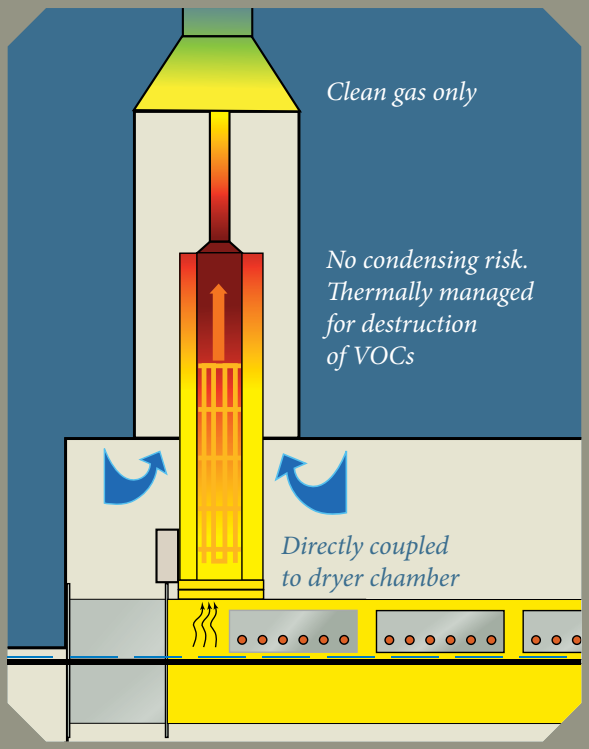


Microzone™ Technology allows for infinite profile flexibility to meet changing cell architectures.

A combined radiant and convection cooling action rapidly cools the cells as required for maximum cell efficiency.

The UltraFlex™ can achieve rapid thermal ramping and cooling rates of up to 250°C per second. And Despatch's new Microzone™ Technology provides infinite profile flexibility independent of belt speed, including the ability to tailor peak temperature while minimizing the time above a set temperature. Microzone lamps are configured to create the sharp divisions and tight control needed to adapt to changing cell architectures, new pastes and selective emitters.

In addition to these exceptional performance capabilities, all models feature an enhanced graphical user interface, eye-level electronics access, and patented push-button chamber access. The UltraFlex defies conventional furnace design in many ways. Despatch has engineered a smarter, more efficient tool with a smaller footprint and a first-of-its-kind configuration.



Despatch's Thermal Oxidizer attaches directly to the furnace, removing any chance of condensation. VOCs are incinerated, releasing only small amounts of CO2 and water.

VOC Thermal Oxidizer

Virtually maintenance-free elimination of Volatile Organic Compounds in exhaust gasses

An energy-efficient airflow system is combined with a point-of-generation Thermal Oxidizer abatement system that eliminates over 99 percent of VOCs with virtually no maintenance. Current VOC abatement options are ineffective and require extensive maintenance. With remote facility abatement systems, solvents condense in the ductwork requiring extensive cleaning and creating a fire hazard. Condensers require containment and removal of hazardous solvents and regular cleaning. Despatch's Thermal Oxidizer attaches directly to the furnace, removing any chance of condensation. VOCs are incinerated, releasing only small amounts of CO2 and water.

IL-RTS In-Line Rapid Thermal Shock

Removes bow from cells below 180 micron eliminating the need for low-bow paste

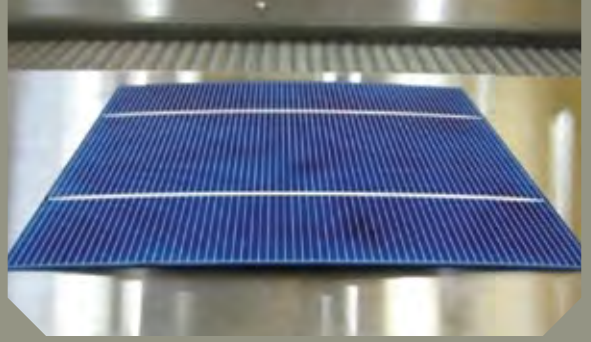
ANOTHER BARRIER TO THINNER WAFERS HAS BEEN ELIMINATED

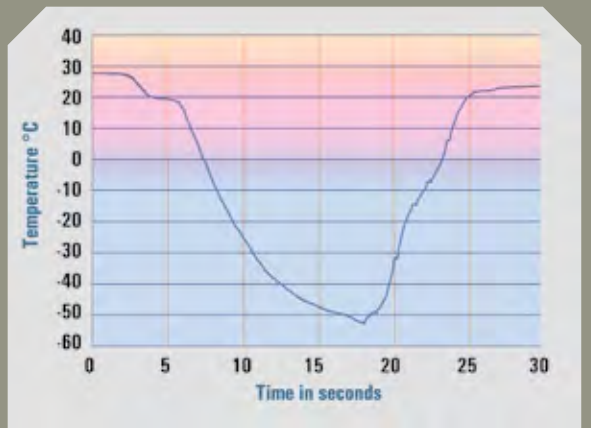
The In-line Rapid Thermal Shock (IL-RTS) tool leverages proven Despatch thermal technology from the electronics industry for a revolutionary solar application. The IL-RTS features a simple, in-line process that removes wafer bow by rapidly heating the wafer after cooling, eliminating the need for higher-cost, lower efficiency low-bow paste.

After moving through the firing furnace, cells enter the IL-RTS and are cooled and rapidly heated to relieve the wafer stress that causes bow. Cells are returned to a temperature above the dew point temperature to prevent condensation. The IL-RTS is designed to be compatible with any firing furnace on the front end, and the exit table accepts cell tester automation equipment for a completely seamless in-line process.

FEATURES AT A GLANCE

- Humidity control: prevents unwanted condensation inside the unit
- Rapid cooling section: reduce temperature of cell to below -50°C
- Helps reduce dependencies on low-bow paste
- Heating chamber: reheats cell to above dew point temperature to avoid condensation
- Enables thinner cells (220µm, 180µm, 160µm) with higher electrical performance





In-line Diffusion Furnace

Diffusion technology for the industry's most uniform emitters

BETTER RESULTS THROUGH IN-LINE DIFFUSION

The Despatch In-line Diffusion Furnace incorporates advanced infrared thermal technology that provides the tight temperature uniformity needed for increased cell efficiencies. Air is passively preheated as it enters the chamber and lamps on top and bottom along with edge heaters effectively transfer heat to the wafers. Automated drop-down access to the chamber reduces maintenance time and the insulation in the first zones of the furnace is easily removed if it becomes contaminated. The furnace provides advanced profile capability and a fully comprehensive software system.

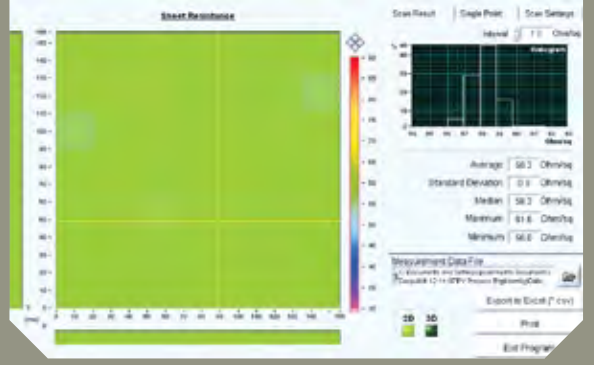
In-line processing offers reduced wafer handling and greater throughput than batch processing. With less handling you will have less breakage and increased yield. The Despatch Diffusion Furnace combined with USI's Deposition tool consistently produces highly uniform emitters using aqueous-based doping. This repeatability enables higher sheet resistances, excellent yields and optimum cell efficiency.

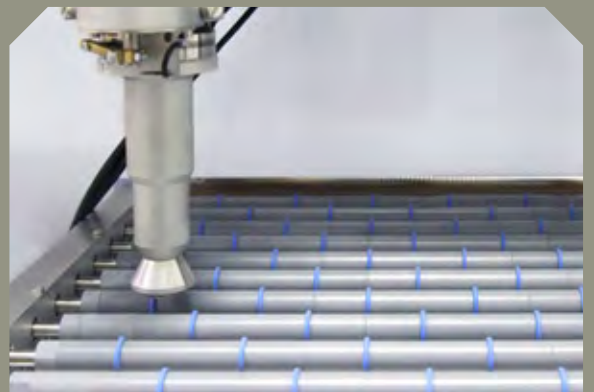
FEATURES AT A GLANCE

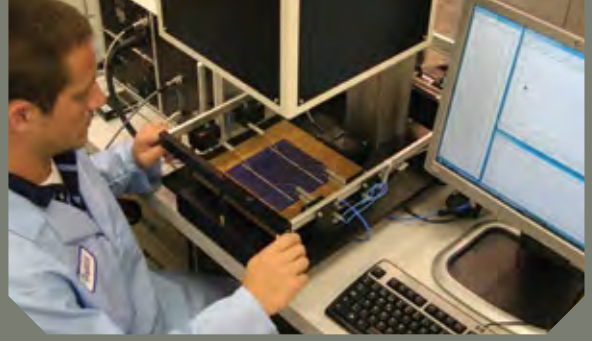
- High volume production
- Exceptional thermal uniformity ± 1°C in the dwell region
- Closed loop temperature controls
- Advanced graphical user interface
- Safe, simple chamber accessibility
- High production up-time
- Ease of maintenance

The Despatch Diffusion Furnace combined with USI's Deposition tool is a reliable system for highly uniform emitters.

A plasma system is available for chemical-free conditioning of the wafer surface.







INNOVATION

A unique competitive advantage:
Despatch Innovation Resources

Despatch provides a unique opportunity for process and product development and evaluation with a simple, singular focus: To provide customers with cost-effective solutions up front—before equipment design begins or purchase commitments are made.

Our clients enjoy direct access to highly skilled Despatch scientists and engineers who are experts at process optimization and helping customers solve complex problems. The Despatch Innovation Center is equipped with process tools and metrology specific to the manufacturing and performance analysis of photovoltaic cells. We work with universities, laboratories and leading manufacturers around the world.

This proven approach significantly reduces purchase risk, speeds production, ensures process integrity and saves customers time and money.

SERVICE

Service and support: global presence, with local expertise

With other thermal equipment providers, service stops after the sale. Not with Despatch. We provide expert technical service, process optimization, a range of installation options and an extensive parts inventory to all of our customers worldwide. And, if that's not enough, we have the capability to service some competitors' equipment. At Despatch, we believe in exceeding customer expectations and going above and beyond what an average equipment manufacturer will provide. Worldwide service, installation, parts and advice – we have you covered!

WE'RE HERE FOR YOU, WHENEVER, WHEREVER

Rest assured that when you call our Service Help line, you will be speaking with experienced, knowledgeable personnel, fully capable of assisting you with any equipment questions you may have.

Our network of Certified Service Representatives is spread out across the globe to provide technical support and service to Despatch customers worldwide.

Contact the Service Department : USA 1-800-473-7373
Internationally 1-952-469-8230

Contact us via email: service@despatch.com

VALUE-ADDED OPTIONS:

On-Site and Factory Training.

Process Optimization. As new equipment or process steps are added we can optimize your tools to achieve maximum efficiency.

Equipment modifications. We provide modifications and upgrades to bring your equipment up-to-date with current technology and operating at peak efficiency.

CUSTOM SOLUTIONS

Customization: the low-risk choice for your complex challenges

Despatch is applying its extensive experience and knowledge in infrared heating to new and emerging solar technologies such as: curing of thin films, in-line drying, sintering and applications requiring special atmospheres. No one has more proven success in partnering with customers to deliver complex thermal processing solutions for research and development, production and product testing. That's why when it comes to evolving an existing application or implementing a first-of-its-kind process, more global businesses choose Despatch Industries. Our innovative designs are backed by seasoned engineering, manufacturing and project management teams with decades of experience bringing large projects in on time and on budget.

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GLOBAL OFFICES

Germany: +49 30 629 073 410 / europe@despatch.com
China: +86-21-62365868 / shanghai@despatch.com
Taiwan: +886-3-6588484 / taiwan@despatch.com
Japan: +011-81-42-729-5355 / japan@despatch.com

USA HEADQUARTERS

Phone: 1-952-469-5424
1-888-DESPATCH (1-888-337-7282)
Fax: 1-952-469-4513
sales@despatch.com
service@despatch.com

www.despatch.com

8860 207th Street West
Minneapolis, MN 55044 USA

Despatch INDUSTRIES

1-11-PVLINE