



# EXTOL<sup>INC</sup>

## About Extol

Extol is a manufacturing technology company that improves the way plastic products are made. We provide plastic assembly technology, custom automation, and engineering services across our customers' value stream.

## We don't make you compromise.

Extol specializes in solving tough challenges for plastic product manufacturers. We believe that the needs of each application are unique. So the best equipment solutions should be tailored to meet those needs. That's why Extol has both plastic welding expertise and custom automation expertise. When you work with us, you get a configurable plastic welding solution that is optimized for performance.

## Plastic Welding Expertise

We solve the toughest plastic welding challenges.



## Custom Automation Expertise

We tailor equipment to meet your specific needs.



### Plastic Staking

### Plastic Welding

#### InfraStake

Door Panels  
Interior Trim  
Busbars

#### nanoSTAKE

Lighting  
Sensors  
Control Modules

#### Laser

Lighting  
Oil Manifolds  
Spray Bars

#### InfraGuide

Engine Ducts  
Filtration  
Resonators

#### Hot-Plate

Bottles  
Center Consoles  
Glove Boxes

#### Titan

Hot Plate Welding  
InfraGuide  
IR Welding

#### Spin

Manifold Ports  
Duct Ports  
Valves



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#### Get in Touch

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# Introducing InfraStake

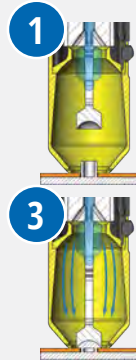
InfraStake is a tight, clean staking process that uses focused infrared energy to heat and form a plastic boss.



INFRASTAKE®

## How the InfraStake Process Works

Reflective surfaces focus infrared energy from an IR lamp onto the plastic boss, heating it. Once the material is softened, a non-heated punch forms the boss into a stake.



1

### Clamp

Module is positioned over the molded boss. The face of the concentrator clamps the part directly at the stake point.

3

### Form

IR lamp is switched off and the non-heated punch forms the semi-molten boss into a stake.

2

### Heat

Infrared (IR) lamp is illuminated. Light is focused radially on the plastic boss.

4

### Retract

After the plastic has re-solidified, the punch retracts and the module retracts from the part.

## How InfraStake Can Help You

This technology shines above outdated, hot, sticky staking processes.



### Strongest Stake Joints

InfraStake softens the boss before staking, which allows the material to flow easily and minimizes internal stresses that are common with other processes.



### Tightest Stake Joints

InfraStake modules clamp each stake point directly, applying independent pressure, which ensures the joint is as tight as possible.



### Reliable & Repeatable

The InfraStake process monitors several vital parameters that ensure a consistent, quality process.



### Safe for Electronics

InfraStake doesn't vibrate, and the energy is contained, which makes it safe to use with electronics and other sensitive components.



### No Sticking

InfraStake heats the boss without touching it and forms it with a non-heated punch, so it doesn't stick to even the most challenging materials, like nylon.



### Low Energy Use

InfraStake uses a low-wattage bulb, using very little energy.



### No Read-Through

InfraStake does not use excessive heat or vibration, eliminating the risk of A-surface marking and read-through on aesthetic components.



### Tamper Evident

InfraStake produces a permanent joint that shows evidence of tampering if the product is opened. In contrast, screws can be removed without evidence of tampering.



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# The Best InfraStake Option For Your Production Line

InfraStake is available in standard and custom machines, as well as integration packages for assembly lines.



## Standard Machines

An ideal benchtop solution for staking small to medium-sized thermoplastic parts.



## Custom Machine

The possibilities are endless. We've built unique single-point InfraStake machines and others incorporating 100+ InfraStake modules. Projects range from simple bench-top machines to complex work cells, which feature numerous IR machines and additional joining processes and functions.



## Integration & Associated Components

Integration packages include:

- InfraStake modules
- Power supply / controller
- Air manifolds for module function
- Dual flow rate air filtration and regulation system
- Maintenance tool kit
- Detailed documentation

## Applications for InfraStake by Industry

### Automotive:



#### Door Panels

Door panels and their subassemblies, including:

- Armrests
- Door handles
- Map pockets
- Speaker grilles



#### Electronics

Electronic systems, including:

- Cameras
- Control modules
- Infotainment systems
- Instrument clusters
- Overhead console
- Instrument clusters
- Overhead consoles
- Radar
- Sensors



### Life Sciences:

#### Medical Devices

Medical devices, including:

- Continuous glucose monitors (CGM)
- Drug delivery
- Endoscopy tools
- Respiratory systems
- Surgical valves



### Consumer Products:

#### Electronics and Appliances

Electronic devices, such as:

- Headphones
- Tablets
- PCs
- Wearables
- Remotes
- And more
- Speakers

## InfraStake Design Guidelines

To avoid common pitfalls and design flaws, download our InfraStake Design Guidelines from our website.

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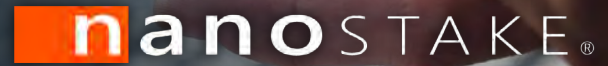


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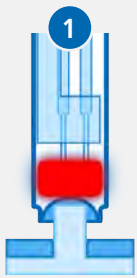
# Staking in Tight Spaces

NanoSTAKE uses our patented technology to heat and form plastic bosses into stakes quickly.



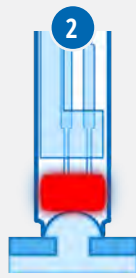
## How the NanoSTAKE Process Works

When accuracy and speed matter, NanoSTAKE is the right choice. This process uses our Smart Respond™ heating technology to heat and cool quickly. It's easy to integrate, operating with low voltage and current.



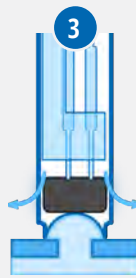
### 1 Heat

The Smart Respond™ heating technology heats the punch to a programmed melt temperature in seconds.



### 2 Form

The low-current, high-performance heater maintains the melt temperature as the punch forms the boss into a stake.



### 3 Cool

Once the punch reaches the correct height, it rapidly cools to a programmed release temperature.



### 4 Retract

The cooled module retracts.

## How NanoSTAKE Can Help You

This patented technology prevents plastic from sticking after being staked.

After staking a part, Smart Release warms the nanoSTAKE modules while lightly pulling up to allow them to release cleanly from the plastic. Once the modules retract, Smart Release intelligently cools them back down.



### Fits in Tight Spaces

NanoSTAKE is small and fits into tight spaces where other technologies don't.



### Safe for Electronics

Doesn't vibrate and only heats the boss. Safe to use with electronics and other sensitive components.



### Low Energy Use

NanoSTAKE uses low current and low voltage power, using very little energy.



### Cleaner Stakes

No vibration means finished stakes are clean and free of particulate contaminants.



### Reliable & Repeatable

True closed-loop process that controls several key parameters to ensure a consistent, quality process.



### Tamper Evident

Produces a permanent joint that shows evidence of tampering. In contrast, screws can be removed without evidence of tampering.



### Smart Release Tech

Briefly reheats the module as it retracts, ensuring the plastic releases cleanly.



### No Read Through

No excessive heat or vibration, eliminating the risk of A-surface marking and read-through.



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# The Best NanoSTAKE Option For Your Production Line

NanoSTAKE is available in standard and custom machines, as well as integration packages for assembly lines.



## Standard Machines

NanoSTAKE supports multiple stake points, enabling simultaneous staking of several bosses. This improves efficiency and consistency in complex assemblies.



## Custom Machines

When you need a solution specifically tailored to your unique needs and requirements, we can create a nanoSTAKE machine that fits seamlessly into your process.



## Integration Packages

Integration packages include everything you need to integrate the technology into a machine: module(s), pneumatics kit(s), module controller(s), and system controller(s).

## Applications for NanoSTAKE by Industry



### Automotive

- Door Panels
- Electronics & PCBs
- Instrument Panels
- Lighting



### Consumer

- ATV, UTVs
- Drones
- Electronics & PCBs
- Speakers



### Energy Storage

- Batteries
- Busbars
- Terminal Plates



### Life Sciences

- Light Lenses
- Needle Staking
- Stent Trays
- Surgical Devices

## NanoSTAKE Design Guidelines

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# Laser Plastic Welding Configured to Your Needs

Many laser welding applications require a specialized solution to optimize speed and performance. We customize each laser welding machine to fit the specific application. This means the machine can be built as large or as small as needed. It can apply force using any method you prefer, and it can use the laser technology best suited for your parts.

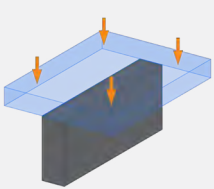


## How the Laser Welding Process Works

Laser plastic welding employs a precise IR laser beam that passes through a transmissive material and is absorbed by an absorptive material. The two materials are held in close contact, causing the joint to heat and melt as the laser energy is absorbed. This process results in a clean weld with minimal flash.

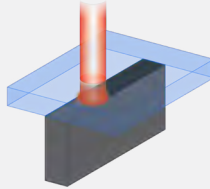
### Clamp

Two parts are clamped together with the IR transparent material on top and the absorbing material on the bottom.



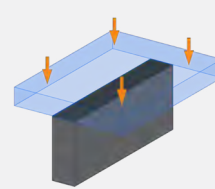
### Heat

The laser is transmitted through the top component and absorbed by the lower, heating and melting the joint.



### Cool

As the laser turns off, the clamping force is maintained to allow the joint to cool and solidify.



## Extol Laser Welding: 20+ Years of IR Experience

Extol's laser plastic welding uses focused infrared (IR) energy to precisely melt and bond plastics. Unlike broad IR sources like Extol's InfraStake, which has been used for over 20 years, laser welding employs specific IR wavelengths—usually between 1 and 2 microns.

This precision enables tight process control and repeatability, ensuring high-quality welds tailored to each specific application. Key parameters—including beam size, speed, power, and number of passes—can be finely adjusted, giving manufacturers the flexibility to optimize strength, aesthetics, and cycle time for their unique product requirements.



### Clean Process

Laser welding can minimize or eliminate unwanted particulate and visual flash by applying the right amount of energy to the weld surface.



### Fast Weld Times

Extremely focused energy means the plastic is heated exceptionally fast. This translates to fast weld times.



### Precise Tech

Allows for miniaturized part designs and closer internal component placement, ensuring energy is precisely directed to each part.



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# The Best Laser Welding Option For Your Production Line

Our Laser Plastic Welding Machines are available in standard machines and custom machines for integration into equipment.



## Standard Machines

Offer precise, clean, and consistent welds in a ready-to-use package.



## Custom Machines

Get it your way with endless possibilities from custom tooling to large-scale work cells with multiple welding stations.



## Integrations

Easily integrate our laser welding system into your automation line or custom work cell.

## Applications for Laser Plastic Welding by Industry



### Automotive

- Actuators
- Badges
- Electronic housings
- Lighting
- Oil and coolant distribution
- Sensors



### Life Sciences

- Catheters
- Delicate packaging
- Fluid filtration
- Microfluidics



### Energy Storage

- Battery modules
- Flow batteries
- Membranes



### Consumer

- Audio components
- Electronics
- Wearables

## Laser Welding Design Guidelines

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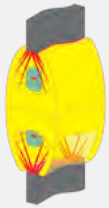
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## Focused Infrared Welding for Clean Parts

InfraGuide is different than other IR technologies. Small 100 W emitters ensure uniform heat along the entire weld joint, which translates to stronger parts. Positive air pressure clears off-gassing and eliminates the risk of flare-ups. We customize every InfraGuide IR welding machine to fit your specific application, so it can be built as large or as small based on your requirements, and it can use any force application method. You always receive the IR welding solution best suited to your parts.

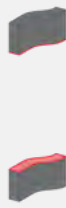
### How the IR Welding Process Works

Extol's InfraGuide uses focused IR energy to heat the weld joint on two parts. Once the joints are heated, the InfraGuide tooling moves out of the way, and the parts are pressed together to weld.



#### Heat

InfraGuide emitters focus the IR energy on the weld ribs of both parts, heating them.



#### Open

Once the weld ribs are hot, the InfraGuide emitters are removed.



#### Weld

The parts are brought together and welded.

### Uniform Heat Distribution Creates Stronger Parts

Customers choose InfraGuide over other IR methods because it has a higher weld strength. It heats quicker, and works with any material color, including clear parts. InfraGuide is safe to use with sensitive applications because you control the energy placement during the entire weld, so it can be adjusted and fine-tuned as needed.



#### Uniform Energy

Each IR lamp is controlled independently, allowing precise tuning for uniform heating of the weld rib, ensuring optimal temperature and minimal material degradation.



#### Clean

InfraGuide utilizes non-contact, non-vibratory welding, preventing sticking and particulate contamination. We gradually heat materials with precise power control to avoid discoloration.



#### No Flare Ups

Positive air pressure in the InfraGuide module exhausts off-gassing, eliminating the risk of ignition that can occur with other IR technologies.



#### Focused & Efficient

InfraGuide focuses IR energy onto the weld rib, using low-wattage lamps, and saves energy by turning off the IR between cycles.



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# The Best IR Welding Option For Your Production Line

Whether you want a standalone InfraGuide machine or custom automation, we've got you covered.



## Titan Series Welder

The Titan Series gives manufacturers a smarter, more flexible way to weld plastic parts—reducing downtime, cutting costs, and accelerating speed to market



## Custom Machines

The possibilities are endless with our custom InfraGuide welders. Whether you need something small and simple, or large and automated, we've got you covered



## Integration

Same powerful Titan Series welding platform designed to be integrated into an automation line

## Applications for InfraGuide Welding by Industry



### Automotive

- Air intake ducts
- Bottles
- Resonators
- Filters
- Lamps



### Consumer

- Small engine fuel tanks
- Electronics housings
- Battery terminals
- Battery covers



### Life Sciences

- Filter end caps
- Bottles

Looking for general guidance for joint design and weld path?

Download our InfraGuide design guidelines here:



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# Hot Plate Welding for Strong, Sealed Joints

Hot plate welding applies controlled heat to join plastic parts consistently and reliably. It's a proven method of thermal welding that produces strong, airtight plastic joints, making it ideal for large or complex components. Hot plate welding creates durable bonds for rigid thermoplastics, perfect for strong, sealed connections within assemblies. Achieve high-strength, hermetic welds even in challenging shapes and large parts.

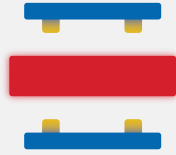
## How the Hot Plate Welding Process Works

Hot plate welding joins thermoplastic parts by pressing them against a heated platen until the surfaces melt, then bringing them together under pressure to form a solid, permanent bond. This controlled sequence produces uniform, repeatable welds with high structural integrity.



### Melt

Two components are brought into contact with a heated tool. The heat conducts into melt ribs causing them to soften. Also called the 'Heat Phase.'



### Open

Components are removed from the heated tool as it is retracted out of the way. Also called the 'Changeover Phase.'



### Seal

Components are brought together and a hold pressure is applied until the weld cools. Also called the 'Weld Phase.'

## Extol: Where Precision Meets Production

Extol's hot plate systems are built for precision, repeatability, and process control. We help you solve complex joining challenges and bring high-performance plastic assemblies to market faster. We work with you to optimize your process, reduce risks, and streamline validation. Our hot plate welding solutions provide strength, reliability, and scalability.



### Fast Weld Times

Three servo-driven platens deliver fast platen motion and minimized open times resulting in a shorter cycle time.



### Flexible

Interchangeable tooling and heated tool storage options allow for a complete tooling changeover in minutes.



### Intuitive

Intuitive operator interface and user-defined I/O make for easy configuration.



### Process Control

Servo-driven platens eliminate the need for hard-stops and provide ultimate force, velocity, and displacement control and feedback.



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# The Best Hot Plate Welding Option For Your Production Line

Our Hot Plate Welding Machines are available in the Titan Series Welder, Rapid Conductor and custom machines for integration into equipment.



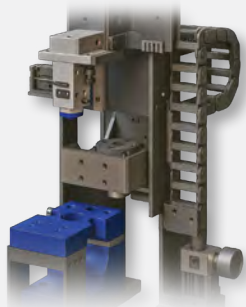
### Titan Series Welder

The Titan Series gives manufacturers a smarter, more flexible way to weld plastic parts—reducing downtime, cutting costs, and accelerating speed to market



### Rapid Conductor

An excellent hot plate welder featuring fully supported, servo-driven platens for fast, powerful, and independent force and distance control.



### Custom Machines

The possibilities are endless with our custom hot-plate welders. Whether you need something small and simple, or large and automated, we've got you covered.

## Applications for Hot Plate Welding by Industry



### Automotive

- Air intake ducts
- Batteries
- Brake reservoirs
- Center consoles
- Coolant bottles
- Glove boxes
- Lighting



### Consumer

- Appliances
- Pool filtration and pump systems
- Power tools
- Speakers
- Sporting goods



### Energy Storage

- Battery modules
- Flow batteries
- Stack-welded assemblies



### Life Sciences

- Blood cartridges
- Bottles
- Pharmaceutical filtration
- Wearables

## Hot Plate Welding Design Guidelines

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# Introducing the Titan Series

The Titan Series gives manufacturers a smarter, more flexible way to weld plastic parts—reducing downtime, cutting costs, and accelerating speed to market. By offering a common base system with configurable heat sources—hot plate, InfraGuide, or quartz IR—it delivers long-term flexibility without the need for multiple dedicated machines.



## How the Titan Series Configuration Works

You specify the technology you need: either Titan Series HP for hot plate, Titan Series IG for InfraGuide, or Titan Series Q for quartz infrared. This is an upgrade of our legacy Rapid Conductor hot-plate welder, with better cost, size choices, and flexible custom options.

### Step 1

#### Pick your technology

- Hot Plate
- InfraGuide
- Quartz IR

### Step 2

#### Pick your loading procedure

- Front Load
- Pass-Through (automation-ready)

### Step 3

#### Pick your machine options

- SmartSafe Power Loss Recovery
- High-Precision Press Force
- Overhead Light and Fan
- Stacklight
- Barcode Scanner
- Label Printer
- Light curtains

### Step 4

#### Pick your tool accessories

- Heated Rack
- Tool Cart
- Tool Rack

## How the Titan Series Can Help You

The Titan Series supports faster development cycles by enabling early equipment and process optimization. The modular design allows individual heat source modules to be accessed, serviced, or reconfigured by Extol without disrupting the entire platform.



### Cost

Lower total cost of ownership with future-proof scalability



### Flexibility

Choose size, technology, options, and accessories



### Size

Smaller footprint than legacy systems



### Automation

Seamless integration into automated lines



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# The Best Titan Series Options For Your Production Line

We offer turnkey machines ranging from standard Extol press options to fully customized automation equipment. The Titan can be customized for integration into automation for customers who build assembly equipment in-house (or equipment integrators/machine builders).



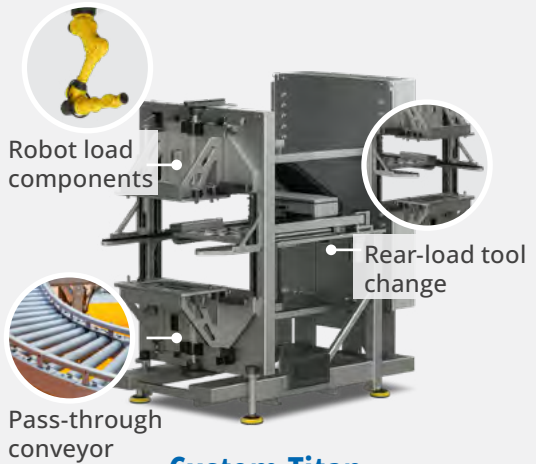
## Standard Titan

Turnkey machine with selectable options



## Integration Titan

Same powerful welding platform designed to be integrated into an automation line



Robot load components

Rear-load tool change

Pass-through conveyor

## Custom Titan

Unlimited custom upgrades on the powerful Titan welding platform

## Welder Specifications

Series:	2000	4000
Work Area:	Heated area: 12" deep / 15" wide Press area: 12" deep / 15" wide	Heated area: 15" deep / 24" wide Press area: 18" deep / 24" wide
Machine Dimensions:	42" Wide / 96" Tall / 92.5" Deep	52" Wide / 96" Tall / 95.5" Deep
Clamping Force Capacity:	2000 lb	4000 lb
Machine Speeds:	Fastest welder in the market, up to 2g acceleration.	Fastest welder in the market, up to 2g acceleration.
Maximum Press Stroke (per platen):	12"	12"
Maximum Press Open Height:	28"	28"
Maximum Heat Shuttle Stroke:	26"	26"
Press Positional Accuracy:	+/- 0.001"	+/- 0.001"



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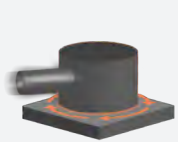
# Spin Welding for Smart Weld Joints

When you need strong, leak-proof welds, the Vortex Eminence Spin Welder is an ideal solution. Whatever your application, we configure our servo-driven machines to work specifically with your part in mind. Whether your assembly has a small diameter or a large one, we have a spin welding solution that will meet your needs.



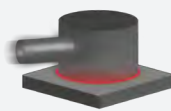
## How the Spin Welding Process Works

The Vortex Eminence Spin Welder uses surface friction concentrated in a circular weld joint. One part is spun relative to the other while force is applied, generating heat that causes the material to melt. Once spinning stops, the parts remain pressed together, allowing them to bond.



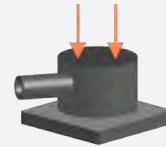
### Spin

One component spins, causing surface friction against the fixed component.



### Melt

Friction between the two components generates heat, causing the contact surfaces to melt.



### Hold

As the spinning stops, the weld joint resolidifies under pressure and they join.

## Servo-Driven Spin Welders for Torque, Force & Velocity Control

A proper joint design is critical to achieving a strong, leak-proof weld with minimal flash and a wide process window. The Vortex Eminence is both scalable and integrable, so it is a perfect solution for manufacturers and integrators alike. Depending on your needs, we configure the torque and force output to weld parts of all shapes and sizes.



### Process Control

Easily optimize the welding speed, feed rate, and force for strong, hermetically sealed parts.



### Powerful

High-powered, so you get the torque and force needed for each application.



### Easy to Operate

Graphic interface allows easy setup and on-the-fly process changes as needed.



### Easy to Integrate

Our engineered controls are easy to tie into and integrate into your existing line.



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# The Best Spin Welding Option for Your Production Line

Whether you want a standalone Vortex Eminence or a custom option for a larger part, Extol has you covered.



## Vortex Eminence

Use the Vortex Eminence for a unique plastic welding technology capable of strong, leak-proof welds.



## Integrations

The Vortex Eminence spin welder is modular and easy to integrate into automation lines.



## Custom Machines

With a custom spin welder, the possibilities are endless. We'll design a solution around your application to meet your specific needs.

## Applications for Spin Welding by Industry



### Automotive

- Engine ports
- Engine ducts
- Lights
- Oil tubes



### Consumer

- Valves
- Drinkware
- Washer balance rings
- Vacuums
- Lights
- Pool fittings
- Industrial piping



### Life Sciences

- Connectors
- Bottles

## Spin Welding Design Guidelines

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### Get in Touch

Contact our team with any questions and tell us about your application to request a quote.