

**DELTASYS  
EFORMING**  
TECHNOLOGY FOR GROWTH



**PATTERN  
FORGE**  
HIGH SPEED AUTOMATIC  
PATTERN MAKING MACHINE

**MADE  
IN  
BHARAT** (India)

# FROM WEEKS TO HOURS

The New Age of  
Pattern Making



PATTERN FORGE Makes Patterns, Core Boxes  
and Gating System suitable for:

**Green Sand:** HPML | Hand Moulding | Squeeze Jolt  
**No Bakes:** Alpha Set | Pep Sets | Furan Resin  
**CO<sub>2</sub> Moulding**



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# From Artisan Skill to Digital Manufacturing

## The Natural Evolution of Pattern Making

For decades, pattern making has been one of the most respected and skilled disciplines in the foundry industry. Traditionally, the quality of a pattern depended heavily on the experience, craftsmanship and judgment of the pattern maker. This artisan-led approach has delivered reliable results and has shaped generations of successful foundries. However, the manufacturing environment around foundries has changed.

# Where PATTERN FORGE Fits In

**PATTERN FORGE** bridges the gap between digital design and physical tooling

### Skill and Experience at the core



Manual Interpretation of Drawings



Craftsmanship & Shop Floor Experience



Longer Lead Times



Variation & Accuracy Challenges



**Dependency on scarce manual skills**

### Digital tools driving consistency



CAD Models with Exact Dimensions



Simulation & Validation

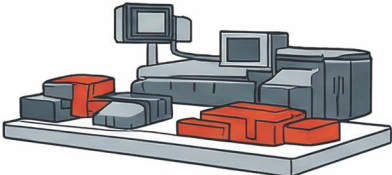


Digital Files & Version Control



Repeatability & Precision

**Streamlined digital workflow**



### It converts:

- CAD data directly into finished patterns and core boxes
- Validated digital models into repeatable, shop-ready tooling

### By doing so, PATTERN FORGE:

- Reduces dependency on scarce manual skills
- Ensures dimensional consistency across multiple patterns
- Delivers predictable lead times
- Allows patterns to be reproduced, modified, or scaled using the same digital source

*This does not replace experience, it captures it in digital form, making it reusable & reliable.*

## A Complement, Not a Replacement

PATTERN FORGE is not positioned against traditional pattern making. It is designed to support foundries facing modern pressures:

- Faster development cycles
- Frequent design changes
- HPML and high-volume production demands
- Reduced availability of skilled manpower

By integrating PATTERN FORGE, foundries gain control, continuity, & confidence in their tooling process, without losing the understanding built over years of practical experience.

## Moving Forward with Confidence

PATTERN FORGE enables foundries to adopt this shift at their own pace, while maintaining the reliability and understanding that traditional pattern making has always provided.



**From skill  
to system.**



**From experience  
to repeatability.**



**From drawings  
to digital tooling.**

*“Digital manufacturing is not a trend,  
it is a gradual, practical shift.”*

# About Us

DELTASYS E-FORMING is a deep-tech engineering company engaged in the **design, development and manufacturing of advanced 3D printing systems, robotic manufacturing solutions and CNC machining centres.** With a strong focus on innovation, engineering depth and industrial reliability, the company delivers machines built for modern manufacturing, tooling and large-format production applications.



## Advanced Additive & Robotic Manufacturing Solutions

DELTASYS E-FORMING offers a diverse portfolio of industrial 3D printing and robotic systems, addressing a wide range of manufacturing needs:

- **Advanced Hybrid 3D Printing Systems**  
for high-performance polymers and composite materials
- **Large-Format Composite 3D Printing Systems**  
for boat building, composite tooling and structural components
- **Robotic 3D Printing Solutions**  
for multi-axis additive manufacturing and complex geometries
- **Robotic Sand Milling Systems**  
for producing pattern-less moulds & direct mould generation for sand casting
- **Construction 3D Printing Systems**  
for large-scale, automated building and infrastructure applications

The company's product philosophy is centred on developing "mother machines", core industrial platforms that enable scalable, accurate and repeatable manufacturing across industries.

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# CNC Machining Centers & Tooling Solutions

DELTASYS E-FORMING designs & manufactures a wide range of precision CNC machining centres, including:

- 3-axis, 4-axis and 5-axis CNC Machining Centres for pattern, mould and tooling applications
- Large-Format 5-Axis CNC Machines for composite mould making, plastic trimming, & complex surface machining
- Heavy-Duty CNC Routers for large pattern manufacturing in wood, plastics, & composite materials

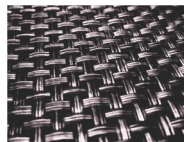
Additionally, the company develops Special Purpose Machines (SPMs) capable of machining complex geometries in materials such as:



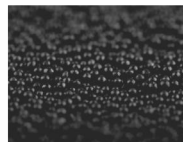
Hard metals



Stone



Composites



Plastics



Wood

## Applications

- Patterns
- Core boxes
- Moulds
- Jigs
- Fixtures
- Industrial tooling

## Industries Served

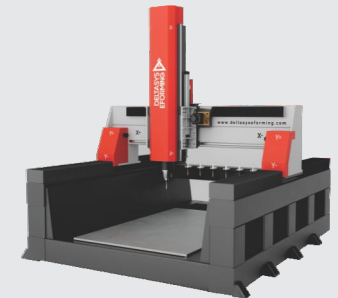
- Automotive
- Railways
- Aerospace
- Defence
- Construction
- Marine
- General engineering



PATTERN FORGE



5 Axis CNC Router



3 Axis (BT40) Router



Robotic Hybrid Tooling Cell

# Manufacturing Facility and Infrastructure

DELTASYS E-FORMING operates a fully integrated, full-fledged manufacturing facility, equipped with all allied infrastructure required for in-house machine development and assembly. The facility includes:



Precision machining and fabrication infrastructure



Assembly and testing bays for large-format machines



Electrical, automation and control system integration capabilities



Quality inspection and performance validation setups

This strong in-house capability ensures complete control over design, manufacturing quality, testing and long-term serviceability of every machine delivered

# Our Team

The strength of DELTASYS E-FORMING lies in its focused, multi-disciplinary engineering team built to deliver high-precision, advanced manufacturing workflows. By integrating multiple engineering domains, the company ensures that every solution is robust, scalable and production-ready.

## Engineers We Hire for Precision Workflows

- **Mechanical & Structural Engineers** – Designing rigid, thermally stable machine structures for long-term accuracy.
- **Automation, Robotics & Motion Control Engineers** – Enabling precise, repeatable and synchronized multi-axis motion.
- **Additive Manufacturing & Materials Engineers** – Developing and validating high-performance composite processes.
- **CNC & Industrial Software Engineers** – Integrating CAM, control systems and digital shop-floor workflows.
- **Manufacturing & Process Engineers** – Ensuring scalability, reliability and efficient production execution.

DELTASYS E-FORMING deliberately builds a balanced workforce of young and experienced engineers. Young professionals bring agility, fresh ideas and rapid technology adoption, while experienced engineers contribute deep domain knowledge, process maturity and engineering discipline. This combination fosters continuous innovation while ensuring industrial-grade reliability.

Together, this blend of expertise enables application-driven, shop-floor-ready solutions that combine advanced technology with practical manufacturing excellence.

*Balanced Team:  
Young Innovation with  
Experienced Expertise*

# How every foundry can make pattern in-house with their own PATTERN FORGE machine

The foundry industry has long been a cornerstone of manufacturing, enabling the creation of cast components critical to sectors like Automotive, Construction, Power Generation, Locomotive, Agriculture and other Engineering Industries. Yet, behind every casting is a vital element that often poses challenges for foundries: The pattern.

Traditionally, pattern making has been seen as an art form, requiring the expertise of highly skilled craftsmen. This reliance on craftsmanship, while producing exceptional results, has introduced certain challenges that persist in the industry to this day. For many foundries, in-house pattern making has remained out of reach. The reasons are clear:



## 1. Lack of Skilled Labor

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Pattern making is a complex process involving deep technical knowledge and craftsmanship. From understanding the nuances of draft angles to precisely locating parting lines, the process requires skills that are not only hard to find but also expensive to hire and retain. This has made pattern making a specialty dominated by external vendors.



## 2. Challenging Design Processes

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Designing a pattern isn't straightforward. It demands expertise in interpreting 2D drawings or CAD models, coupled with a strong understanding of casting principles. Even with skilled hands, the intricate design process often results in long lead times and potential errors.



### 3. Outsourcing to Third-Party Pattern Makers

Most foundries opt to outsource pattern making to third-party vendors.

While this has been the norm for decades, it comes with its own set of pain points:

**Delays in Delivery:** Foundries often face delays of weeks or even months for the delivery of patterns, causing disruptions in production schedules and missed deadlines for casting deliveries.

**Quality Issues:** Outsourcing patterns sometimes leads to inconsistencies or defects that require rework, causing further delays and additional costs.

**High Costs:** The cost of outsourcing patterns, particularly for complex designs or large-scale production, can be prohibitively expensive.

These challenges have, for too long, been accepted as the cost of doing business in the foundry sector. However, the advent of digital technologies, such as casting simulation software, CNC machines and

***Innovative solutions like PATTERN FORGE, is transforming the landscape of pattern making.***

# Foundries now can have their own pattern productions

With tools like PATTERN FORGE, foundries now have the opportunity to bring pattern making in-house. By leveraging this advanced high-speed automatic pattern-making machine, foundries can overcome



**Eliminating Delays:** In-house pattern production with PATTERN FORGE dramatically reduces lead times, enabling foundries to meet their production deadlines.



**Ensuring Consistent Quality:** Automated processes ensure patterns are produced to precise specifications, reducing errors and improving the overall quality of castings.



**Enhancing Productivity:** The integration of advanced technologies allows foundries to create complex patterns faster, with less manual intervention and at lower costs.

*The incorporation of Industry 4.0 principles and digital manufacturing technologies like PATTERN FORGE represents a paradigm shift for foundries. What was once an artisan's craft has evolved into a streamlined, automated process that can be mastered with the right training and tools.*

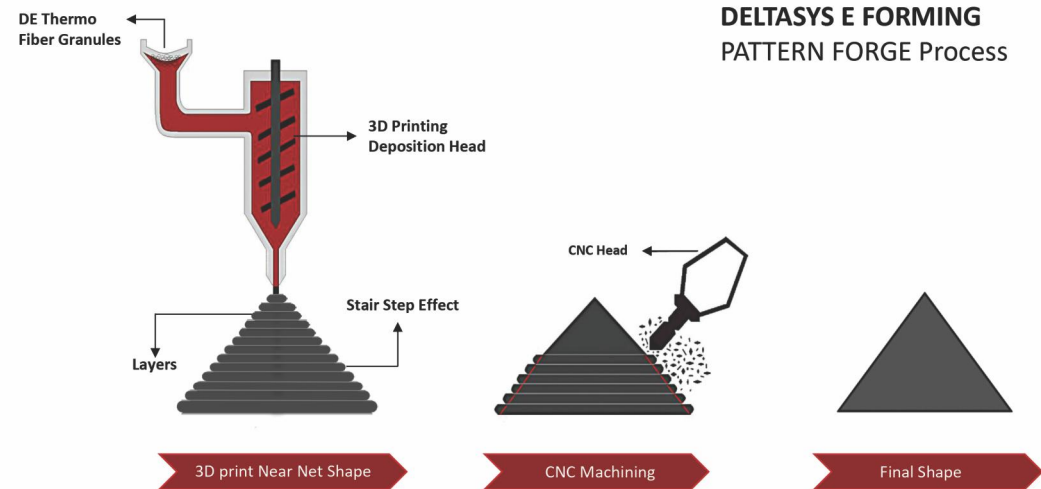
*“This transformation not only makes pattern making more accessible but also empowers foundries to take control of their operations, minimize dependency on third parties and compete more effectively in a fast-paced market.”*



# PATTERN FORGE Overview

PATTERN FORGE is a state-of-the-art, high-speed automatic pattern making machine designed to transform the sand casting and composite industry. This innovative machine combines advanced materials and cutting-edge technology to deliver unmatched speed, precision, efficiency and cost savings in the pattern making process. The PATTERN FORGE technique distinguishes itself from traditional FDM wire-based 3D printing by employing specialized resin rather than conventional wire-like thermoplastic materials.

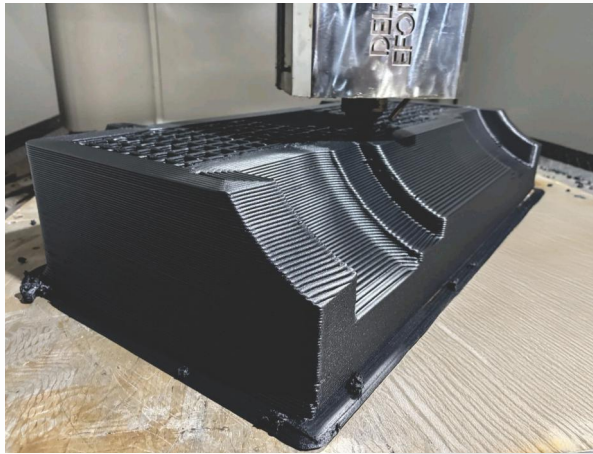
Its capacity to generate near-net shape designs optimizes production timelines, lowers labour expenses and accommodates a diverse range of materials typically required in conventional pattern fabrication.



## How PATTERN FORGE Works

The system comprises a specialized material deposition head which is guided by CAD data, where all movement and deposition of material happens through CAM programs layer by layer until the final near-net shape is achieved. Alongside this, there is a machining module designed to yield optimal outcomes.

Pattern Forge utilizes a dual-phase approach to produce superior patterns, integrating the application of its proprietary DE Thermo Fiber resin with precision CNC milling, which is available in various configurations.



Deposition Head

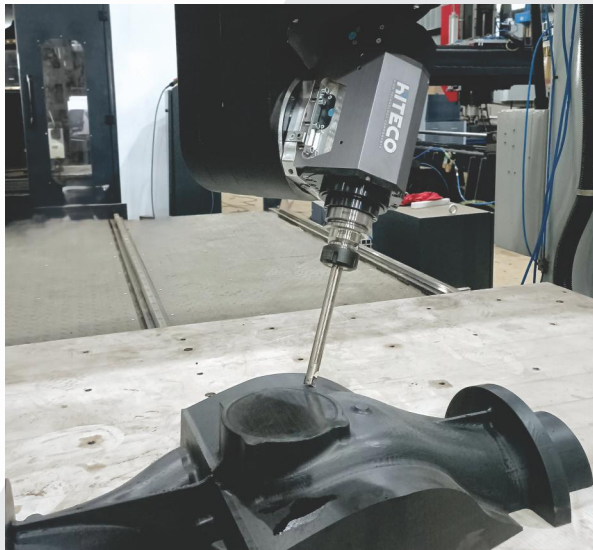
## Material Deposition Head

### STEP 1: Material Deposition

**Proprietary DE Thermo Fiber Resin:** The process begins with DE Thermo Fiber resin, a unique material developed by Deltasys E-Forming Company. This resin is specifically formulated to deliver superior performance in pattern making.

**Melting and Deposition:** The resin is melted using a positive displacement pump, which ensures a consistent flow. The melted resin is then pushed through a wide orifice and precisely deposited onto a heated substrate plate of the desired size.

**Layer-by-Layer Building:** The operator programs the machine to follow the desired pattern geometry. The pump deposits the resin layer by layer until the pattern reaches its near-net shape. This automated process eliminates the need for manual intervention, ensuring consistency and accuracy.



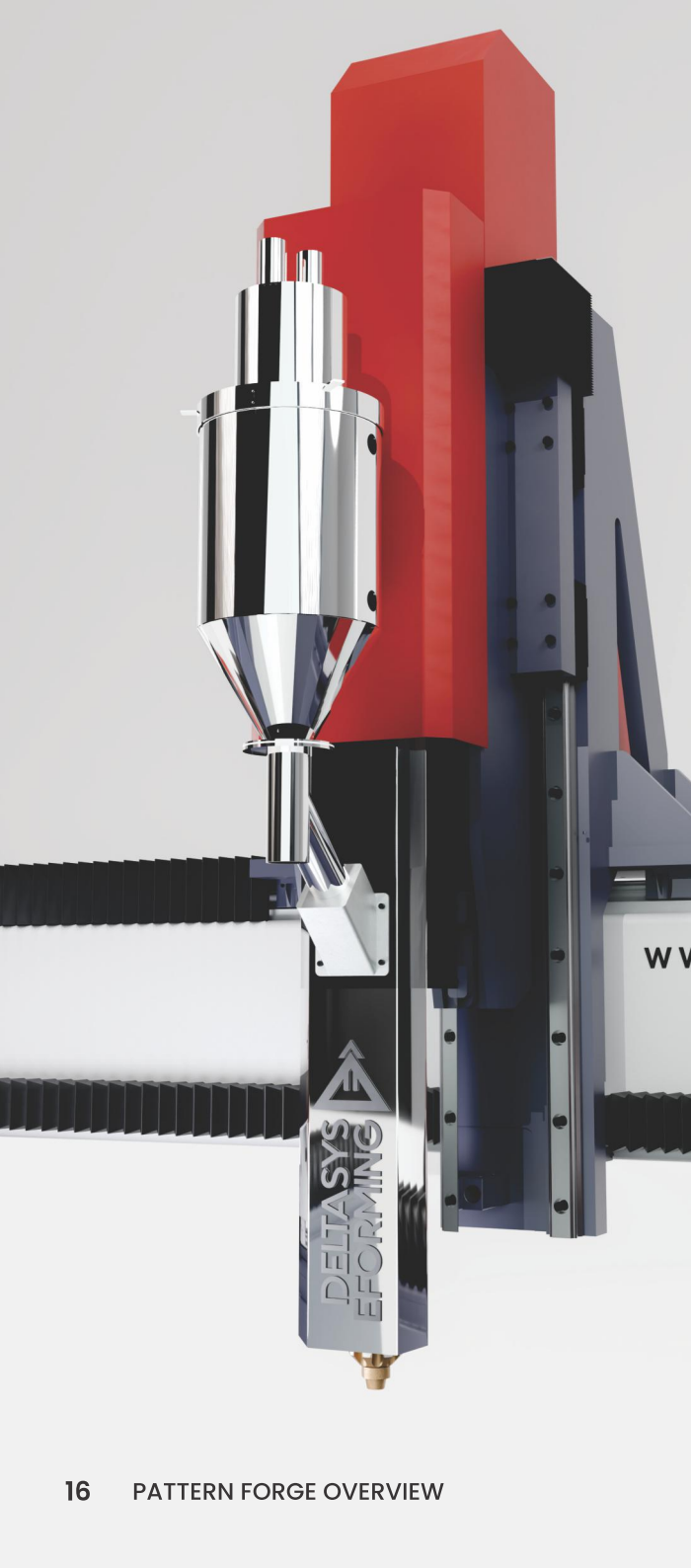
Machining Head

## Machining Head

### STEP 2: CNC Milling for Final Shaping

**Precision Finishing:** Once the near-net shape is achieved, the pattern undergoes a final shaping process using a CNC milling head. This step refines the pattern to its exact specifications, ensuring precise dimensions and smooth surfaces.

**Customization and Flexibility:** The CNC milling head can be programmed to accommodate various pattern designs and complexities, providing the flexibility to produce patterns for different casting requirements.



# Deposition Head

## The Heart of PATTERN FORGE

At the core of PATTERN FORGE lies its indigenously developed high-performance deposition head, engineered for consistent, high-throughput extrusion of fiber-reinforced polymer composites used in industrial pattern and core box manufacturing.

The deposition head is manufactured using bimetalllic wear-resistant steel, specifically selected to withstand continuous exposure to abrasive glass-fibre and carbon-fibre reinforced polymers. All critical wear components, including the extrusion nozzle, are made from hardened tool steel, significantly reducing wear and ensuring long service life even under demanding production conditions.

To deliver precise and repeatable material output, the head is driven by a high-torque servo motor coupled with a high-precision gearbox, supported by a closed-loop encoder system. This configuration ensures accurate control of extrusion rate, stable material flow and consistent layer deposition across long build cycles.

***Better Melt Flow,  
Better Print Quality***

The internal design of the deposition head incorporates multiple functional zones:

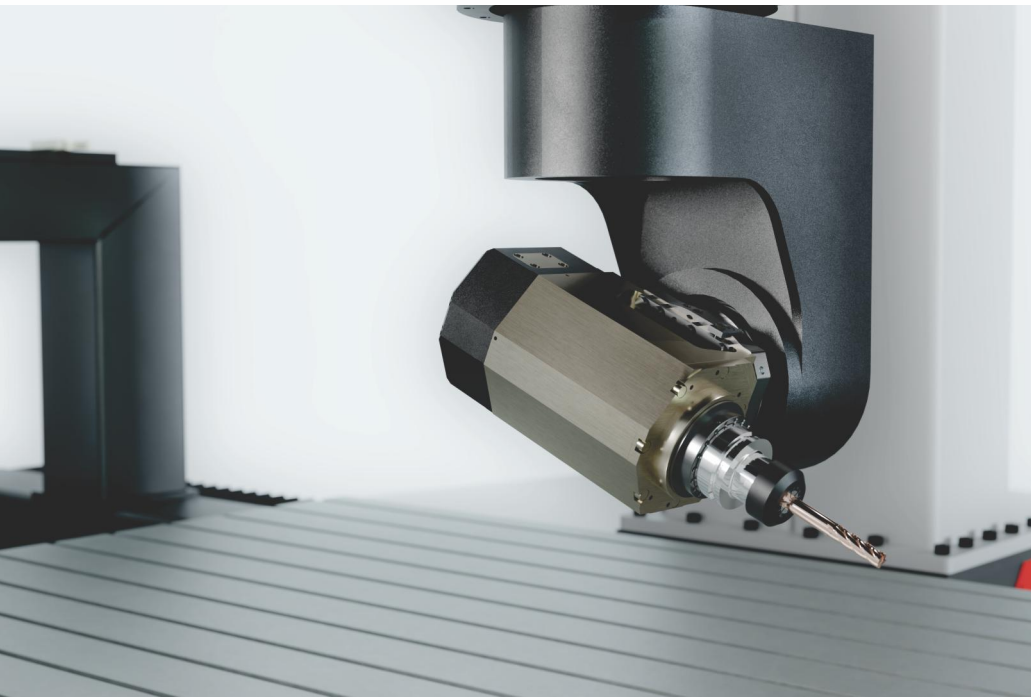
- A dedicated cooling zone at the feeder section, which prevents premature softening of granules and enables smooth, uninterrupted material feeding
- Three independently controlled heating zones, equipped with industrial-grade band heaters capable of sustained operation at 350–400 °C, ensuring uniform melting and stable rheology of composite materials

## Available Specifications

	DE Xtrude11	DE Xtrude25	DE Xtrude40	DE Xtrude60	DE Xtrude100
Extuder Output kg/Hr (Polymer dependant)	11	25	40	60	100
Cooling Zone at Feeding Zone	Yes	Yes	Yes	Yes	Yes
Heating Zone	4 nos	4 nos	4 nos	5 nos	5 nos
Automatic Pellet Feeding	yes	yes	yes	yes	yes
Nozzles	2,4,6,8 mm	6,8,10,12 mm	8,12,16,20 mm	10,12,16,20,25 mm	16,20,25,30 mm
Servo Driven With Gear Box	yes	yes	yes	yes	yes

# Machining Head

## Precision Finishing for Industrial Tooling



**5 Axis Machining Head**



**BT 40 Machining Head**

The CNC Machining Head is a critical part of the PATTERN FORGE ecosystem, designed to deliver accurate, repeatable and efficient finishing of printed patterns, core boxes and tooling components. Developed to integrate seamlessly with additive manufacturing, this CNC unit transforms near-net-shape prints into production-ready tooling within the same workflow.

## Flexible Integration Architecture

The CNC unit can be configured in two ways based on application needs:

- Integrated CNC Head mounted on the same gantry and chassis as the deposition system, enabling automated switching between printing and machining operations.
- Standalone Dedicated CNC Unit, designed for customers requiring independent machining capacity or higher duty cycles.

This flexibility allows Pattern Forge to adapt to small pattern shops as well as large industrial toolrooms.

## Multi-Axis Capability for Complex Geometry

For large or geometrically complex patterns, PATTERN FORGE offers a 5-Axis Tilt CNC Head, enabling:

- Access to multiple faces in a single setup
- Machining of deep pockets, undercuts and inclined surfaces
- Reduced part repositioning and alignment errors
- Faster overall cycle time with higher surface consistency

For smaller or simpler parts, a 3-Axis CNC configuration provides a cost-effective and efficient solution without compromising accuracy

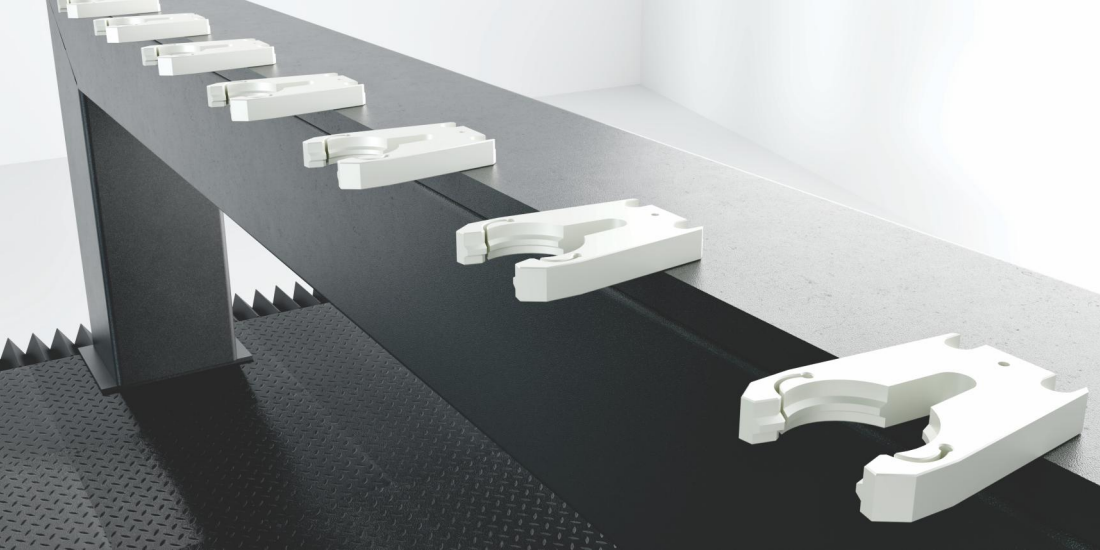
## Controller Flexibility

### **Built for Your Shop Standards**

Pattern Forge offers full flexibility in CNC control systems to align with customer preferences, existing skill sets and service ecosystems.

Supported controllers include: Siemens | Mitsubishi | FANUC | Heidenhain | Fagor | Syntec | Other controllers upon request

This ensures smooth integration into existing toolrooms and minimizes retraining and operational disruption.



CNC unit comes with 6 to 12 tools ATC (automatic tool changing) linear magazine.

## Spindle & Tooling Options

Customers can select the spindle interface best suited to their tooling and production environment:

- **BT40** – robust, widely adopted, ideal for pattern and tooling work
- **HSK 63F** – high-speed, high-precision finishing applications
- **5-Axis Tilt Spindle** – advanced multi-surface machining in a single setup

## Built for Stability & Accuracy

The CNC head operates on the same rigid, stress-relieved machine structure used across the Pattern Forge platform, ensuring:

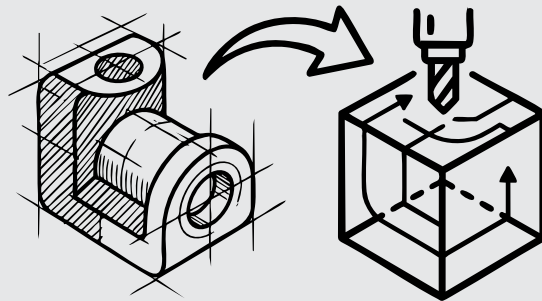
- High positional accuracy
- Stable machining even on large printed components
- Consistent surface quality across repeated jobs

All CNC heads are compatible with Automatic Tool Changer (ATC) magazines, enabling unattended operation and rapid tool changes for roughing, finishing, drilling and profiling.

Servo-driven axes and precision transmission components allow reliable machining of plastic, composite and fiber-reinforced materials commonly used in pattern and core box production.

One System.  
One Workflow.  
One Setup.

By combining additive deposition and CNC machining within a unified platform, PATTERN FORGE eliminates the delays typically associated with external machining, multiple setups and manual finishing.



*The result is a streamlined digital-to-tooling process, from CAD model to finished pattern - delivered faster, more consistently, and with full control.*

## Key Advantages at a Glance

- Integrated or standalone CNC configurations
- 3-Axis and 5-Axis machining options
- Multiple spindle and controller choices
- Automatic Tool Changing (ATC) support
- Single-setup machining for large patterns
- Designed specifically for tooling & foundry applications

# PATTERN FORGE Features

PATTERN FORGE is designed as an industrial production machine, not a prototype or experimental system.

*Every mechanical, thermal and control element is selected to ensure long-term accuracy, repeatability and stable performance under continuous foundry and tooling workloads.*



# 1. Precision Motion System

Pattern Forge uses high-quality Rack & Pinion drives, Linear Motion (LM) Guides and Industrial Gearboxes across all axes.

- Ensures smooth and backlash-controlled motion
- Maintains accuracy at both high deposition and milling speeds
- Supports heavy tooling loads without loss of precision
- Designed for long service life with minimal wear

*This motion architecture allows the machine to deliver consistent output quality, even during long build cycles.*

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# 2. Heavy-Duty

## Machine Frame & Worktable

The machine frame and worktable are manufactured using a large-machine-grade fabrication process, ensuring structural integrity and dimensional stability.

- Integrated welded steel structure
- Stress relief annealing after fabrication
- Precision machining on a large VMC (Vertical Milling Center) machine
- Final vibration aging treatment

This multi-stage process eliminates internal stresses and ensures:

- High structural strength
- Long-term dimensional accuracy
- Resistance to deformation over time

*The result is a machine structure capable of stable operation for 15+ years under normal industrial usage.*

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### 3. Gantry Design & Drive System

Both X and Y gantries are driven by A.C. Servo Motors, paired with a lightweight cast cross-beam design.

- High precision and high-speed movement
- Excellent torque-to-inertia ratio
- Stable acceleration and deceleration
- Reduced vibration during rapid motion

*This configuration guarantees high positioning accuracy, smooth motion and long-term durability, even during continuous high-speed operation.*

### 4. Controlled Thermal Management

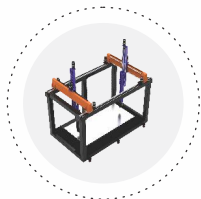
#### Chiller Unit

- Actively cools the feeding & critical thermal zones
- Maintains stable process temperatures
- Prevents heat-related inconsistencies during long runs

#### Hot Air Dryer Unit

- Removes moisture from pellet-based materials
- Ensures consistent material flow & melt quality
- Prevents voids, surface defects, & process interruptions

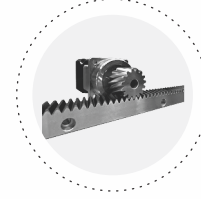
*Together, these systems ensure process stability and repeatable material behaviour, regardless of ambient conditions.*



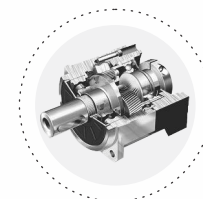
Two separate Gantry for milling and printing



AC Servo motors



High precision helical rack and pinion



Low backlash, Noise less, High precision gearbox

## 5. Intelligent Control & User Interface

### Touch Screen Control Panel

- Centralized control of deposition, machining, & motion parameters
- Easy adjustment of speeds, temperatures, & process settings
- Operator-friendly interface suitable for shop-floor environments

### Industrial Controller System

- Closed-loop control for motion & extrusion
- High reliability during long build cycles
- Accurate synchronization between deposition & machining operations



*This control architecture enables precise, repeatable, & operator-independent performance.*

## 6. Built for Industrial Consistency

Every component in PATTERN FORGE from structure to motion, from thermal control to electronics, is selected & integrated to support:

- Continuous operation
- Predictable output quality
- Minimal downtime
- Long-term serviceability

*PATTERN FORGE is not designed for occasional use, it is built to be a dependable production asset in modern foundry and tooling environments.*



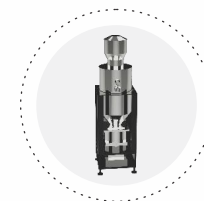
Heavy duty structure



Chiller unit for extruder cooling



Vacuum assisted Automatic raw material feeding for extruder head



Hot air dryer for plastic pellets to remove the moisture

# Bed Platform System

## Designed for Material Performance, Accuracy & Process Reliability

The bed platform plays a critical role in ensuring dimensional accuracy, part stability and long-term pattern performance. PATTERN FORGE offers three configurable bed platform options, allowing customers to select the right solution based on material type, pattern size and moulding process.

### 1. Plywood-Mounted Bed Platform (For low-temperature, low-stress applications)

This configuration uses a plywood base mounted on a rigid bed holder, suitable for materials such as PP, PLA and similar low-temperature polymers with low thermal expansion. Best suited for:

- Concept patterns
- Hand moulding
- Low-stress green sand applications
- Short-run or prototype tooling

**Engineering note:** While this setup does not require active heating and offers lower energy consumption, materials printed on non-heated plywood beds are inherently limited in mechanical strength and thermal stability. Such materials are not recommended for high-pressure moulding processes like HPML, where compaction forces and abrasion are significantly higher.



***PATTERN FORGE clearly distinguishes application-appropriate usage, ensuring customers avoid premature pattern wear or performance compromise.***

## 2. Aluminium Heated Bed Platform (For engineering-grade and high-performance materials)

This configuration features a precision-machined aluminium bed with integrated heating, enabling stable printing of engineering-grade thermoplastics such as:

- ABS
- Polycarbonate (PC)
- ABS + PC blends
- Fiber-reinforced thermoplastics

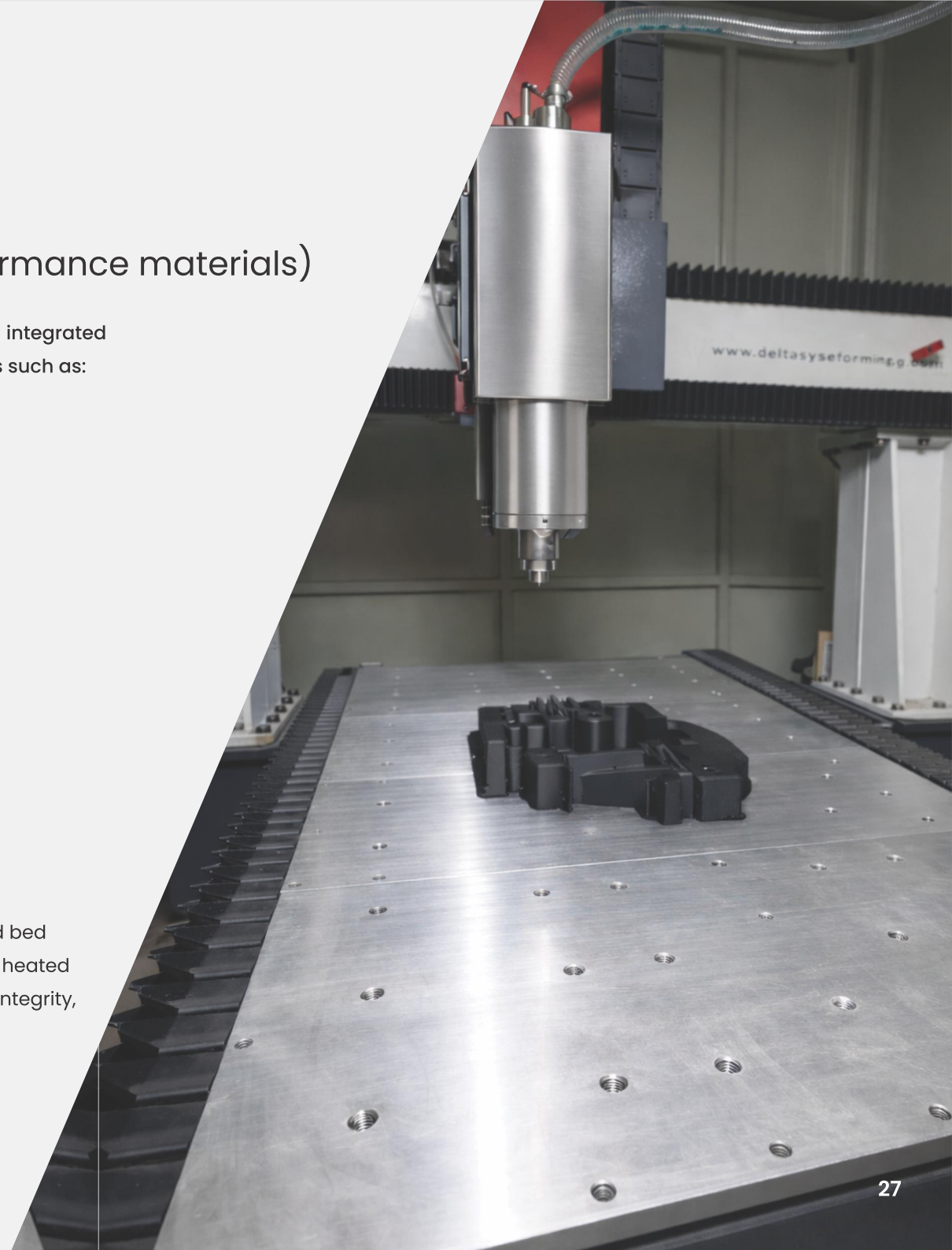
### Key advantages:

- Controlled thermal environment prevents warpage
- Strong bed adhesion for large and heavy patterns
- Improved interlayer bonding
- Dimensional stability across long build cycles

### Recommended for:

- HPML moulding lines
- Squeeze Jolt processes
- High-wear and high-impression applications

**Important clarification:** Engineering-grade materials require controlled bed heating to achieve their full mechanical potential. Operating without a heated bed may reduce initial power consumption but can compromise part integrity, adhesion and long-term durability—especially in demanding foundry environments.

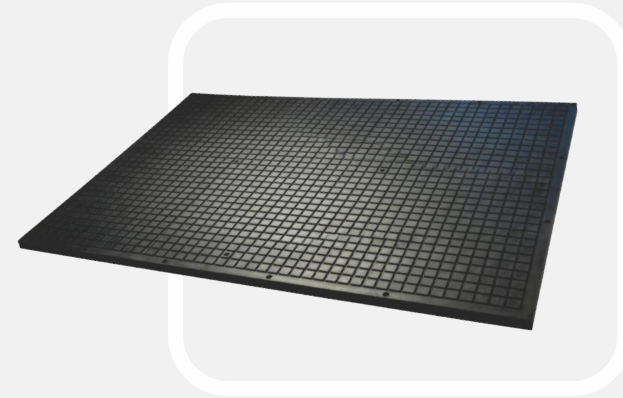


### 3. Vacuum Table with Heated Aluminium Bed (For thin sheets, segmented tooling & special applications)

The vacuum table configuration integrates a slotted aluminium heated bed with an industrial vacuum system, enabling thin plastic sheets or substrates to be securely held during printing or machining.

Ideal for:

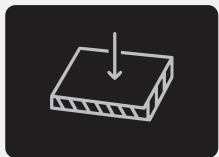
- Thin or flexible tooling components
- Segmented pattern parts
- Lightweight fixtures
- Precision finishing operations



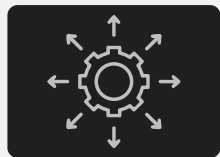
*Vacuum holding ensures uniform flatness, accurate positioning and vibration-free operation, particularly useful where mechanical clamping is impractical.*

### Designed for Real Foundry Conditions

Each bed platform option is engineered with a clear understanding of:



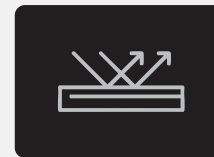
Material behavior



Thermal expansion



Moulding pressure



Abrasive wear environments

By offering application-specific bed solutions, PATTERN FORGE ensures that customers select the right foundation for the right material and process, rather than relying on one-size-fits-all assumptions.

# Airtight Machine Enclosure

## Process Stability, Safety & Environmental Control

### Key Benefits:

-  **Thermal stability:** Maintains a controlled internal environment during printing and machining
-  **Process consistency:** Reduces temperature fluctuations and airflow disturbances
-  **Material performance:** Improves layer bonding and surface quality
-  **Dust & fume containment:** Protects operators and surrounding equipment
-  **Noise reduction:** Creates a safer and quieter shop floor

The enclosure is constructed using industrial-grade panels and safety interlocks, ensuring compliance with modern manufacturing standards while supporting long-duration, unattended operation.

*“PATTERN FORGE machines are equipped with a fully enclosed, airtight machine housing, designed to enhance both process reliability and operator safety.”*



# PATTERN FORGE Materials

At DELTASYS E-FORMING, material performance is treated as a core engineering element, not an afterthought. Our machines including PATTERN FORGE, Robotic Hybrid Systems and CNC Platforms are designed to process a carefully validated range of thermoplastic and composite materials, ensuring consistent performance across tooling and industrial applications.

*“Engineered Materials  
for Reliable Tooling &  
Advanced Manufacturing”*



## DE Thermo Fiber Resin – Designed for Pattern Making

At the heart of Pattern Forge is DE Thermo Fiber Resin, a proprietary, pellet-based composite material developed specifically for sand casting pattern and core box applications.

This material is engineered to meet the practical demands of foundries:

- High dimensional stability under moulding loads
- Excellent surface finish after CNC machining
- High wear resistance for abrasive sand contact
- Good impact strength for handling and assembly
- Stable behavior across Green Sand, No-Bake and CO<sub>2</sub> moulding processes

Unlike filament-based materials, DE Thermo Fiber Resin is processed in granule form, enabling:



Higher deposition  
rates



Lower material  
cost per kg



Consistent melt flow  
and bonding

## Available Grades of DE Thermo Fiber Resin

To address varying foundry requirements, DE Thermo Fiber Resin is available in multiple grades, including:

- **Standard Grade** – Optimized for general pattern making and medium-volume production
- **High-Wear Grade** – Enhanced abrasion resistance for HPML and Squeeze Jolt lines
- **High-Stiffness Grade** – Improved rigidity for large patterns and core boxes
- **Machinability-Optimized Grade** – Designed for superior CNC finishing

Material selection is guided based on moulding process, expected impressions, pattern size, & surface quality requirements.

## Materials for Applications Beyond Pattern Making

In addition to pattern-focused materials, DELTASYS E-FORMING systems are capable of processing a wide range of **thermoplastics & composite** materials for broader industrial use.

Include materials suitable for:

- Core boxes
- Mould segments
- Fixtures, jigs, & tooling aids
- Large-format composite structures

Depending on the machine configuration, materials may include:

- Fiber-reinforced thermoplastics
- Wear-resistant composite blends
- Structural-grade polymers
- Application-specific material formulations

This flexibility allows customers to **extend machine usage beyond foundry tooling**, improving overall return on investment.

## Open & Collaborative Material Approach

While DE Thermo Fiber Resin is the recommended and validated material for PATTERN FORGE, DELTASYS E-FORMING follows a collaborative material development approach.

- Continuous testing and validation of new composite blends
- Support for application-driven material trials
- Collaboration with material scientists and industry partners

## Material Support & Availability

- Consistent supply of DE Thermo Fiber Resin grades
- Guidance on material selection and process parameters
- Support for application-specific requirements

## DE Thermo Fiber resin – Material Properties

NO.	PROPERTY	VALUE
1	Melting Point	240 °C - 320 °C
2	Service Temperature	88 °C - 144 °C
3	Heat Distortion Temperature	101 °C - 160 °C
4	Tensile Strength	52 Mpa - 130 Mpa
5	Flexural Strength	70 Mpa - 150 Mpa
6	Impact Strength	10 kg-cm/cm
7	Flammability	UL-94 HB
8	Density	1 g/cc to 1.4 g/cc

Our goal is to ensure that customers are not locked into a single solution, but instead benefit from materials that evolve with application needs.

Material performance directly affects tooling life, surface quality and moulding consistency and our material strategy reflects this responsibility.

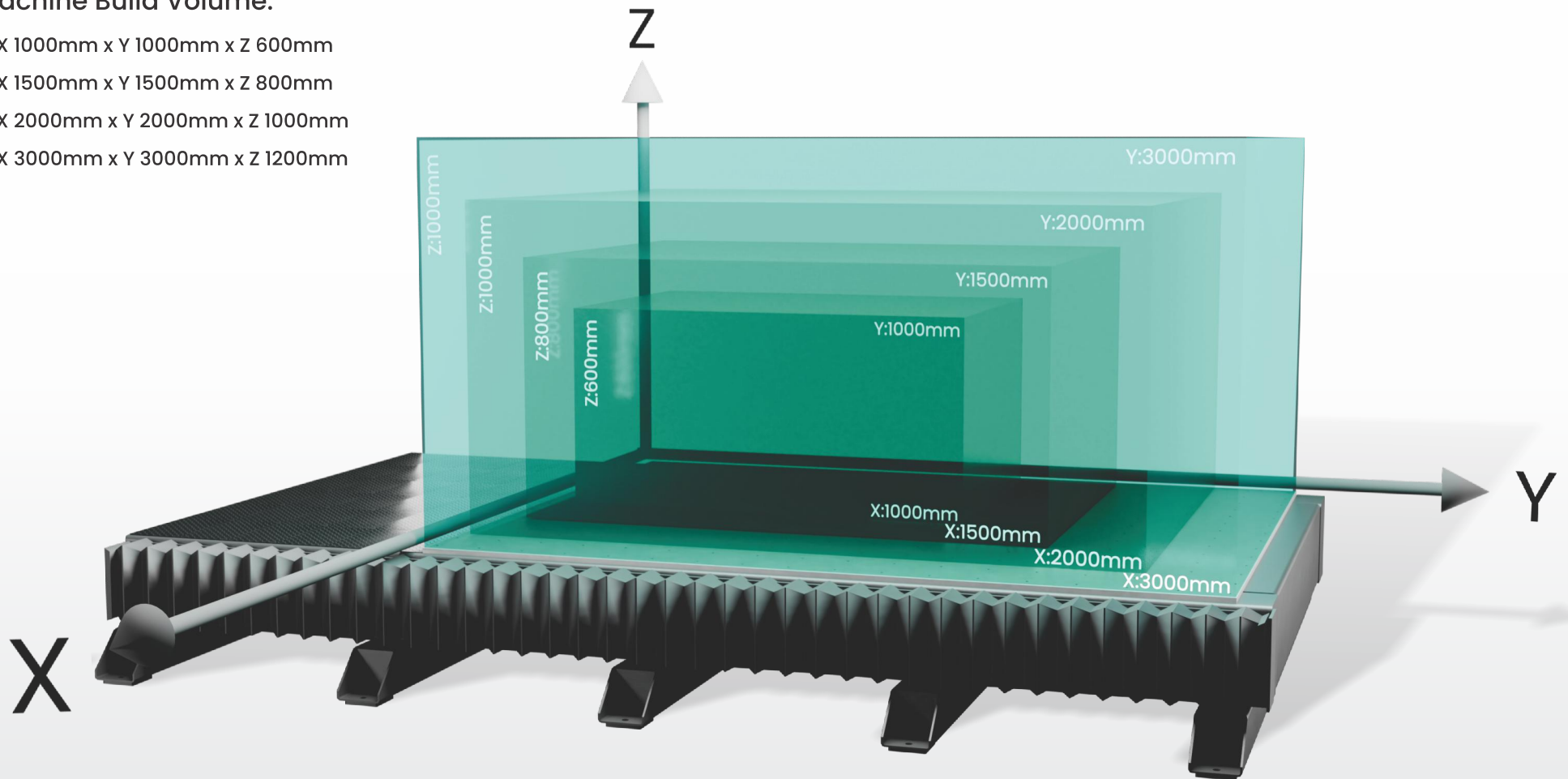


All DE Thermo Fibre Resins are recyclable.

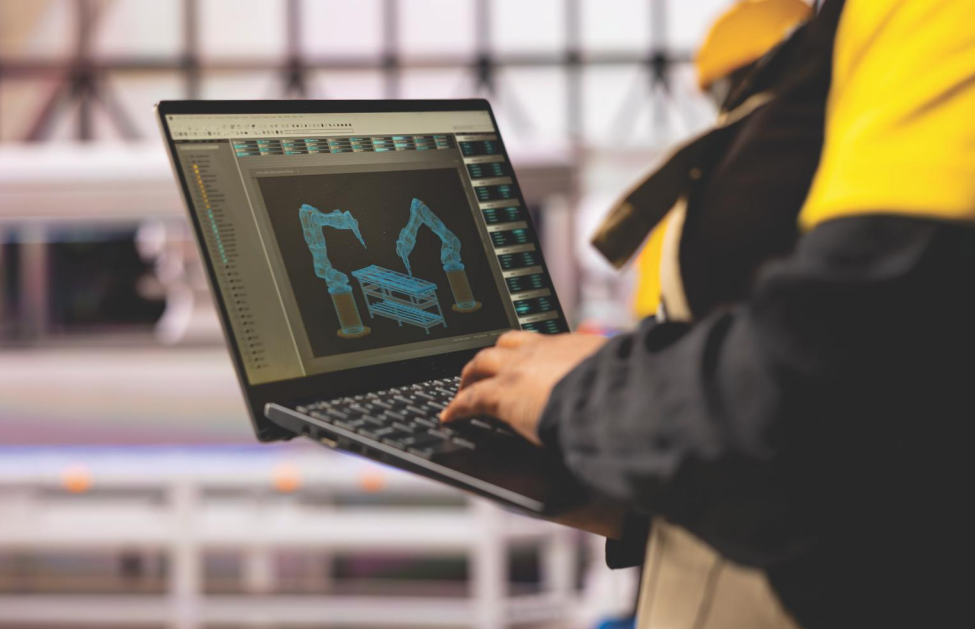
# Available Sizes in Machine

## Machine Build Volume:

- X 1000mm x Y 1000mm x Z 600mm
- X 1500mm x Y 1500mm x Z 800mm
- X 2000mm x Y 2000mm x Z 1000mm
- X 3000mm x Y 3000mm x Z 1200mm



In addition to standard offerings, we provide on-demand customization for large sizes.



# Intelligent Slicing & Path Planning Software

PATTERN FORGE is powered by an advanced slicing and path-planning software designed specifically for large-format, industrial tooling applications. The software efficiently converts any CAD geometry small or large, simple or complex—into optimized machine programs, ensuring accuracy, consistency and repeatability

## Built for Industrial Geometry

PATTERN FORGE software is developed to handle:

- Large and heavy pattern geometries
- Thick wall sections and reinforced tooling features
- Long continuous toolpaths without loss of precision

## Simple Interface, Powerful Control

- Intuitive, operator-friendly user interface
- Clear parameter control for speed, flow, layer height and reinforcement
- Easy program handling for operators and programmers alike

## Pre-Print Simulation & Validation

Before printing begins, the software provides:

- Complete printing simulation
- Collision and reachability checks
- Toolpath visualization across all axes

The system scales seamlessly from **small inserts to multi-meter tooling**, without compromising control or surface quality.

This reduces dependency on highly specialized software skills and enables quick adoption on the shop floor.

This allows operators to **verify feasibility, optimize strategy and avoid costly errors** before material is deposited.

## Advanced Slicing Strategies

Traditional additive manufacturing relies on 2D, planar layer stacking, which often leads to:

- Visible layer steps
- Anisotropic strength
- Longer print times

PATTERN FORGE software overcomes these limitations through multi-axis and non-planar slicing strategies.

## Supported Slicing Modes

- **Planar (Conventional 2.5D Path Planning):** Reliable and efficient for standard tooling geometries with consistent layer control.
- **Non-Planar – Three-Axis:** Optimized 3D toolpaths improve surface finish and structural continuity using three-axis motion.
- **Non-Planar with Additional Tilting Axes:** For complex geometries, the software utilizes multiple axes to maintain optimal deposition angles, improving strength and surface quality.
- **Angled Slicing:** Maximizes efficiency for deep cavities, overhangs, and complex profiles while reducing support requirements.
- **Load-Case Optimized Slicing:** Slicing strategies are adapted based on expected mechanical loads, improving isotropic strength and functional durability of patterns and core boxes.



Horizontal



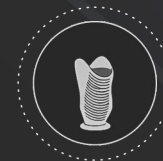
Angular



Multi-Planar



Non-Planar



Vase



Segmented



Slicing Path



Radial



Cladding



Revolve

## What This Means for Tooling Quality

- Smoother freeform surfaces
- Improved mechanical consistency
- Reduced post-machining effort
- Optimized material usage and cycle time

Pattern Forge software doesn't just slice geometry, it understands tooling behavior, machine kinematics and foundry requirements.

# Experience the Future of Pattern Making

PATTERN FORGE is more than just a Machine. It's a game changer for the Sand Casting Industry. By integrating advanced technology, proprietary materials and precision engineering. PATTERN FORGE redefines efficiency, quality and convenience Pattern Making.

Pattern Output after Deposition



Pattern Output after CNC Machining and Spray Coating



Pattern Output after Deposition



Pattern Output after CNC Machining

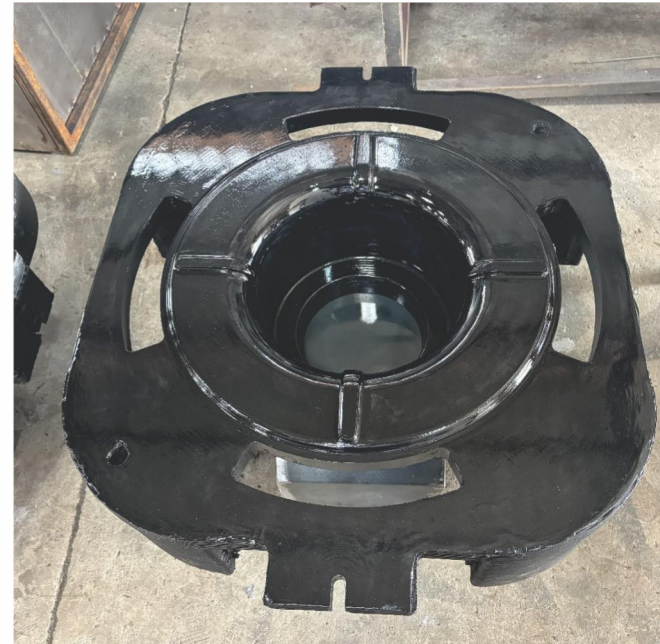


Pattern Output after Spray Coating

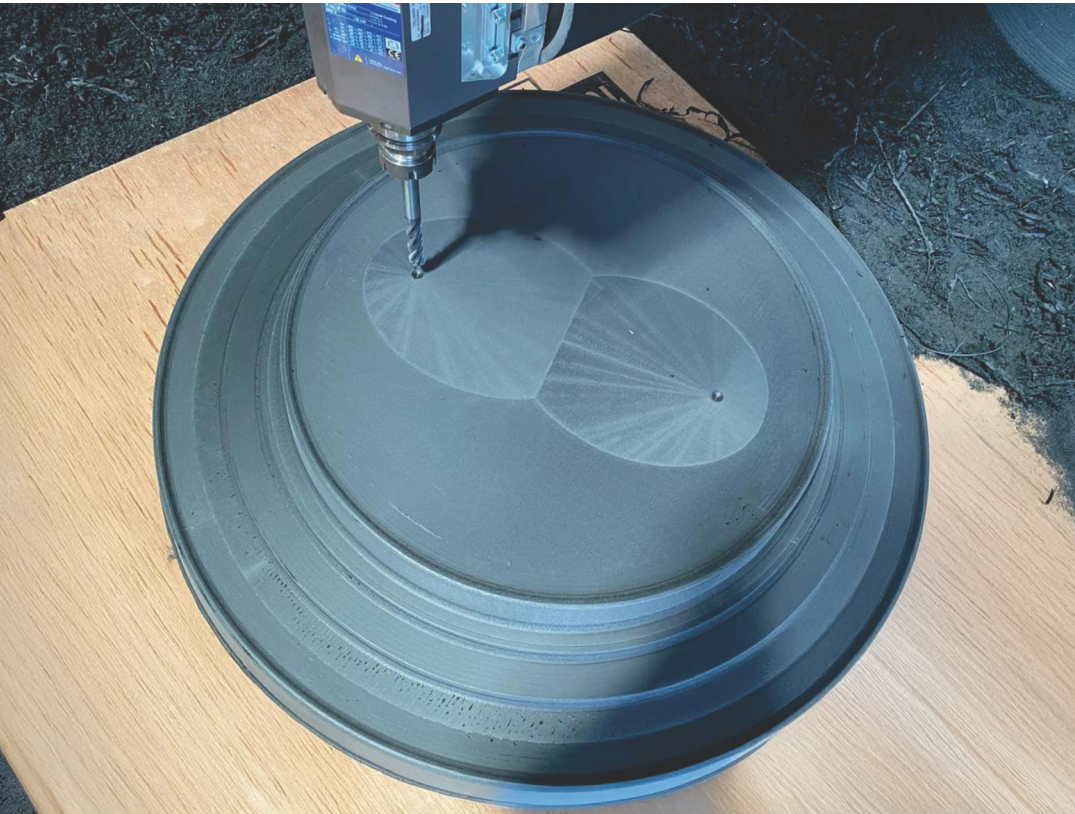
Letters made on pattern with PATTERN FORGE



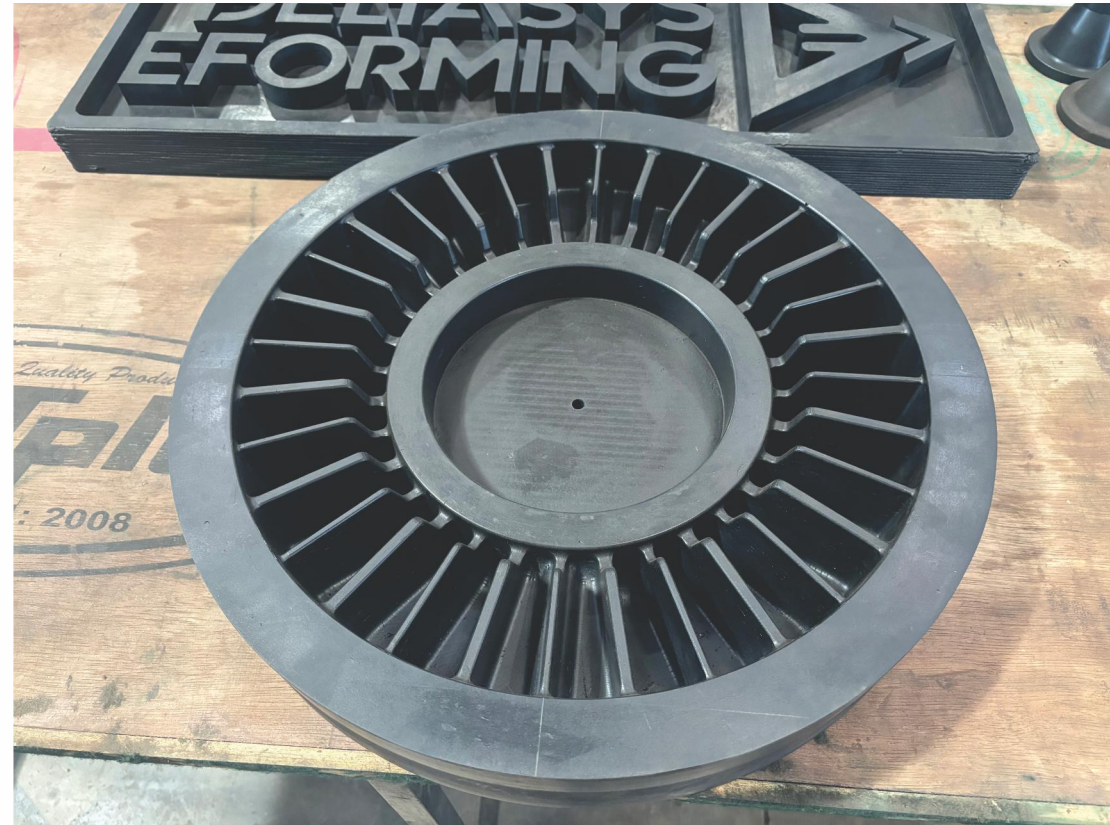
Core Box made on PATTERN FORGE: Core Box for pump body



## Pattern Finish after Machining



- Pattern finish achieved with roughness value 16-32 micro inch Ra
- More finish than above value is achieved with liquid resin coating



Small ribbed structure can be made with minimum wall thickness of 3mm

A large, black, multi-layered core box is shown in an open position. The box is made of many thin, dark layers, giving it a textured, fibrous appearance. Several loose pieces of the same material are being held by hands, demonstrating how they fit into the box. The box is placed on a light-colored concrete floor. In the background, a person's legs and feet in work boots are visible, along with a red object.

**Core Box with  
loose pieces**

**Note: Core boxes can be  
made for cold box core shooter.**

# Proven Compatibility Across all Moulding Processes

PATTERN FORGE made patterns and core boxes are engineered to work reliably across all common sandcasting moulding processes. Compatibility is achieved through material selection, process-aware design and reinforcement strategies, not assumptions.



## Green Sand Moulding

**Hand Moulding:** Suitable for low to medium volumes where quick turnaround and flexibility are critical. Uniform material structure ensures consistent parting and dimensional stability.

**Squeeze Jolt:** Designed to withstand repeated compaction loads. Proper ribbing and surface protection in high-contact areas ensure stable performance over extended use.

### HPML (High Pressure Moulding Line):

HPML applications are design-dependent.

PATTERN FORGE patterns for HPML are developed with:

- Reinforced sections
- Increased wall thickness
- Wear-resistant contact faces
- Provision for metal wear pads where required

This ensures reliable operation under high squeeze pressure and repetitive cycles.

## No-Bake Moulding

**Alpha Set , PEP Set & Furan:** Ideal applications due to low mechanical stress on patterns. Smooth surfaces, dimensional stability and chemical resistance provide consistent mould quality with minimal wear.

## Co<sub>2</sub> Moulding

Stable performance with predictable wear behavior. Patterns are designed considering sand hardness and gas curing pressure.



## Cold Box (Core Boxes)

Pattern Forge core boxes are suitable for manual and cold box core shooter applications, even under high sand shooting pressure.

Design considerations include:

- Reinforced impact zones at sand entry points
- Optimized cavity geometry to reduce direct abrasion
- Optional replaceable inserts in high-wear areas
- Precision mating surfaces for accurate clamping

This approach ensures long-term usability without compromising production speed.



## Design strategies that make the difference

- Identification of primary wear zones
- Localized reinforcement instead of overbuilding
- Replaceable inserts for extreme wear areas
- Process-specific design, not one-size-fits-all tooling



## What this means for foundries

- Confidence across multiple moulding lines
- One tooling platform for patterns and core boxes
- Reduced dependency on external vendors
- Predictable performance with realistic expectations

***PATTERN FORGE tooling is not about replacing every metal tool-but about using the right tool, designed the right way, for the right process.***

# Various Machines in Other Companies

## IH Casting

Moulding Process: No Bake Alpha Set

Print Time: 14 Hours

Machining Time: 22 Hours

Model Dimension:

Diameter 1400 mm, Height 200 mm.



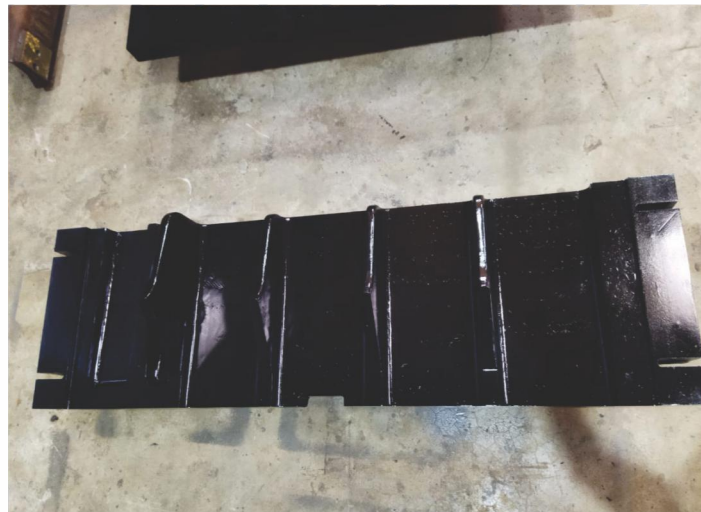
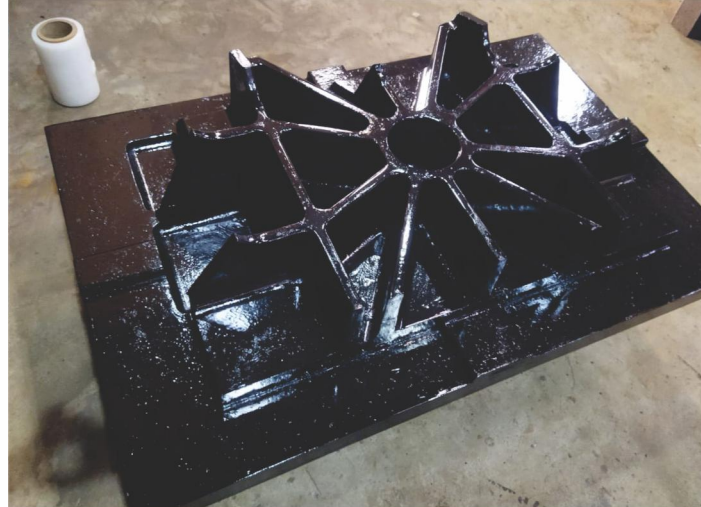
## Jyoti CNC

Moulding Process: No Bake Alpha Set

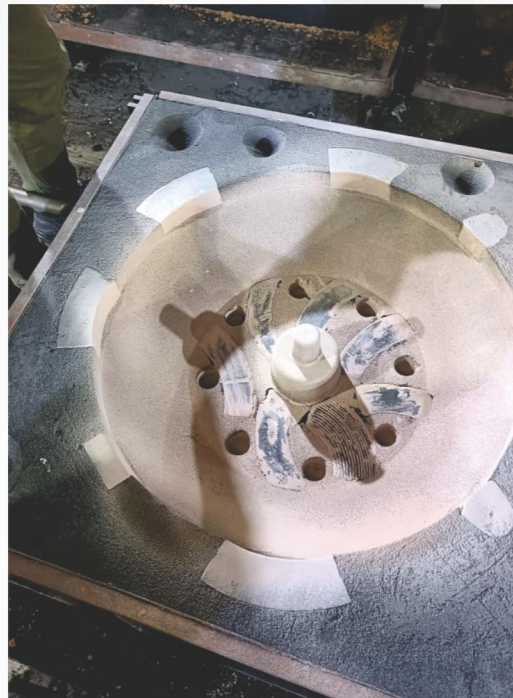
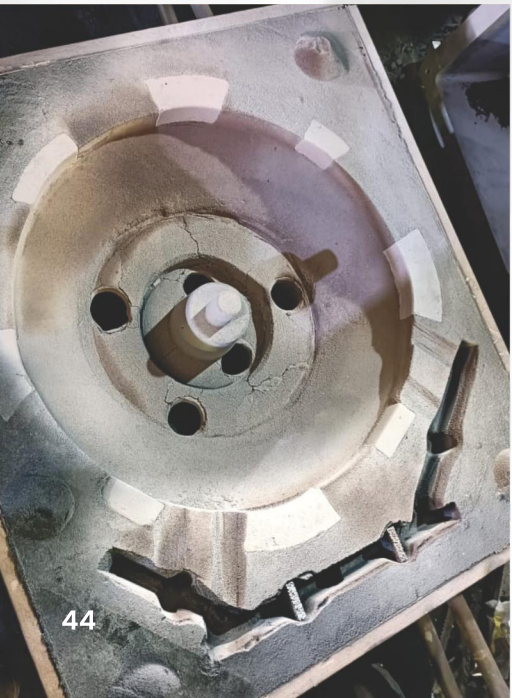
Print Time: 44 Hours

Machining Time: 108 Hours

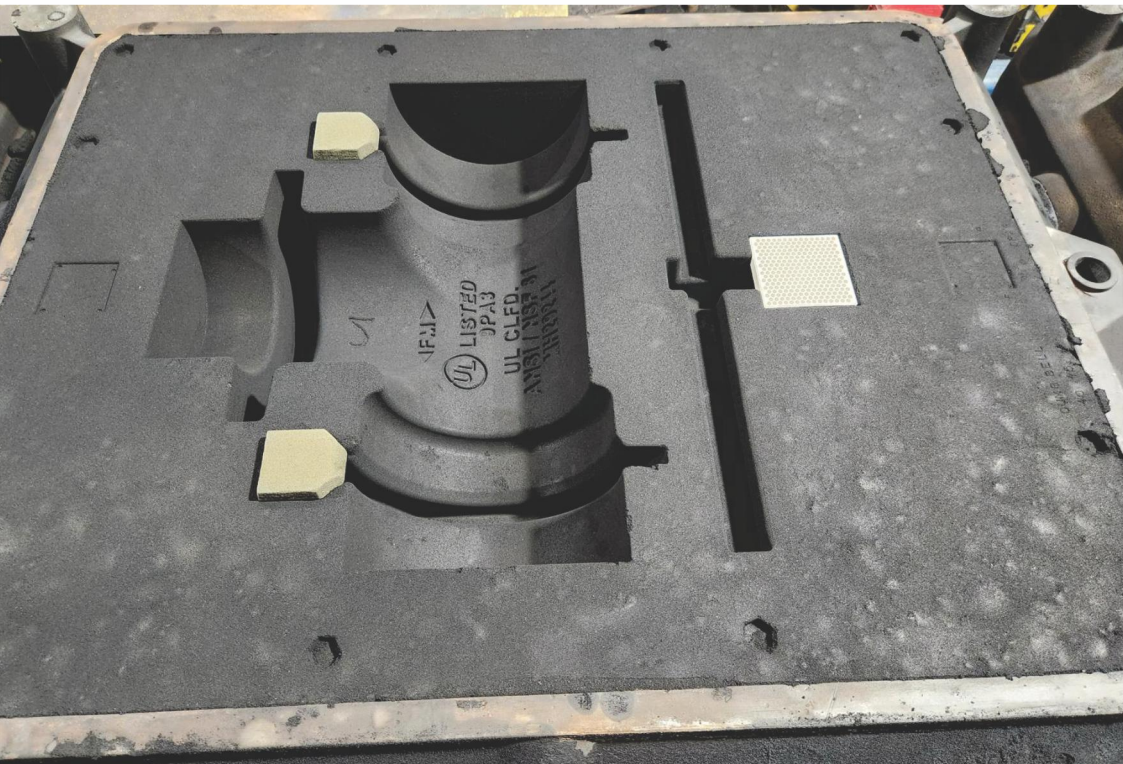
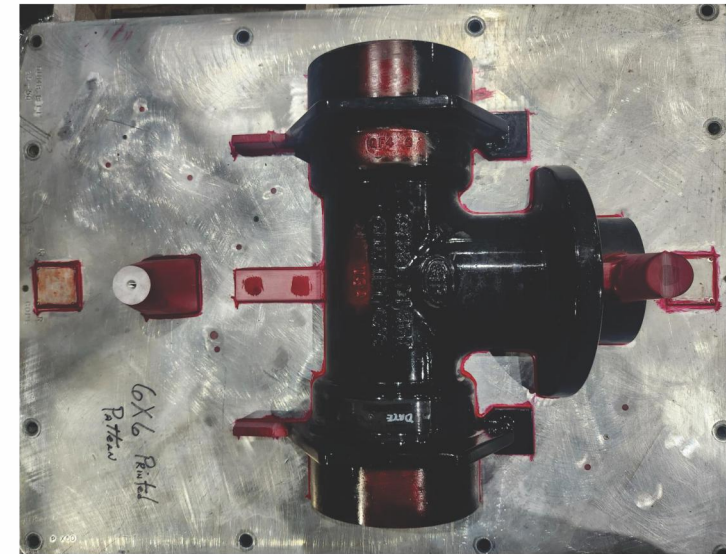
Model Dimension: L 2000mm,  
W 950 mm, H 500 mm.



**Moulding Process: No Bake FURAN**  
**Total Print Time including Pattern**  
**and Core Box: 28 Hours**  
**Machining Time: 35 Hours**  
**Model Dimension: Dia 700 mm, H 300 mm.**

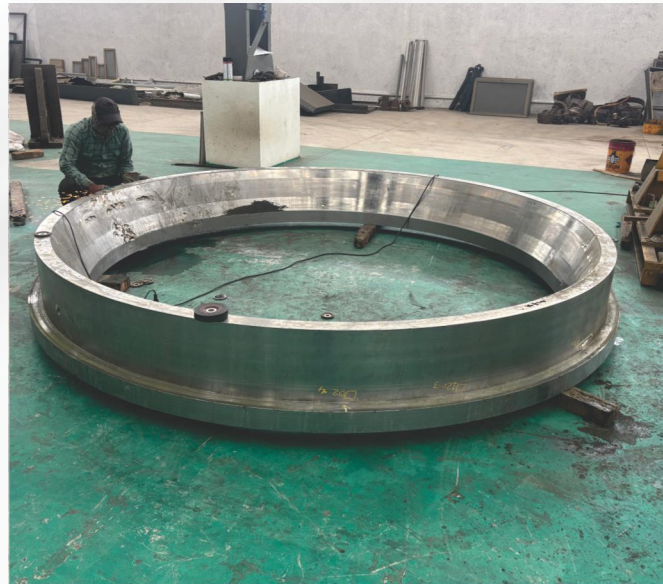


Moulding Process:  
HPML Green Sand  
Print Time: 4 Hours  
Machining Time: 6 Hours  
Model Dimension: L 600 mm,  
W 450 mm, H 280 mm.



## Atul Precision Cast

Moulding Process: No Bake Alpha Set  
Print Time: 60 Hours (Made in 6 Segments)  
Machining Time: No Machining is Needed,  
layer gap was filled with filler putty.  
Model Dimension: Dia 3200 mm,  
H 650 mm.



## Ghatge Patil Industries

Moulding Process: Co<sub>2</sub> Moulding

Print Time: 2 Days 18 Hours (for entire set)

Machining Time: 3 Days.

Model Dimension: L 1400 mm,  
W 1200 mm, H 550 mm.



Moulding Process: Co<sub>2</sub> Moulding

Print Time: 16 Hours

Machining Time: 22 Hours

Model Dimension: L 1146 mm, W 1146 mm, H 366 mm



# Pattern Life

## Key Parameters That Influence Pattern Life

Parameter	Impact on Pattern Life
Moulding process	▶ Compaction force & abrasion
Sand type	▶ Grain shape, hardness, additives
Compaction pressure	▶ High pressure = higher wear
Pattern design	▶ Ribbing, wall thickness, reinforcement
Maintenance	▶ Coating, cleaning, handling
Casting weight & size	▶ Load transferred to pattern



## Pattern Life by Moulding Process (Comparative Ranges)

### Green Sand – Squeeze Jolt / Hand Moulding

Pattern Material	Typical Life Range*	Remarks
Wooden Pattern	▶ Not recommended	▶ Cannot withstand high compaction
Aluminium Pattern	▶ 20,000 – 30,000 impressions	▶ High accuracy, higher capital cost
PATTERN FORGE (Composite Tooling)	▶ 3,000 – 9,000 impressions	▶ Comparable to PU/resin tooling; depends on sand & maintenance

**Best suited for:** Short to medium production runs | Frequent design changes | Development and breakdown jobs

## Green Sand – HPML Line (High Pressure)

Pattern Material	Typical Life Range*	Remarks
Wooden Pattern	▶ Not recommended	▶ Cannot withstand high compaction
Aluminium Pattern	▶ 20,000 – 30,000 impressions	▶ Industry standard for mass production
PATTERN FORGE (Reinforced Design)	▶ 3,000 – 10,000 impressions	▶ Design-dependent; reinforcement & inserts recommended

Note: For HPML applications, pattern design strategy (wall thickness, ribs, wear pads) plays a critical role.

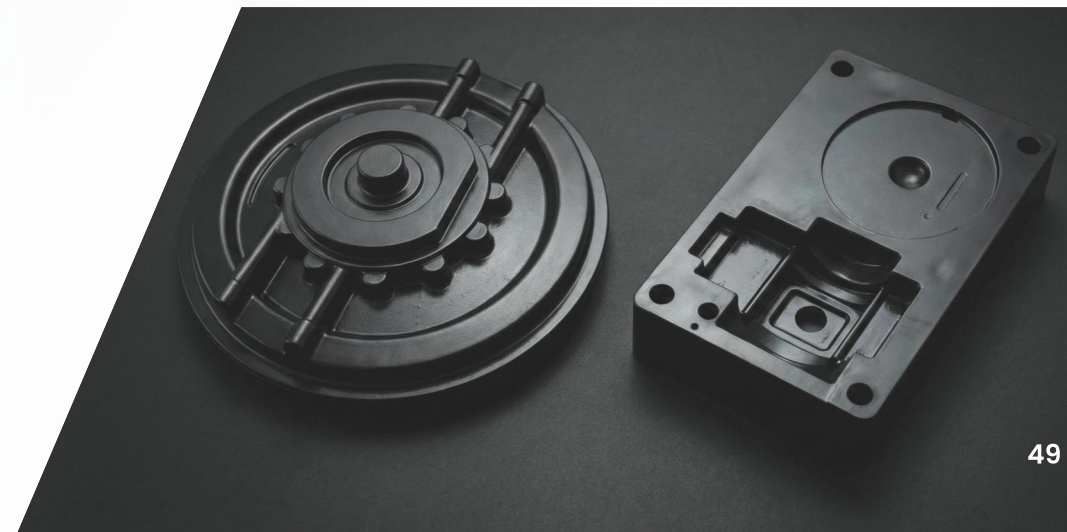
## No-Bake Moulding (Alpha Set / Furan)

Pattern Material	Typical Life Range*	Remarks
Wooden Pattern	▶ 1,500 – 4,000 impressions	▶ Resin attack and surface wear
Aluminium Pattern	▶ 20,000 – 50,000 impressions	▶ Stable but higher lead time
PATTERN FORGE (Composite Tooling)	▶ 15,000 – 40,000 impressions	▶ Very stable life due to low compaction stress

Key Advantage in No-Bake: Low moulding pressure results in minimal mechanical wear, making composite tooling highly effective.

## Co<sub>2</sub> Moulding

Pattern Material	Typical Life Range*
Wooden Pattern	▶ 200 – 1500
Aluminium Pattern	▶ 25,000 – 60,000
PATTERN FORGE	▶ 12,000 – 30,000



# Cost Comparison

## PATTERN FORGE vs Conventional Pattern Making

### Understanding the true cost of a Pattern

Pattern cost is not just the material cost. It includes:

- Design interpretation & manual skill
- Skilled labour availability
- Multiple fabrication steps
- Rework & corrections
- Lead time delays affecting production
- Opportunity loss in urgent or low-volume jobs

*PATTERN FORGE addresses these hidden costs systematically.*

### Cost Structure Comparison (Indicative)

Cost Element	Wooden Pattern	Aluminium Pattern	PATTERN FORGE Pattern
Design To Pattern Lead Time	▶ Medium	▶ Long	▶ Very Short
Skilled Labour Dependency	▶ Very High	▶ High	▶ Low
Material Wastage	▶ High (20–30%)	▶ High (30–40%)	▶ <10%
Manual Assembly (Glue, Nails, Screws)	▶ Yes	▶ Not applicable	▶ No
CNC Machining Dependency	▶ No	▶ Yes (High)	▶ No External CNC
Rework Cost	▶ High	▶ Medium	▶ Low
Pattern Cost (Relative)	▶ 100%	▶ 180–220%	▶ 60–75%
Cost for Urgent Jobs	▶ High premium	▶ Very high	▶ Minimal Premium

*Key Insight:  
PATTERN FORGE eliminates multiple intermediate steps where time, labour, and money are lost.*

## Hidden Costs in Conventional Pattern Making

### Wooden Patterns

Familiar and faster for small jobs, but:

- Heavy dependence on skilled artisans
- Manual joining using glue, nails, screws
- Variability in accuracy
- Frequent rework
- Shorter usable life
- High labour hours per pattern

*Labour alone  
can account  
for 40–50% of  
total wooden  
pattern cost.*

### Aluminium Patterns

Accurate and durable, but:

- Require thermocol master patterns
- Multiple vendors and handovers
- CNC machining queues
- Long lead times
- High material and machining costs
- Capital-intensive for low or medium volumes

*Aluminium  
patterns often  
cost 2X to 2.5X  
compared to  
digitally  
produced  
tooling.*

## Why Pattern Forge Is a Smarter Investment

### PATTERN FORGE: Cost Efficiency by Design

PATTERN FORGE converts digital data directly into tooling, eliminating:

- Manual shaping
- Intermediate master patterns
- External CNC dependence
- Assembly consumables
- Repeated human intervention

### Result:

- 30–40% lower total pattern cost vs wood
- 55–65% lower cost vs aluminium
- 60–80% reduction in lead time

## Industry 4.0 Ready Tooling

PATTERN FORGE aligns with modern manufacturing by offering:

- Digital repeatability
- CAD-to-pattern workflow
- Traceability & documentation
- Scalable production
- Integration with modern foundry lines  
(Green Sand, No Bake, HPML)

## Is PATTERN FORGE an Expense or an Investment?

PATTERN FORGE is not just a replacement for wooden or aluminium patterns.

It is a tooling production system that:

- Saves time on every project
- Reduces cost across multiple jobs
- Enables new business opportunities
- Future-proofs your foundry operations

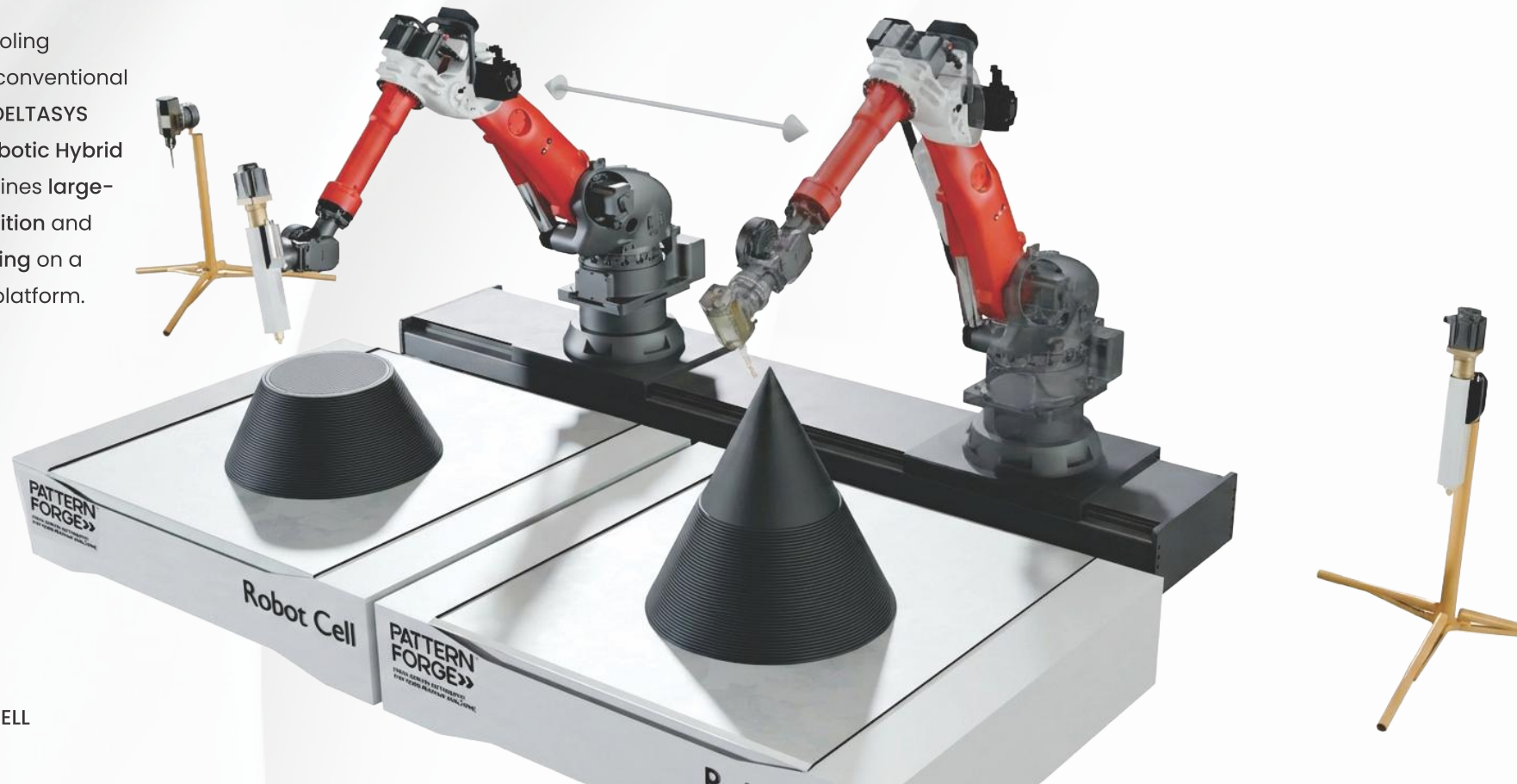
*The real ROI comes from speed, flexibility, and independence.*

# Robotic Hybrid Tooling Cell

## Additive Deposition + CNC Finishing on a Single Robotic Platform

To address complex tooling requirements beyond conventional machine geometries, DELTASYS E-FORMING offers a Robotic Hybrid Tooling Cell that combines large-format material deposition and precision CNC machining on a single, flexible robotic platform.

*“At the heart of this system is an industrial robotic arm, equipped with automatic tool-changing capability, allowing it to perform two critical operations sequentially, additive build-up followed by subtractive finishing without manual intervention.”*





## Step 1: Robotic Additive Deposition

The robotic arm is fitted with a **high-output composite deposition head**, enabling free-form material deposition in multiple orientations. Unlike conventional gantry systems, the robotic architecture allows:

- **Multi-axis and angular printing**, enabling material to be deposited at optimized angles
- **Hollow and rib-reinforced structures**, reducing material consumption while maintaining strength
- **Complex geometries and undercuts** that are difficult or impossible to achieve with linear-axis machines
- **Efficient material placement**, especially for large patterns, core boxes and mold segments



Angular deposition not only improves structural integrity but also minimizes internal stresses and significantly reduces build time and material usage.



## Step 2: Automatic Tool Change & CNC Finishing

Once deposition is complete, the robot automatically switches from the deposition head to a CNC machining head. The same printed component is then:

- Machined to final dimensions
- Finished to required surface quality
- Precisely profiled for parting lines, drafts and functional features

*“This additive-subtractive workflow ensures high dimensional accuracy while eliminating the need to transfer the component between machines.”*

# Why Robotic Hybrid Tooling?

- **Exceptional flexibility** for complex and large tooling geometries
- **Reduced lead time** by combining printing and machining in one setup
- **Lower material usage** through hollow and optimized structures
- **Scalable solution** for patterns, core boxes, molds and prototype tooling

Designed for modern foundry and tooling environments, the Robotic Hybrid Tooling Cell represents a **future-ready approach** to pattern and mold manufacturing, where **freedom of geometry meets manufacturing precision**.

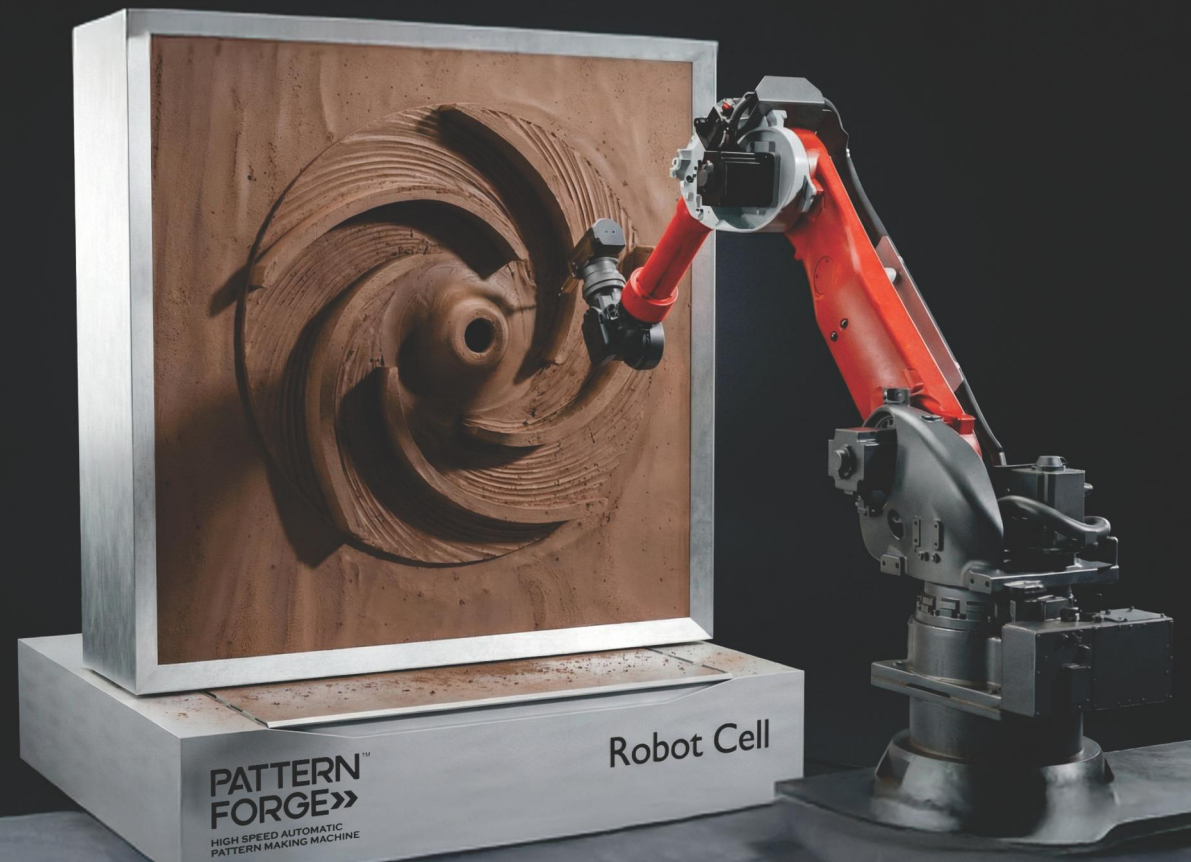
# Robotic Sand Milling for Pattern-less Mould Making

## Pattern-Less Mould Manufacturing

In its third mode, the same robotic arm is used for Sand Milling, enabling the creation of pattern-less moulds.

In this process:

- A sand cake (No-Bake, Alpha Set, Furan, or other moulding sand) is prepared inside a mould box
- The robotic arm, fitted with specialized CNC milling tools, machines the sand block directly
- Complex mould cavities are created without any pattern or core box



## Why Sand Milling?

- Enables immediate mould creation for prototypes, spares and low-volume production
- Eliminates pattern and core box lead time entirely
- Significantly more cost-effective than sand 3D printing
- Uses existing foundry sand systems—no expensive binders or consumables

Sand milling offers a practical alternative to sand 3D printing, especially for foundries seeking faster turnaround without high operating costs.

# One Robot. Multiple Returns.

DELTASYS E-FORMING robotic solution transforms into a high-utilization, multi-function asset for the foundry.

By combining:

Composite  
Deposition

CNC Finishing

Sand Milling

For customers investing in Pattern Forge, this robotic cell acts as a powerful extension, covering:

Pattern  
making

Core box  
manufacturing

Pattern-less  
mould production

*All with one robotic platform, one control philosophy and one integrated workflow.*



# Range of Our Machines

## CNC Variants – 5 Axis & 3 Axis(BT40)

### CNC Routers Overview

DELTASYS EFORMING CNC ROUTER is a computer-controlled machine that precisely cuts, shapes and engraves materials such as wood, metal, plastic and composites. CNC routers operate through a router bit that moves along multiple axes to create complex cuts and designs. They offer high efficiency, accuracy and repeatability, allowing operators to produce consistent results across multiple projects. Equipped with automated software, CNC routers streamline production and minimize human error, making them valuable in industries requiring detailed craftsmanship and rapid, scalable manufacturing processes.

### 5-Axis CNC Router

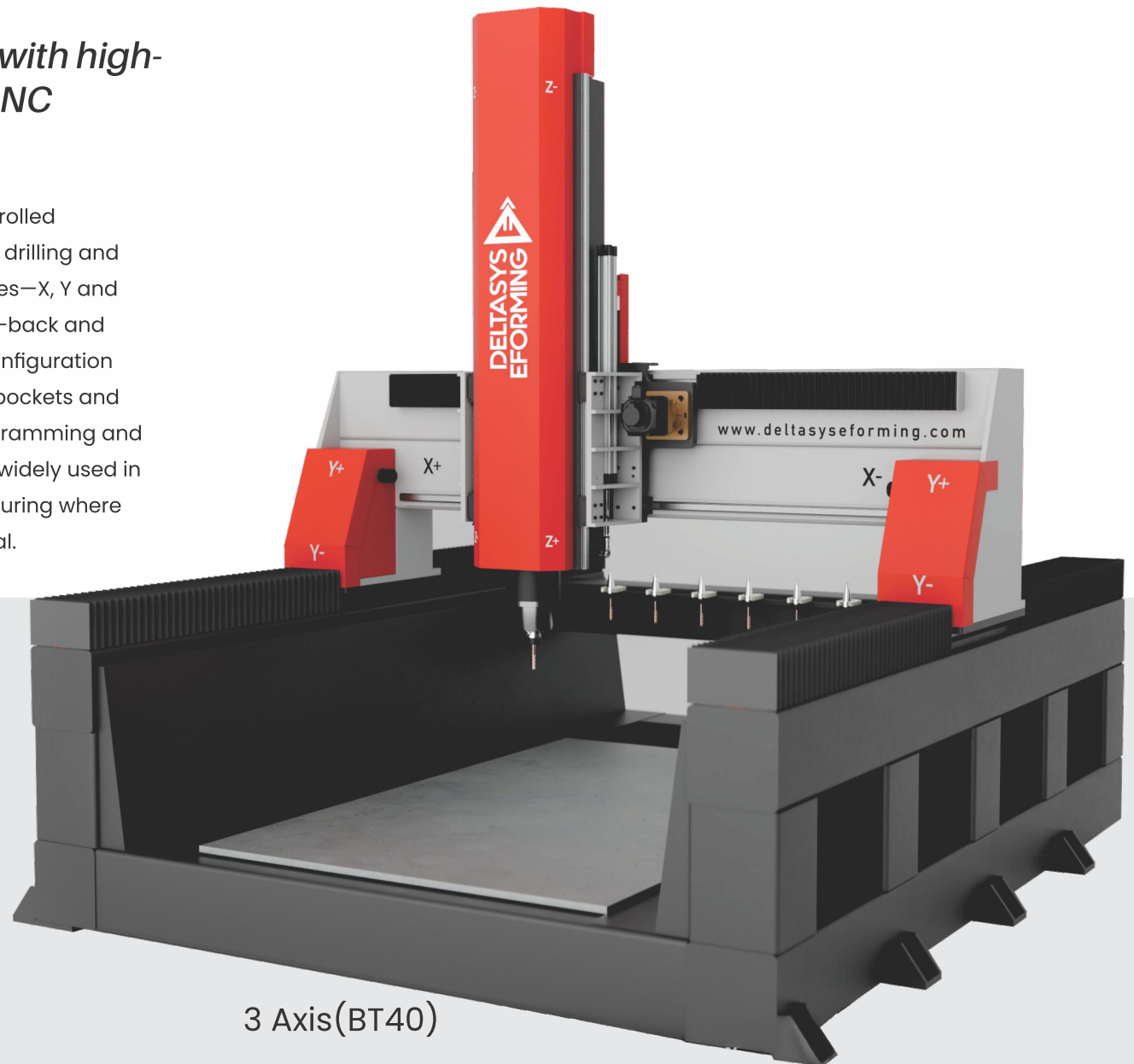
DELTASYS EFORMING 5-AXIS CNC ROUTER comes with robust and reliable HITECO Italy tilt head. This machine is being widely used for plastic and composite trimming, pattern & moulds for composite and sandcasting industries. This versatile 5-Axis is available with either single moving aluminium tables or moving beam gantry type.



## 3-Axis CNC Router

*“Revolutionize your production with high-quality, fast and precise 3-Axis CNC Routers.”*

A 3-axis CNC machining center is a computer-controlled manufacturing system designed for precise milling, drilling and cutting operations. It operates along three linear axes—X, Y and Z—allowing the cutting tool to move left–right, front–back and up–down while the workpiece remains fixed. This configuration enables accurate machining of flat surfaces, slots, pockets and basic contours. Known for its reliability, ease of programming and cost efficiency, the 3-axis CNC machining center is widely used in industrial production, tooling and pattern manufacturing where consistency and dimensional accuracy are essential.



3 Axis(BT40)

# Concrete 3D Printers

## Concrete 3D printer Overview

*Precision. Innovation. Possibility- Powered by DELTASYS E-FORMING*

Concrete 3D printing is reshaping how we build—from housing and infrastructure to research and rapid prototyping. By combining automation with advanced material science, this technology enables complex structures to be built layer by layer, directly from digital designs faster, with less waste and greater design freedom.

At the forefront of this transformation is Deltasys E-Forming, India's leading developer and manufacturer of concrete 3D printing machines. With a commitment to engineering excellence and real-world usability, we provide a full range of solutions for academic institutions, research laboratories, construction companies and innovators in sustainable architecture.

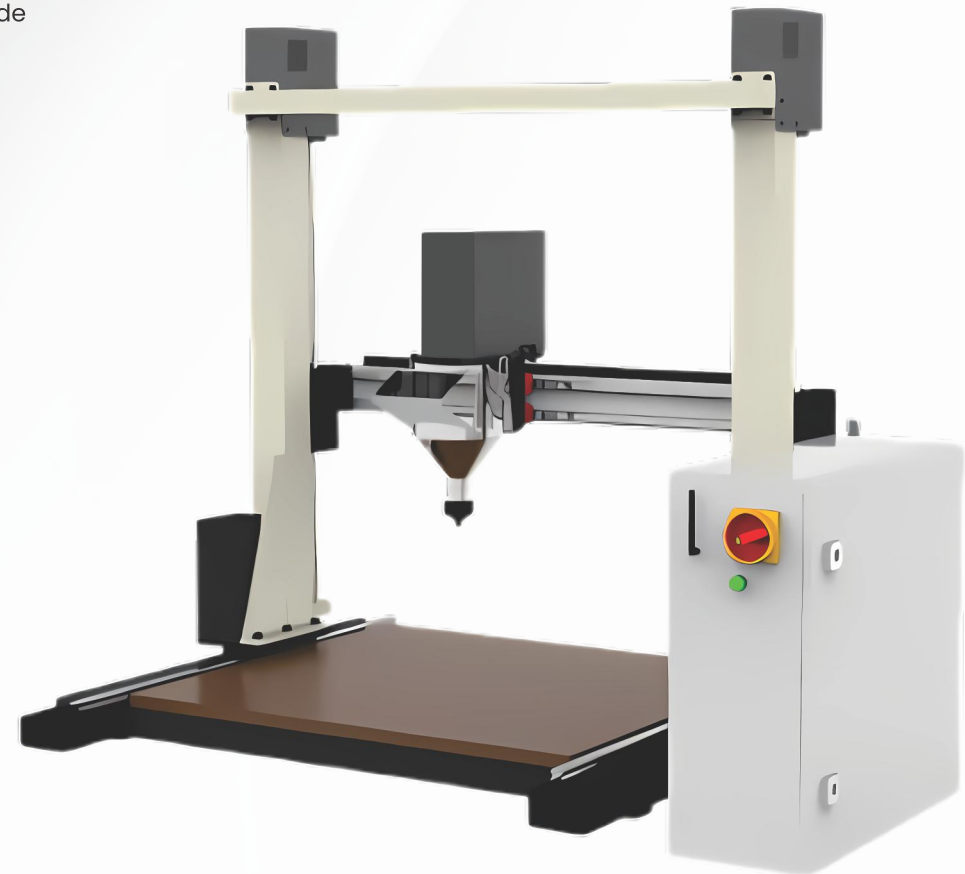
## Available Specifications:

### 1. Table Top Small R&D

Concrete 3D Printer

600mm x 600mm x 600mm Build Volume

Designed for research labs and universities, this compact printer includes an integrated mixing and dosing system and a polycarbonate-enclosed build area. It enables affordable, hands-on research into cementitious materials, mortar rheology and printability—all within a controlled lab environment.





## 2. On-site Gantry-style Concrete 3D Printer

(Customizable for Large-Scale Construction)

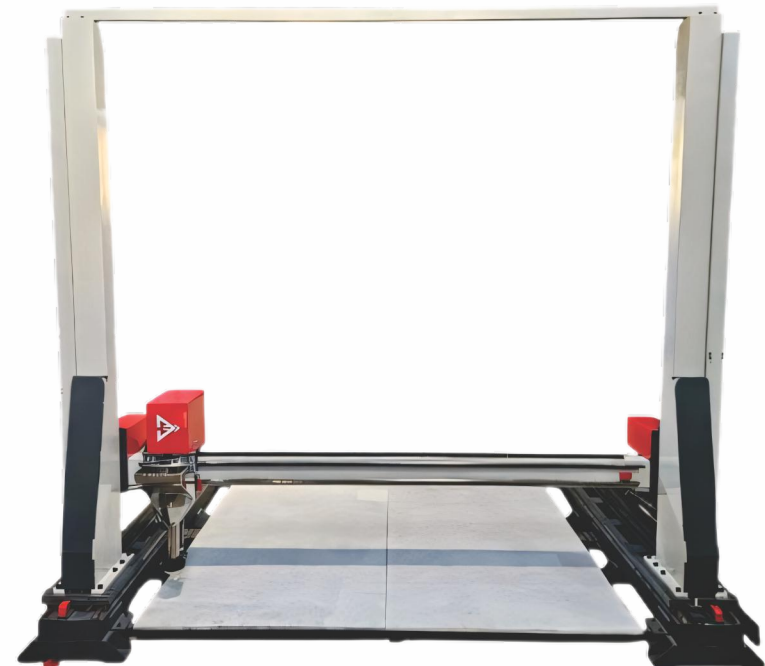
Our largest and most robust solution, the gantry-style system is built for on-site 3D printing of homes, public infrastructure and large architectural elements. Engineered for mobility and scalability, these machines can print directly at construction sites using a variety of printable concretes, enabling faster builds and digital customization on demand.

## 3. E-builder Lab Scale

Concrete 3D Printer

1000mm<sup>3</sup> and 2000mm<sup>3</sup> Models

Suited for mid-sized prototyping and advanced material testing, these machines support a broader range of materials including mortars, geopolymers and aggregate-based concretes. Installed on a level ground surface, they work with industrial mixing and pumping systems and are ideal for scaling up lab research for real-world applications.





# Service, Support & Spare Parts Commitment

At DELTASYS E-FORMING, we believe that advanced machines deliver real value only when they are backed by **reliable service, responsive support and assured spare parts availability**. Our service philosophy is built to support customers operating Pattern Forge, Robotic Systems, 5-Axis CNC Routers and BT40 CNC Routers in demanding production environments.



## On-Site Service & Technical Support

Our experienced service engineers provide on-site support for installation, commissioning, preventive maintenance and breakdown assistance.

Each machine is supported by a structured service process to ensure:

- Quick diagnosis and resolution of issues
- Minimal downtime in production
- Safe and correct machine operation
- Consistent performance over the machine's lifecycle

*We maintain a clear response mechanism, ensuring customer concerns are acknowledged promptly and addressed efficiently, either remotely or through on-site intervention, depending on the situation.*



## Preventive Maintenance & AMC Support

To ensure long-term reliability, DELTASYS E-FORMING offers Preventive Maintenance Programs and Annual Maintenance Contracts (AMC) tailored to machine usage and application.

- Scheduled service visits by trained engineers
- Inspection, calibration and health checks of critical components
- Recommendations for wear parts and consumables
- Machine performance optimization over time

*Our approach focuses on preventing failures before they occur, not just reacting to breakdowns*

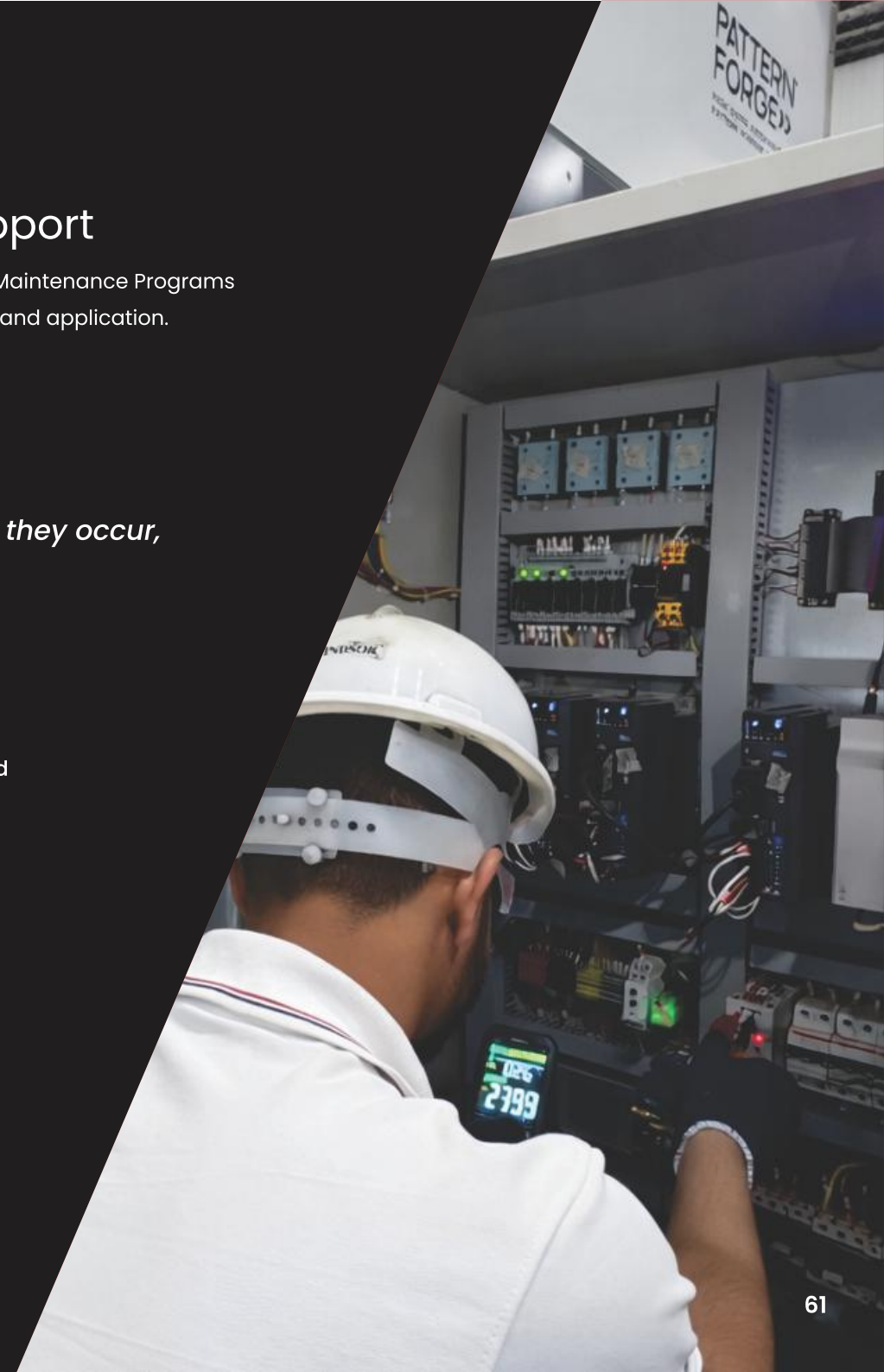


## Spare Parts Availability

All DELTASYS E-FORMING machines are designed with **standardized and serviceable components**, ensuring ease of maintenance and faster spare replacement.

- Critical spares are readily available from our inventory
- Indigenous development ensures long-term spare continuity
- Clear spare part identification and documentation
- Support for planned spares stocking for high-usage customers

*This reduces dependency, lead time and operational risk for our customers.*



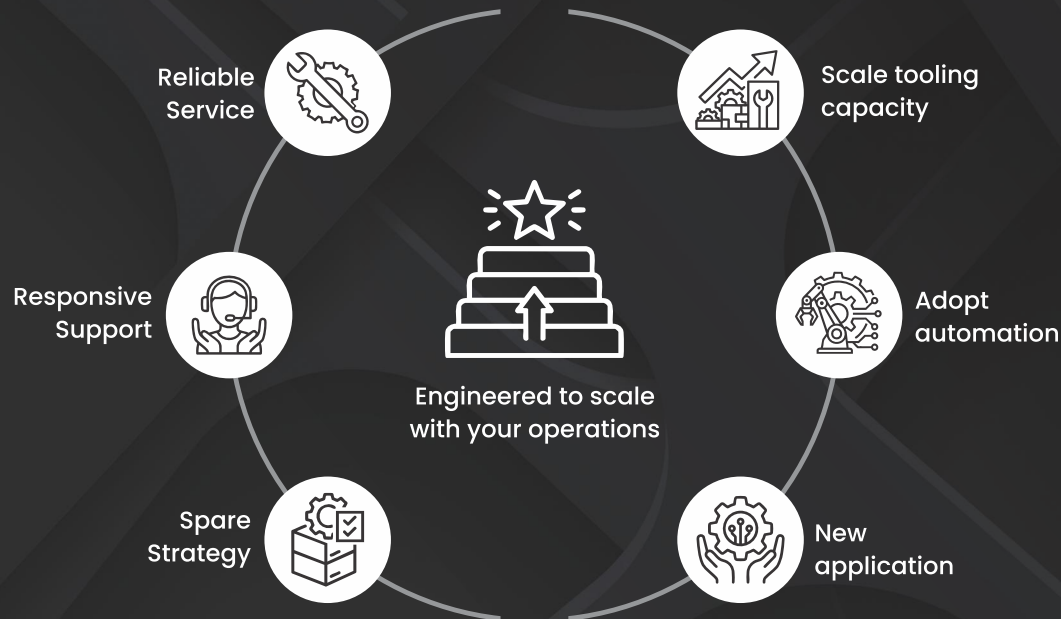


## Application & Process Support

Beyond machine service, our team supports customers in process understanding and optimization, including:

- Material and tooling recommendations
- Application guidance for patterns, core boxes and moulds
- Process parameter tuning for additive and subtractive operations

*This ensures customers extract maximum value from the technology, not just the hardware.*



## A Long-Term Partnership Approach

DELTA-SYS E-FORMING views every machine installation as the beginning of a long-term partnership, not a one-time sale. Our service, support and spare strategy is designed to grow with your operations, whether you are scaling tooling capacity, adopting automation, or expanding into new applications.

*Reliable machines deserve reliable support and that is our commitment.*

# Key customers who have procured our PATTERN FORGE machines



Ghatge Patil Industries Ltd  
Kolhapur, Maharashtra



Engineering Better Tomorrows

Kiswok Industries Pvt Ltd  
Howrah, West Bengal



Kejriwal Casting Ltd  
Kolkata, West Bengal



Atul Precision Cast PVT LTD  
Rajkot, Gujarat



Mayura Steel Pvt Ltd  
Kolhapur, Maharashtra



IEMCO Industries Pvt Ltd  
Jamshedpur, Jharkhand



Calcutta Export Company  
Kolkata, West Bengal



Howrah Ferrous Ltd  
Kolkata, West Bengal



NIF ISPAT Private Limited  
Howrah, West Bengal



Parason Machinery,  
Chatrapati Sambhaji Nagar,  
Maharashtra



R.B. Agarwalla & Co.  
Kolkata, West Bengal



SRM Industries  
Chennai



SAJJAN Engineering & Casting Ltd.  
Ludhiana



Jyoti CNC Automation Ltd  
Rajkot



SICAST  
Riyadh, Saudi Arabia

Specifications, availability, and features are subject to change without prior notice. All information contained in this brochure is for informational purposes only and is non-binding.



Developer and Manufacturer of  
3D Printing Machines and  
CNC Machining Centers

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