UnionTech
Create Your Imagination

Case Study

Patterns on Wheels: How Lichond Mould Reshapes the Tire Mould Industry with 3D Printing

Lichond Mould is a tire mold manufacturer that was founded in 2013 and is located in Shandong, China. It is a high-tech company with a focus on tire mold creation, research, and production. The company has garnered recognition with over 10 patents, establishing itself as a leading force in the tire mold industry.

"We are one of the first enterprises to embrace the 3D printing Technology."

Bing Wang
Deputy General Manager
of Lichong Mould 3D Printing Center

The tire mold industry is and has always been a comprehensive market with intensive market competition due to the continuously increasing need for tire performance. The pattern design of tires directly determines their performance, the design and manufacturing of tire molds are recognized as the most challenging processes in this industry.

The precision of tire molds directly affects the precision and quality of tires, as well as factors such as safety and driving comfort. Under these circumstances, the rapid iteration of tire pattern designs has brought new and sophisticated challenges to tire mold manufacturers. The tire molds produced not only have few in quantity but also come in various types due to their complex shapes with numerous curves and angles, making it difficult to achieve precision with traditional manufacturing processes.

To enhance its tire pattern design capabilities, Lichond Mould introduced additive manufacturing technology with a production line of industrial RA600 SLA 3D printers specially designed for the tire mold industry by UnionTech in 2019, which greatly increased production efficiency and simplified the workflow of tire mold production.

The Pattern Dilemma Within the Tire Mold Production Process

Established in 2013 and positioned at a magnificent coastline city, Weifang, Lichond Mould is a high-tech enterprise that integrates the design, research, manufacturing, and sales of tire molds with more than 10 patents. Despite its current success, the journey to manufacturing excellence has been a challenging one.

As the traditional tire mold production process went through several complicated steps, one major technical issue emerged, the craft of sophisticated tire mold patterns requires painstaking manual detailing, especially in navigating complex part machining dead corners.

Traditional Tire Mold Manufacturing

In certain instances, manual insertion of steel pieces, especially for high-performance tire molds, became necessary for refinement. Under such circumstances, molds designed for winter or snow, or those with specialized configurations, required extensive steel piece refinement. Some molds even necessitated the incorporation of thousands of steel pieces, significantly escalating the complexity of the manufacturing process.

Setting aside the challenges in design complexity, the heightened demands from users for both quantity and quality of tire molds have notably increased the production difficulties. Many manufacturers found themselves grappling with the impracticality of meeting these rising demands. An opportunity for industry upgrading has yet to be explored.

Pioneers of the 3D Printing Digitalization Empowering the Tire Mold Industry

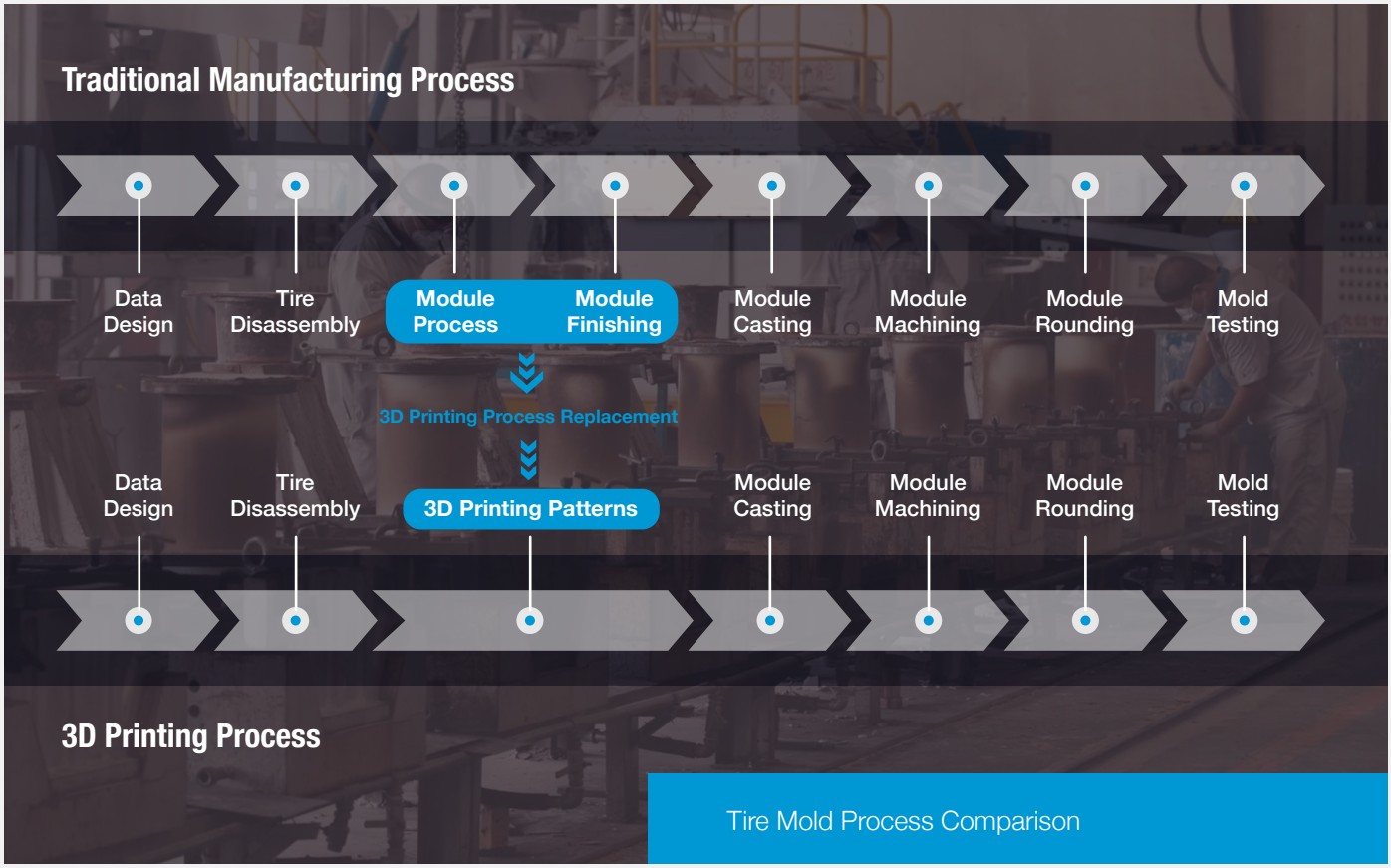
Lichong Mould Staff Using Tire ONE Cloud Platform

In response to evolving market demands and addressing the challenges in the tire mold manufacturing industry, UnionTech leverages its technological expertise and extensive experience in the 3D printing industry to introduce a customized digital 3D printing solution for tire molds. This innovative solution encompasses specialized 3D printing equipment, printing materials, manufacturing process packages, post-processing solutions, and dedicated Tire ONE, a 3D printing cloud platform system specially designed for the tire mold industry. It seamlessly integrates 3D printing technology into the tire mold manufacturing process.

By incorporating 18 sets of UnionTech industrial RA600 SLA 3D printers, Lichond Mould has ascended to the status of a director company member of the China Rubber Industry Association, establishing itself as a leading brand in the tire mold industry. This strategic move has resulted in a remarkable increase in working efficiency, exceeding 80%.

Designed with a thorough understanding of the current state of the tire mold industry, the tire mold industry solution incorporates over 20 years of UnionTech's practical experience in equipment, materials, processes, and software. It offers customers UnionTech's unique digital process parameter package, facilitating the intelligent manufacturing and digital transformation of the tire mold industry.

UnionTech's tire mold industry solution enables one-click intelligent printing, effortlessly addressing data repair, pre-processing, and various stages of 3D printing. Essentially, this innovative technology and process empower mold factories to reduce costs, enhance efficiency, and achieve a bountiful harvest of both quality and profits.

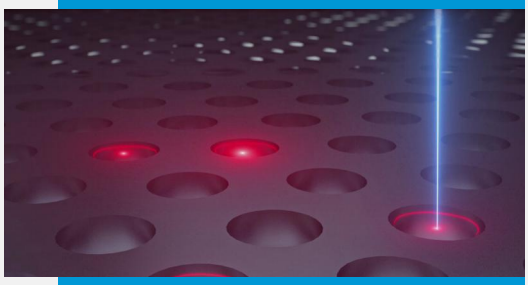


Tire Mold Process Comparison

" 3D printing technology effectively addresses the diverse and intricate design characteristics of the tire mold industry, mitigating industry pain points to a considerable extent. Tire mold manufacturers are no longer confronted with challenges related to the complexity of tread patterns and manufacturing processes. This not only enhances the production capabilities of the tire mold industry but also accelerates the iteration speed of tire product development. "

—— Xingbin Gao, Supervisor of Industrial North Division, UnionTech

The Industrial 3D Printer Born for the Tire Mold Industry



Automatic Calibration Technology

3D Printing
High Precision Master Tire Mold

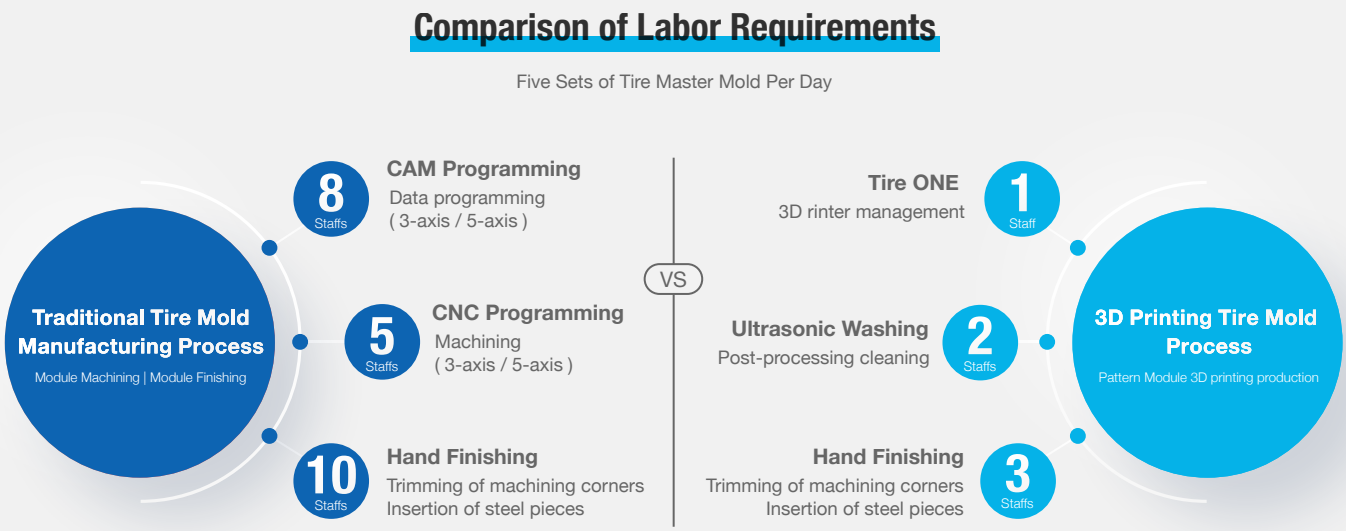
Drawing on practical applications in the tire mold industry, UnionTech has developed the industrial 3D printer—RA600, a printer tailored specifically for tire mold manufacturing. The introduction of the RA600 addresses challenges in the tire industry, such as high costs, low efficiency, and complex processes, providing robust support for intelligent manufacturing in the tire mold sector.

Another feature of the RA600 lies in its excellent stability, equipped with high-end optoelectronic components. Combined with UnionTech's efficient and stable control solutions, it ensures printing stability—an indispensable factor in selecting mechanical equipment. With over 20 years of dedicated expertise in the professional field, UnionTech has solidified its absolute position in the realm of 3D printing photopolymerization. Leveraging steadfast craftsmanship and leading-edge technology, UnionTech has created products renowned for high stability and reliability.

Apart from challenge addressing and stability, UnionTech proudly offers the RA600 with:

Self-Developed Electronic Control system that Boosts Stability

UnionTech's self-developed electronic control system encompasses motion control, liquid level control, and temperature field control, delivering exceptional stability to the equipment. Structurally, this control system is the only one in China to adopt a master-slave control mechanism between the upper and lower computers, ensuring the maximum stability and reliability of the equipment. Additionally, by incorporating a pressure difference detection sensor and an advanced liquid level control algorithm, the scraper coating system can quickly and reliably adjust negative pressure. This effectively reduces the liquid level adjustment time during the printing process, thereby improving the efficiency of the equipment.



Key Parameter Monitoring System that Ensures Consistency

The innovative spot mode detection feature helps monitor and control the spot shape on the liquid surface in real-time. It uses algorithmic software to correct and adjust printing strategies, ensuring consistent print quality.

Another creative defective part monitoring function employs original machine vision detection algorithms and deep learning. This feature allows for the real-time detection and calculation of graphics as they form on each printing layer. It actively monitors and identifies defects or failures, triggering timely responses like alarms, pauses, or terminations. This effectively prevents printing losses and promotes unmanned production.

Comparison of 3D Printed Tire Master Molds and Traditional Machining Accuracy

Key Items	Technology Standard	Detection Methods	Traditional Data	3D Printing Data
Surface Roughness Technical Requirements	Contour arithmetic mean deviation Ra≤4μm	Roughness Meter	Ra≤4.0μm	Ra < 3.5μm
Judgement standard of tread point deviation	Take N measuring points on the tread (covering 80% of the area of the tread), more than 90% of the point deviation is within ±0.08mm.	Coordinate Measuring Machine	Take N measuring points on the tread (covering 80% of the area of the tread), more than 90% of the point deviation is within ±0.05mm.	Take N measuring points on the tread (covering 80% of the area of the tread), more than 90% of the point deviation is within ±0.03mm
Tire width size technical requirements	Deviation of outer tire model within ±0.2mm; deviation of inner tire width within ±0.15mm.	Coordinate Measuring Machine	Deviation of outer tire model within ±0.2mm; deviation of inner tire width within ±0.15mm.	Outer tyre deviation within ±0.15mm; Inner tyre width deviation within ±0.1mm.
Technical requirements of tread steel size	Thickness of the steel piece (minimum 0.4mm) deviation ±0.05mm	Dial Calipers	The thickness deviation of the steel piece can be controlled at ±0.05mm	the thickness deviation of the steel piece can be controlled at ±0.03mm
Tread roundness	Roundness deviation within 0.05mm in any cross-section in circumferential direction.	Coordinate Measuring Machine	Roundness deviation within 0.05mm in any cross-section in circumferential direction.	roundness deviation of 0.03mm in any cross-section in the circumferential direction.

Ultra-High Precision that Minimizes Deviation

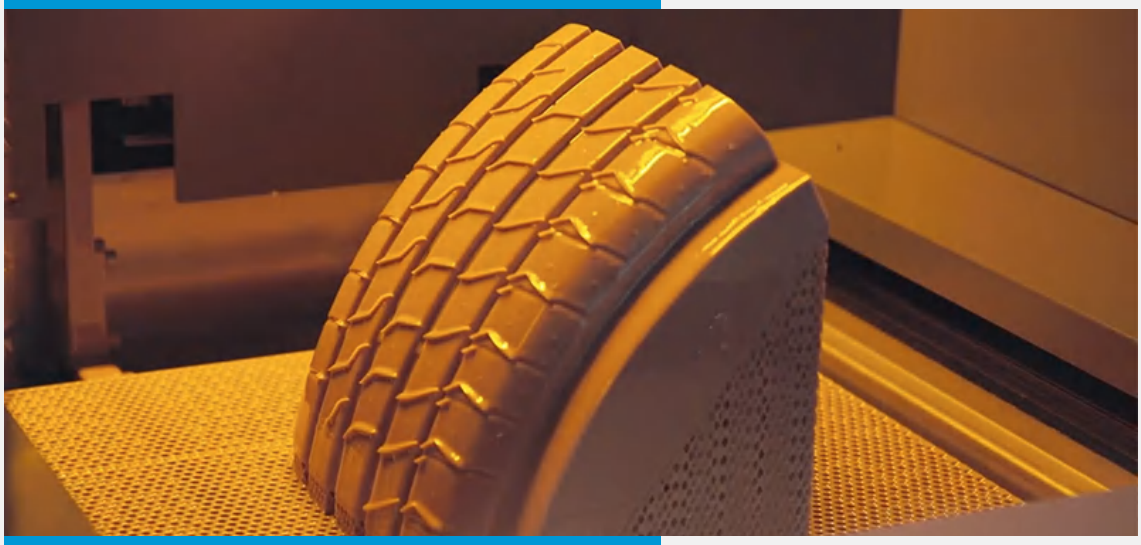
RA600's tire molds showcase exceptional precision, accurately reproducing intricate patterns while keeping pattern groove dimensions and roundness deviation within ±0.05mm. This precision allows for the presentation of complex shapes that are challenging for manual methods, significantly expanding design possibilities. Simultaneously, it streamlines the intricate processes of manual finishing and steel plate inlaying, reducing production cycles, enhancing overall efficiency, and resulting in substantial savings in labor and production costs.

A Tire Mold Masterpiece and Beyond

An example generated by RA600 showcased exactly how 3D printing technology reshapes the tire mold industry with its capabilities to present highly precise surface quality and intricate pattern details. While in a manual approach, each protrusion and groove on the tire requires the meticulous placement of blades, consuming time and effort, and elevating costs.

"UnionTech, a leader in 3D printing for industrial transformation, is dedicated to helping customers achieve milestones through innovative thinking and adaptability. UnionTech's technological breakthroughs are the rapid advancement of additive manufacturing in the tire mold sector, placing the company at the forefront of 3D printing technology."

—— Chao Wang, Vice General Manager, UnionTech



3D Printed Segmented Tire Mold

With the triumphant implementation of Lichond Mould in the tire mold industry, Wang highlighted UnionTech's core essence and its commitment to technological breakthroughs facilitated by 3D printing. The entire industry stands on the brink of entering a digital era of iterative industrial development, anticipating disruptive changes.

UnionTech pledges its dedication to the advancement and application of new equipment and materials, intelligent manufacturing, and digital production management systems. Through specialized technology and knowledge, the aim is to empower the tire mold industry, upholding an innovative spirit to lead the progress and development of the entire industry.

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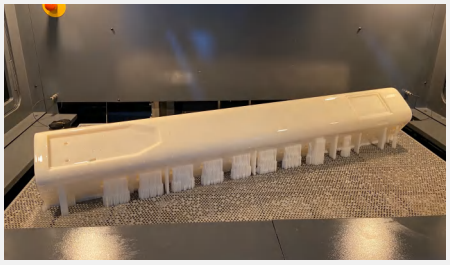
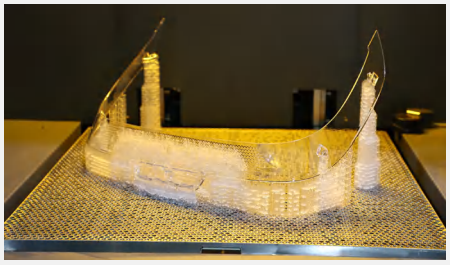
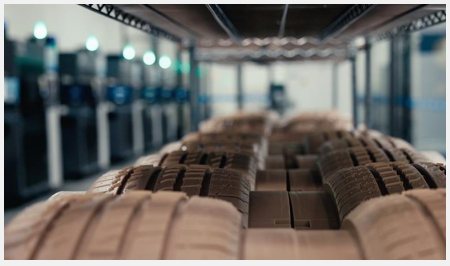
UnionTech - Global Provider of AM Solutions

Established in 2000, UnionTech stands as a global leader in the field of industrial SLA 3D printing. Within the realm of industrial 3D printers, we have successfully introduced 68 distinct products across more than 20 product series, showcasing our dedication to innovation and technological advancement. Our commitment to excellence is underscored by the acquisition of 185 patents, coupled with an investment exceeding 15 million USD in research and development over the past three years.

Presently, UnionTech's product technology encompasses printers, printing materials, and printing applications. This comprehensive approach equips us with exceptional integration capabilities, enabling us to manage the entire closed loop within the industrial printer market, spanning from upstream to midstream and downstream processes.




Headquarters

Room 102, Unit 40, 258 Xinzhuan Rd,
Shanghai 201612,
China

Further Offices

Bleichstrasse 8,
61137 Schöneck,
Germany

1718 N Fry Road #320 Houston,
Texas 77084,
United States