LASER SOLUTIONS FOR TIRE PRODUCTION

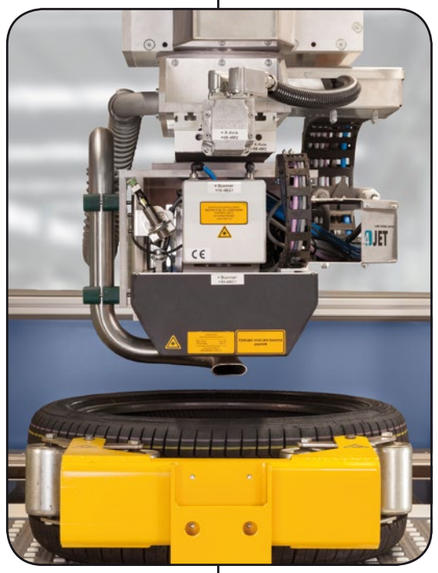
- Laser Tire Marking
- Laser Tire Mold Cleaning
- Laser Inner Liner Cleaning
- Sidewall Information Verification
- Integrated Systems

LASER | SYSTEME | SERVICES

4JET

LASER TIRE MARKING

Permanent and Individual Engravings



Laser marking in action:
A focussed laser beam vaporizes the tire rubber and leaves a crisp and permanent marking with soft edges. The process creates a plasma over the tire surface. The tire is not affected and requires no post processing.

T-Mark System

WORKING PRINCIPLE

- A focussed laser beam vaporizes rubber leaving a crisp engraving
- The beam spot moves over the surface with high precision by using galvanometer scan heads
- Vapors are evacuated locally

ADVANTAGES OF LASER MARKING

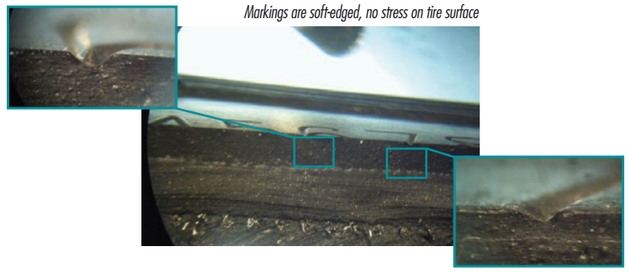
- **Permanent, unique and false proof engraving** of all tire types
- **Flexibility to engrave letters, numbers, graphics**
- **Enables 100% traceability** even after years of tire usage

TIRE MARKING FOR ...

- Individual serial numbers – 100% traceability
- DOT date codes
- OE customer logos
- Theft protection
- Test tires
- ECE 109 retread information
- Implementation of UN/ECE 117 and EC 661/2009

	Stamp in mold	Paper bar code	RFID	Laser
Individual info	No	Yes	Yes	Yes
Durable	Yes	No	Yes	Yes
Machine-readable	Conditional	Yes	Yes	Yes
Human-readable	Yes	Conditional	No	Yes

Tire marking technologies overview



Markings are soft-edged, no stress on tire surface

AUTOMATION OPTIONS

4JET's T-Mark System is designed for high-volume inline processing of tires. The fully automated process identifies the target position of each engraving, performs the marking process and a validation routine for each tire.
The handheld T-Mark Compact System is a highly flexible tool for engraving test and prototype tires, small production runs and retread tires in a semi-automated set-up.
Marking information is retrieved from a database or entered manually. After positioning the device by help of a manipulator the engraving is performed within a few seconds.

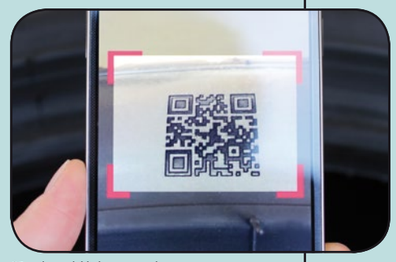
4JET machines are CE certified and built in accordance with US requirements (e.g. CDRH). Laser engraving is approved to be utilized for DOT date code engraving by NHTSA and major OE car and truck manufacturers.

T-Mark Compact – the handheld system is easily positioned using a balancer

SCANNECT TOTAL TIRE TRACEABILITY

- **Tire manufacturers** benefit from unique, permanent, low cost laser marking
- **Tire assembly providers** use QR code based unique IDs to assure tire/wheel combinations
- **OE car tire plants** assure 100% traceability
- **Car/Tire dealerships** connect to end customers
- **Fleet managers** can prevent theft, schedule replacements, and keep track of inventory
- **Private customers** can check a tire history, test reports and order replacement

Laser engraving on a tire sidewall

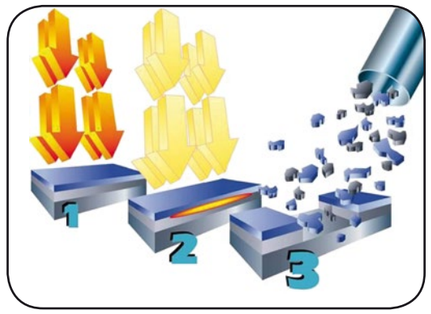


QR code readable by a smartphone camera

TIRE MOLD CLEANING

Touchless Cleaning for High Quality Tires

Stationary Tire Mold Cleaning System for Offline Cleaning (STMCS)



WORKING PRINCIPLE

- High power IR lasers with short pulses blast off the residue coating
- The metal surface remains unaffected and does not heat up during the short pulse duration
- Vapors and debris are evacuated locally

ADVANTAGES OF LASER CLEANING

- **High quality cleaning** of all mold types
- **Abrasion free** and complete cleaning of sidewalls and tread area – no mold damage
- **Lowest emissions** of all cleaning systems
- **Media free** (no dry-ice, no blasting media)
- **Lowest operation cost** of all cleaning technologies
- **Cleans hot and cold molds – both in-press and offline**

AUTOMATION OPTIONS

4JET has designed laser systems for cleaning molds in-press and offline. Both machine platforms use the unique and patented 6-axis cleaning head designed for maximum performance for complex tread patterns.
The laser light is steered into every section of the mold surface and leaves no residue behind.
The systems are suitable for cleaning segmented, puzzle and two-piece molds as well as sidewalls.

Green and Lean – Laser Mold Cleaning

Noise-Emissions per Mold Cleaning

Laser	78 dBA
Dry-Ice	100 dBA

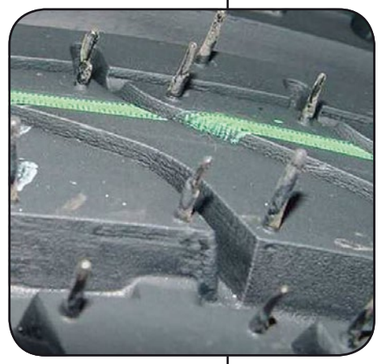
CO_2-Emissions per Mold Cleaning

Laser	4 kg
Dry-Ice	120 kg

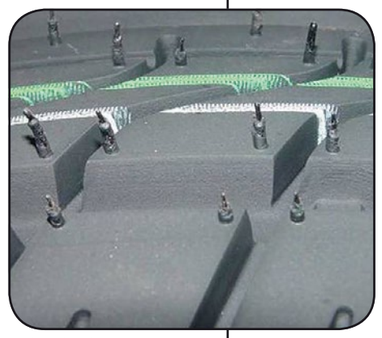
Energy Consumption per Mold Cleaning

Laser	12 kW
Dry-Ice	140 kW

Mobile Tire Mold Cleaning System for In-Press Cleaning (TMCS)



Imperfect cleaning



High quality cleaning (Laser)

INNER LINER CLEANING

Perfect Adhesion by Laser Cleaning

WORKING PRINCIPLE

- Release agents and other lubricants used in the production process are removed by high power IR lasers
- The structure of the tire remains unaffected
- Gapless processing is ensured by a variable angle of the processing head
- Arising particles and vapors are extracted locally

Partially cleaned inner liner

ADVANTAGES OF LASER CLEANING

- Spotless and dry cleaning of inner liner surface
- Leaves a perfect surface for adhesion of sealants, noise foam or RFID tags
- Self teaching machine for fast ramp-up
- Turn table design for maximum productivity and laser up-time
- Savings of consumable and recycling costs for the cleaning agents compared to wet chemical cleaning
- Compact footprint
- Low maintenance solid state laser

Tire Cleaning System (TCS)

T-SORT

First Tire Check and DOT Code Reading System

DETECT AND SORT

- Automated "First Tire Check" to verify complete sidewall information after mold changes
- Sorting tires and wheels by DOT date code recognition
- Stable laser scanning process suitable for low contrast and oily surfaces
- Self-learning software
- Compact footprint and fast cycle time allowing line integration
- Optional laser engraving feature

DOT date code and weekly code captured with T-Sort

T-Sort System

INTEGRATED SOLUTIONS FOR TIRE MANUFACTURING

Customized Laser Systems

LASER SYSTEMS TO ENABLE TOMORROW´S PRODUCTION

4JET creates integrated process solutions for innovative laser surface treatment solutions. Extensive know-how in surface and materials processing, an expert team of laser technologists, mechanical designers and software engineers and our state-of-art laboratories provide world class solutions for ablation, cleaning and modification of surfaces.

Our tool kit of modular designs for laser processes, optics, material handling and software allow us to quickly realize reliable and cost efficient solutions that are suitable for 24/7 mass production.

A global service network, professional project management and our culture of continous innovation make us the partner for bringing new technologies into mass production.

Looking for Tailor-Made Solutions?
Besides offering a number of proven system platforms we are able to supply custom made equipment.

Our strength – integrated systems!

4JET Technologies GmbH

Konrad-Zuse-Straße 1
52477 Alsdorf, Germany

☎ +49 (0) 24 04 55 230-0
🖷 +49 (0) 24 04 55 230-11

✉ sales@4jet.de
🌍 www.4jet.de

LASER | SYSTEME | SERVICES

4JET