



## CUSTOMER CASE STUDY

How Ford Otosan Gölcük Plant and Döktaş Manisa Aluminum Casting Plant Implemented CDOT barcodes for Enhanced Traceability in Aluminum Low-Pressure Die-Casting (LPDC) EV Battery Housing Manufacturing

<https://fordotosan.com.tr/en>

<https://www.doktas.com/en/>

Industry - Automotive / Casting and Forging

## Ensuring Reliable Traceability in EV Battery Housing Production

Döktaş Dökümcülük Aluminum Casting and its customer, Ford Otosan, were facing a significant challenge in establishing reliable production traceability for electric vehicle (EV) battery housings—critical components that endure extreme manufacturing processes. At the core of this challenge was the need to apply a robust coding system capable of withstanding heavy casting production at Döktaş, remaining readable throughout the entire process, and surviving all stages of production. The code needed to stay intact and scannable until the component was installed in the vehicle, ensuring seamless traceability.

Döktaş, one of Turkey's leading foundries specializing in aluminum low-pressure die-casting (LPDC), manufactures complex parts, including EV battery housings, which must meet stringent quality standards under challenging production conditions. To stay competitive and meet Ford Otosan's quality and transparency requirements, Döktaş integrated **CDOT barcodes**. These barcodes ensure accurate tracking and monitoring across the entire production line, especially under extreme conditions such as heat treatment. CDOT barcodes provide a reliable solution, safeguarding production traceability and helping to meet the rigorous demands of EV battery housing manufacturing.

## Challenges

### Reading After Heat Treatment at 540°C / 1040°F

**Traditional codes could not provide adequate traceability in the extreme environments of aluminum die-casting, particularly at temperatures as high as 540°C / 1040°F during heat treatment.** Codes often became unreadable after exposure to these conditions, making it difficult to track each part from casting to final inspection.

### Reading in Rigorous Processes From Rough and Shiny Surfaces despite Specific Light and Optics

The battery housings undergo various processes like deburring, straightening, and heat treatment. The surfaces, often rough or shiny, made traditional barcode and datamatrix unreadable. Additionally, maintaining the integrity of the codes throughout these stages, including on parts exposed to **heat, pressure, and treatments**, posed a significant challenge.

### Real-Time Monitoring of Production and Scrap

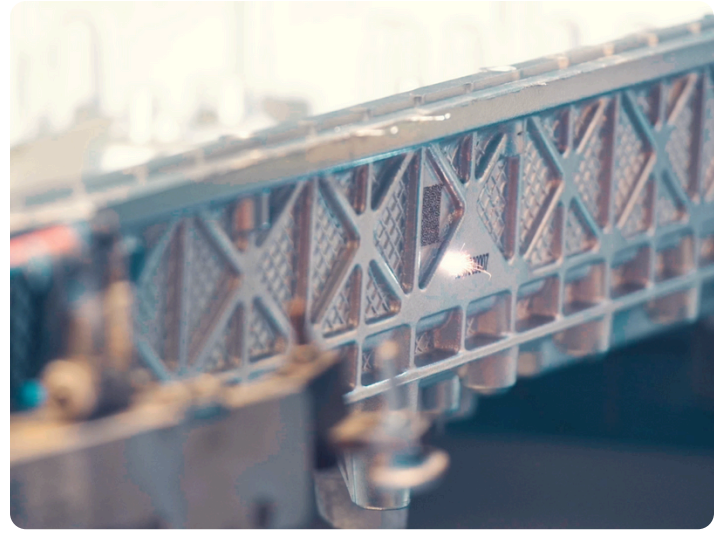
Döktaş required a system that could capture and monitor **real-time process data**, such as temperature, pressure, and cycle times. The lack of real-time monitoring hindered the ability to identify issues promptly, leading to production inefficiencies and **higher scrap rates**.

## CDOT Barcode Solution

Döktaş Dökümcülük and FORD Otosan collaborated with Cosmodot to implement the **innovative CDOT barcodes**. This next-generation 2D code specifically designed to handle the extreme conditions which are also present in low-pressure die-casting manufacturing environments. **The CDOT code could be applied via a regular laser marking device**, providing a durable and reliable solution for marking on aluminum surfaces exposed to high temperatures and mechanical stress.



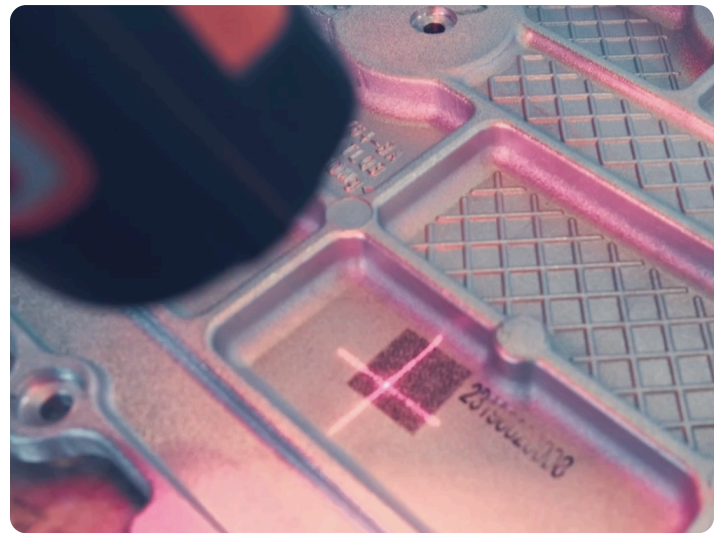
Marking CDOT code on cast aluminum



Markable with any lazer marking machine



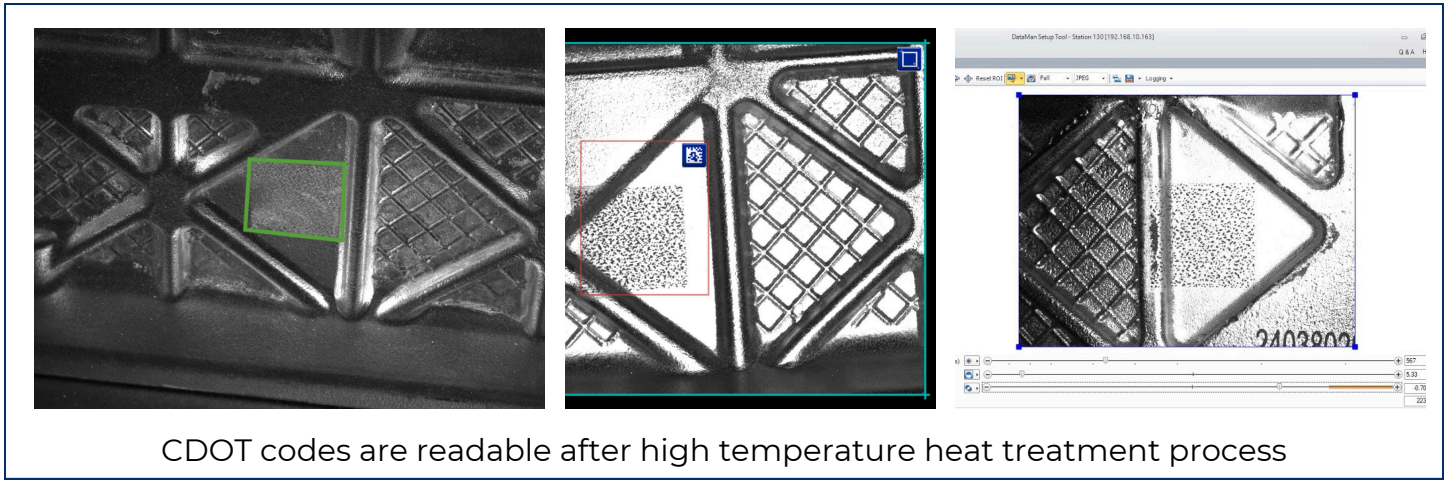
Readable with any industrial camera



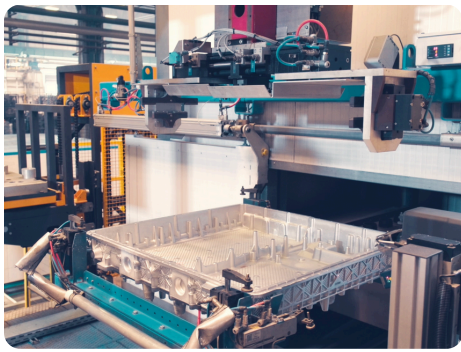
Readable with any handheld terminal

## Key Features of CDOT Barcode

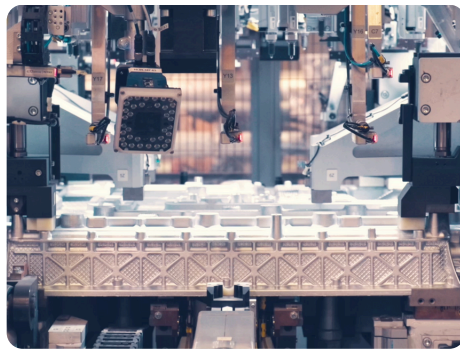
**Resistance to Heat-Treatment:** The CDOT code is laser-engraved onto battery housings, each CDOT code having a unique ID for each battery housing, ensuring durability throughout the entire production process, including heat treatment. **Unlike traditional barcodes, the CDOT code remains readable even after being exposed to temperatures exceeding 540°C / 1040°F.** CDOT remains durable even after exposure to this temperature for over two hours.



**Real-Time Part Data Collection and Monitoring with Any Industrial Camera:** The integration of regular industrial cameras and handheld terminals allowed Döktaş to read the CDOT codes at multiple stages of production. This enabled real-time monitoring of critical parameters such as pressure, temperature, machine status, and cycle times for each individual part. Shortly, the real-time communication aligns the data with the product ID.



100W laser marking device in the air quenching unit



Regular industrial cameras at each station



Regular handheld readers at inspection desks

**Döktaş Dashboard**

Production Period: 15:00:00 - 16:00:00

Station Throughput: 592

Döktaş Factory Full Line Control

Ürün ID	Toplam	Kabla Bekleyen	Kabla OK	İst İşlem Bekleyen	İst İşlem OK	Kırtanma Bekleyen	Kırtanma OK	Yanama Bekleyen	Yanama OK	Montaj Bekleyen	Montaj OK	Final OK
Kapak	1473	603	1070	476	1507	277	603	21	1462	42	1420	2
İst İşlem	1445	62	1383	132	1253	166	1076	56	1432	42	1390	2
Toplam	3178	765	2353	608	2760	382	1481	77	1794	144	1810	724

**Döktaş Alu BU Data Flows**

Daily Process Count by Location

Daily Process Count

Over 15 processes are tracked for each part engraved with a unique CDOT barcode, enabling real-time monitoring of machine parameters and quality metrics

- Seamless Integration with Manufacturing Processes:** CDOT's unique capabilities allowed for easy integration with downstream processes such as deburring, straightening, heat treatment, and final inspection. The system provided end-to-end traceability and prevented human errors during the production process.



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*For the past two years, we have been searching for a code or application for our aluminum low-pressure casting products that is readable and durable. Despite trying various coding and tracking technologies, we were unable to achieve satisfactory results until we implemented the CDOT barcode. With CDOT in place, both our team and our customer can easily track all processes, making everything much more efficient. CDOT has significantly improved our operations.*

*— Gökhan Aksu, Maintenance & Investment Manager, Döktaş Dökümcülük Aluminum and Wheels Plants*

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## Key Results

Introduction of CDOT barcodes established a comprehensive part-based tracking system, enhancing traceability in aluminum low-pressure die-casting manufacturing.

**Superior Barcode Technology:** CDOT codes provide durability on hot surfaces exceeding 700°C and maintain resilience through heat treatment, enabling 100% traceability.

**Enhanced Operational Efficiency:** Integration of part-based traceability improves identification of errors and specific processes, leading to:

- 18.5% increase in process efficiency.
- 14.5% increase in labor efficiency through lean practices and automation.
- 12.5% reduction in inventory of raw materials, semi-finished, and finished products.



**Improved Production Planning:** Achieved a 9.5% improvement in planning through regular demand flow and mass customization.

**Anomaly Identification:** Proactive monitoring minimizes scrap rates and optimizes resource utilization.

**Quality Performance Enhancement:** Achieved a 23% improvement in quality performance, including early error detection.

**Maintenance Performance Improvement:** 22% enhancement in maintenance performance through visibility of parameters and real-time monitoring.

**Sustainable Performance:** Leveraging advanced coding systems allows enterprises to navigate modern manufacturing complexities, driving sustainable performance and competitive advantage.



By continuing to enhance end-to-end traceability of their aluminum products, Döktaş Aluminum Casting is taking significant steps to transform its operations and increase process analytics. As part of their ongoing transition to sustainable production, the company will soon begin tracking energy, water, and carbon values for each part. In the next phase, predictive maintenance and production forecasting, driven by AI and machine learning, will be fully integrated into their systems. Moving forward, Döktaş intends to implement digital twin technology, enabling real-time crisis resolution simulations and rapid product development.

*"We will keep partnering with Cosmodot in the future, particularly in maintaining our predictive maintenance systems and advancing our digital twin initiatives. The key to success lies in sustaining optimal performance through continued digital transformation. There is no doubt that this journey will be ongoing – and Cosmodot will be our long-term partner to help us achieve our vision."*

*– Gökhan Aksu, Maintenance & Investment Manager, Döktaş Dökümcülük Aluminum and Wheels Plants*

TO LEARN MORE, PLEASE CONTACT YOUR COSMODOT REPRESENTATIVE OR VISIT US ONLINE AT [THECOSMODOT.COM](https://www.thecosmodot.com)