

# Structural Repair and Certified Manufacturing of Lifting Equipment Components

A Strategic Technical Solution for the Oil & Gas Sector

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## 1. ABSTRACT

The oil & gas industry operates in extremely harsh environments where the integrity of lifting equipment is essential for operational safety and continuity.

This paper presents a modern, reliable and certified approach to structural repair of metallic components and the manufacturing of spare parts using fully traceable, internationally certified materials.

ICOS integrates engineering expertise, precision machining, strict quality control, certified welding, specialized industrial coating, and laser-engraved identification plates to deliver robust technical solutions that extend equipment life, reduce operational costs, minimize downtime, and meet the stringent requirements of oil & gas operations.

**Keywords:** Structural repair, lifting equipment, oil and gas industry, certified materials, welding and coating validation, spare parts manufacturing, laser engraving, asset traceability

## 2. INTRODUCTION

In offshore and onshore operations, every metallic component subjected to load, vibration, and corrosion plays a critical role. When these components experience wear or damage, structured repair - executed with technical rigor and international certification - becomes a strategic solution to ensure operational safety and efficiency.

Figure 1 illustrates a representative example of a damaged metallic component prior to intervention.



*Figure 1: Example of metallic component damaged before structural repair*

ICOS ensures that every project follows international standards, auditable procedures, and practices aligned with the expectations of major oil & gas operators.

## 3. STRUCTURAL REPAIR AS A STRATEGIC SOLUTION

Structural repair provides significant advantages to oil & gas operators seeking efficiency, safety, and cost reduction without compromising equipment integrity.

## 2.1. Industrial-Precision Structural Restoration

ICOS performs a range of structural repair activities, including:

- Correction of deformations and misalignments
- Restoration of original dimensions
- Reconstruction of degraded metallic sections
- Reinforcement of critical areas exposed to high stress

Figure 2 shows a CNC-machined spare part manufactured for structural integration.



*Figure 2: CNC machining of a spare part for integration in structural repairs*

These processes ensure that each repaired component maintains proper mechanical resistance and dimensional accuracy.

## 4. MANUFACTURING OF SPARE PARTS USING CERTIFIED MATERIALS

Certified materials are essential to guarantee:

- Mechanical resistance
- Full traceability
- Compatibility with ASME, EN and ASTM standards

ICOS manufactures spare parts internally using:

CNC turning and milling

- High-precision industrial cutting
- Forming and finishing machining

All materials are certified according to EN 10204 (3.1 / 3.2), providing oil & gas clients with:

- Reduced dependency on imports
- Shorter lead times
- Guaranteed compatibility with original equipment
- Enhanced operational reliability

## 5. CERTIFIED WELDING FOR THE OIL & GAS INDUSTRY

Welding is a crucial stage in any structural repair process. ICOS guarantees that all welding activities — performed internally or by certified partners — fully comply with international standards such as ASME IX and EN ISO 9606, ensuring:

- Qualified welding procedures (WPS/PQR)
- Certified and audited welders
- Stringent control of critical welding parameters
- Complete documentation and traceability

## 6. LASER-ENGRAVED IDENTIFICATION PLATES

Traceability is a fundamental requirement in the oil & gas industry.

To ensure clear and permanent identification of repaired or manufactured parts, **ICOS produces its own identification plates (nameplates) using high-precision laser engraving technology.**

This process guarantees:

- Permanent markings resistant to abrasion
- Excellent legibility even in marine environments
- Engraving of codes, serial numbers, batch data, dates and specifications
- Compliance with inspection and audit requirements
- Reduced costs and full customization flexibility

Figure 3 shows an example of a laser-engraved identification plate produced by ICOS.



BEFORE



AFTER

*Figure 3: Laser-engraved identification plate manufactured by ICOS*

## 7. FINAL RESULTS FOR THE CLIENT

After completing structural repair, protective coating, and identification marking, equipment is ready for safe reintegration into operation.

Figure 4 presents a fully repaired, coated, and identified component.



*Figure 4: Fully repaired, protected, and identified metallic component*

Clients benefit from:

- Significant cost reduction
- Extended equipment lifespan
- Full compliance with international standards
- Enhanced operational traceability
- Reduced downtime

## 8. CONCLUSION

ICOS integrated approach — combining structural repair, certified spare-part manufacturing, validated welding, specialized coating, and laser-engraved identification — responds to the challenges of the oil & gas sector with precision, safety, and efficiency.

Repairing a component is not merely correcting a defect; it is:

- Protecting operations,
- Reducing costs,
- Enhancing reliability,
- And ensuring continuous performance in critical environments.

With this methodology, ICOS positions itself as a strategic partner for companies requiring high-quality, traceable, and dependable industrial equipment solutions.

## 9. REFERENCES

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