CASE STUDY | REMEDIAL | IN-FIELD REPAIR

IWS INTEGRATED WELLHEAD SERVICES

In-Field Remedial TIG Welding of 4130 Wellhead Equipment

Four 4130 plugs TIG-welded within a 4130 spool on offshore wells — restoring wellhead equipment in place, not replacing it.

SCOPE	MATERIAL	LOCATION	STANDARD
Remedial TIG welding (GTAW)	4130 plugs in a 4130 spool	Offshore — repair in place	NACE MR0175 · ASME IX

THE CHALLENGE

On offshore wells, 4130 wellhead equipment — a 4130 spool with four separate plug locations — needed remedial welding to restore it to service, carried out in place rather than removing and replacing the equipment.

4130 is a low-alloy steel that is sensitive to its thermal history. Remedial welds on it must be controlled precisely, and in sour service they must also meet **NACE MR0175 / ISO 15156** hardness limits — on equipment already installed on the wellhead.

Replacement would mean cost, lead time and downtime. Repair in place — done correctly and verifiably — avoids all three.

WHY IT WAS DIFFICULT

- **Precision TIG on 4130.** GTAW (TIG) was selected for its control and clean, high-quality deposit — essential on 4130, where heat input and hardness must be tightly managed to avoid brittle, crack-prone microstructure.
- **Four separate repairs.** Four individual plug welds within one spool, each qualified and consistent — repeatability, not a one-off.
- **Repair in place.** Restoring installed wellhead equipment on location, to code, without the controlled conditions of a workshop and without removing the spool.

THE STAKES

Wellhead equipment is pressure-containing and safety-critical. A remedial weld that does not meet code is not an option — the repair has to restore full integrity, verifiably.

Done right, repair in place converts a potential equipment replacement — with its cost, lead time and downtime — into a fast, documented restoration that returns the well to service.

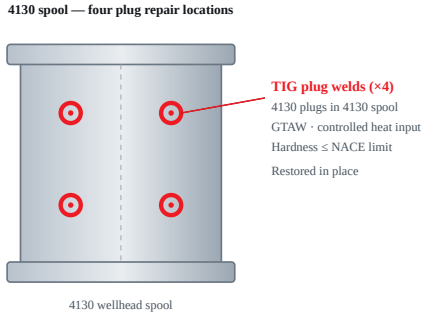
The requirement: a code-verified 4130 repair, executed in place, that restores the equipment to full service.

Repair in place	TIG / GTAW	×4 welds	Verified
No removal, no replacement	Precision process for 4130	Consistent, qualified repairs	NDE & hardness to NACE, documented

THE SOLUTION

IWS carried out the repair as a **qualified TIG (GTAW) procedure**, backed by a welding procedure specification (WPS) and supporting procedure and welder qualification records for 4130 in sour service.

- **TIG for control.** GTAW selected for precise heat input and a clean, high-integrity deposit — the right process for remedial work on sensitive 4130 material.
- **Hardness & thermal control.** Documented preheat, inter-pass control and heat treatment to keep weld and HAZ hardness within NACE MR0175 limits on 4130.
- **Four consistent repairs.** Each of the four plug welds executed to the same qualified procedure — restoring the spool as a whole.
- **Verification built in.** NDE and hardness verification on the completed repairs, with the documentation to confirm the equipment was restored to code.



Schematic — remedial TIG plug welds in a 4130 spool (illustrative, not to scale)

THE RESULT

All four 4130 plug welds were completed **in place**, restoring the wellhead equipment to service without removal or replacement — verified and documented to code.

The job stands as a **benchmark remedial capability** for IWS: NACE-compliant repair of 4130 wellhead equipment carried out at the rig site rather than requiring workshop return or replacement.

> *"Repair in place, done to code, meant the operator restored the equipment instead of replacing it — saving the cost, the lead time and the downtime."*
>
> **— IWS PROJECT ENGINEERING**

VERIFICATION & RECORDS

- **Procedure qualification** to ASME IX (GTAW), with WPS and supporting records.
- **Hardness verification** across weld and HAZ within NACE MR0175 limits on 4130.
- **Controlled thermal cycle** with documented preheat and inter-pass control.
- **NDE sign-off** on each of the four repairs before return to service.

> *"Restoring 4130 equipment in the field, to NACE, takes procedure and control — not improvisation. That is exactly what we brought."*
>
> **— IWS WELDING ENGINEERING**

KEY TAKEAWAYS

This case shows a capability that saves operators real money: code-verified remedial welding that restores wellhead equipment in place.

- **Repair, not replace.** Four 4130 welds restored the spool in place — avoiding the cost, lead time and downtime of replacement.
- **TIG precision on 4130.** The right process, qualified and controlled, for sensitive low-alloy wellhead material.
- **Verifiable restoration.** NDE and hardness records confirm the equipment was returned to full, code-compliant integrity.

WHY IT MATTERS

Being able to repair 4130 wellhead equipment in the field — to NACE, with records — turns a costly replacement into a fast, documented restoration.

This is why operators call IWS when equipment needs to be restored, not just removed.