

MANUFACTURE REQUIREMENTS

CASE STUDY PACK



ENGINEERING MOMENTUM



Probe has been a trusted supply chain partner for engineering projects for over four decades. In this time, we have worked closely with our clients, building lasting relationships, to enable them to optimise asset productivity and performance.

Manufacturing oilfield equipment is at the core of the Probe offering. We are acutely aware of the demands and deadlines placed on our clients; so we are reliably responsive to their request to ensure projects are delivered quickly but without compromising quality and safety.

Our promise to you is always to find a solution to your engineering requirements, whilst delivering momentum to your project. The content of this case study pack provides insight into how we have provided unrivalled results to some of the design, procurement, manufacture and quality assurance challenges our clients have had over the years.

Thank you for taking the time to read this case study pack. We look forward to helping with your project very soon.

David Brennan Managing Director

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CASE STUDY 1

Fully clad components for HP filter system

The problem

Probe's client is an international energy services provider that manufactures and distributes products which enable the extraction of oil and gas for the world's leading companies. When they were asked to build a high-pressure filter system for an operator in the North Sea, they approached Probe to supply them with a range of filter vessel components. The manufactured items would be used to protect downstream components from contamination levels beyond the recommended cleanliness target.

The project required Inconel 625 corrosion resistant cladding being applied to the internal parts of the components, which would be exposed to a sour environment.

Sour environments are defined as fluids containing water as a liquid and hydrogen sulfide exceeding the limits as defined; these environments may cause sulfide stress cracking (SSC) of susceptible materials. Probe were called to manufacture and supply 7 1/16" 10,000 flanged and butt weld elbows, studded manifold blocks, long filter body sections and bottom subs along with closure plugs and acme collars to support this challenge.

This was the first time our client had been challenged with producing a fully clad filter system. They were aware of Probe's ability, having purchased several sets of components in the past, and long-standing reputation of producing fully clad components, so embarked on a close collaboration with Probe to achieve the desired result for the end client.

The solution

Probe manufactured in-house, all the required parts for the system, with the exception of the valves and skid. All parts were manufactured to meet API 6A (20th Edition), PSL-3 and the client's own specification; with all internal parts of the system requiring additional corrosion resistant alloy (CRA) cladding. Our solution was as specified to apply Inconel 625 to all internal surfaces and over the fabrication welds.

Due to the length of the bodies, Probe developed innovative extra-long arms for the cladding heads, whilst a camera was also required to monitor the weld beads during this process.

Fully cladding many of the components with Inconel 625, as opposed to producing them all in solid alloy, reduced project costs considerably. The long bores of the vessels did not require re-machining after cladding, as the method used, produced a good surface finish.

During the project, the end client also decided that the test ports in several of the flanges could not be clad in the small bores. Probe responded to the request by replacing the components with Duplex stainless steel to ensure that the materials used on the whetted parts were completely corrosion resistant.

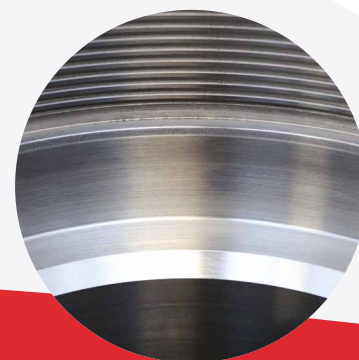
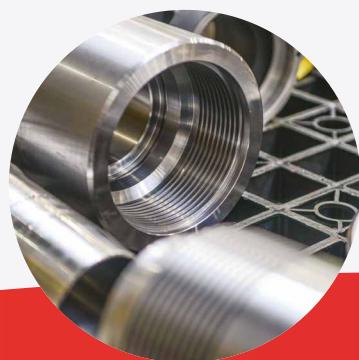
Throughout the project quality was assured by Probe. An ultrasonic examination of the raw material, magnetic particle examination of pre-clad surfaces and a dye penetrant examination was carried out. Final examinations and surface hardness surveys ensured that all products produced by Probe were fully compliant with the requirements of the specification.

Dave Good, Technical Sales Manager, Probe, said "We worked very closely with our client on this project, responding to developments throughout the process. We are delighted to have been a main supplier of components for this pioneering piece of work, which by being fully clad, has set a standard for future equipment for operators in the North Sea."

The result

A successful solution to the client's requirements had been created. Probe supplied the equipment in a timely manner, allowing our client to complete the build of the high-pressure filter system which was then delivered to the operator in the North Sea.

“As this was our first time producing a fully clad filter system it was key that we used a supply chain partner who had a long-standing reputation in this area. Probe were able to deliver a foolproof solution which was fully compliant to the quality standards we required.”



CASE STUDY 2

Cost-effective innovative cladded spool component

The problem

When our client required an innovative spool component developed as part of a wider project, based on their design parameters and guideline drawings, they approached Probe for a manufacture solution.

Our client is a subsea engineering and offshore technology company who specialise in the supply of tailored equipment and engineering services to enable the execution of challenging offshore projects. Their promise to clients is to deliver bespoke equipment solutions on spec, budget and on time. Probe were the ideal supply chain partner to work with on this project due to our ability to meet short lead times and provide a wide variety of corrosion resistant finishes, whilst upholding the highest quality and safety standards.

The end client required the wellhead component to be used in a flanged wellhead assembly to secure the upper end of a casing string. A corrosive resistant finish needed to withstand the harsh environment in which the product would be situated in.

Probe were challenged with aiding in the design and manufacturing of an inlaid spool component which would meet the needs of this project and conform to industry standards.

The solution

Probe were initially presented with the client's design parameters. We utilised our dedicated in-house design team to compile the engineering drawings, which would allow our operations team to manufacture the spool.

Our design and manufacture process conformed to the required API 16A and DNV OS-E101 standards. This included developing the bespoke aspect of the cladding to the spool. An Inconel 625 inlay was applied to all whetted areas including the bore. Surface modification of oilfield components for protection against corrosion is critical in the offshore industry. Among the various coating techniques for surface modification of ferrous metals, Inconel 625 cladding offers advantages over other conventional techniques such as thermal spraying and arc weld. Applying this cladding also provides a cost-saving innovative solution as opposed to producing the whole component in solid alloy, with a cost-reduction of up to 60%. This is achieved by only cladding areas at immediate risk of corrosion which include bores, connector seals, ring grooves, valve seats and flange faces. Applying this cladding to the client's spool meant that it was protected with a high-quality layer with minimal imperfections.

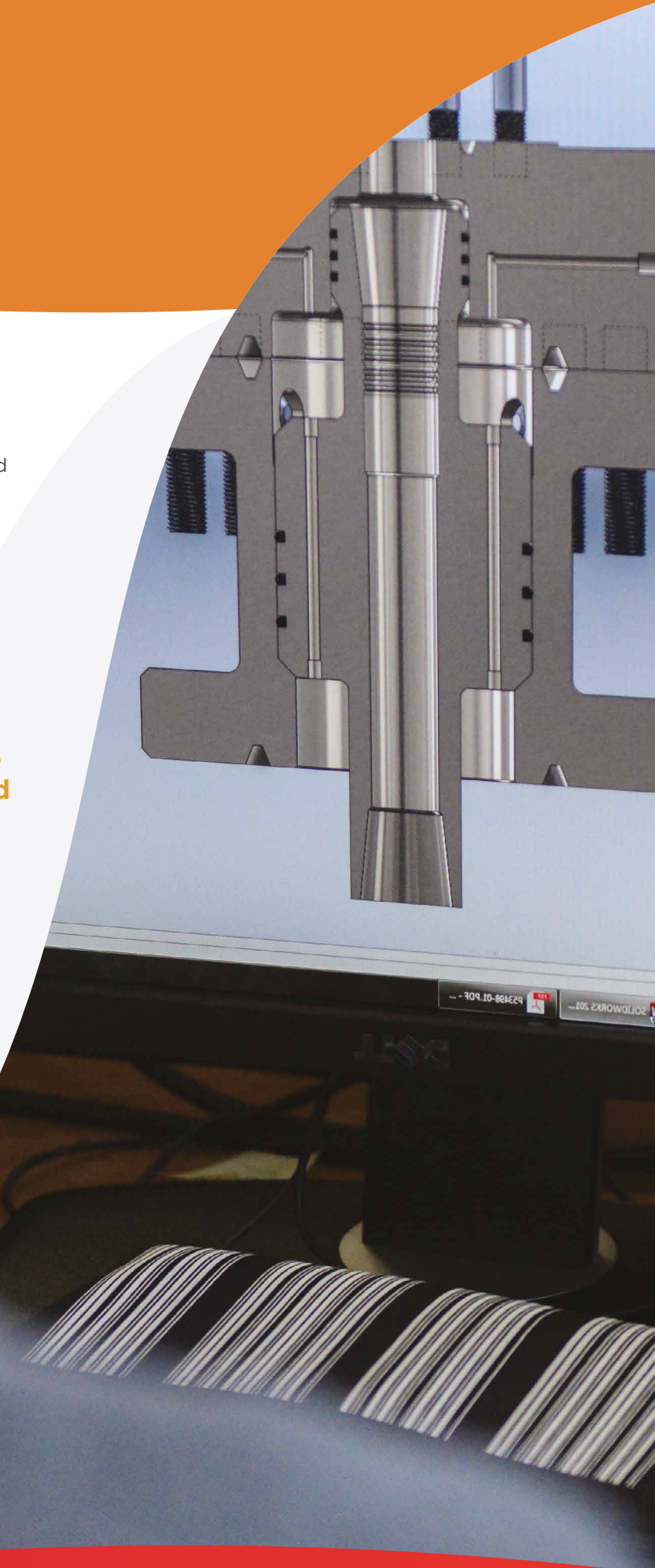
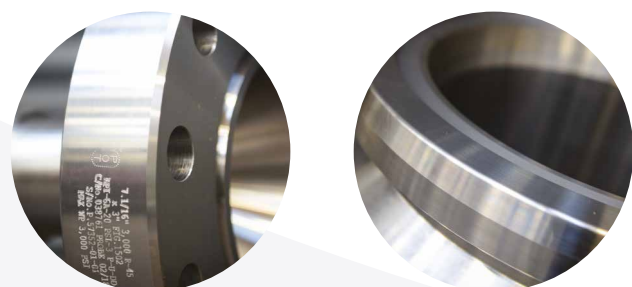
The spool was finished with paint to meet the NORSOK M501 standard. This NORSOK standard gives the requirements for the selection of coating materials, surface preparation, application procedures and inspection for protective coatings to be applied during the construction and installation of offshore installations and associated facilities, which is a compliancy in Norway. Finally, the product was fully inspected and witnessed by DNV GL engineering consultants and received excellent feedback and approval before being shipped to our client.

Marc Saiche, Sales Engineer, Probe, said, "Our engineers worked closely with our client throughout the design and manufacture process, whilst considering the best bespoke cladding solution to meet the client's expectation. I was delighted that we received such good feedback from DNV GL. This just reinforced our non-destructive testing (NDT) methods and is another example of a high-quality piece of equipment provided for our client in a timely manner."

The result

For the end client, a full turnkey project with design aid and manufacture of a fully inlaid and painted product was achieved.

"We were extremely impressed with Probe's design and manufacturing processes throughout this project. The knowledge and expertise the team provided, ensured we were able to achieve the right cost-effective and innovative wellhead solution for our client."



CASE STUDY 3

A trusted supply chain partner for over 20 years

The problem

Probe's client is a premium supplier of high pressure production pipework products to major oil companies, and service providers in both the UK and Europe.

Probe has been a trusted supply chain partner of engineering projects for this client for over 20 years. In this time, we have been set challenges that have required the optimization of many of their assets by manufacturing components that ensure productivity and performance is improved.

With all projects, the equipment has required the highest standards of manufacturing innovation to be applied to conform to API specification 6A and related standards.

The solution

Our in-house raw material stock, machines and engineering expertise has allowed us the flexibility to design equipment manufactured to all the specific intellectual property (IP) that has been supplied by the client over the years. Our stock held is generally more than 1,000 tonnes and we therefore have been able to meet urgent delivery times that our client has had from this holding.

Probe have manufactured products for our client such as blind flanges, spool adaptors, hammer unions, hubs, clamps, and also developed pressure test stumps, quick union adaptors, and manifold blocks.

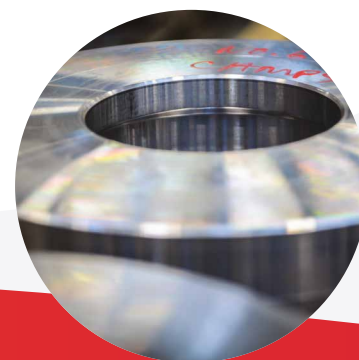
David Brennan, Managing Director, Probe, said, "Manufacturing oilfield equipment is at the core of the Probe offering. We are acutely aware of the demands and deadlines placed on clients; so we are reliably responsive to their ongoing requests to ensure projects are delivered quickly but without compromising quality and safety.

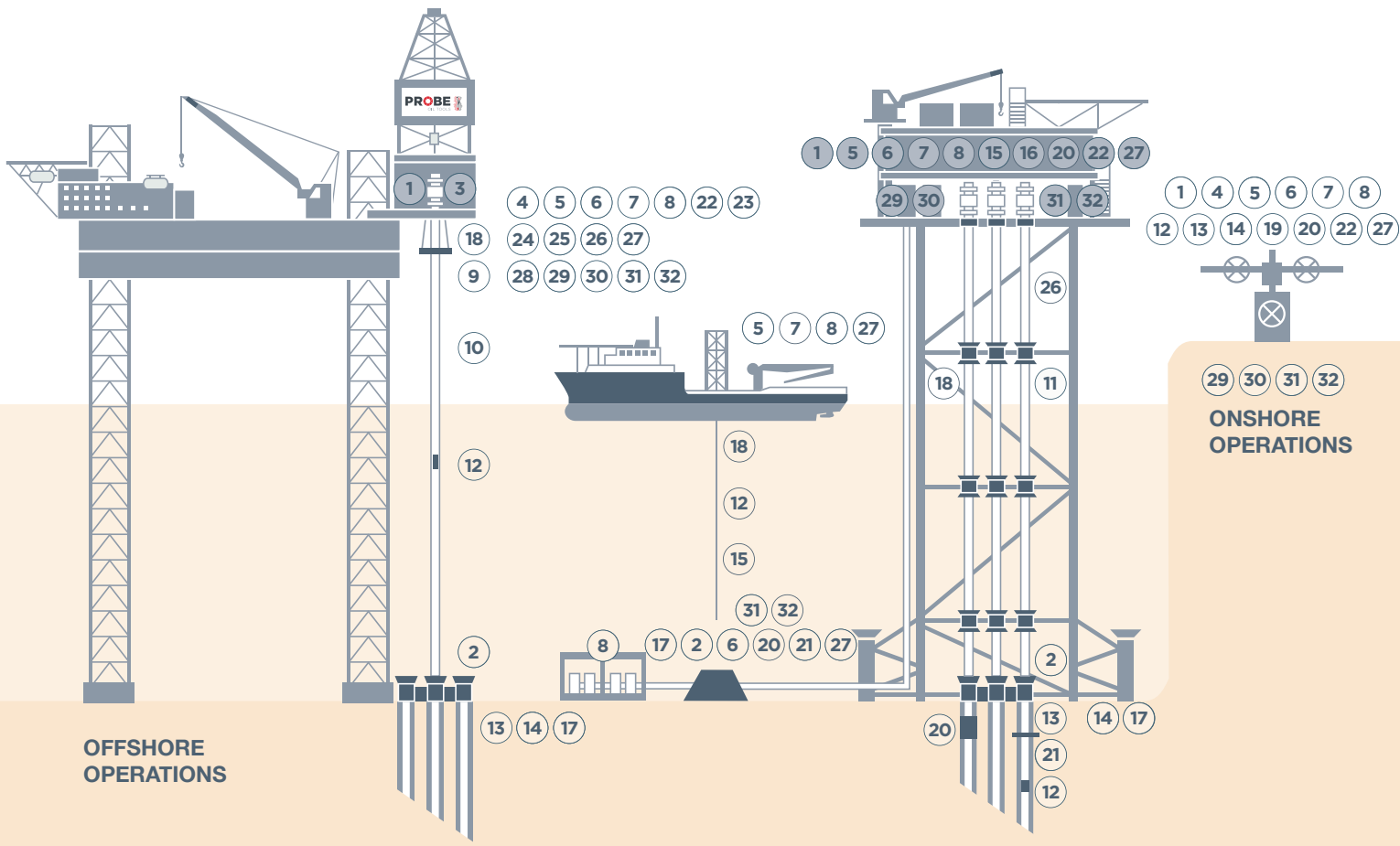
"Supporting our machining capabilities, we are fortunate to have automated welding stations which allows us to provide a range of corrosion resistant claddings. Applying cladding to components, as opposed to producing them in solid alloy, is a popular cost-saving choice for all our clients, which allows them to maximise the life of their assets. We have been delighted to work in collaboration with our client on many innovative projects over the years and look forward to continue this partnership in the future".

The result

All equipment for our client has gone through our rigorous inspection process prior to delivery, carried out by Probe's highly qualified in-house team. They are equipped with a comprehensive range of inspection devices, including a precision measuring centre and MRP gauges. The inspection department also includes a fully equipped light controlled room for non-destructive testing (NDT). Our products are all supplied with specific certifications which can all be accessed via the Probe online portal.

"The Manufacturing service area from Probe has grown significantly over the time we have worked with them. The Probe team are an essential supply chain partner to both our onshore and offshore oilfield operations and the cost reductions and time saving solutions always allow operations to run safely and successfully."





OFFSHORE OPERATIONS

ONSHORE OPERATIONS

- | | | | |
|---------------------------|----------------------|--|---|
| ① Surface wellheads | ⑨ Tension rings | ⑰ Subsea offset adaptors | ⑳ Tubing & casing crossover subs |
| ② Subsea wellheads | ⑩ Drilling riser | ⑱ High pressure high temperature riser | ㉑ Pup joints |
| ③ Wear bushings | ⑪ Marine riser | ㉒ Frac head | ㉒ Lift subs |
| ④ Drilling spools | ⑫ Flow control tools | ㉓ Instrument flange/test caps | ㉓ Rotary connection repair |
| ⑤ Surface trees | ⑬ Casing hanger | ㉔ Test plugs & running tools | ㉔ Casing connection repair |
| ⑥ Diverter spools | ⑭ Tubing hanger | ㉕ Chiksan pipe | ㉕ Tubing connection repair |
| ⑦ Double studded adaptors | ⑮ Lubricator | ㉖ Drifts | ㉖ Wellhead repair & maintenance |
| ⑧ Choke & kill manifolds | ⑯ Wellhead desander | ㉗ Rotary crossover subs | ㉗ Pressure equipment repair & maintenance |

