

As Good as New

Retrofit3D trim breathes new life into an undersized valve

Location: Africa

Client: Offshore oil & gas facility



The Challenge

A major offshore oil & gas facility, located 150km off the coast of Nigeria, was spending valuable time investigating problems experienced by its second stage water transfer pumps. On closer inspection, it became clear that the valve on the mini flow line was too small for the flow through the pump. The valve was designed to handle a maximum flow of $257 \text{ m}^3/\text{h}$, while the actual required flow was $310\text{m}^3/\text{h}$ – putting a strain on the system.

Undersized valves experience a higher pressure drop across the valve to maintain adequate flow and exhibit limited flow capacity. The restrictions in the valve can cause a build-up of pressure, risking damage to upstream pumps or other equipment. An undersized control valve generally cannot deliver sufficient flow rates under maximum load conditions.

Faced with these problems, the customer turned to IMI CCI (part of IMI Critical Engineering's family of specialist companies) for help.



The Solution

IMI CCI's specialists worked closely with the plant maintenance engineer to carry out a full review of the system and its actual operating conditions. The customer was looking for a cost-effective solution that did not involve replacing the entire valve.

Having reviewed the original specifications, including the requirement for multi stage control to handle the high pressure drop, IMI CCI's engineers proposed an upgrade of the valve trim using IMI Critical's state-of-the-art Retrofit3D solution. Retrofit3D harnesses the power of additive manufacturing (or 3D printing) to design and manufacture custom-made valve trim. The bespoke trim is tailored to a specific application and process and avoids the extra time and expense involved in changing the valve body.

IMI CCI's engineers calculated that changing the trim from 5" to 6" would increase the valve's capacity to meet the required flow co-efficient (C_v) for the process conditions. The entire trim assembly (seat and plug) was upgraded to the larger size, while the cage assembly was replaced with a single 3D-printed cage, incorporating multi-stage paths to reduce pressure. This cage would provide enhanced flow control by incorporating "tear drop" holes using an innovative 3D printing technique called direct metal laser sintering. Manufacturing the trim in Inconel 718, which provides enhanced resistance to the erosion caused by high velocity water, will also extend the service life of the valve.

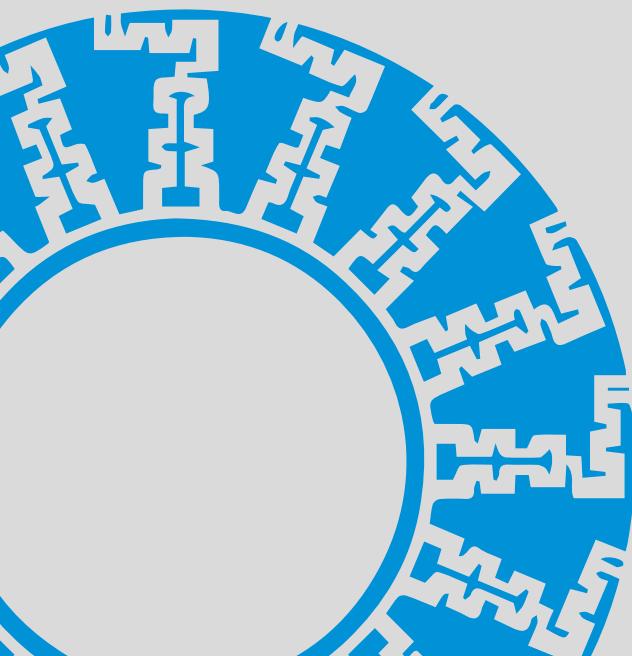
This solution allowed the customer to reuse the existing valve body, bonnet, actuator and accessories, saving the cost of replacing those parts. Meanwhile, the new 6" trim was delivered within 12 weeks, dramatically improving the efficiency of the plant, as well as reducing maintenance cycles.



IMI CCI's multi-path, multi-stage DRAG® trim designs provide optimal performance

The DRAG® Disk Stack

IMI CCI's DRAG® Disk Stack is a multi-stage, tortuous path trim that uses right angle turns to reduce the pressure through the valve in controlled stages. The multi-stage trim design eliminates problems with flashing, cavitation, erosion, noise, and vibration by limiting the fluid trim exit velocities to less than 100 ft/s, which is in line with ISA guidelines.



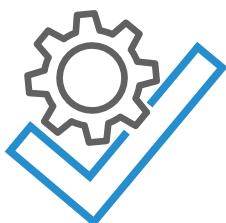
Great Value from Great Valves

By taking advantage of IMI Critical's Retrofit3D solution technology, our customer's are able to:



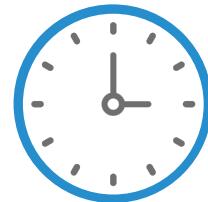
Save money

Retrofit3D is a cost-effective solution, avoiding expensive installation costs such as engineering, pipe cutting, welding, pressure testing, and QA testing.



Improve TCO

Lower maintenance, improved efficiency, and better trim performance, along with a reduced need to plan and stock spares, provides a better total cost of ownership.



Move quickly

As a drop-in solution, Retrofit3D takes away the time-consuming activities of replacing an entire valve. Furthermore, using additive manufacturing technology, Retrofit3D allows quick turnaround, so you don't have to plan months ahead.

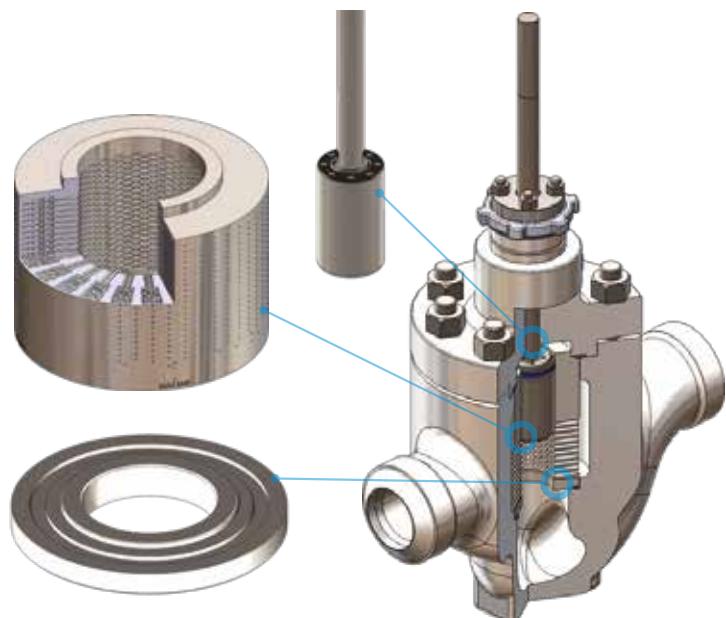


Increase efficiencies and reliability

The retrofitted valves deliver greater process control, higher performance levels, and stronger reliability for the plant.

Example Trim

IMI Critical's Retrofit3D solution and DRAG® Disk Stack technology allow plants to seamlessly upgrade their valves to cope with significant changes to process conditions.



“ IMI CCI valves require minimal maintenance and deliver exceptional performance.

“ It is expensive and time-consuming to replace a valve... being able to simply drop in a trim set – that is huge.

“ Retrofit3D helped us stay within our budget and keep the plant competitive in the marketplace.

Retrofit3D is available for over 50 different valve models, so contact us at retrofit3d@imi-critical.com now, and let us improve your control valve operations!