

Aster Bukom

Innovative AOGV design allows successful replacement of 3 valves on live system without shutdown at critical energy infrastructure Refinery in Singapore.



CHALLENGES

- Maintain system online capability – avoid shut-down
- Replace 3 inoperable plug valves
- Fuel gas flowing medium at up to 1300 m³ per hour
- Ensure full system integrity with zero HSE concerns
- Rigid piping infrastructure
- Corroded flange faces and potential gasket removal issues

Challenge

A Major provider of Integrated Energy Solutions needed to replace three inoperable valves at a refining and petrochemical facility in Singapore. Whilst traditional intervention solutions would require a facility shutdown the client was evaluating utilizing the Izomax AOGV as a viable alternative.

A technical review of the plant revealed a highly constrained piping arrangement with limited flexibility

and no practical means of introducing temporary deflection without extensive modifications to the surrounding system.

With little room for the flange separation required with a standard AOGV to enable spade insertion and a positive isolation, Izomax began a feasibility study based on utilizing a modified butterfly valve AOGV which would allow removal of the old gaskets and the entire plug valve in an uninterrupted operation, whilst the system remained live.

SOLUTIONS

- Design & test new 10" 150 class AOGV based on Butterfly design to allow plug valve replacement without shutdown
- Replicate flange separation constraints during testing to ensure gasket removal and replacement during operation
- Robust risk assessment process and operational reviews with Izomax & Client



Design and testing was carried out over a 12 month period. A final, pre-mobilization FAT and mock test was performed to ensure flawless safe execution, with a live gas system at 4 bar and temperatures in the order of 65 – 70 degrees Centigrade.

Technical Snapshot

Izomax performed a site survey relatively early in the project to ensure accessibility and suitability of the AOGV, at which point it became clear that the rigid piping and support systems would not allow a standard AOGV to be used.

Izomax recommended modifying the AOGV Butterfly system for the 10" 150 class system. Retracting and installing Butterfly valves in live piping systems using the AOGV method is a tried and tested, robust alternative to traditional methods. The solution eliminates

the need for a full process shutdown and significantly reduces operational disruption. The AOGV is installed over the wafer-type Butterfly valve, sealing on the pipe flanges as normal for this method. Modifications to the AOGV Butterfly system to allow use on the Plug-Valves included a new AOGV envelope (allowing dimensional fit as well as pressure and temperature integrity), a Trolley system for valve removal and insertion, a gasket tool for removing and scraping the old gasket as well as insertion of the new gasket, and ancillary tooling for operations.

It should be noted that the previous plant owner (a Super-Major) had successfully used Izomax on multiple projects and was integral to the technology selection and planning process prior to the new owner taking over plant.

With a limited time window for design, testing and mobilization, a strong project plan with clear roles and milestones was agreed between Izomax and the client.

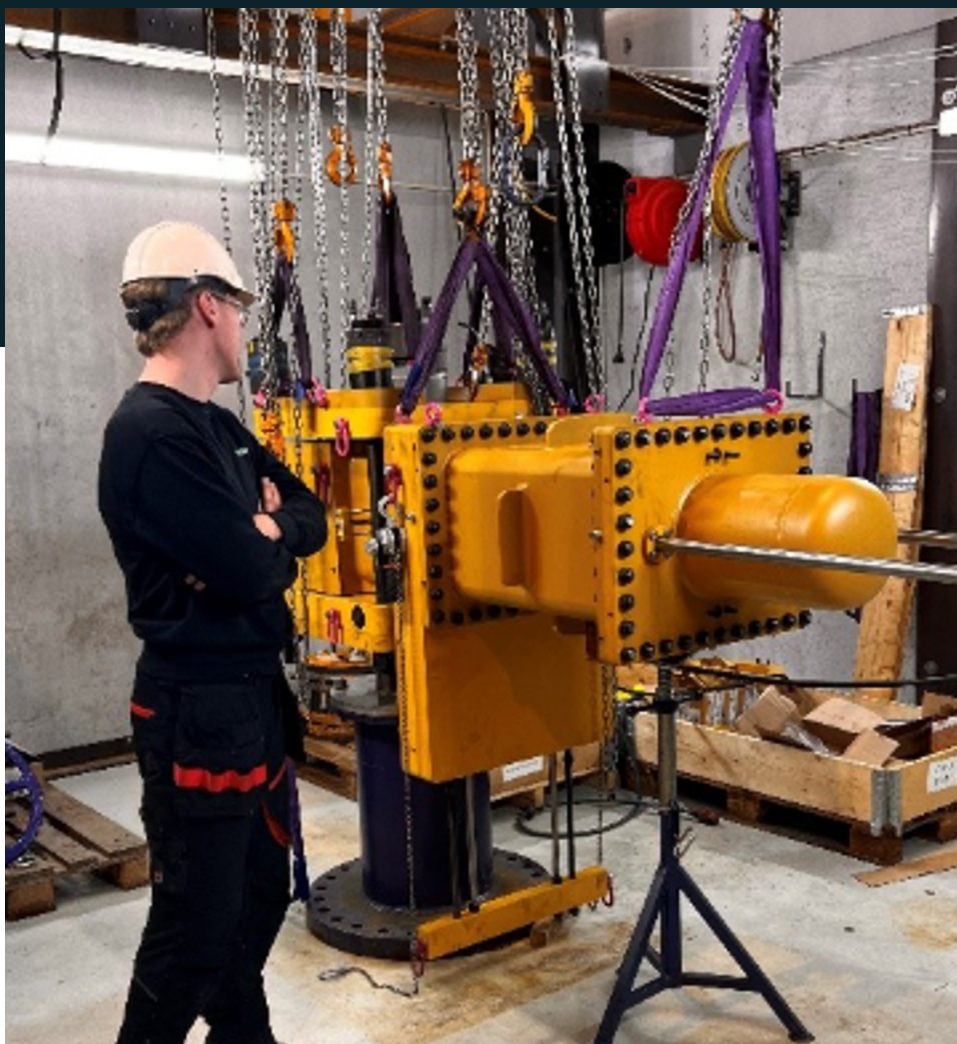
A combined FAT and mock-up test was organized at Izomax facilities, allowing full testing of the new tool in addition to ensure flange separation restrictions could be overcome without exceeding pipe stress analytical recommendations.

In line with Izomax standard process for any AOGV isolation, detailed risk assessments were performed throughout the planning process. The client was unable to be on-site at Izomax' facility prior to mobilization, hence carefully planned meetings were required to ensure full familiarity with the assembly and disassembly of the AOGV. Three dimensional models



of the valves were printed to ensure site conditions were replicated. The client then dispatched one of the new valves to Izomax for mock testing – allowing informed and detailed discussions and preparation prior to job execution. Lifting, operational readiness and access constraints were reviewed and challenges safely mitigated.

The project was executed as per plan, allowing continuous operation while the inoperable valves were replaced, followed by a full pressure integrity and testing regime.



OUTCOME

Three inoperable Valves replaced, entire operation safely completed without shutdown

- ✓ New A0GV design implemented successfully
- 🕒 Flawless execution of multiple valve replacement while system live and flowing
- 🛡️ Strong teamwork with new client, from initial feasibility review through tool design and iterative modification, to detailed risk assessment planning and execution on-site
- 👍 No shutdown or outage – facility continued with full production of pipeline medium