

# Dry Gas Sealing System Retrofit Boosts Performance, Lowers Costs

## Challenge

A hydrogen recycle compressor was impacting the availability, efficiency and profits of the mild hydrocracker unit of a Spanish refinery. Despite these issues, the high cost of OEM upgrades made the refinery reluctant to retrofit the compressor. In addition, the site lacked control over support because of a “black box” supply arrangement with the OEM.

## Solution

Flowserve engineered a less invasive retrofit than the solution proposed by the OEM, upgrading the compressor to a dry gas sealing system that required no modifications to the existing equipment. As a result, both the refinery’s initial investment and its ongoing operating costs were reduced. Flowserve also gave support control back to the customer by providing step-by-step guidelines, enabling the refinery to directly manage the entire process.

### Costly retrofit threatens critical upgrades

Petronor, located in Muskiz, Spain, is a refinery within the Repsol Group. The refinery is a strategic site, both for its capabilities — including refining process efficiency, high conversion rate and storage capacity — and its location, which boasts direct connections to the local jetty terminal and Bilbao harbor.

As part of its ongoing efforts to improve processes, efficiency and profits, Petronor identified reliability issues with the refinery’s mild hydrocracker recycle compressor. The original oil sealing system, which operated at pressures close to 70 bar (1015 psi), was not able to meet a minimum mean time between repair (MTBR) target. This increased oil consumption, with a direct impact on costs and safety related to the management of process gas-contaminated seal oil barrels. It was also creating unnecessary downtime for seal replacement and impacting the availability of the refinery’s hydrotreating unit.

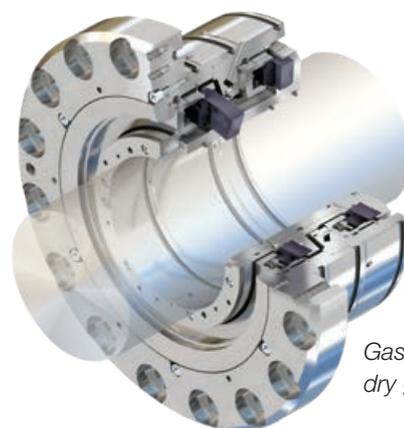
Previously, Petronor had relied exclusively on a turnkey support solution from the compressor OEM. However, this arrangement lacked accountability — preventing Petronor from managing efficiency and controlling costs. Moreover, the only solution proposed by the OEM would require potentially cost-prohibitive modifications to fit a new sealing system.

Reluctant to proceed with this plan, the Repsol Group asked Flowserve if a more cost-effective alternative could be found.

### A no-modification solution

Flowserve proposed retrofitting the compressor with a top-level tandem with intermediate labyrinth Gaspac® L dry gas sealing system. Since this approach required no modifications to the compressor, it offered an immediate cost savings compared to the OEM’s quote.

As with all Flowserve retrofits, the new dry gas seals and support systems were designed to make installation easier. This would minimize the time needed to execute the retrofit while reducing associated risks. The proposed design was in full compliance with common industry standards as well as Repsol’s unique specifications.



*Gaspac L  
dry gas seal*



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### Partnership gives control back to the client

One of the project deliverables from Flowserve was a retrofit installation work package (RIWP). This step-by-step guide enabled Petronor to plan for all necessary internal and external resources, from preliminary stages such as DGS panel installation and pipe routing to field and shop activities.

As a result, Petronor could directly manage the entire retrofit process with complete transparency. From the time of the retrofit's implementation until its commissioning, the only Flowserve representatives on-site were one senior retrofit specialist and one application engineer.

### The results: Repsol takes control with confidence

The Repsol Group upgraded Petronor's hydrogen recycle compressor to the most advanced dry gas sealing technology available in the first quarter of 2017. It was the first time the company performed a major upgrade project without the involvement of the compressor OEM. In addition, the value-added services offered by Flowserve gave them several advantages, including but not limited to:

**Reduced retrofit cost.** Petronor was able to significantly reduce its costs compared to the approach proposed by the compressor OEM (including all modifications, new parts, and a standard managed overhaul at OEM prices).



**Minimal retrofit downtime.** Since no modifications were required to the compressor casing or rotor, the retrofit was quick and successful.

**Lower operating cost.** After the upgrade, Petronor benefited from the best sealing performance on the market, reducing the refinery's day-to-day operating costs.

**Quick return on investment.** Petronor's tangible benefits were so high that the refinery was on track to recoup the cost of the entire project within 18 months.

Flowserve Corporation  
5215 North O'Connor Blvd.  
Suite 2300  
Irving, Texas 75039-5421 USA  
Telephone: +1 937 890 5839

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