Fact sheet

Shell Turbo Technologies

Changing the game in gas processing

SHELL CATALYSTS & TECHNOLOGIES
TRANSFORMING ENERGY TOGETHER

- Innovative, game-changing design
- Increase gas-processing capacity in existing columns by up to 200%
- Reduce absorber costs in greenfield applications by up to 50%

At a glance

Customer drivers
Maximising the potential of existing assets; developing natural gas resources with higher hydrogen sulphide (H_2S) and/or carbon dioxide (CO_2) content; and meeting tighter product gas and liquefied natural gas (LNG) specifications.

Solution
Revamp existing absorber columns with Shell Turbo Technologies, a drop-in solution.

Value delivered
Significantly enhance the capacity of existing units; Reduce the cost/size of the column in greenfield applications; Reduce opex.

Proof point
The technology enabled capacity increases of 20% in an acid gas removal unit (AGRU) absorber column and 59% in a triethylene glycol (TEG) dehydration train.

In each case, the drop in solution unlocked tens of millions of dollars in annual revenue.

The oil and gas industry faces the challenge of balancing the need for higher throughput and the treatment of increasingly contaminated resources while meeting strict capital efficiency requirements.

Shell Turbo Technologies provide a drop-in solution that offers significant benefits to gas-processing facilities by improving absorber column hydraulics and mass-transfer efficiency. These innovations can potentially triple gas-processing capacity and reduce absorber costs in greenfield applications by up to 50%.

Although this technology is currently exclusive to Shell, Shell Catalysts & Technologies is exploring opportunities to bring it to the broader market, with the aim of enhancing gas production with minimal capital expenditure and process disruption.

If you are looking to boost capacity and avoid new train additions in AGRU or TEG dehydration units, this technology can be a game-changer.

About the technology

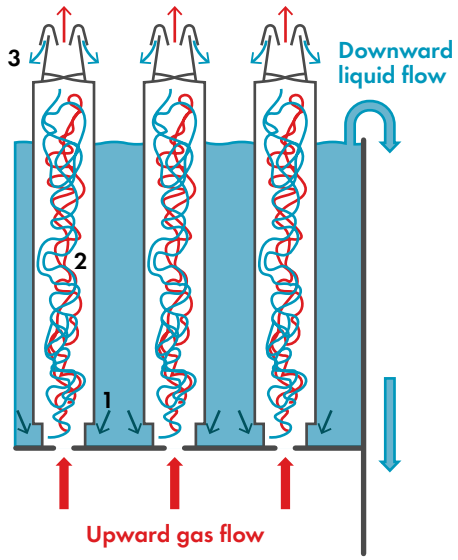

Figure 1: Schematic diagram of the gas and liquid flows. Point (1) shows liquid entering the contacting box, point (2) shows the absorption of contaminants (co-current upward flow) and point (3) shows the swirl tube (gas–liquid separation).

The core of Shell Turbo Technologies is the integrated tray package that combines contacting and separation zones in one integrated tray package that can easily be retrofitted into existing absorber columns.

Gas rises from the tray below and flows into the contacting box through gas inlet channels, and liquid enters through slits at the base (Figure 1: 1).

Upward co-current flow allows time for the solvent to absorb contaminants from the gas (Figure 1: 2).

The gas–liquid mixture enters swirl tubes located just above the contacting box that serve as a separation zone (Figure 1: 3). The centrifugal force generated by the swirl tube sends the liquid towards the wall to drive effective gas–liquid separation. A specially designed cap at the top of the swirl tube deflects the liquid towards the outside of the tube, where it collects in the liquid pool on the tray. Liquid-free gas exits from the top of the cap.

Debottlecking an AGRU

The operator of a natural gas treatment facility using Sulfinol-X gas processing technology (licensed by Shell) sought to increase capacity and control H_2S levels without high costs or operational disruptions. After consulting Shell Catalysts & Technologies, they chose Shell Turbo Technologies, which integrated seamlessly into the existing absorber column, thus minimising downtime.

This deployment, combined with Shell's Sulfinol-X solvent, boosted natural gas production by more than 20%, from 130 to 156 MMSCFD, while maintaining H_2S levels within limits (Figure 2). This increase has the potential to generate an extra $50 million in annual revenue[1]. Additionally, the facility's debottlenecking increased light crude oil production by up to 8,000 barrels per day, potentially unlocking an additional $200 million in annual revenue[2].

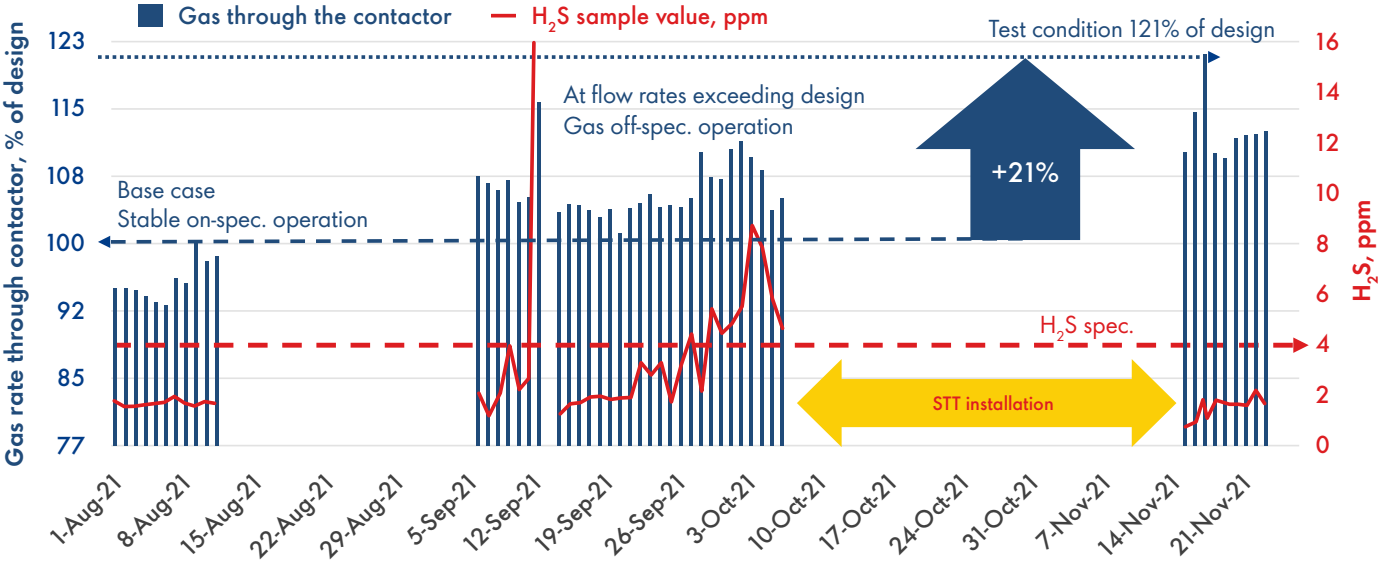

Figure 2: Shell Turbo Technologies enabled the operator to increase natural gas production capacity by more than 20% while keeping H_2S levels within specified limits.

Based on this success, the customer is exploring further deployment of Shell Turbo Technologies at other gas-processing plants.

[1]Assumes a natural gas price of $5 per million Btu
[2]Assumes a crude oil price of $70 per barrel

21% production increase

$50 million

additional revenue

Proof point 2: Enhancing TEG dehydration train capacity

In their first practical application for TEG dehydration, Shell Turbo Technologies achieved a significant 59% train-capacity increase, from 346 to more than 550 MMSCFD. By replacing the existing structured packing with this innovative solution, hydraulic performance improved notably and glycol losses decreased (Figure 3).

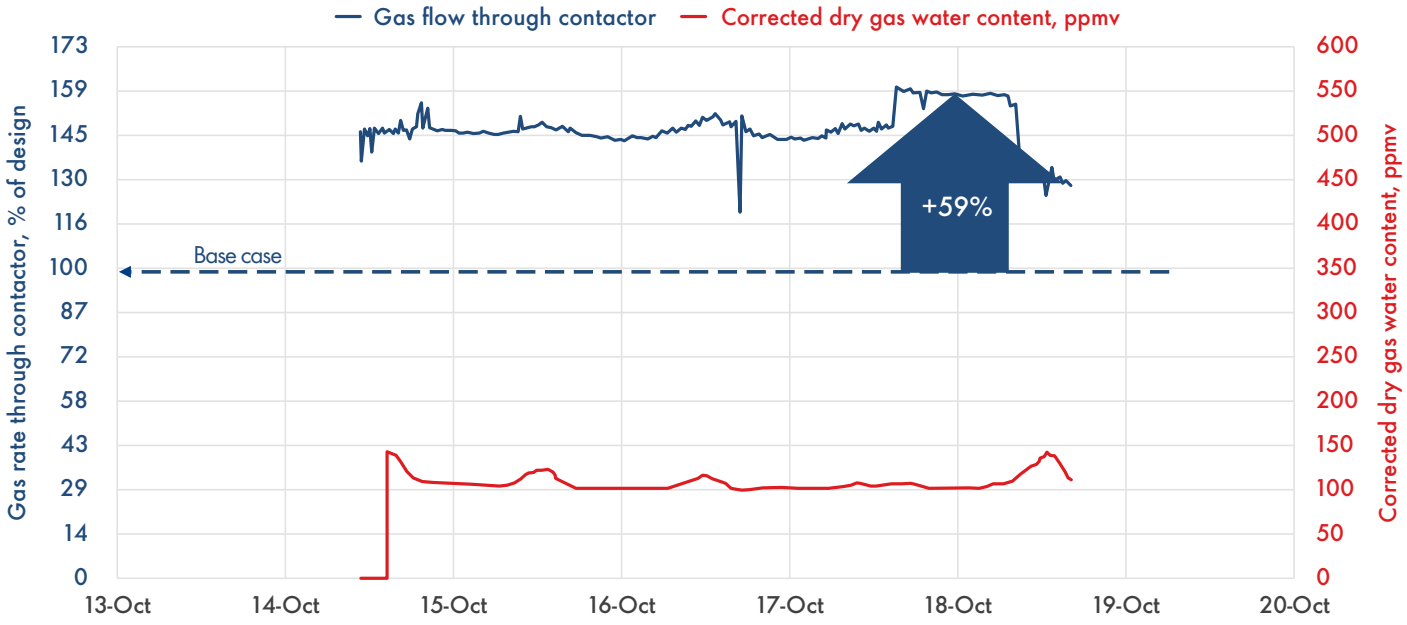

Figure 3. TEG dehydration column gas flow and dry gas water concentration. Following the installation of Shell Turbo Technologies, gas flow increased by 59% (top) while treated gas remained within the moisture specification limit.

In this specific case, the primary aim was to enhance the capacity of one of the trains, thus enabling more streamlined operation with fewer trains. However, it is worth noting that, had the goal been to expand the overall capacity of the system, adopting Shell Turbo Technologies would have translated into a substantial increase of $375 million in annual revenue[3].

This would have resulted in a very rapid return on investment. Additionally, this project not only reduced glycol losses but also led to improved personnel efficiency and productivity, representing a comprehensive enhancement in gas-processing efficiency and profitability.

The client has also chosen Shell Turbo Technologies for another application where increased TEG dehydration capacity is required, with the ultimate goal of meeting export pipeline capacity limits. The alternative option would be to add another TEG unit in parallel, which would take more than 2 years and cost over $70 million to complete.

59% higher gas flow

$375 million

additional revenue

[3]Assumes a natural gas price of $5 per million Btu.

For more information, please visit www.shell.com/ct

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