



Cost savings by gas recycling

Fig 1. HyGear's systems installed at the customer's site

HyGear offers a recycling system to recover the hydrogen from metal production processes. The opportunities lie in the reduction of operational utility costs (hydrogen and/or nitrogen). Therefore, the system fits well with the aims for cost- and energy savings in the metal industry.

In metal treatment processes, hydrogen is required to form a protective atmosphere. Mostly, the used hydrogen is vented after use and new hydrogen needs to be fed into the process. To reduce costs and emissions, HyGear has developed a gas recycling system that recovers the used gases from the process and purifies it into pure hydrogen gas. The Hy.REC system is currently being tested and will be launched later this year.

Conventional technologies

There is already several gas recycling solutions. Conventional solutions contain multiple filtering steps, first filtering main contaminants and later on removing other contaminants like water vapour. However, due to the multiple required filtering steps, these systems are expensive. More advanced solutions are based on electrochemical stacks but these currently do not offer long-term stability nor cost competitiveness.

Advanced Hydrogen Gas Recovery

The complexity in designing a gas

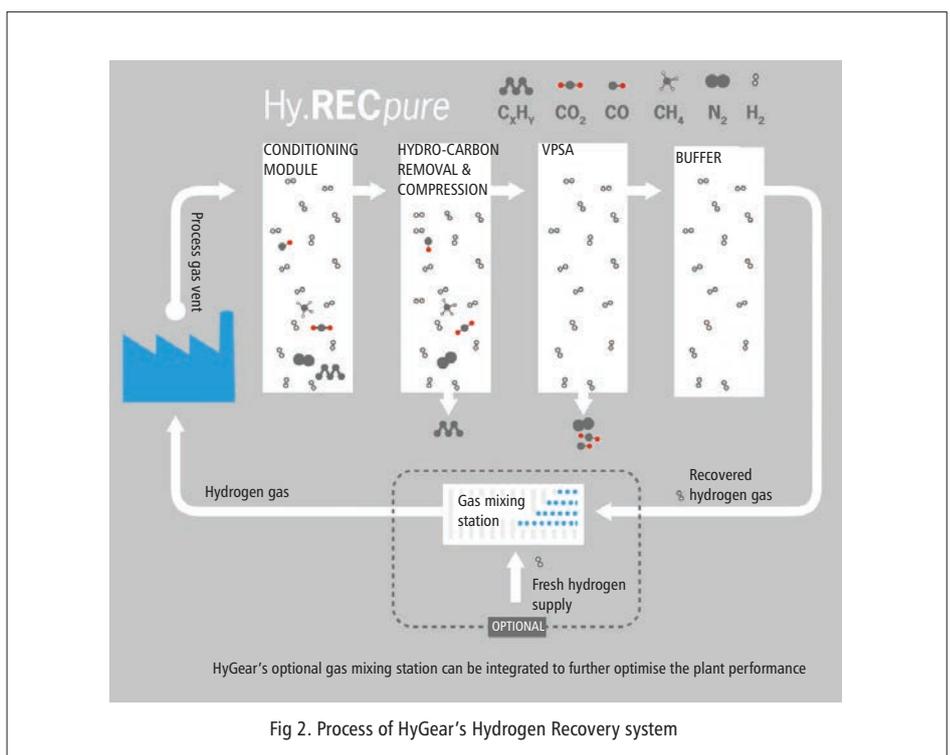


Fig 2. Process of HyGear's Hydrogen Recovery system



recovery system is that the used hydrogen atmosphere is extracted from the process at lower pressure, while gas purification usually requires a larger pressure differential. Therefore, HyGear's Hy.REC gas recovery technology is based

on the company's Vacuum Pressure Swing Adsorption (VPSA) technology. This technology is already proven in the company's Hydrogen Generation Systems. By applying vacuum, the pre-pressure can be kept at a minimum and the need for

compression is minimised. This results in the overall reduction of electricity consumption and lower operational costs.

Mixed gas recovery

Besides the recovery of pure hydrogen, hydrogen also offers a gas recycling system to recover gas mixtures. The Hy.REC for mixed gases is especially interesting for the industries where reductive atmospheres of nitrogen and hydrogen are used. In order to be cost effective, advanced technologies are applied that minimise energy losses and safeguard long-term stable operation of the entire system.

Further cost reductions

To reduce the costs even further, HyGear offers the Hy.GEN and N.GEN on-site gas generation systems that can be installed at the end-user's facilities. This overcomes the necessity for compressed gas supply by road transportation. Decentralised gas production by HyGear offers a safer, more reliable and cost attractive alternative to conventional hydrogen supply by tube trailers or electrolyzers and significantly lowers the environmental impact. ■

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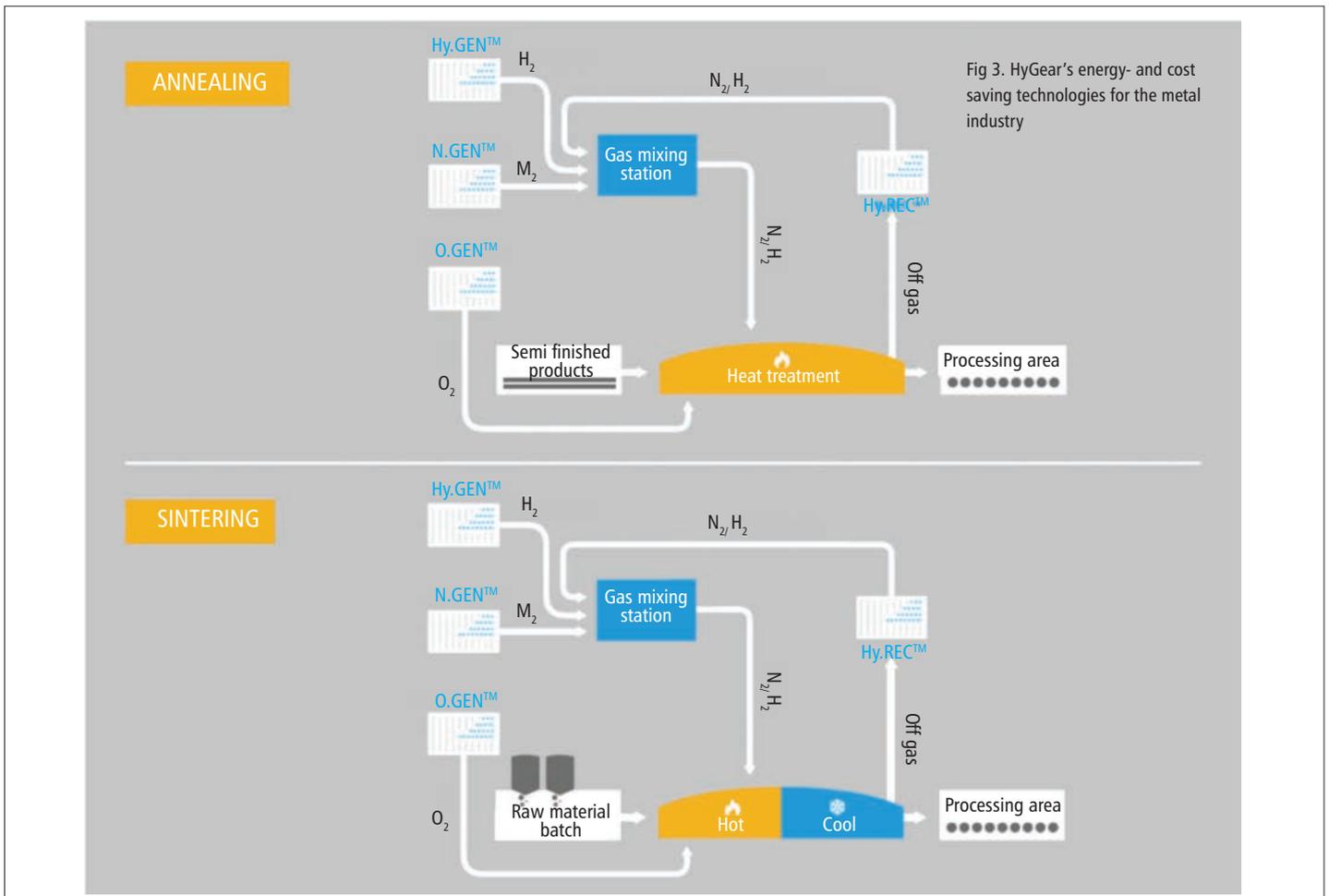


Fig 3. HyGear's energy- and cost saving technologies for the metal industry