

MOPICO® Technology Update

Gas/Electric Partnership Conference 2019

Stefan Niederhauser
Turbomachinery New Equipment Sales
MAN Energy Solutions USA Inc.

February 7, 2019, Houston

MOPICO® – Motor Integrated Pipeline Compressor



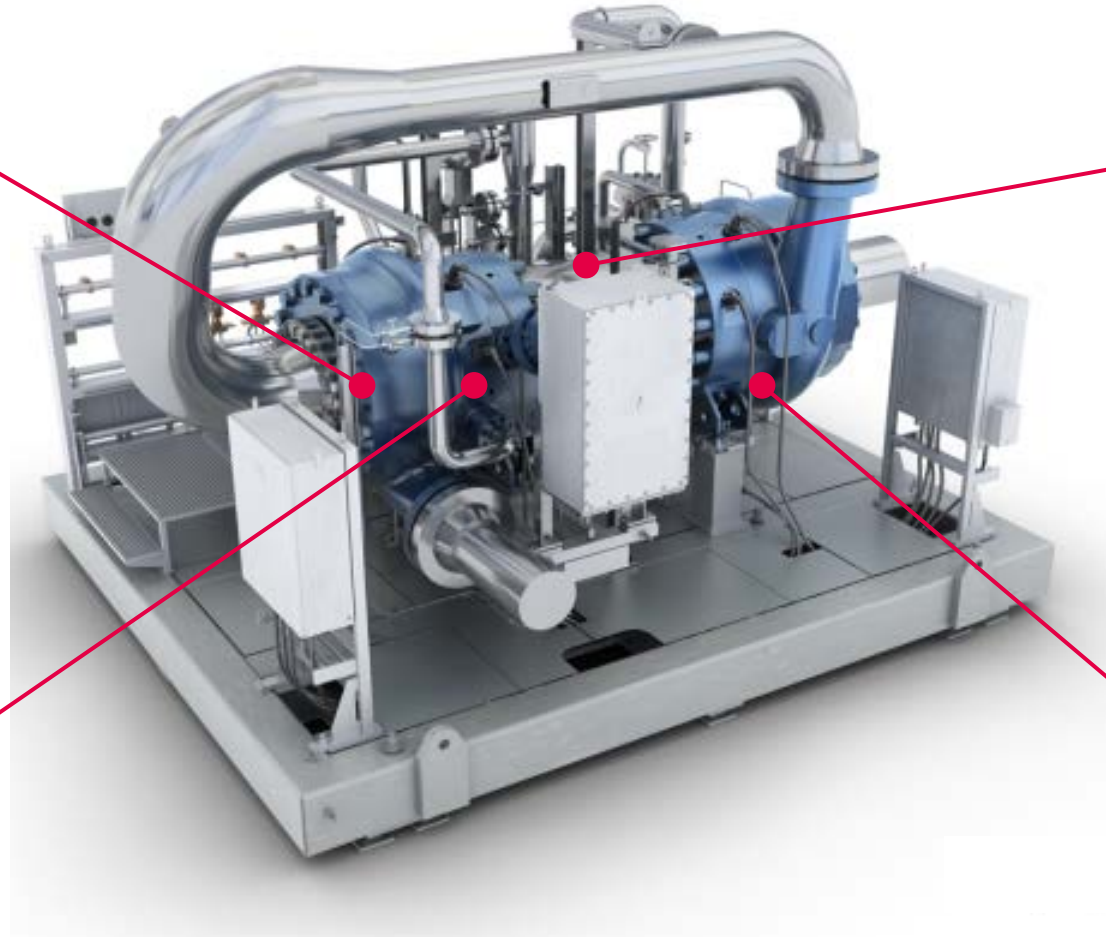
What is a MOPICO® – A Short Recap



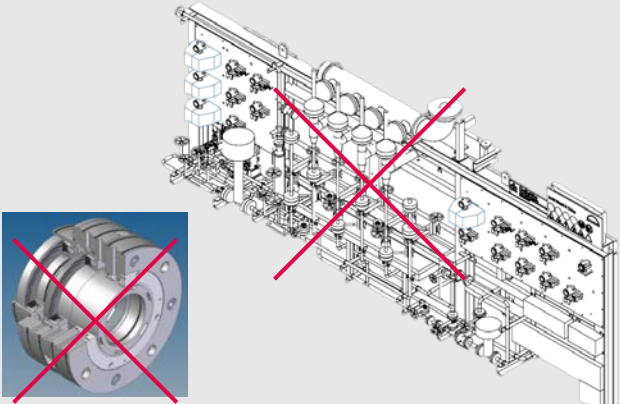
Overhung Impellers



Active Magnetic Bearings



High Speed Induction Motor
(Driven by VFD)

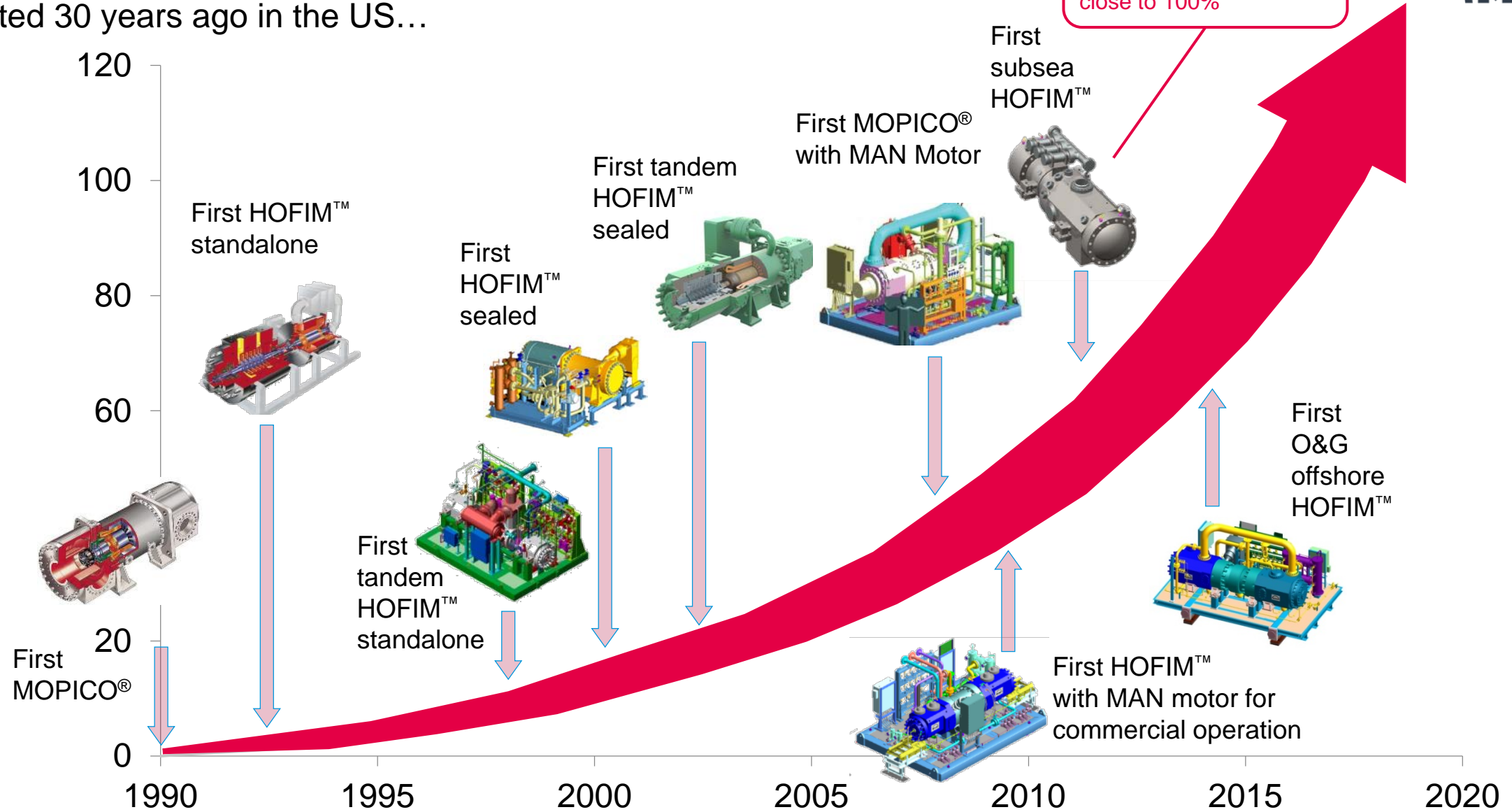


Hermetically Sealed (no DGS)

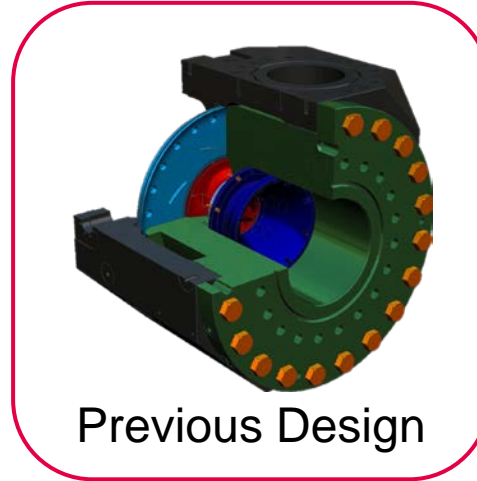
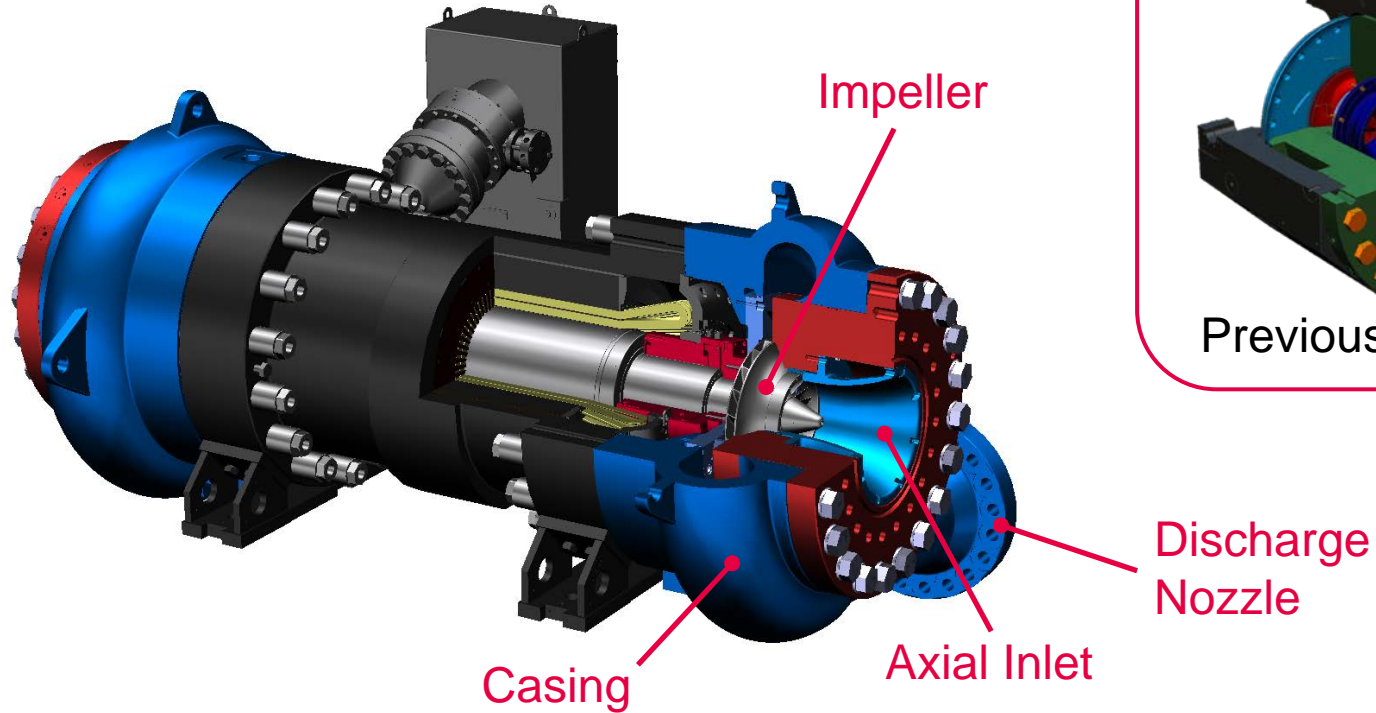
History of the Highspeed Technology



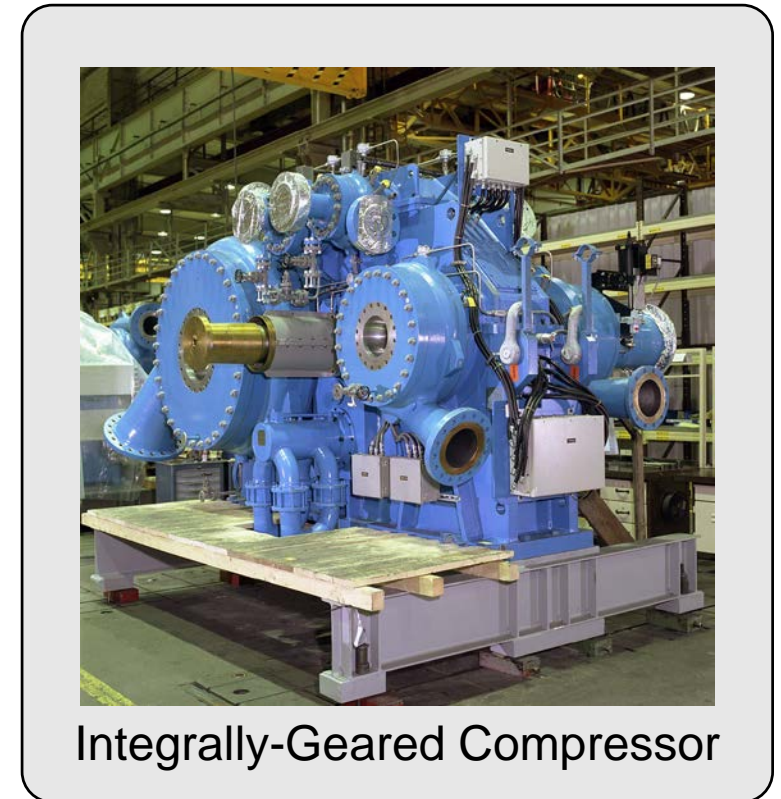
It started 30 years ago in the US...



Improved Casing Volute Design



- MAN used its extensive experience with integrally-gearred compressors to improve the casing volute
- Significant efficiency improvement
- Stable operating range from surge to choke

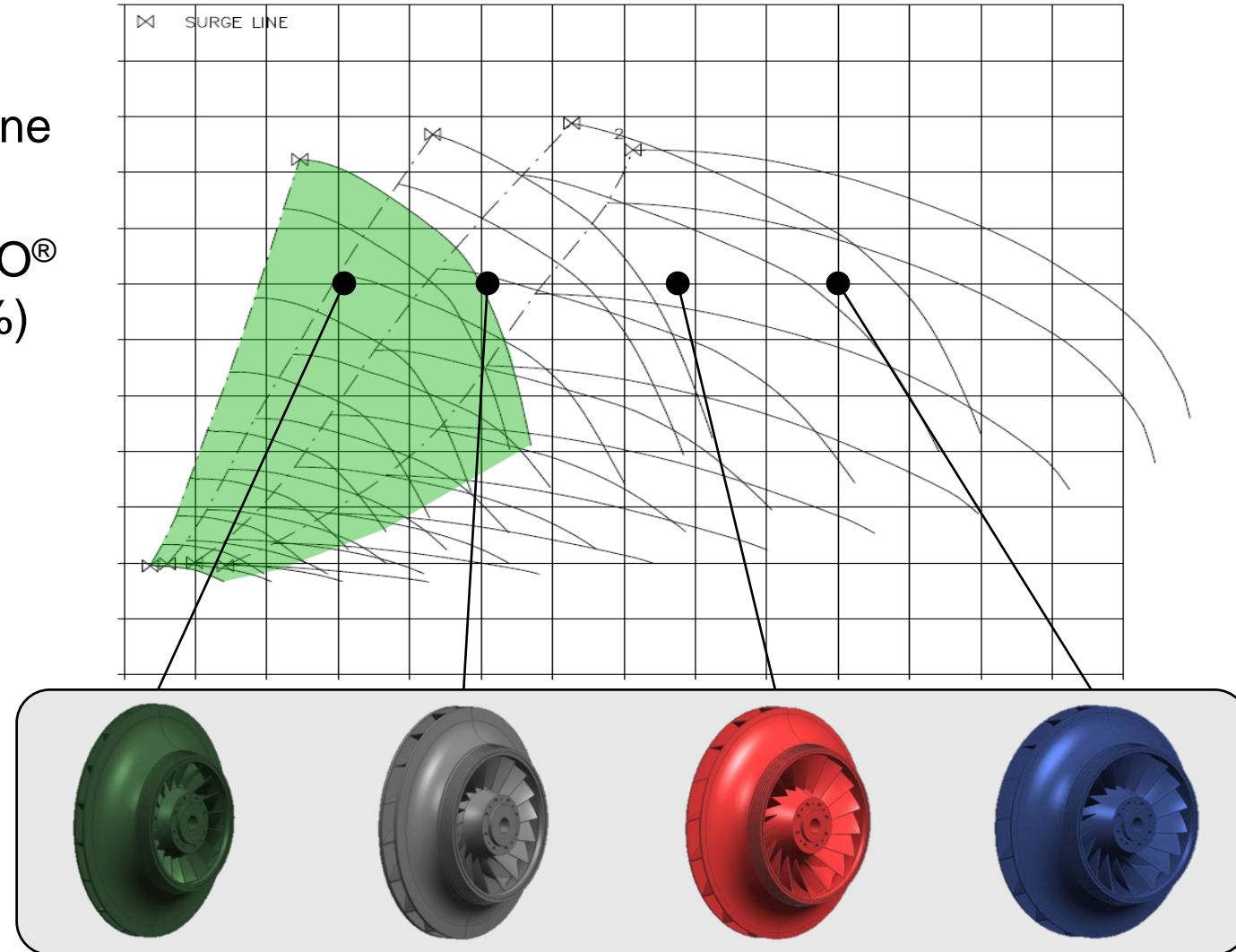


Extended Impeller Family

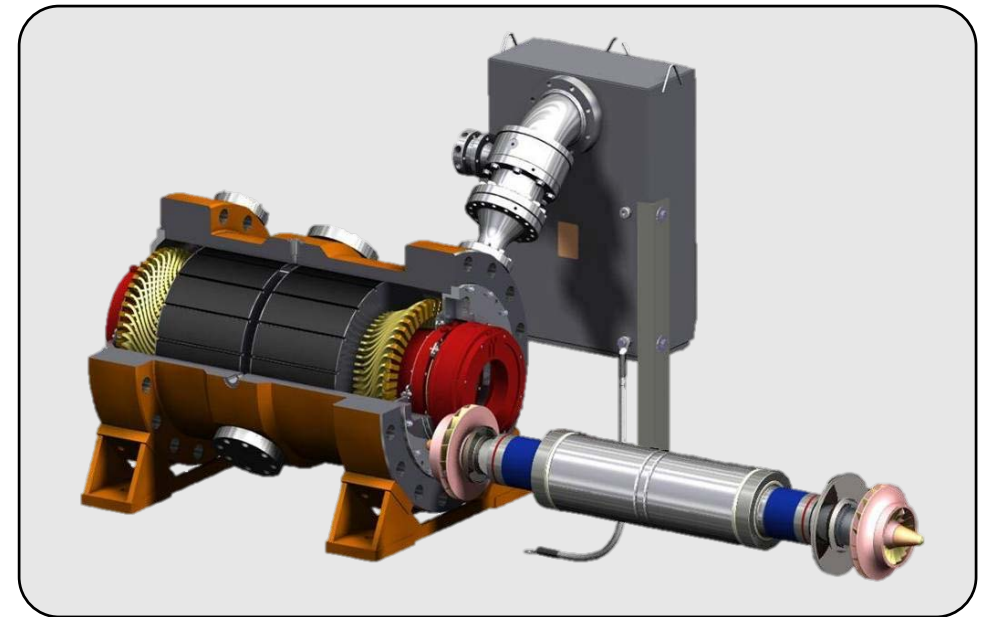
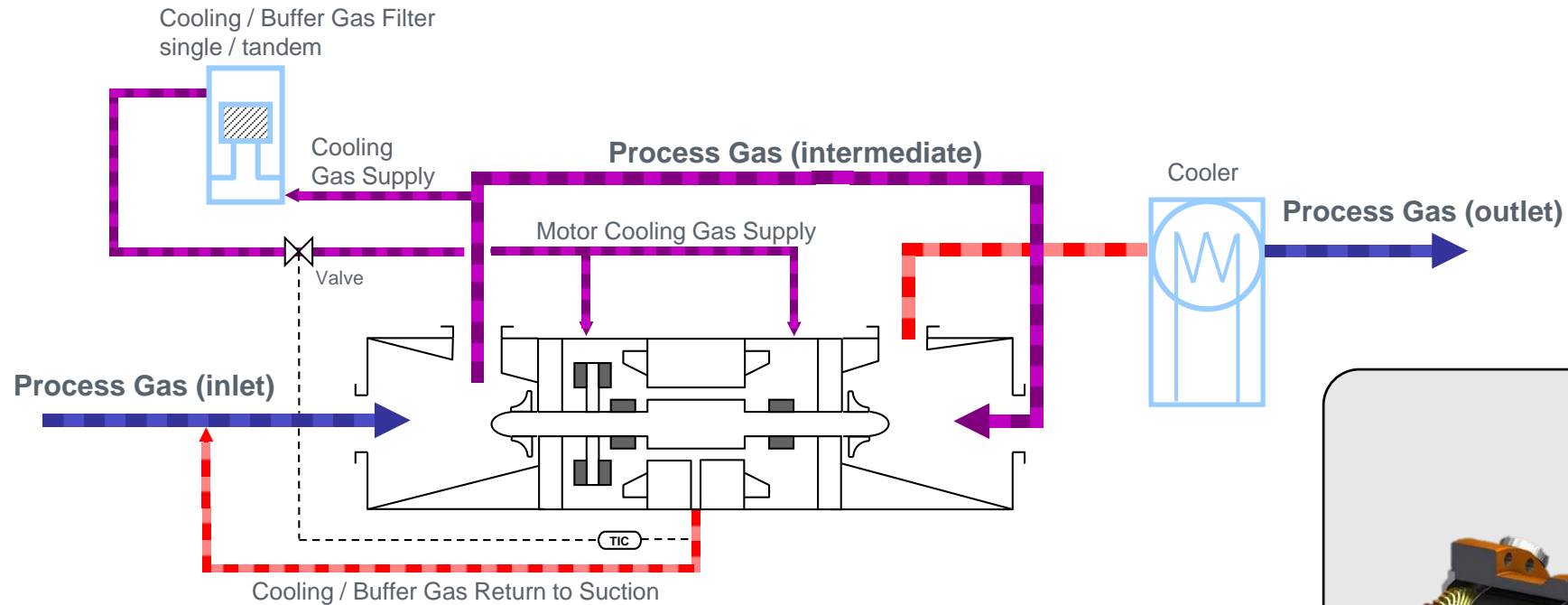


New “low flow” impeller:

- Especially developed for pipeline applications
- Extended range of the MOPICO® for smaller flows (approx. -40%)



Reliable Motor Cooling

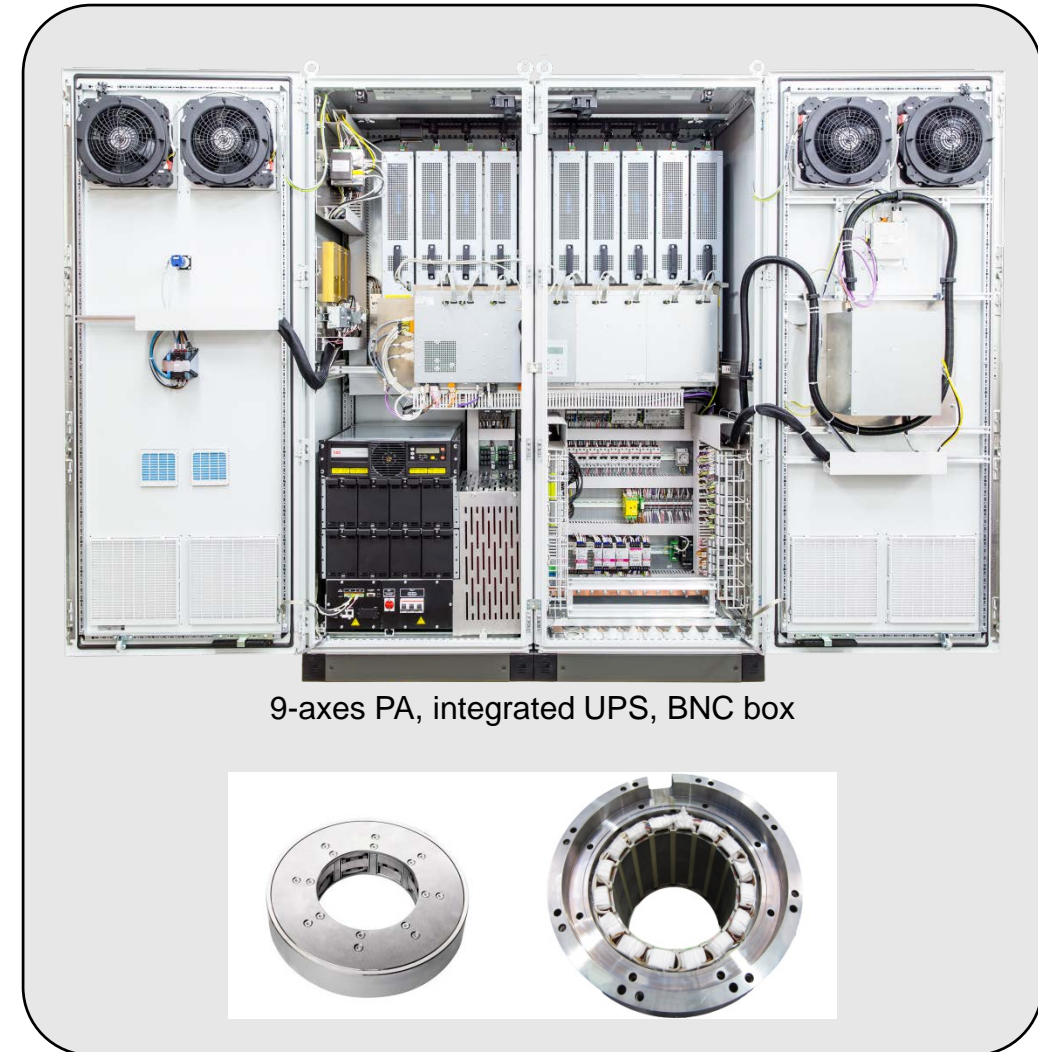


- Symmetric motor cooling for optimized thermal load pattern and temperature gradient
- Motor and cooling system design for sweet and sour gas

Active Magnetic Bearings by MECOS



- MAN in-house solution for the AMB system
 - > One controller family for 5/7/9 axes system (MOPICO and HOFIM)
 - > New SIC power amplifier technology to further increase efficiency
- Fully digital signal processing and control logic enables
 - > Assembly support tools (alignment, balancing)
 - > Remote diagnostic, commissioning & trouble shooting tools for non- experts (FSE)
- High data acquisition frequency and signal resolution yields in ultra-high system state analysis capabilities
 - > Remote monitoring (high and low frequency data recorder)
- All sensor parameters are adjusted/optimized by means of the digital controller, no hardware adaptations necessary
 - > Cable length up to 1000 ft (w/o any adaption nor soldering)
- Advanced predictive damage model for landing bearings

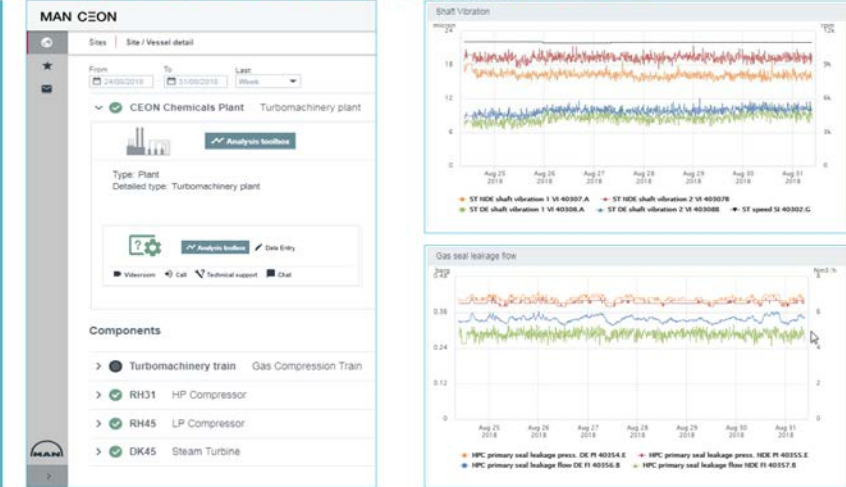


MAN PrimeServ Assist

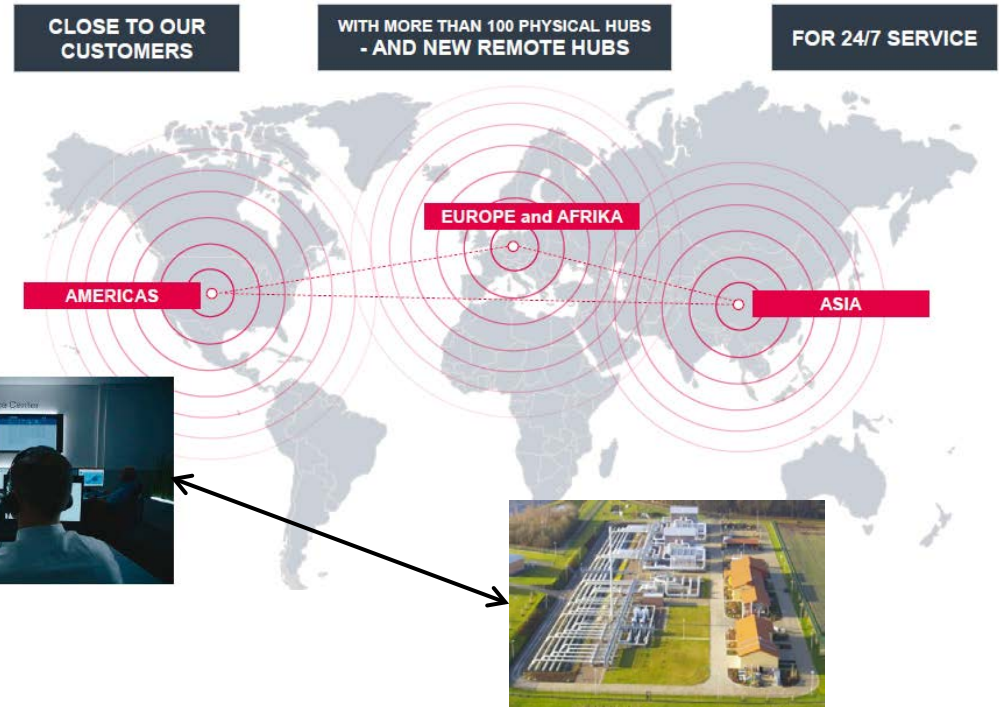
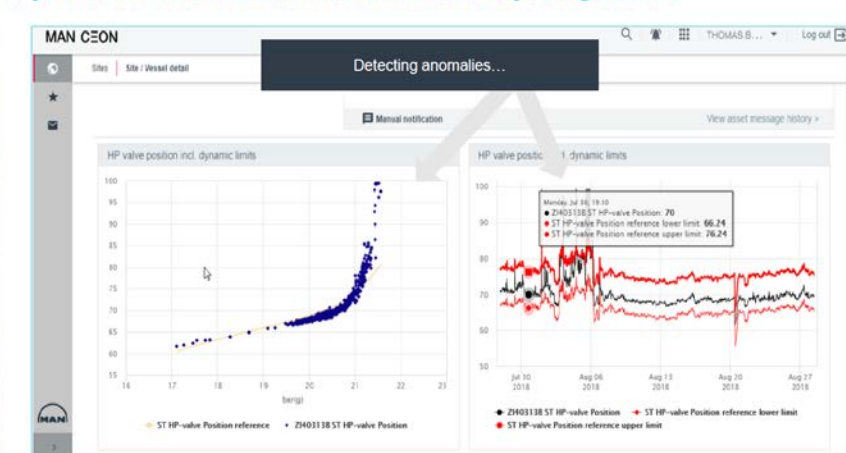


Expert Monitoring, Evaluation and Optimization Service Powered by MAN CEON

Real time transparency of rotating equipment operating data



Dynamic limit observation with advanced analytic algorithms



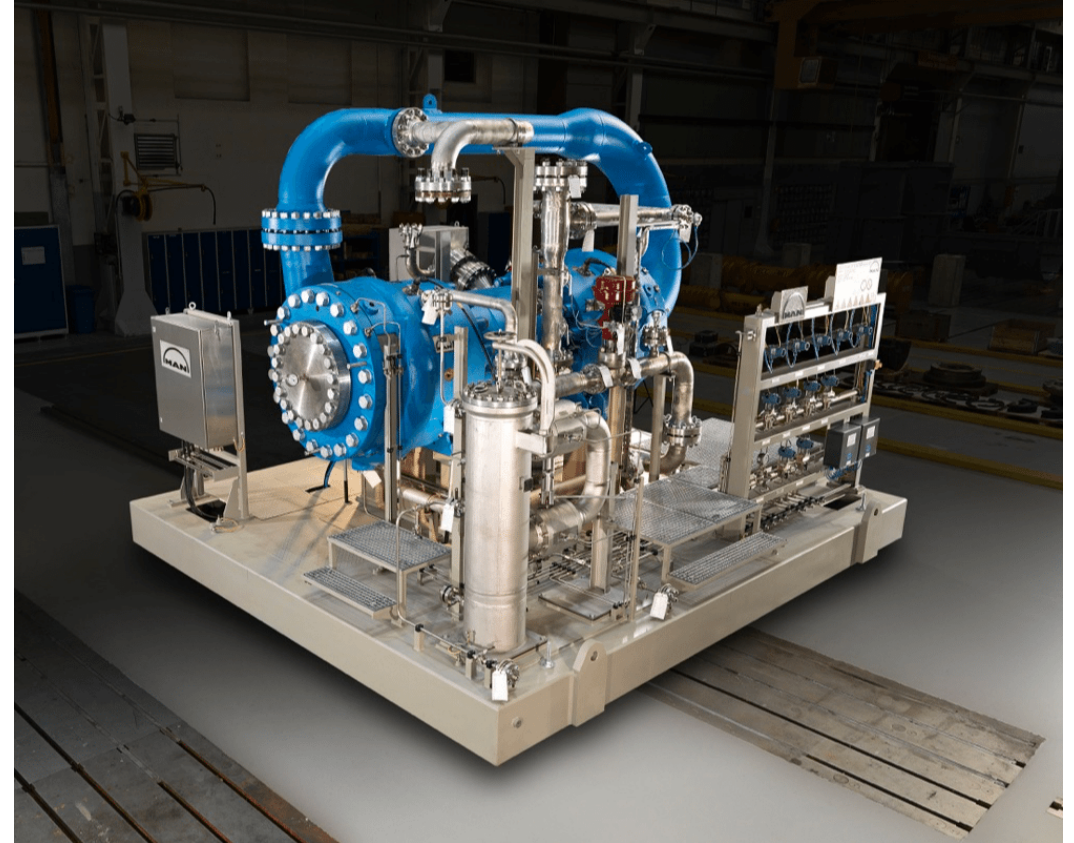
Remote Service Center Organization

MOPICO® is the Best Solution if...



...the following aspects are important for your project:

- No local emissions (CO₂, NO_x, fugitive gases)
- Using the best suited compressor technology for remote operation
- Using the best suited compressor technology for remote monitoring and diagnostics
- Low-maintenance requirements
- Operational flexibility:
 - > Serial/parallel operation of the compressor stages
 - > Fast start/stop capabilities
 - > Extended speed range (30% - 105%)
- High power factor towards the grid over the load range



Disclaimer



All data provided in this document is non-binding.

This data serves informational purposes only and is especially not guaranteed in any way.

Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.

MAN Energy Solutions
Future in the making



Thank you very much!

Stefan Niederhauser
Sales and Applications Engineer

MAN Energy Solutions USA Inc.
Turbomachinery New Equipment Sales
1600A Brittmoore Road
Houston, Texas 77043

Phone: +1 (713) 268-8014
E-mail: stefan.niederhauser@man-es.com