

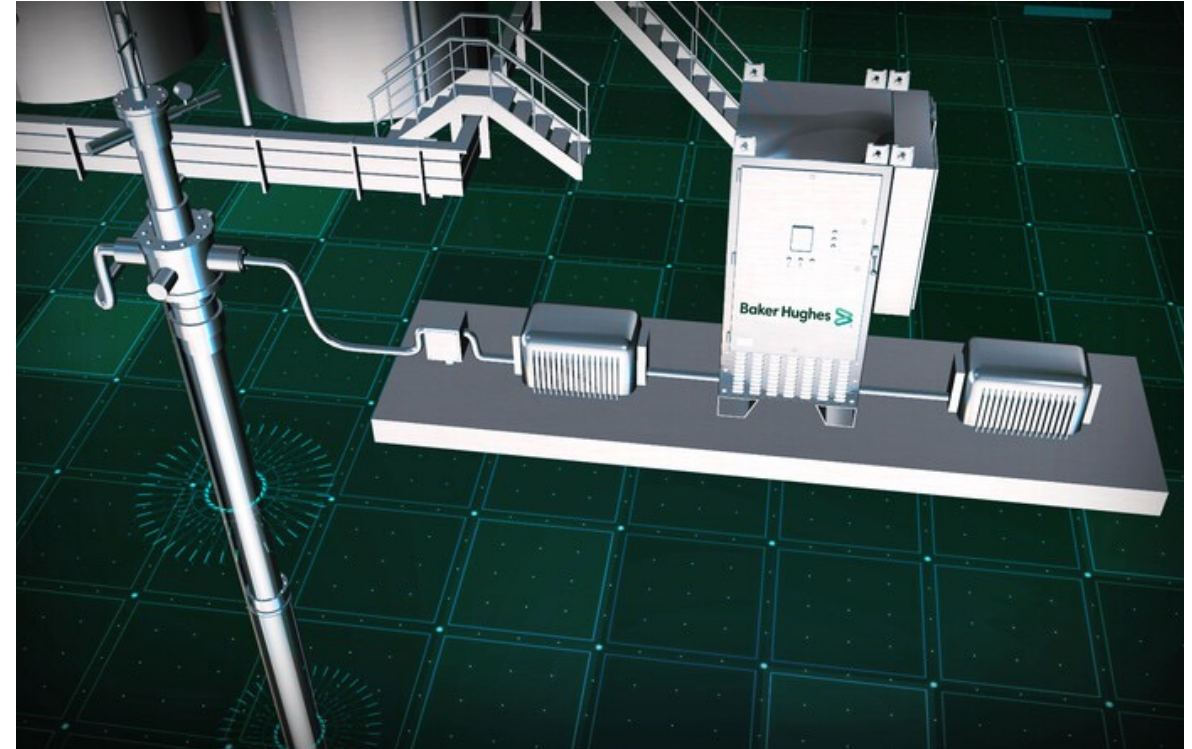
## Veros Systems

- ◆ Funded by Chevron and Shell
- ◆ Acquired by Baker Hughes in 2021
- ◆ Continually monitors relating machinery performance and health using only electrical waveform data

“Veros was instrumental in preventing further ESP-E VFD full voltage troubleshooting as internal cables had already experienced arcing and additional equipment damage was at risk. By working together with Shell and Siemens teams, Veros enabled more effective and quicker root cause analysis of the system.”

**Maarten Poort**

**Shell GM Completions Effectiveness Deepwater Wells**

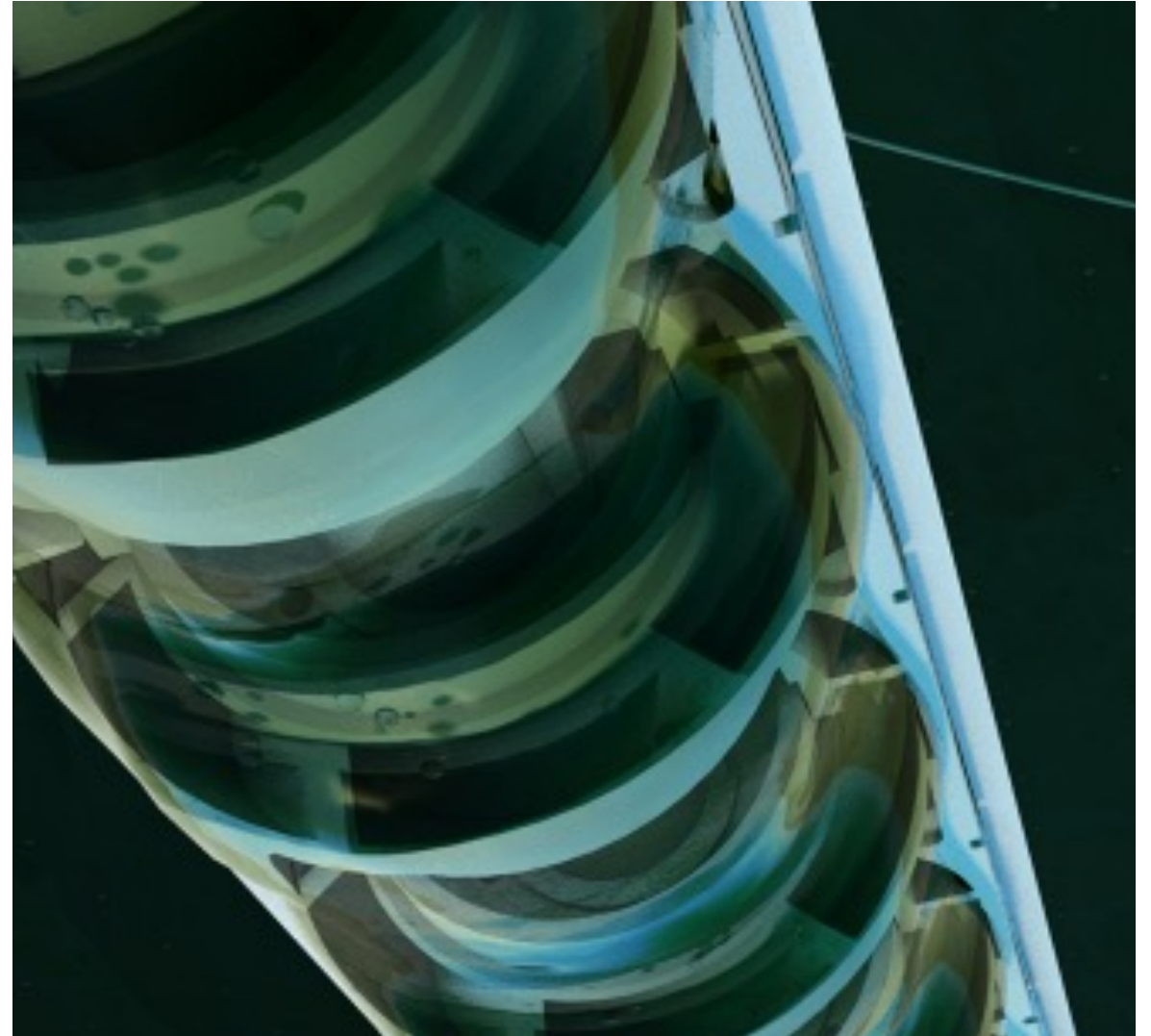


## Applications

- ◆ Artificial Lift (ESPs and Mudline Pumps)
- ◆ Cryogenic Pumps
- ◆ High-speed Motor Driven Reciprocating Compressors
- ◆ Pipeline Pumps
- ◆ Generators and Synchronous Motors (future)

“To make pumps last longer, we have to understand what it is that causes their performance to decline, so we can try and run the pumps more smoothly and efficiently. The Veros system is helping us already by providing performance insights that we could not have obtained any other way.”

**Larry Obst**  
**Shell Subsea Engineering Team Lead**



## Simple Installation

- ◆ No sensors required on rotating machinery
- ◆ All connections at VSD or electrical panel

“One of the systems we adopted as a result was Veros, a system for monitoring electric motors. Subtle fluctuations in the motor’s power consumption can signal its mechanical failure months in advance. These fluctuations can be picked up by Veros sensors wherever the power cable happens to be, which might be in a far more accessible location than the motor. This predicts issues months in advance and thousands of metres from the source, allowing us to take early action. We estimate that Veros could deliver many millions of dollars a year of production that would otherwise have been lost by unplanned shutdowns.”

**Harry Brekelmans**  
**Shell Projects & Technology Director**



## Insight into Machinery

- ◆ Continuous trending and alarming of rotating machinery performance and health
- ◆ Monitors power quality (unbalance and harmonic distortion)
- ◆ Tracks VSD frequency and RMS current and voltage
- ◆ Alarms on changes in torque, speed, load, electrical health and mechanical health

“We are working with Veros to pilot topside monitoring technology. This technology enables to detect Subsea boosting failures, pump life is extended by applying ML/AI to optimize pump performance. As it is the nature in ML on our digital learning, the more data we use to train the system, the more accurate the monitoring results we get”

**Michael Deal**  
Exxon VP of Research, Technology & Digital Development





# Thank you

## Main contacts:

**Jim Dechman**

CEO, Veros Systems

Jim.Dechman @BakerHughes.com

**Fernando Lugo**

Global Sales Director, Veros Systems

Fernando.Lugo@BakerHughes.com

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