

Faster and lower-cost pre-commissioning of subsea pipelines

Traditional subsea pre-commissioning

Before you can perform a hydrostatic test on a new subsea pipeline, you must first confirm the pipe's internal bore. This requires a gauge plate to be mounted on a bi-directional (bi-di) pig to run through the pipeline and into the subsea receiver.

Traditional procedures require the operator to recover an ROV being used to support flooding and gauging operations at the subsea launcher head. A vessel will then have to relocate the ROV to the subsea receiver to verify pig receipt. The receiver is then recovered to the surface to remove pigs and assess the gauge plate's condition. Assuming that the gauge plate is undamaged, the subsea receiver or test head is returned to the seabed and re-attached to the pipeline receiver. When complete, the vessel returns to the launch site and deploys the ROV to commence the hydrotest process.

This can be a very laborious process with a lot of vessel and ROV transit — which increases time and cost.

New solution saves time and reduces cost

The new Subsea Automated Valve Actuation System (SAVAS) from Baker Hughes works in conjunction with our High-Pressure Smart Gauge Tool (HPSGT), which is part of our bi-di pig train.

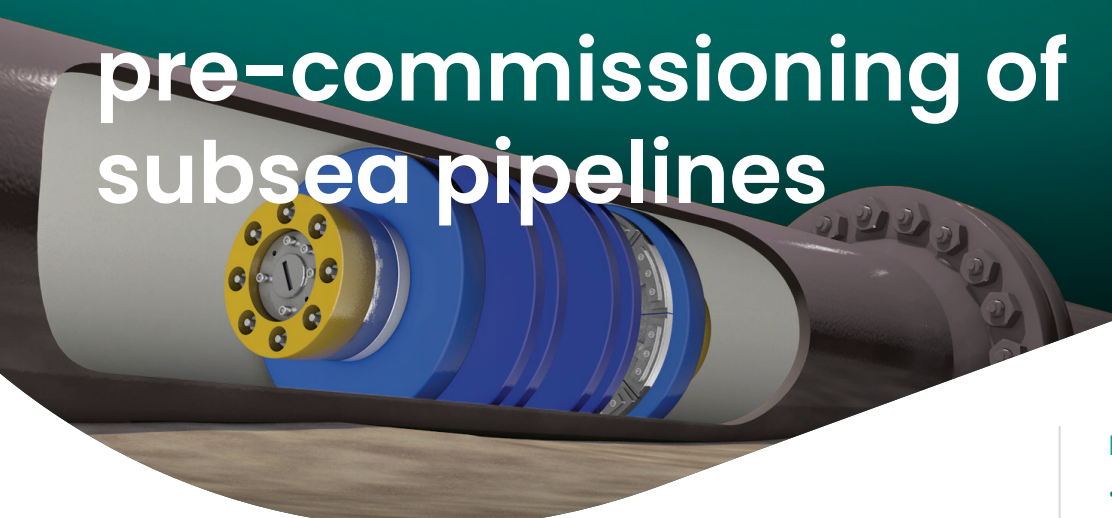
The HPSGT records any impact to its on-board gauge plate, and transmits to SAVAS a go/no-go electromagnetic (EM) signal upon pig receipt. Following a go signal, SAVAS automatically closes its double-block and bleed valves.

As nothing needs to be recovered at the receiver end of the pipeline, no vessel movements are needed, and hydrotesting can proceed immediately after a successful flooding and gauging operation.

At the completion of hydrotesting, the line is depressurized. A dewatering train can then be loaded and run to the receiver. The SAVAS is now used to control the dewatering run. Taking readings from a flowmeter, SAVAS opens valves to different orifice plates in order to control the pig train velocity.

Key benefits

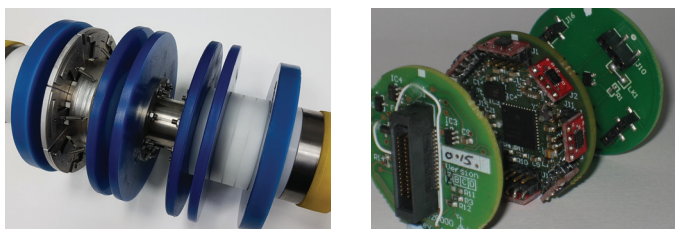
- HPSGT eliminates the need to recover the test head and examine a gauge plate before hydrotest
- SAVAS eliminates the need for vessel relocation from launcher to receiver to close/open valves before/after hydrotest
- For dewatering, SAVAS takes flowmeter readings and regulates flow using either a bespoke throttling valve, or multiple ball valves to route flow through different orifice plates to control pig speed
- SAVAS can be equipped with an automated MEG sampling system to measure and record MEG purity
- Used in combination, they can:
 - Save significant vessel time by eliminating two transit operations
 - Remove risks associated with recovery of the subsea launchers and receivers
 - Reduce risk of weather delays
 - Significantly reduce the number of ROV deployments



High Pressure Smart Gauge Tool

HPSGT is a deepwater evolution of our smart-gauge tool which has been operating around the world since 2010. Key improvements include a 20,000 psi pressure rating, and EM communications instead of acoustics.

HPSGT detects buckles, dents, or excessive weld penetration. It's designed to fit a standard bi-di pig, and utilizes a multi-sensor gauge plate monitoring system to measure and record the deflection of each of the gauge plate segments. If the plate is deflected by a pipeline defect, the deflection is logged and registered. Gauge-plate deflection data is communicated by EM signal to the SAVAS receiver (or ROV).



Subsea Automated Valve Actuation System

SAVAS is deployed at the receive end during pipe lay or installed before flooding. It assesses the HPSGT signal to determine whether or not there has been any gauge plate damage. Once the pig is in the receive trap with no gauge plate damage reported, SAVAS closes two isolation valves to immediately enable the hydrotest procedure without further vessel intervention. HPSGT remains in the pipeline.

Core process pipework

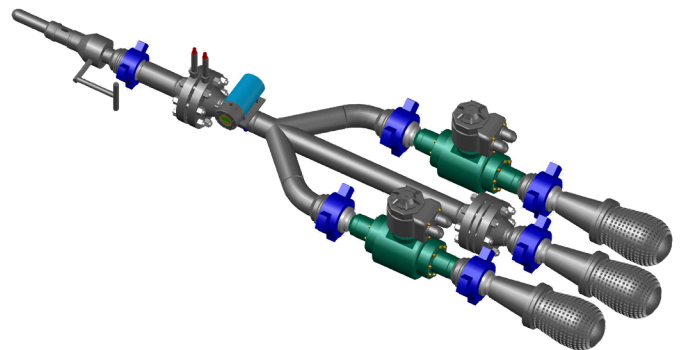
- Hot stab
- Pressure transducers
- Dual ball valves
- Electric actuators
- Dual check valves
- Diffuser
- Anti-vibration mounts to main structure

Control, power, and logging unit

- Subsea control unit records operational parameters, interprets communications from HPSGT, and actuates valves
- Output to subsea display if required
- Low-power sleep mode
- Deployed by vessel crane or pre-installed on receiver

SAVAS for Dewatering

For Dewatering, SAVAS is equipped with a flowmeter to control pig speed during dewatering/MEG swabbing. The control system operates actuated valves to a number of different flow orifices, such that the flow rate can be set to within certain limits at different stages of the operation. Using a number of different orifices in combination, flow can be controlled over a range to give the desired pig speeds.



Note: Baker Hughes holds global patents for automated transition from flooding to hydrotesting and dewatering, and automated flow control during dewatering.