

An offshore oil rig is silhouetted against a dark blue, rippling sea under a clear sky. The rig is positioned in the upper right quadrant of the image.

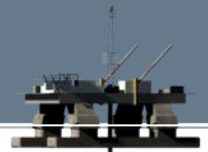
# KNOWFLOW

S Y S T E M S

**CORPORATE OVERVIEW**

**December 2017**

**IADC SPARK TANK**



- (LOWC) and other wellbore pressure-related incidents cost the oil and gas industry BILLIONS of dollars a year and compromise the safety of personnel
- Industry needs an EKD System that can measure real time bi-directional changes in flow in a marine riser under ALL operating conditions
- (EKD) is critical to mitigating the impact of kicks and fluid loss that can result in a Loss Of Well Control (LOWC)

A flow monitoring module mounted on the body of a marine riser joint positioned below the telescopic joint.



Detects and monitors changes in bi-directional fluid flow in a marine riser independent of operations

Flow detection is not corrupted by rig motions (heave, pitch, roll)





- The patented system comprises a flanged bolt-on flow module, with flow monitoring device, mounted on the marine riser
- Flow information is displayed in real-time on the system's primary display, the driller's screen, and is transmitted to off-site locations to the computers and mobile devices of all authorized personnel



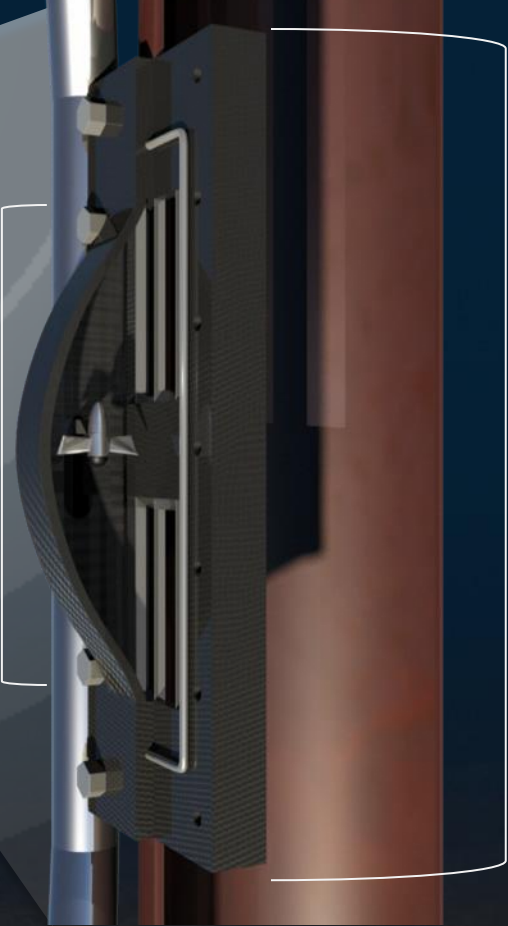


# Data Collection and Monitoring

Installed on Riser Joint



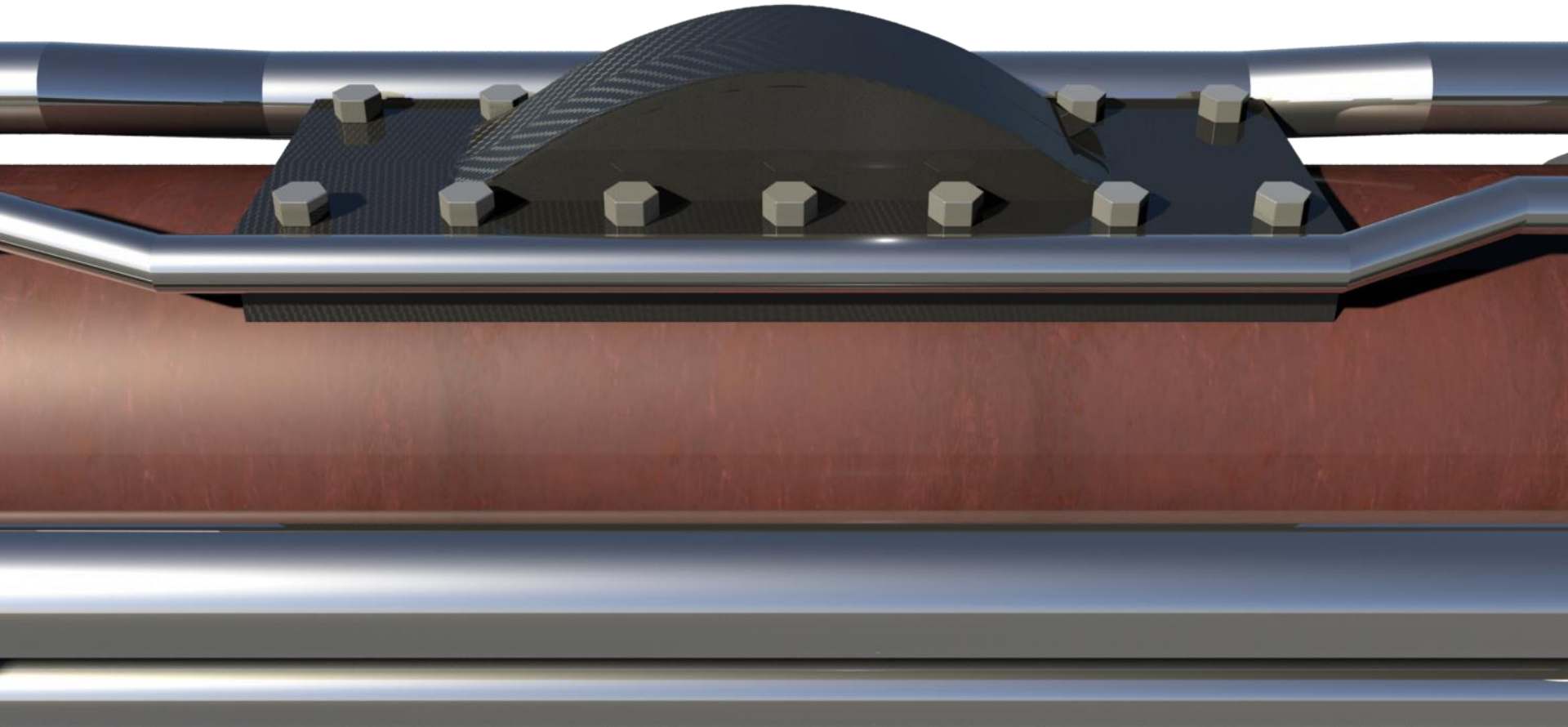
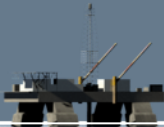
Pin/Box Flange  
Diameter

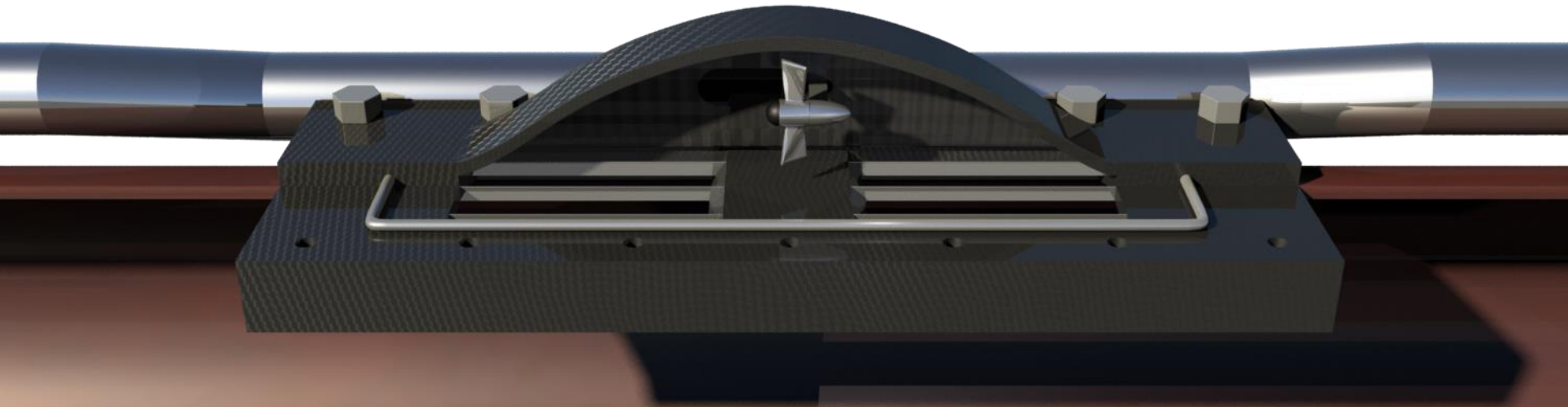


± 50 inches OAL



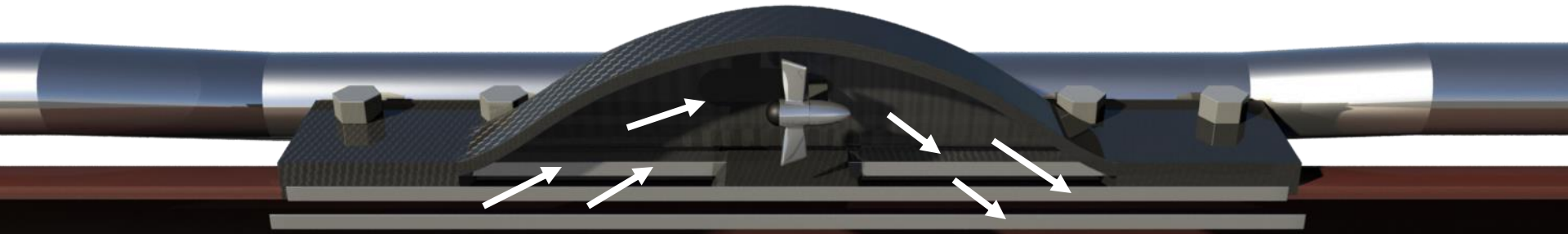
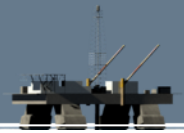
# Flow Monitoring Module on Riser Joint



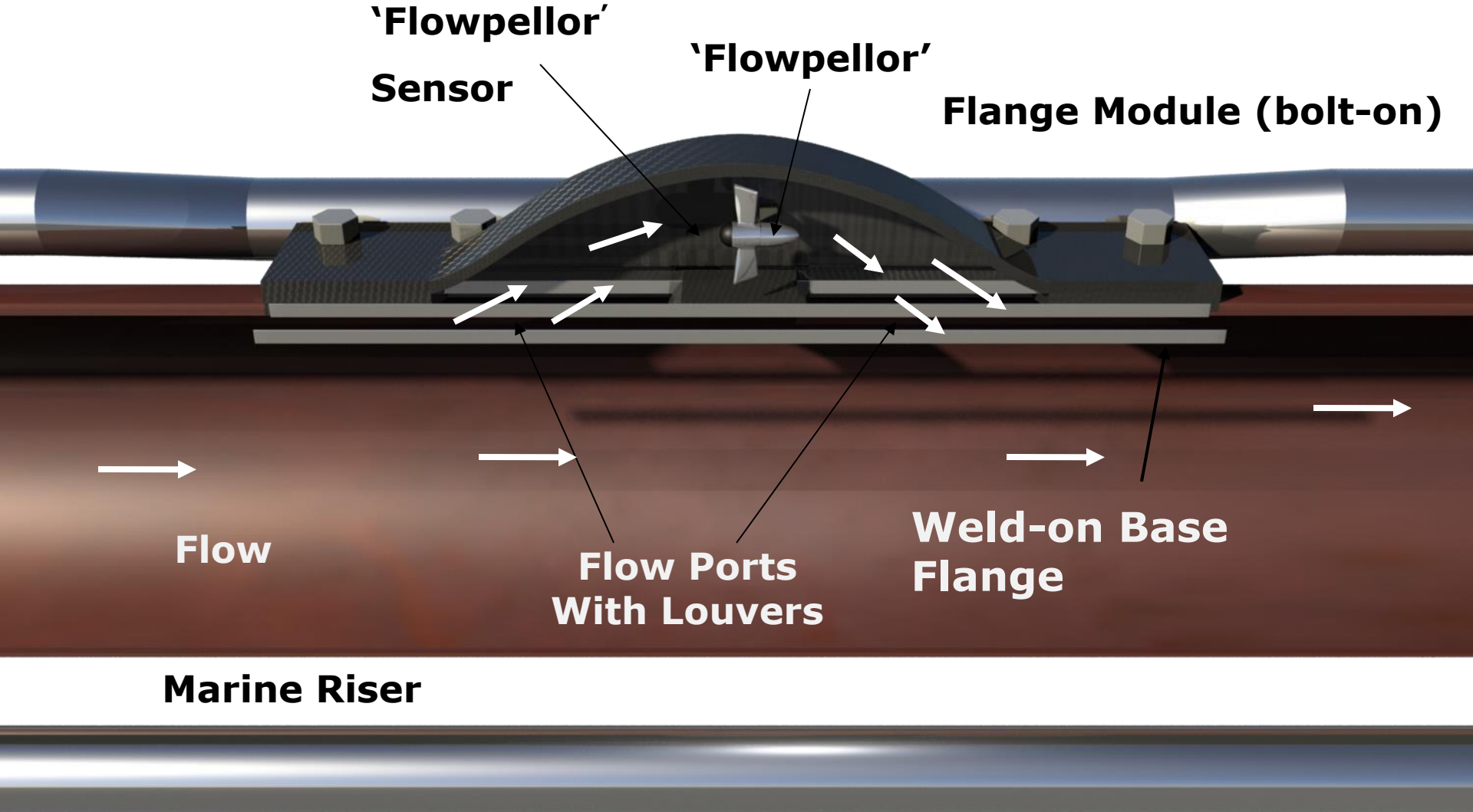
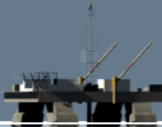


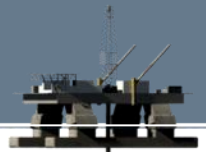
**The interior of the Flow Chamber has a streamlined hydrodynamic profile**



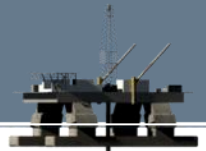


**Riser fluid enters and exits the module through ports in the riser body**

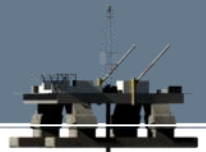




- Patented technology developed specifically to measure real time bi-directional flow and changes in flow in a marine riser
- Flow can be measured below 0.1bbl/minute and is unaffected by rig motions (heave, pitch, and roll)
- Immediate indication of gain or loss is provided during all rig operations. Drilling ahead, tripping, running casing, wireline logging with pumps on or off.

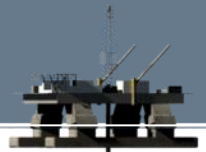


- System is easily calibrated at any time using mud pump flow rate versus flowpeller rpm
- Flow determination is unaffected by drilling or completion fluid type or properties
- Flow determination unaffected by type of rig operation

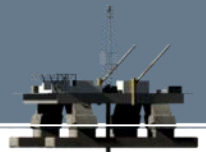


- Minimize the risk of potentially catastrophic well-control incidents or Loss of Well Control (LOWC)
- Early Kick detection (EKD) and Early Kick Confirmation (EKC).
- Determining when a kick has been effectively controlled, and safe drilling operations can resume
- Distinguish between kicks/losses and less hazardous events such as breathing and ballooning permitting the operator to make safe and effective operational decisions





- Flow measurement and associated alarms are operable 24/7 to multiple personnel
- Flow measurement accuracy does not deteriorate with increasing rig motions
- System provides real-time measurement of fluid flow within the riser as opposed to indirectly deducing the flow from tank level changes or mathematical calculations or algorithms on the MODU
- Real-time indication of fluid gain/loss available for all operations



- Reduced connection times and overall time required for “fingerprinting”
- Expanded drilling weather window - Limiting factor with increasing weather is heave compensator stroke not deterioration or indetermination of return flow measurement
- Distinguish between kicks/losses and less hazardous events, positioning the operator to make more cost effective operational decisions

An offshore oil rig is visible in the distance on the left side of the image, set against a backdrop of a vast, dark blue ocean and a sky filled with soft, white clouds. The rig is a complex structure with a tall derrick and various platforms, painted in red and yellow.

**KNOWFLOW**  
S Y S T E M S

**THANK YOU!!**

**[www.knowflow.ca](http://www.knowflow.ca)**