

# Riserless Drilling - Applications of an Innovative Drilling Method and Tools



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# OVERVIEW

**I. Riserless / Dual Gradient Methods**

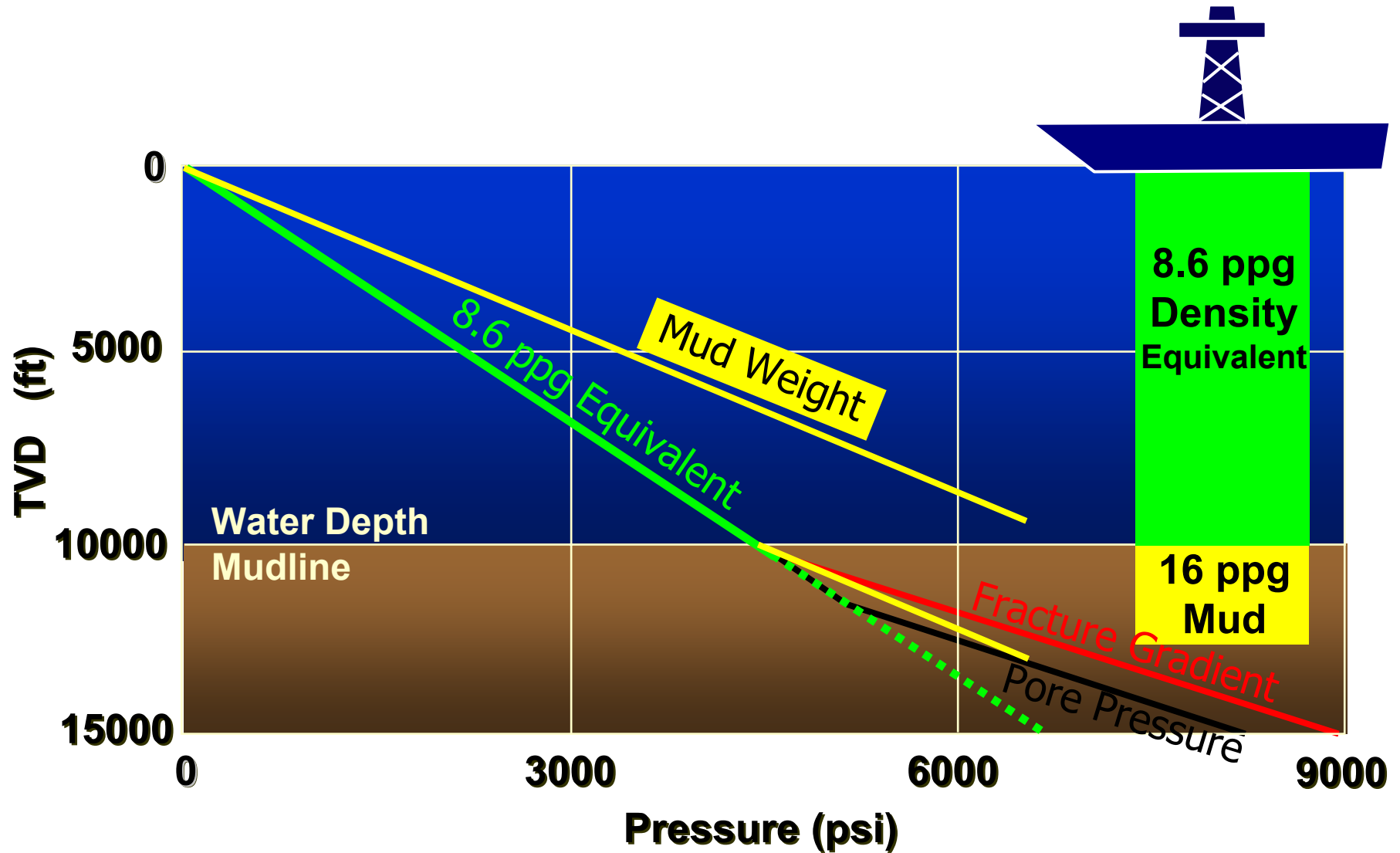
**II. EdR MPD Method**

**III. Primary Enablers**

**IV. Conclusions**



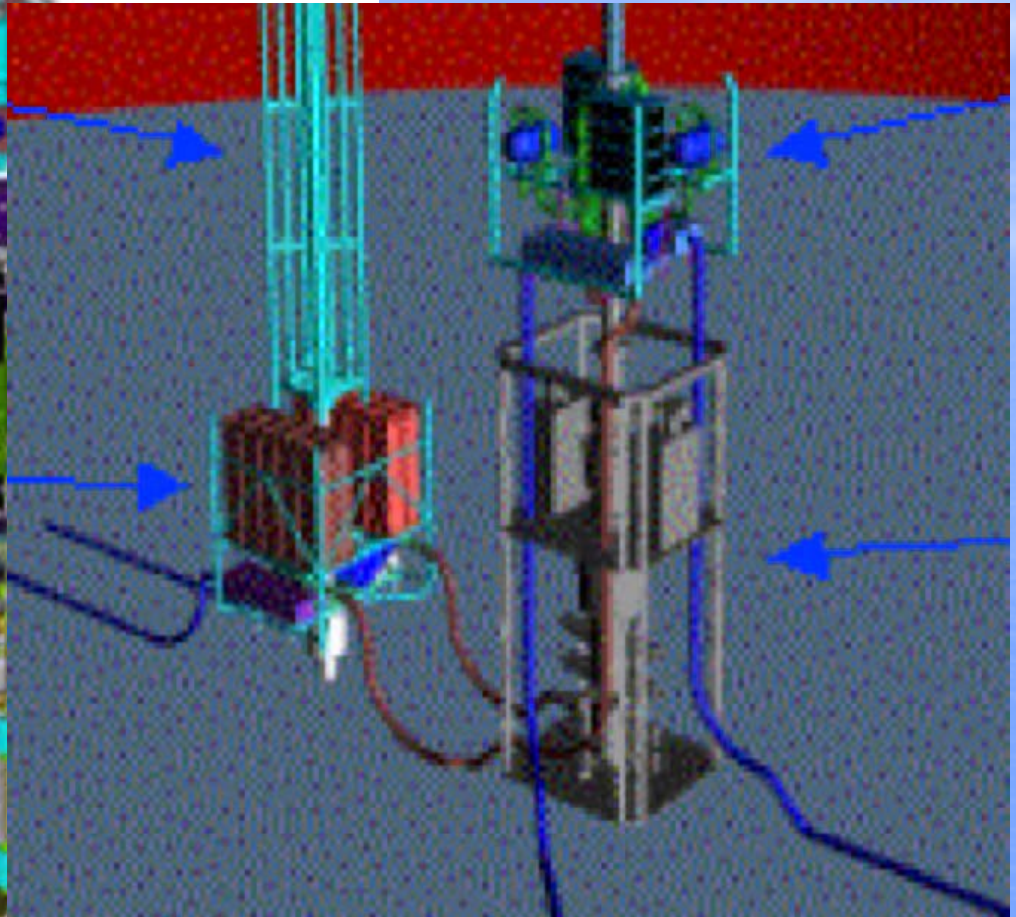
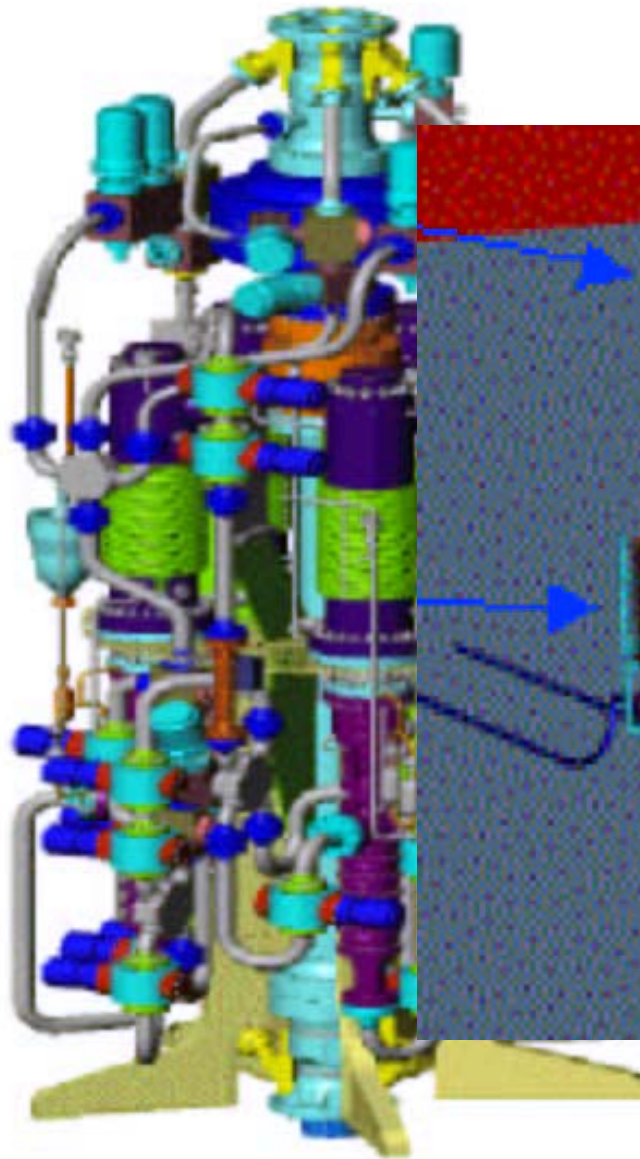
# Dual Gradient Deepwater Drilling



# Risers



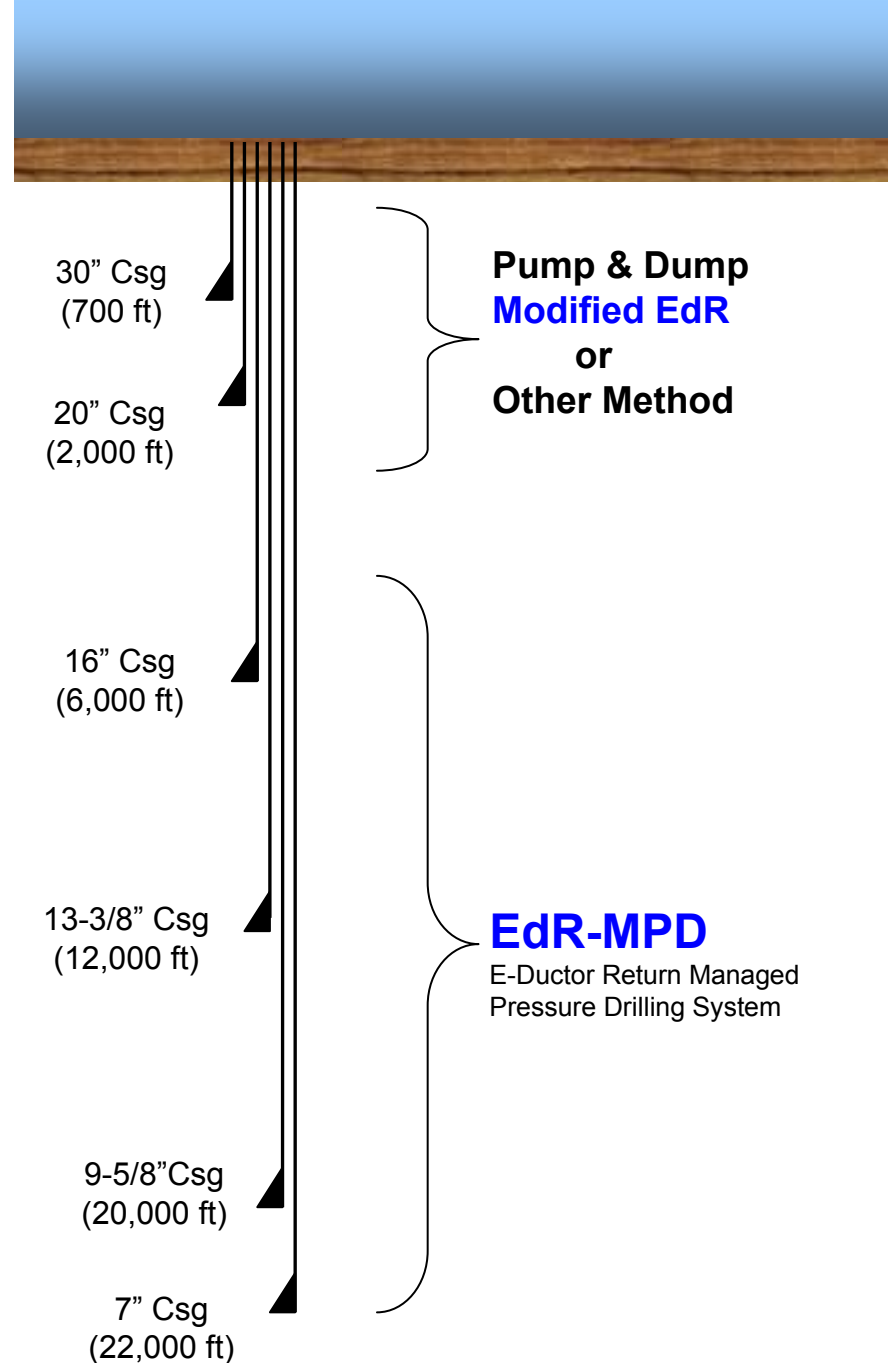




**Shell - SSPS  
System**

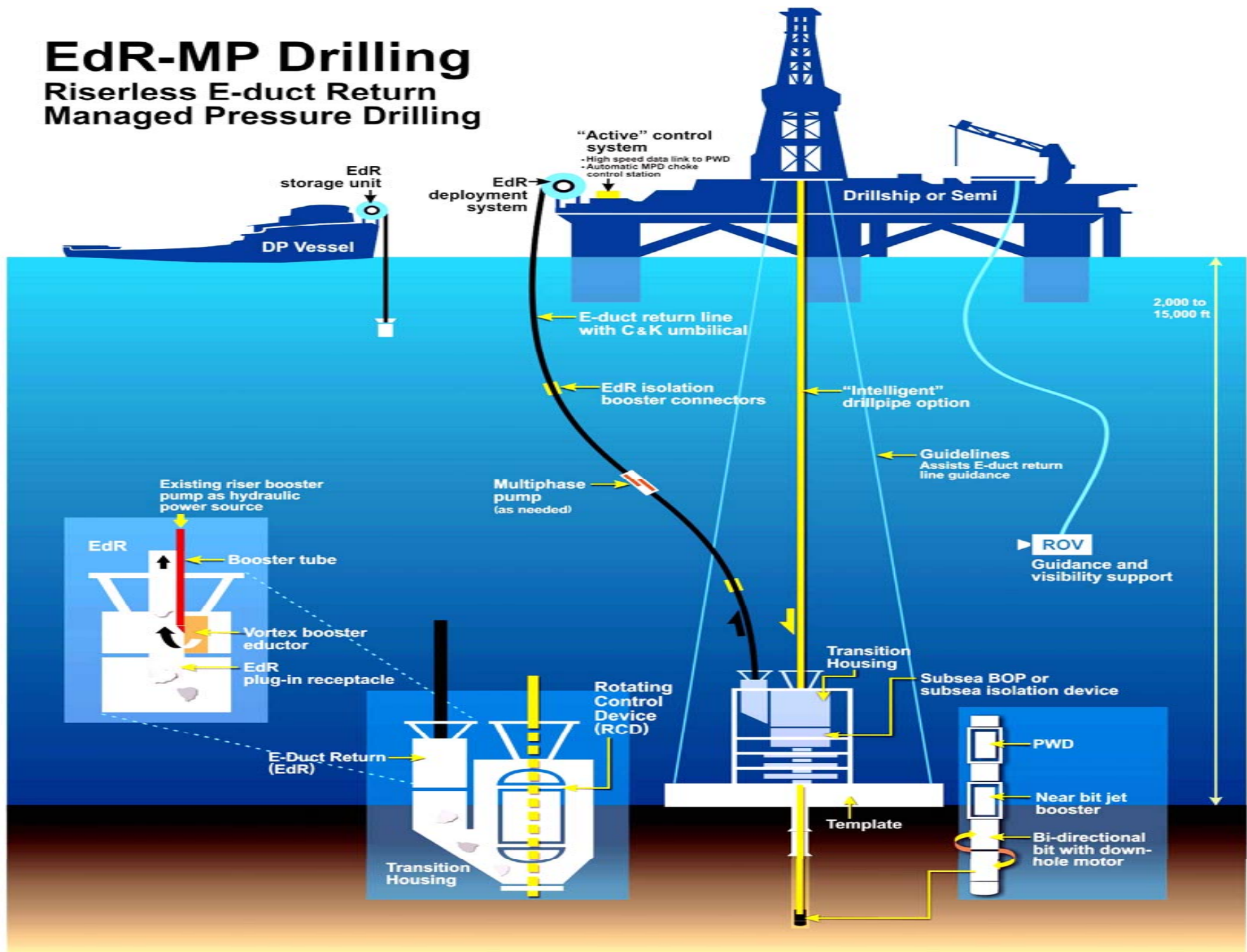
**Maurer - Glass Bead Lift  
Texaco - DeepVision**

# Casing String Targets Using EdR-MPD



# EdR-MP Drilling

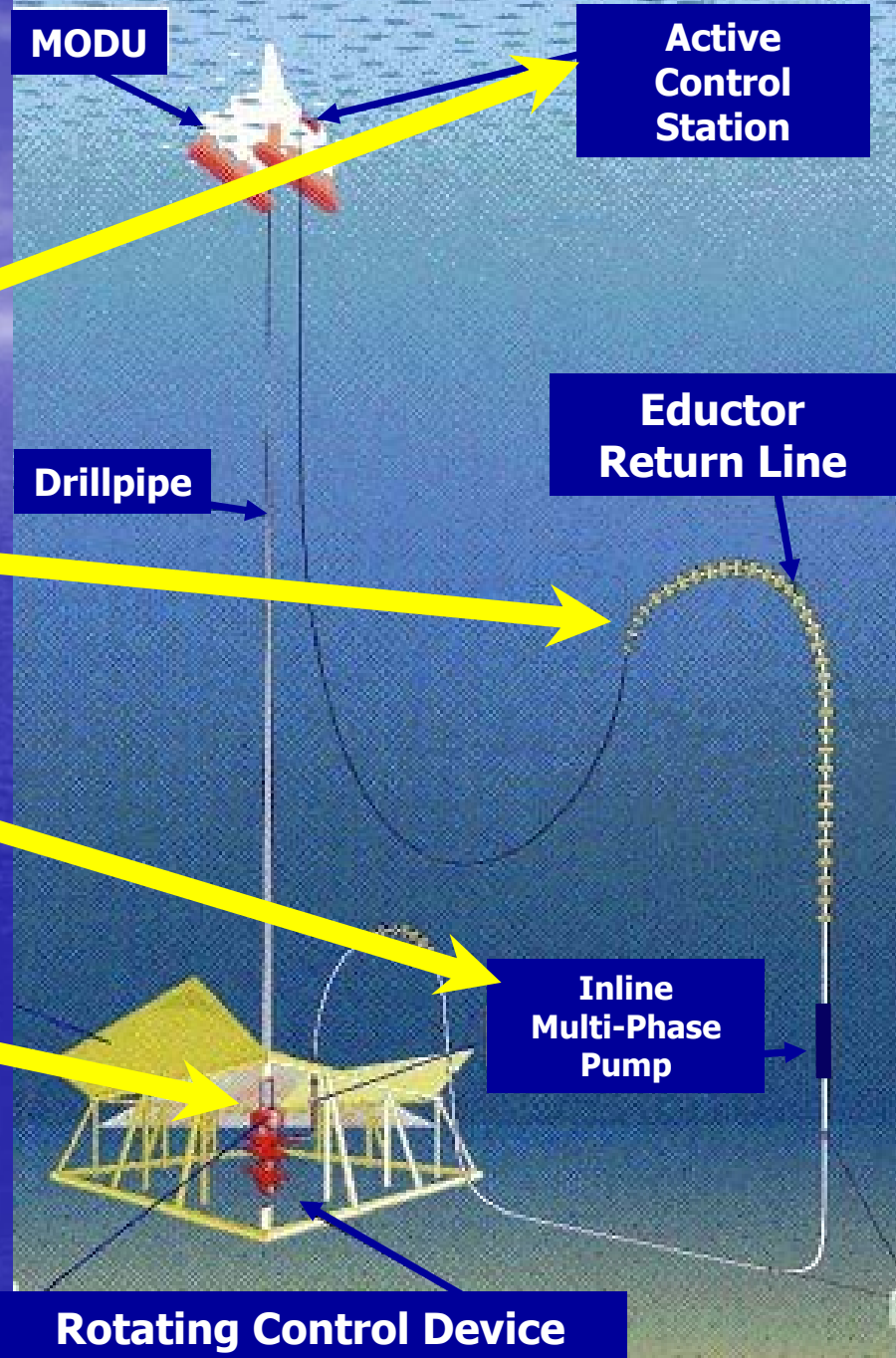
## Riserless E-duct Return Managed Pressure Drilling





# Primary Enablers

- Active Control Station
- Educator Return Line
- In-line Multi-Phase Pump
- Subsea Rotating Control Device







ROTATING HEAD

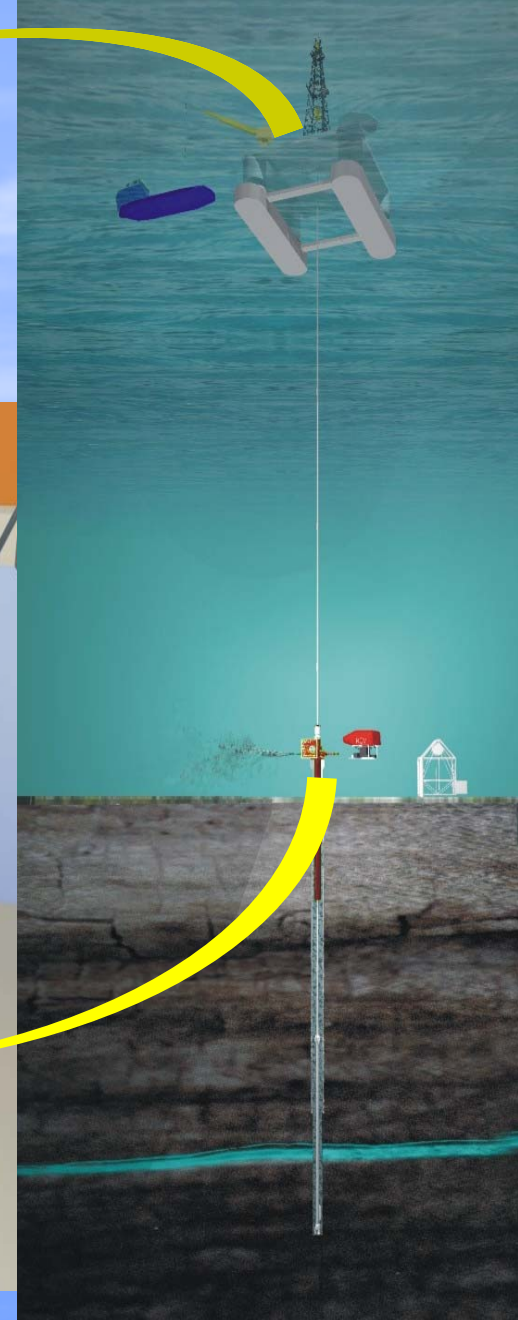
**Drilling technique precisely controls the annular fluid pressure profile within a wellbore.**

**Managed  
Pressure  
Drilling**

# Rotating Control Device



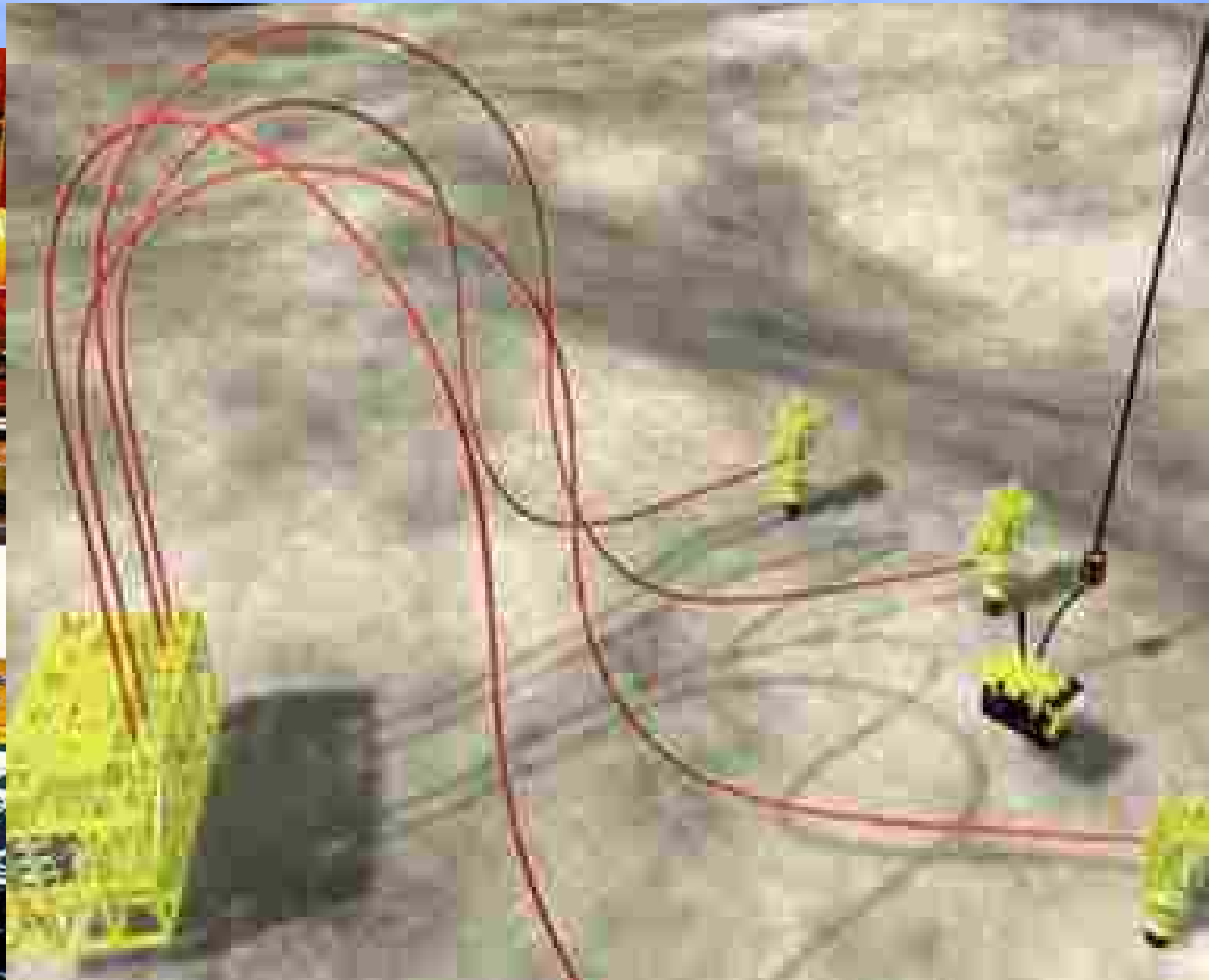
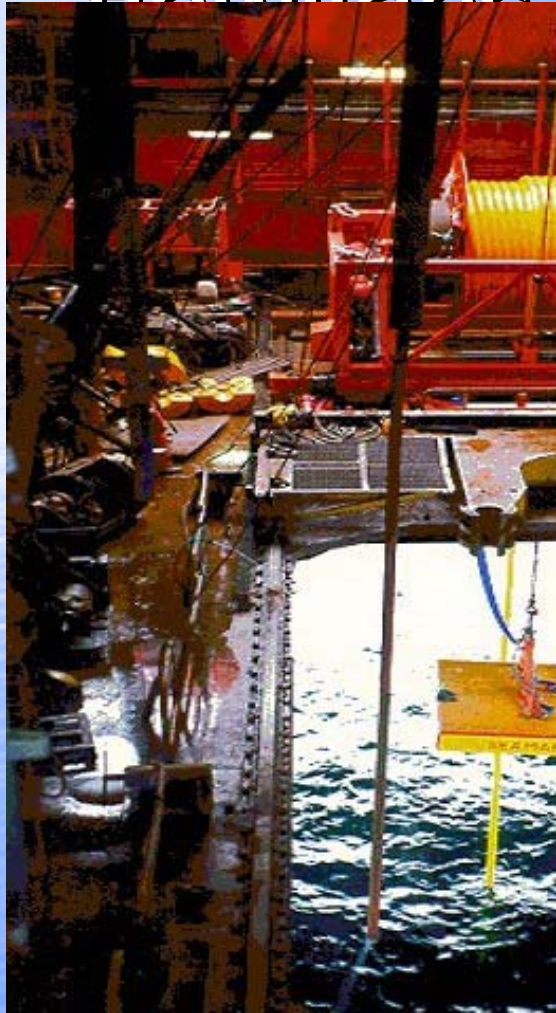
**SURFACE  
APPLICATION**





# Deployment Unit Technology

## Flowlines

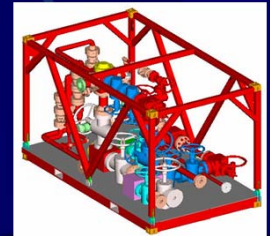






## Choke Manifold

A set of high-pressure valves and associated piping that usually includes at least two chokes, arranged such that one choke may be isolated and taken out of service for repair and refurbishment while well flow is directed through the other one. Also allows the driller to apply a pressure drop as well as grants the ability to divert gas and fluids returned while drilling.



## ACTIVE CONTROL SYSTEM

# Process Control Principles

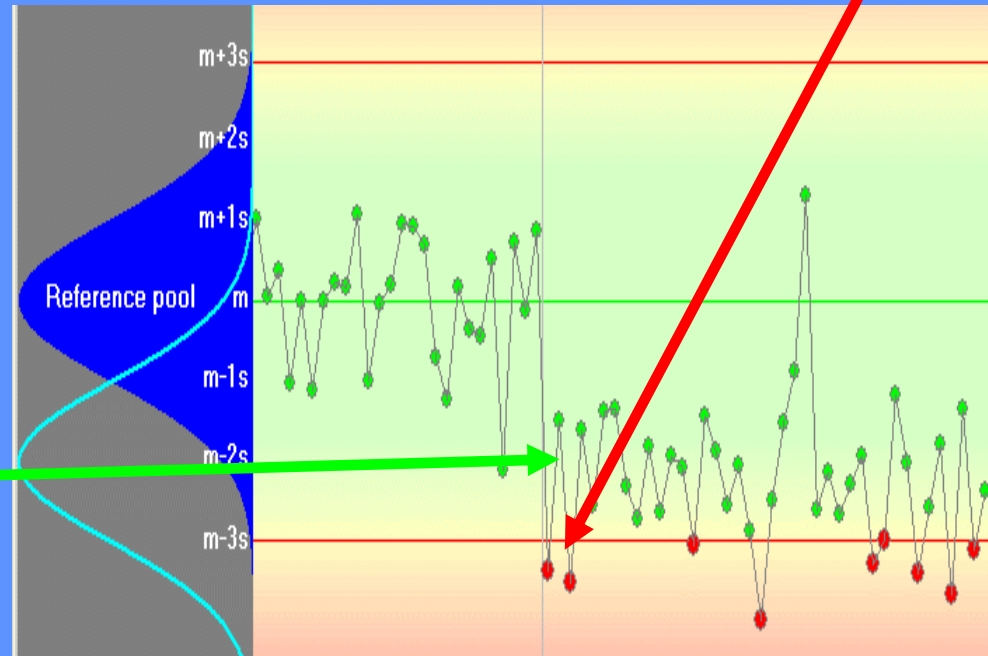
***Shewhart* Control Charts  
for variables.**



**NORMAL  
DISTRIBUTION  
DETERMINED**

**POINT OUTSIDE  
CONTROL LIMITS**

**ADJUSTMENTS  
MADE**

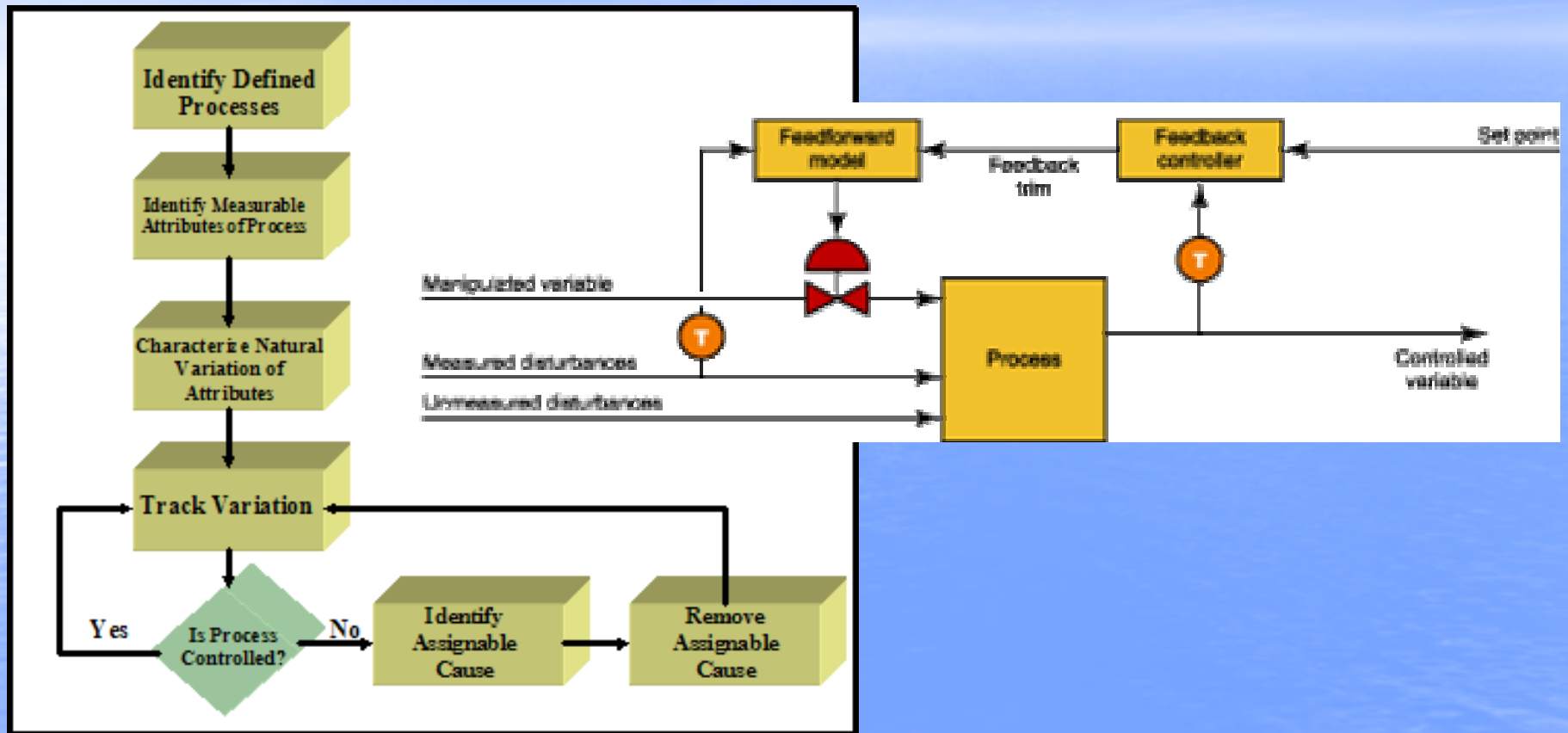


**PROBABILITY  
OF A POINT  
OUTSIDE**

**CONCLUDE  
PROCESS  
HAS SHIFTED  
AND UNSTABLE**



# Active Control Process



# Key Advantages of EdR MPD

## Cost Savings

- Mitigates **Capital Costs** of Riser Pipe.
- Eliminates **Riser Tensioning** & Maintenance.
- Reduced **Installation Time**.
- Less **Mud Volumes** to Fill Riser.
- Lower **Inspection & Handling** Costs.
- Selection of Lower Cost Drilling **Vessels**.
- Less **Handling** = Enhanced Safety Benefits.



# Key Advantages of EdR MPD

## E-Duct Return Line Advantages:

- Mitigates Riser **Fatigue** and Joint **Leaks**.
- Enables **Reverse Circulation**.
- Increases **Riser Angle** Limits.
- Minimizes **VIV** Issues.
- Greater Degree of Vessel **Drifting**.
- Quicker Emergency **Break-Away** .
- Potential Elimination of "**Pump and Dump**".





# Key Advantages of EdR MPD

## Managed Pressure Drilling Allows:

- Drilling with **Annular Control** at all Times.
- Fewer **Casing Strings**.
- Improved **Kick Tolerance**.
- Reduced Risk of **Lost Returns**.



# Conclusions

- **STEP CHANGES**

are needed in deepwater drilling systems, particularly as we continue to explore in greater water depths.

- **EVOLUTION**

There are various competing step change technologies regarding riserless drilling. These various programs continue to evolve as the enabling tools and new technologies come in to play.



# Conclusions

- **EXISTING TECHNOLOGY**

Tremendous cost savings when drilling in deepwater can be achieved using existing technologies.

- **COMBING**

existing technology and tools that are cost effective and provide a safe means of deepwater drilling will be the essential key to enabling large step changes.





# Conclusions

## ● CHAMPIONS

Step changes occur slowly in our industry when no empowered champions take the lead.

Challenges to current drilling techniques in deepwater must be made or the high associated costs will continue to be a barrier to future deepwater exploration.



# THANK YOU

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