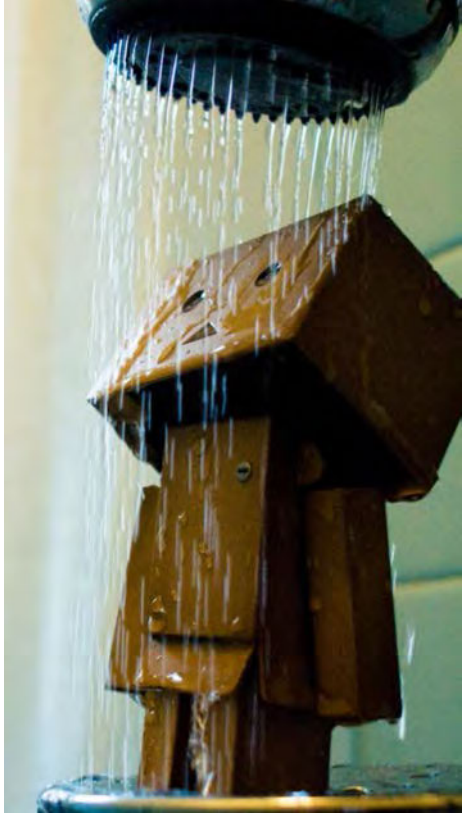
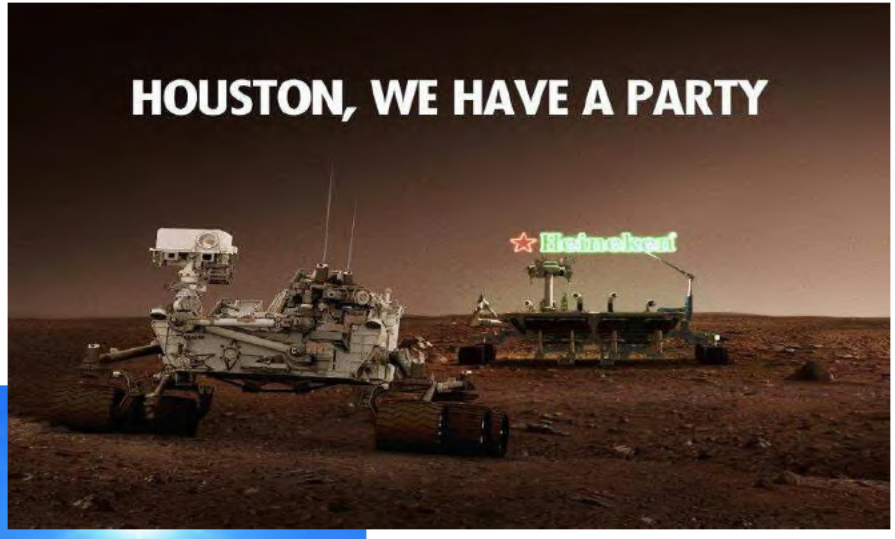
ROBOTICS IN OFFSHORE



D. ROODENBURG
HUISMAN EQUIPMENT B.V.

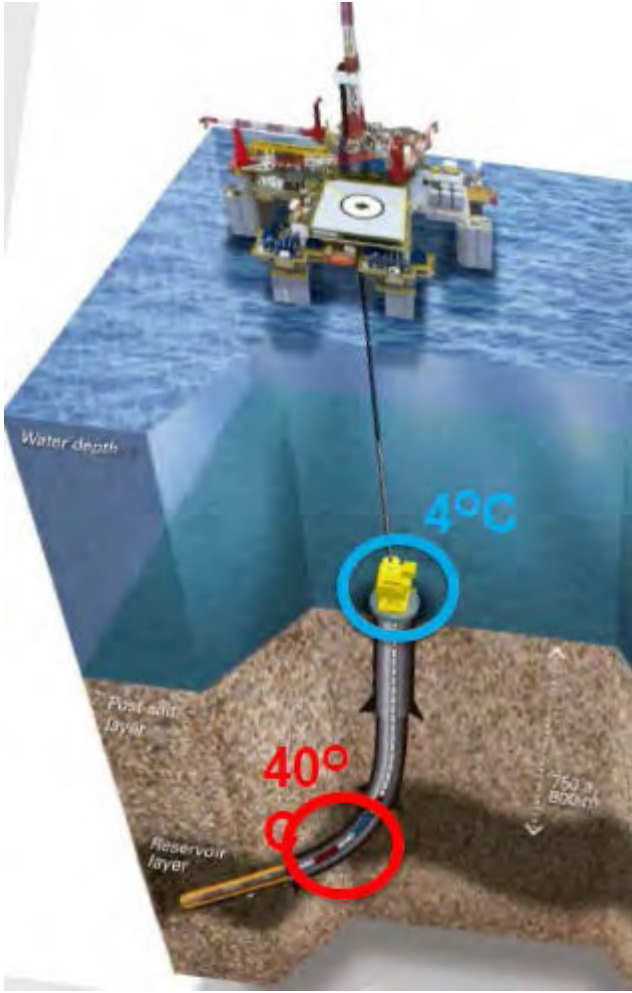
WHAT DID WE GET FROM SPACE?



Engineer **Reliable, autonomous** machines for **harsh** environments

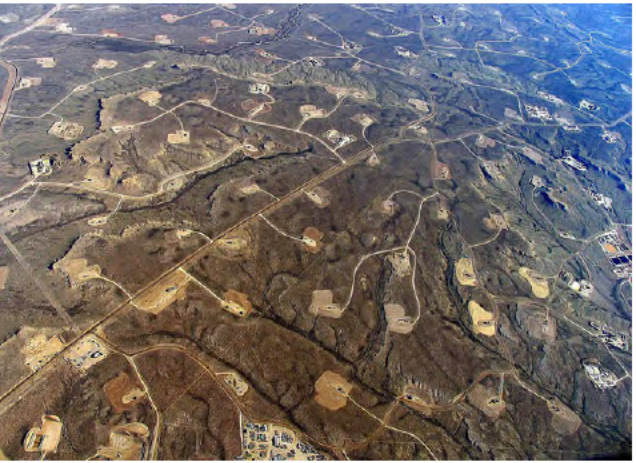
WHAT IS OFFSHORE? - *15M WAVES*

WHAT IS DRILLING?



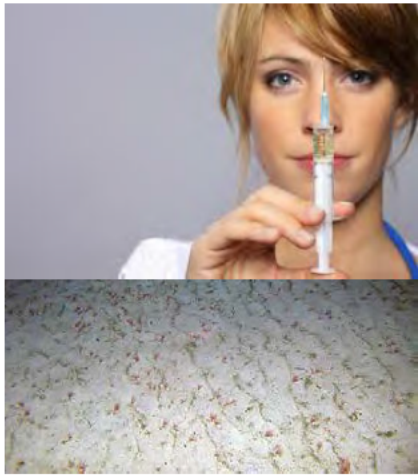
WHY OFFSHORE?
WHICH FOOTPRINT DO YOU PREFER?

NOT IN MY BACKYARD



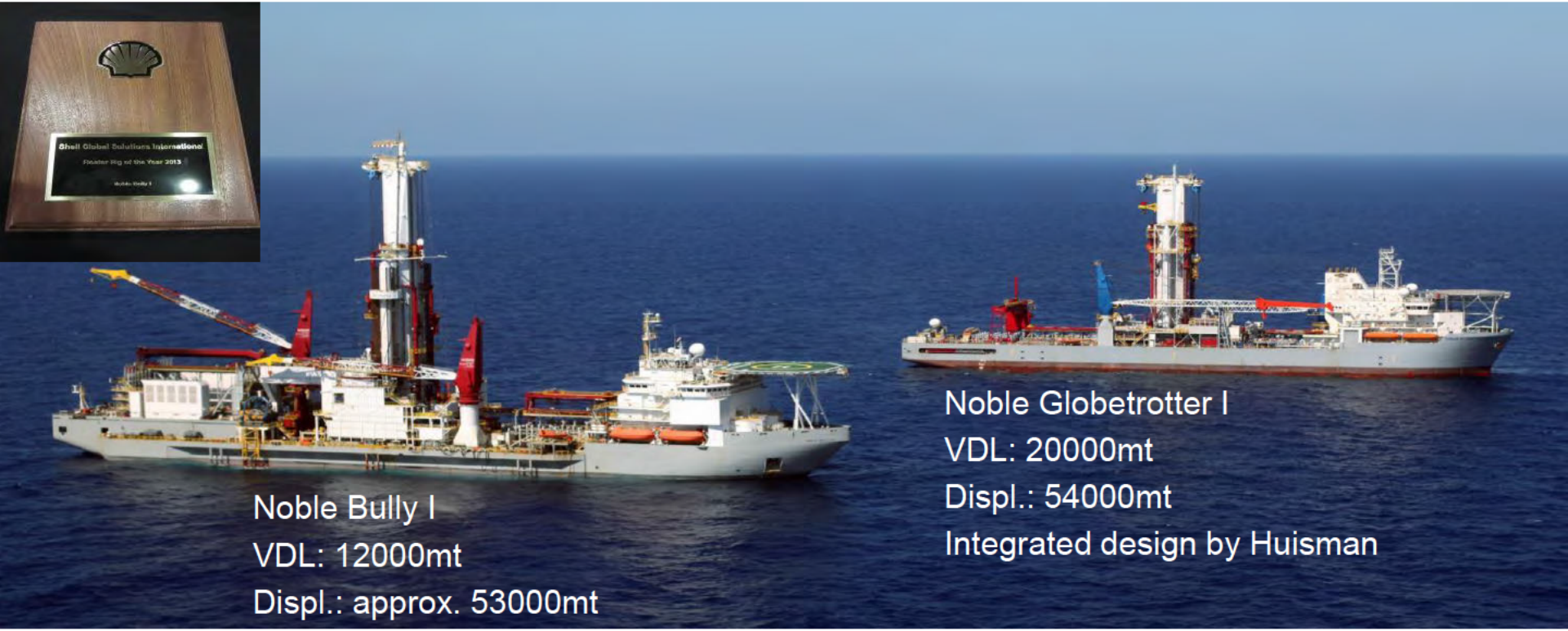
Shale

Mining; coal & tar sands



Deep water drilling

HUISMAN RIG TRACK RECORD OFFSHORE RIGS



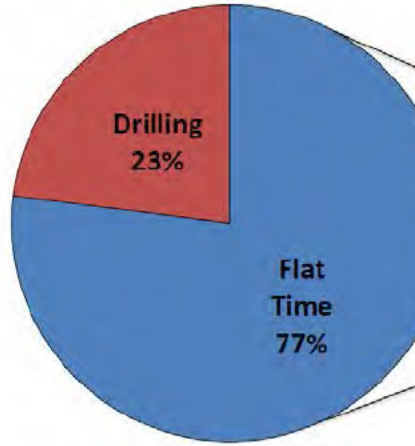
Noble Bully I
VDL: 12000mt
Displ.: approx. 53000mt

Noble Globetrotter I
VDL: 20000mt
Displ.: 54000mt
Integrated design by Huisman

THE NEED FOR SOPHISTICATED ROBOTICS?

HEALTH, SAFETY, PREDICTABLE QUALITY

- Drilling is many connections;
- People still work in one of the most dangerous spots on earth
- 1000 times right, #1001 wrong (accident, incident or bad quality)

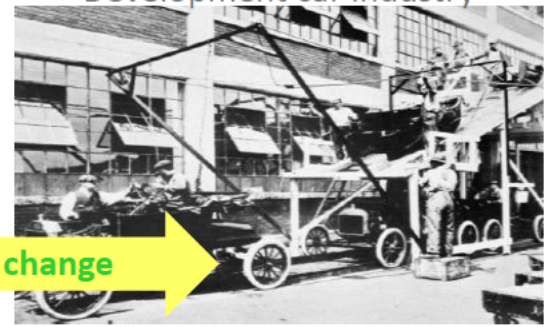


Society of Petroleum Engineers
Annual Technical Conference
and Exhibition

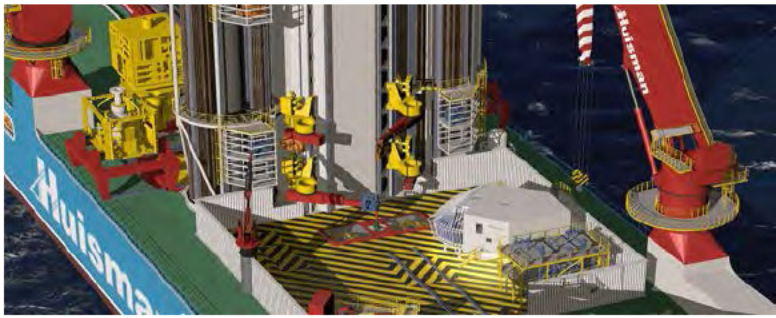
ANALOGY WITH OTHER INDUSTRIES

Development car industry

Process change



Development drilling industry

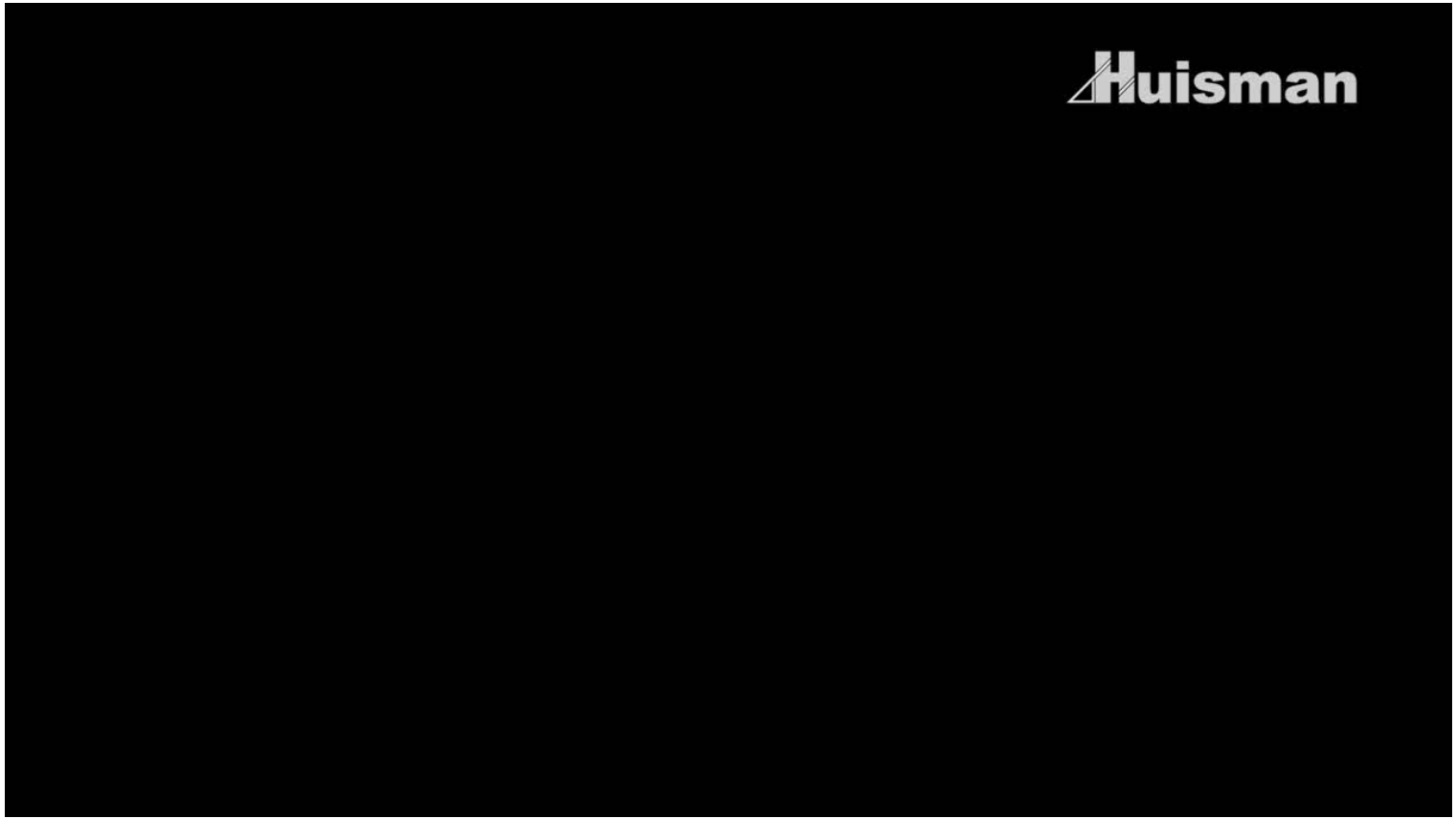


Traditional drill floor	Drill floor Globetrotter	Out future
Romantic, but primitive	*Early mechanisation*	*Faster, lower costs and safer*

FUTURE DRILL FLOOR; FASTER, LOWER COSTS AND SAFER

5000FT/HR TRIPPING

DMPT
INTEGRAL ROBOTIC HANDLERS



HUISMAN ROBOTS PROVIDE BREAKTHROUGH TECHNOLOGY PLATFORM

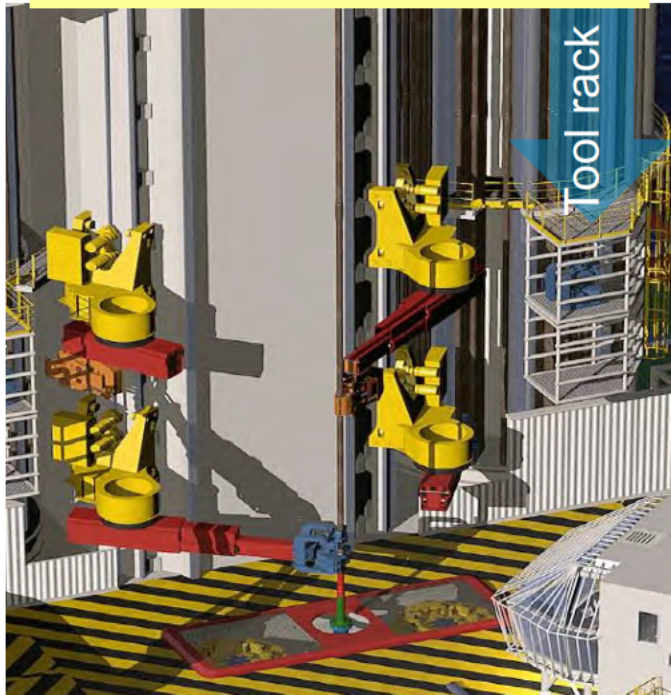
- Tools can quickly be connected to manipulators
  - Dedicated pipe grippers
  - Drill pipe spinner/wrench
  - Casing make up modules
  - Riser running tools
  - Man-riding baskets
  - Umbilical sheaves, etc.

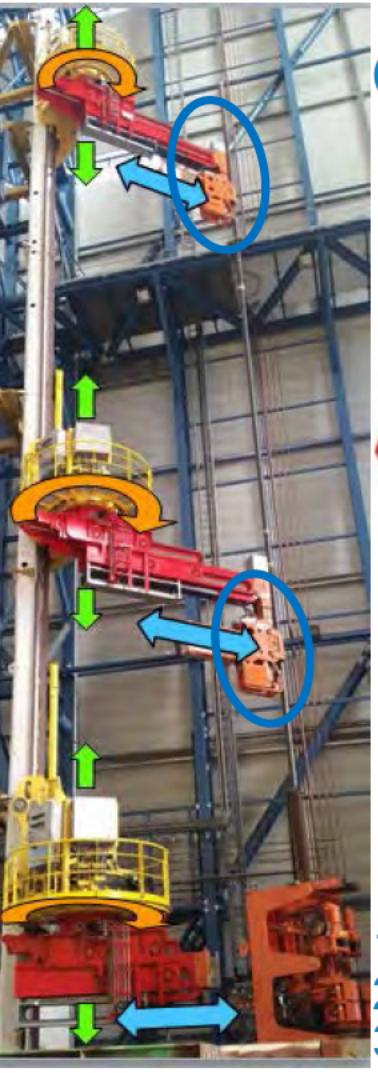
Preventative maintenance

Right 'App' for the job

Offline tool maintenance

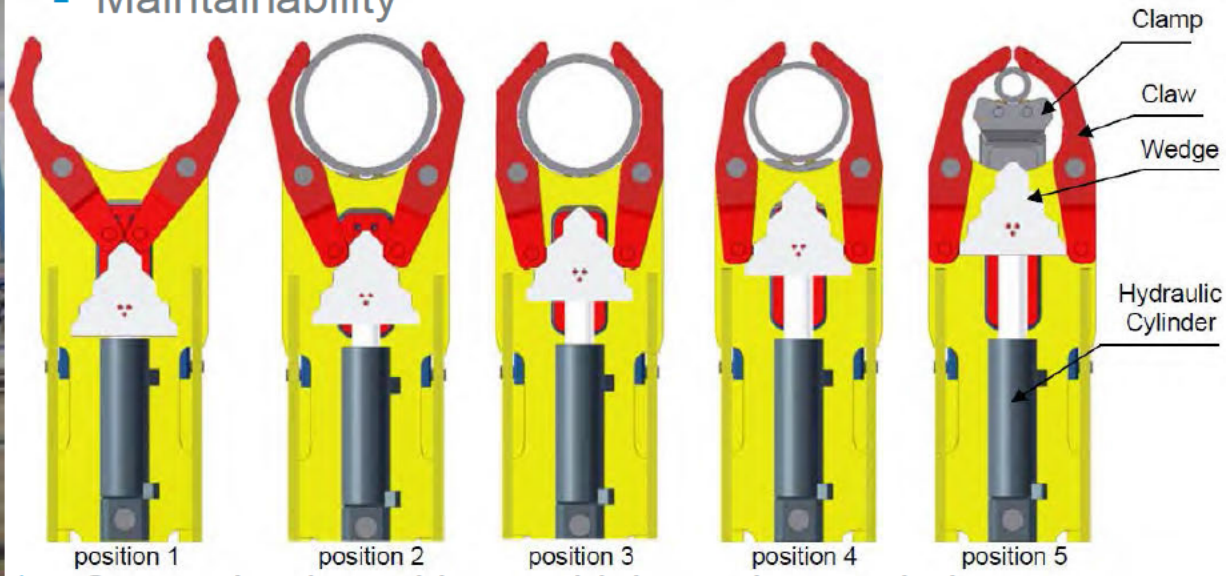
+





GRIPPER DESIGN - PIPE MAY NEVER DROP!

- Safety by design
  - Redundancies
  - Independent monitoring
- Automation ready
- Maintainability



1. Cross check position multiple wedges + timing
2. Cross check Pressure squeeze cyl 40 bar + timing
3. Cross check Negative load when set down → redundant read out

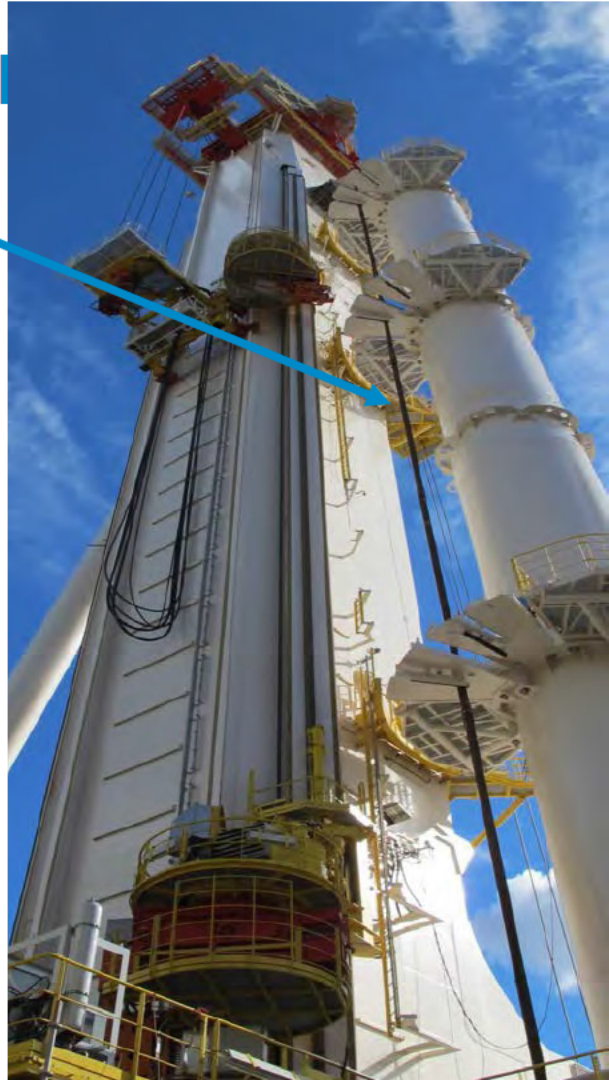
SEEING IS BELIEVING

CONFIRM PERFORMANCE BY TEST

- World first 192 ft stand

Test Goals;

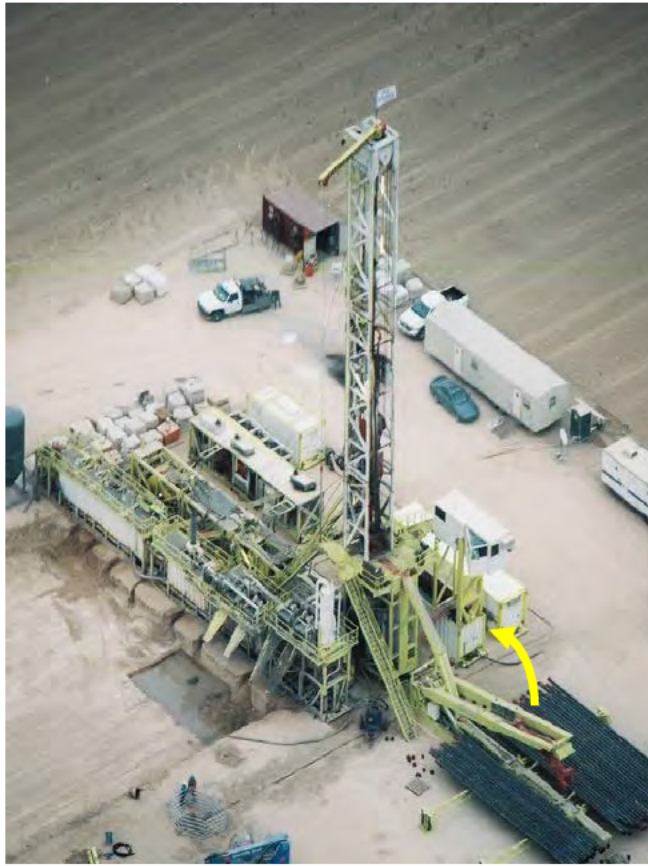
- Demonstrate equipment
- Full scale testing incl dynamics
- Testing automation
- Training operators
- Development future equipment
- Future downhole tests



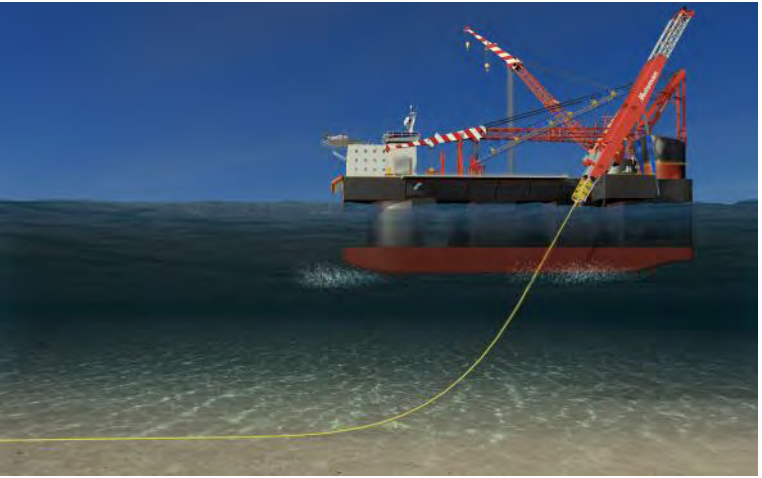
TEST WELL

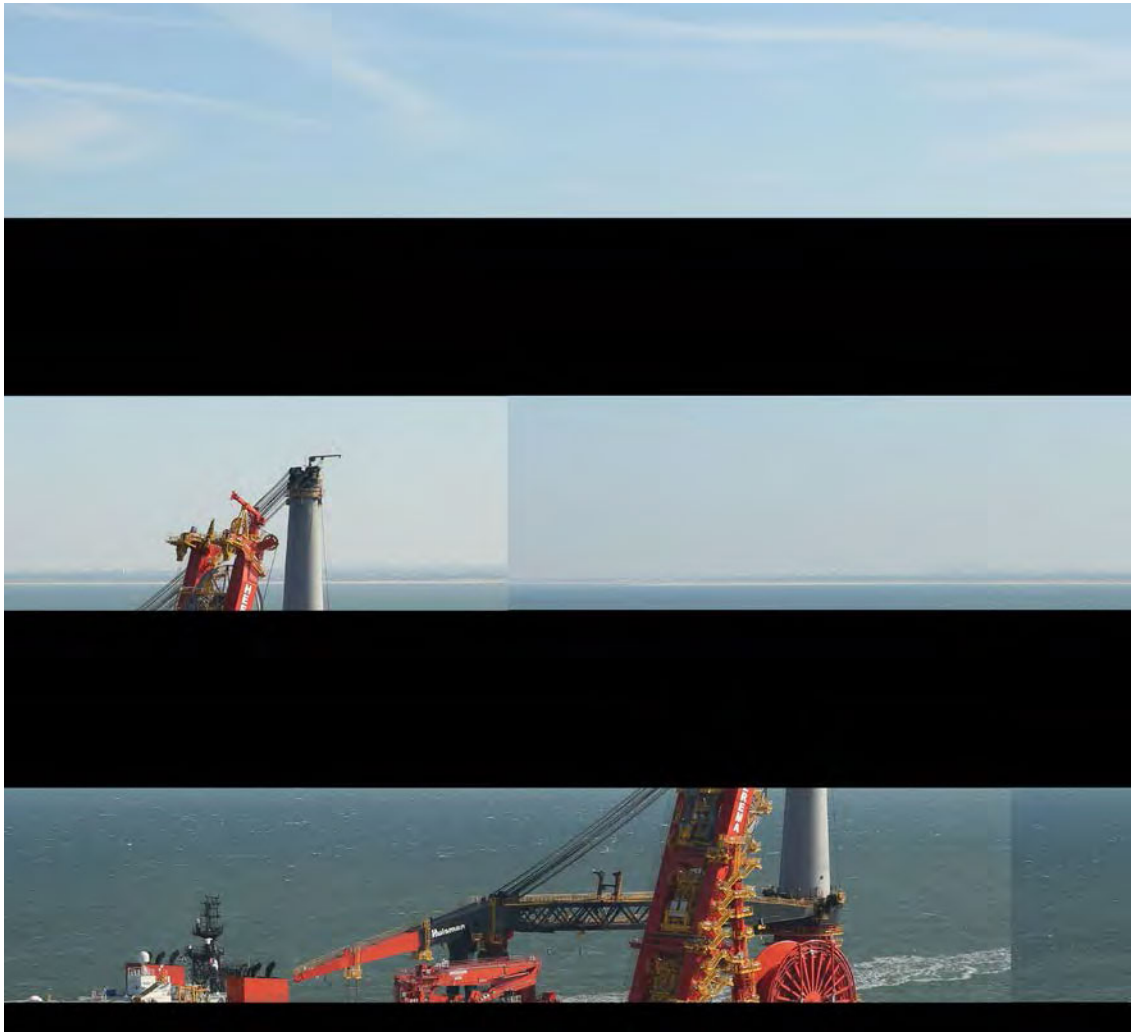
- Ø 118” down to 50 m
- Ø 20” down to 400 m

AUTOMATED LAND RIG – RUNNING NEW BIT IN HOLE

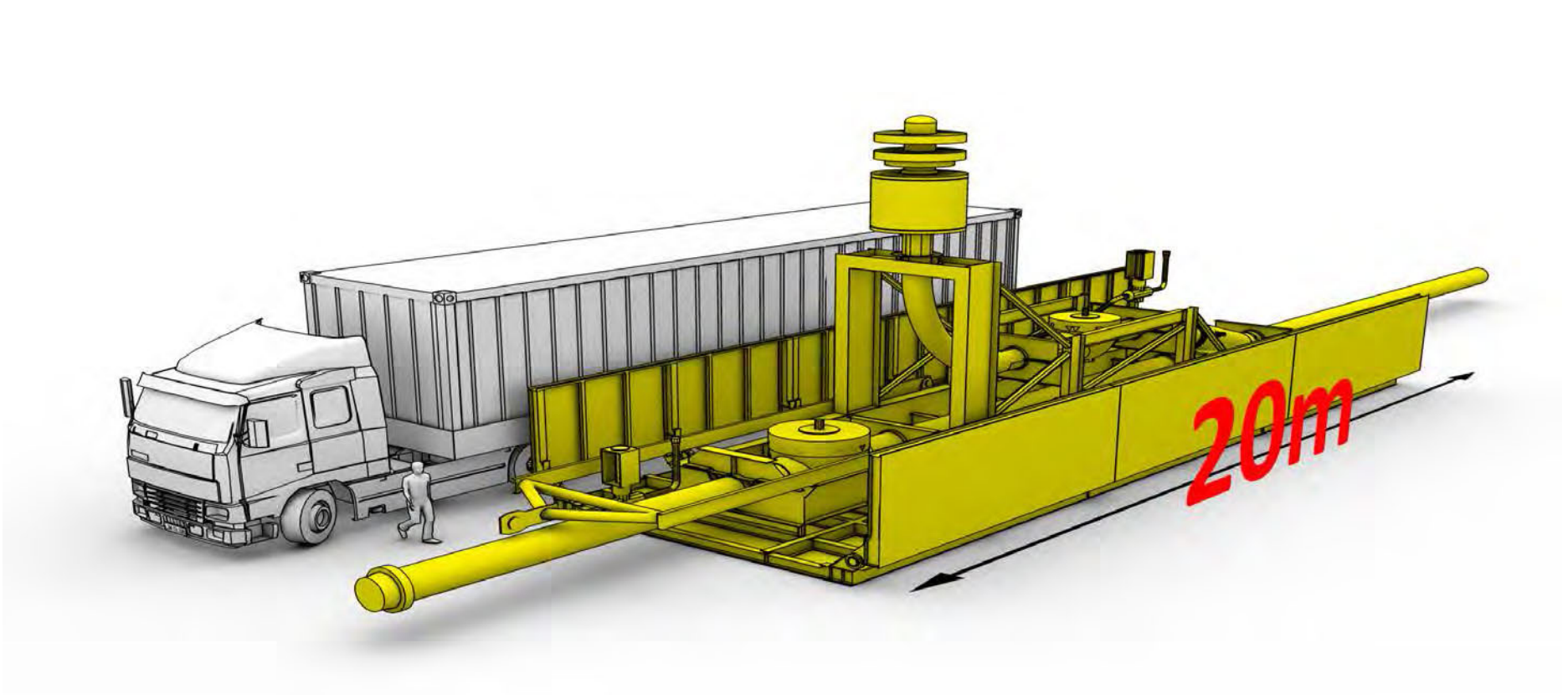


PIPE LAY J-LAY

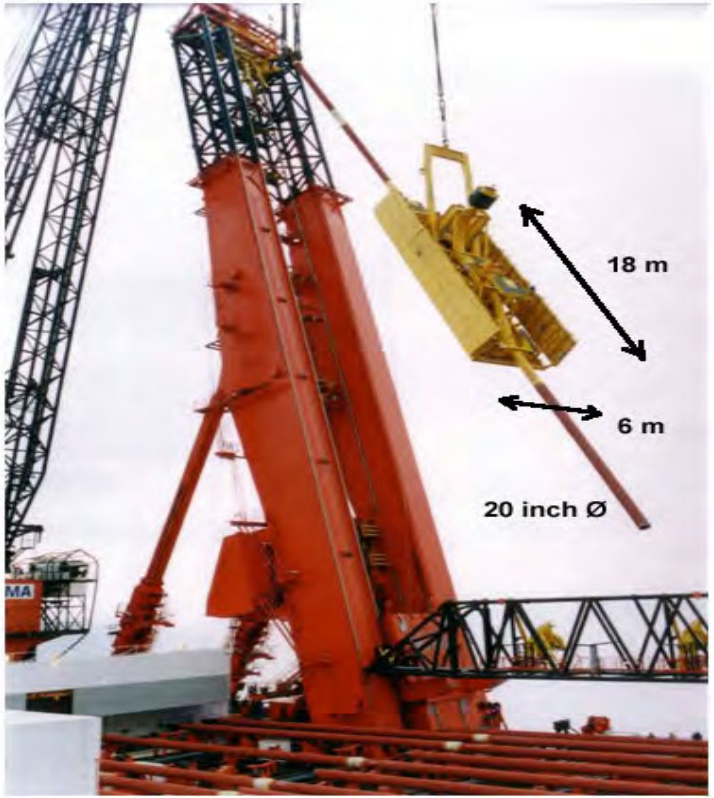




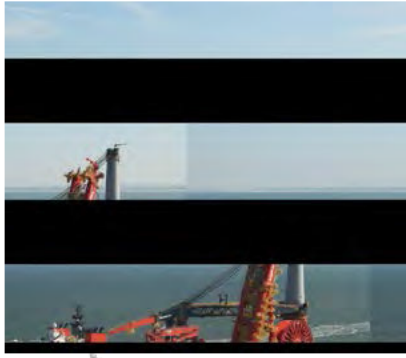
PLET HANDLING

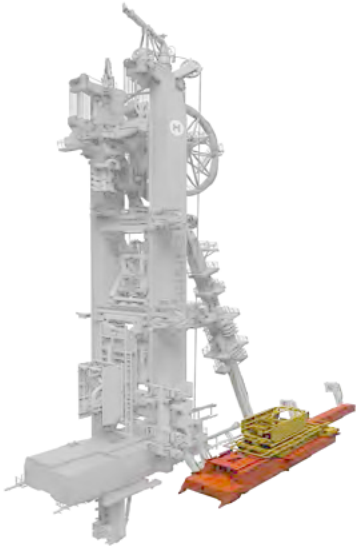


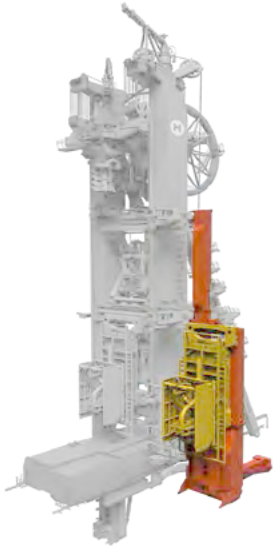
J-LAY / REEL LAY INSTALLATION OF INLINE STRUCTURES

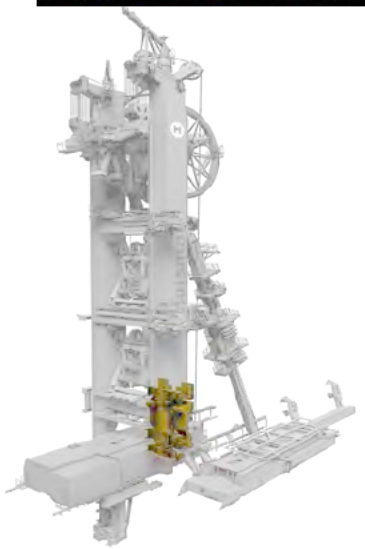


LOAD INLINE STRUCTURE









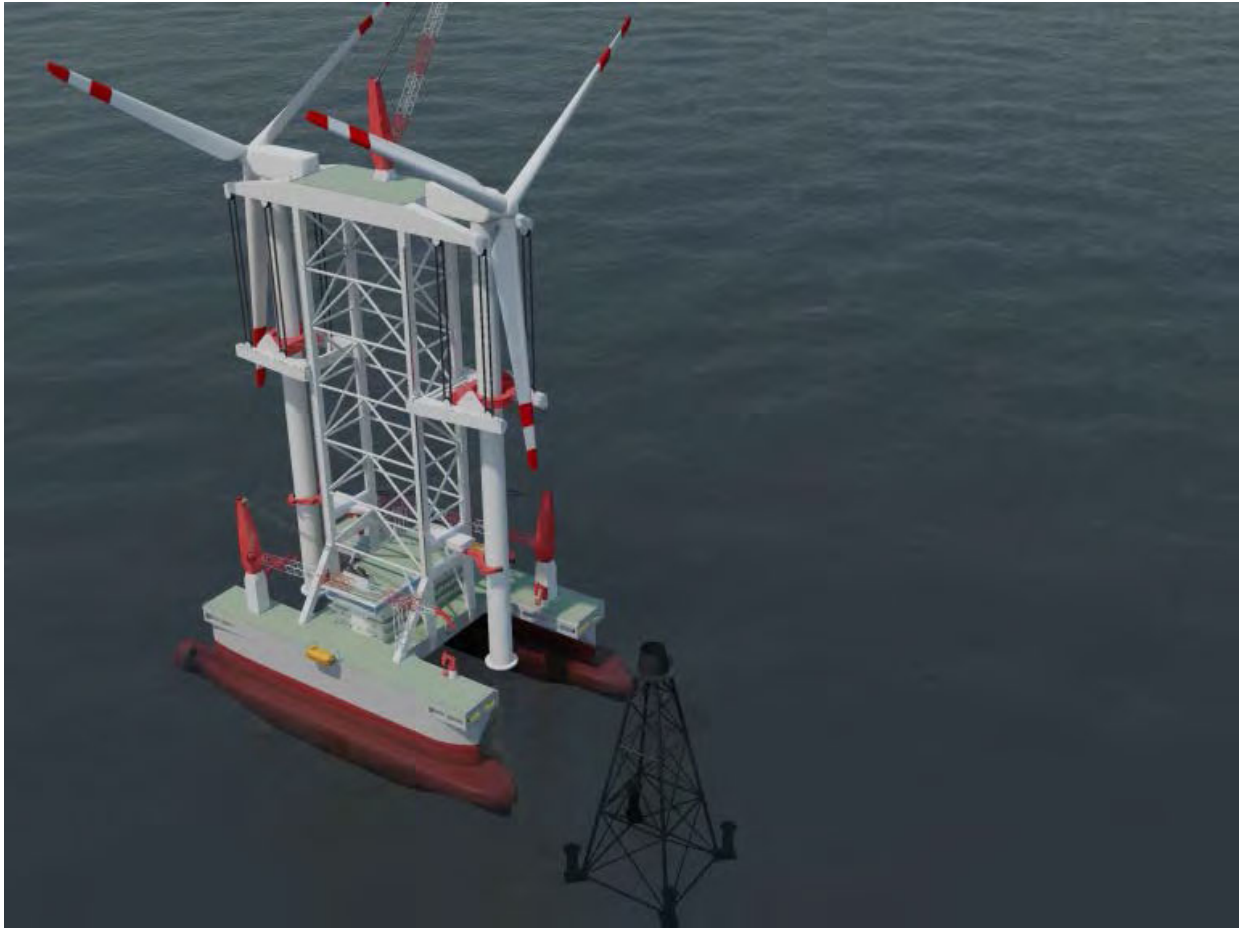
WIND TURBINE SHUTTLE

WIND TURBINE SHUTTLE

- SWATH - Small Water plane Area Twin Hull
- Fast sailing (14 knots)
- To carry and install two wind turbines (1,000mt/pcs) in one piece
- Turbines fully motion compensated during installation (Hs=3.5m)

WORKING WIND TURBINE SHUTTLE MODEL

WIND TURBINE INSTALLATION



CONCLUSION

- Offshore environment very remote
- Harsh conditions
- Capital intensive equipment
- Autonomy

- **Reliability and predictability are key!**