



**THE USE OF AUTOMATION
TO
MITIGATE EXPOSURE**



DrillSafe June 6th 2013

Presenter: Steven Ford



ENVIRONMENTAL EXPOSURE



BP responsible for critical Macondo test

By Ed Crooks in New Orleans

The first phase of the liability trial for damages and penalties over the 2010 Deepwater Horizon disaster ended on Wednesday, with BP concluding its arguments that it had not acted with gross negligence in causing the disaster.

COMMERCIAL AND REPUTATIONAL EXPOSURE



Exxon Valdez

When the Exxon Valdez ran aground off Alaska in 1989, it spilled roughly 34,600 tonnes of oil into Prince William Sound



PHYSICAL EXPOSURE



NOTICE

**A PERSON'S COMMON LAW RIGHT TO ENTER
IS EXPRESSLY WITHDRAWN**

**ADMITTANCE BY INVITATION ONLY
TO ALL PERSONS & ENTITIES**

OTHERWISE TRESPASS APPLIES

HCA 1991 171 CLR 635 F.C. 91/004



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POLITICAL
EXPOSURE



Henry Ford Industrialist

Henry Ford was an American industrialist, the founder of the Ford Motor Company, and sponsor of the development of the assembly line technique of mass production. Henry Ford did not invent the automobile. He didn't even invent the assembly line. But more than any other single individual, he was responsible for transforming the automobile from an invention of unknown utility into an innovation that profoundly shaped the 20th century and continues to affect our lives today.

WHAT DOES WELL MANUFACTURING MEAN?

- Reversed conveyer belt concept
 - machinery moving along well sites drilling and completing wells
- Specialized, highly automated truck / trailer mounted rigs
- Hub structure, allowing centralized production of key logistics, such as drilling fluids, mud, tubes, and pipes – for several well sites at a time
- Autonomous drilling and trajectory control with **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition system (SCADA_{Drill})



TARGET HIGH DENSITY DRILLING & RESOURCE-INTENSIVE PLAYS

- Achieve ultra low-cost wells
- Leveraging capabilities both partners





WELL MANUFACTURING SYSTEM – A SHELL/ CNPC JV

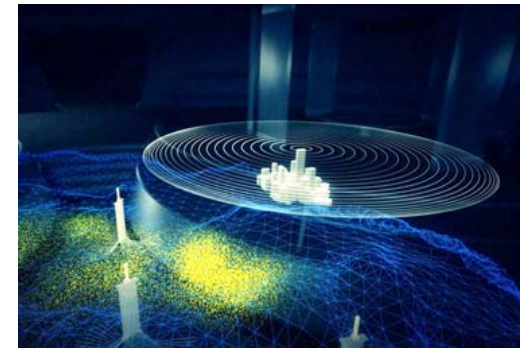
- Leveraging capability of both Shell and China National Petroleum Corporation:
 - Drilling efficiency optimization techniques
 - Automation
 - Low-cost sourcing
- Targeting resource-intensive plays (tight gas, shale gas, coalbed methane) to achieve ultra low-cost wells
- Automated/ standardized/ optimised/ commoditized processes to unlock resource plays
- Less HSSE risk exposure; smaller footprint
- Fully integrated service company
- Mass produce wells: lower drilling cost; operational excellence; speed; consistency



RIGS TAILORED TO TASKS AND PADS



DRILLING AUTOMATION - SCADADRILL



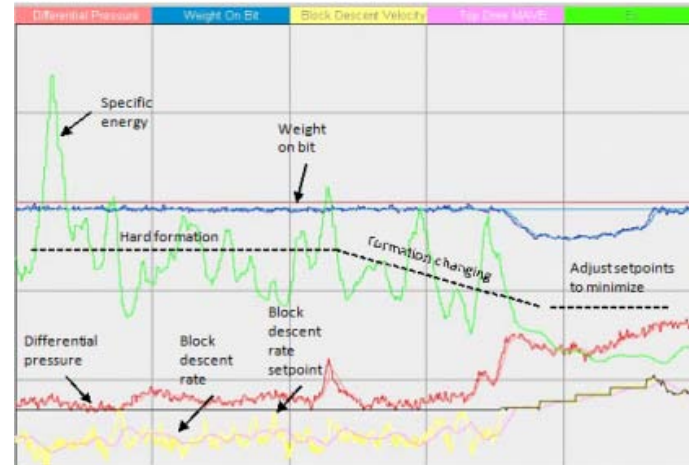
CENTRALLY CONTROLLED

BEATING MANUAL DRILLING

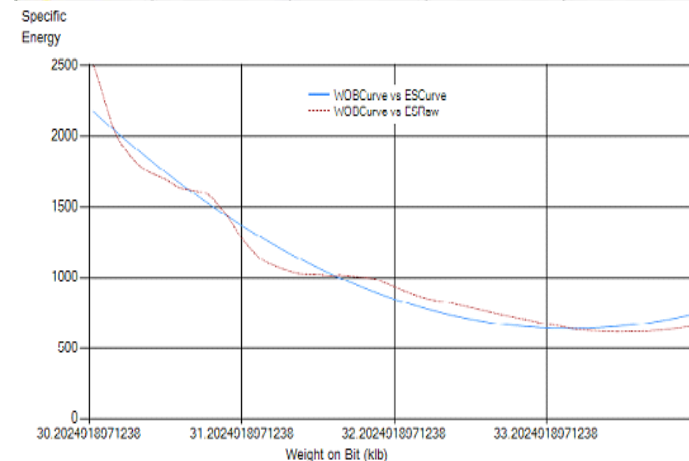
Drilling Automation aims to automate parts of the drilling process, e.g.:

- Automate RPM to optimize Rate of Penetration (ROP).
- Automate Weight on Bit (WOB) to optimize Rate of Penetration (ROP).
- Automate Trajectory / Directional Drilling.
- Automate data collection / Measure While Drilling and Logging While Drilling.
- Automate Pipe handling.

Drilling Automation proven results:



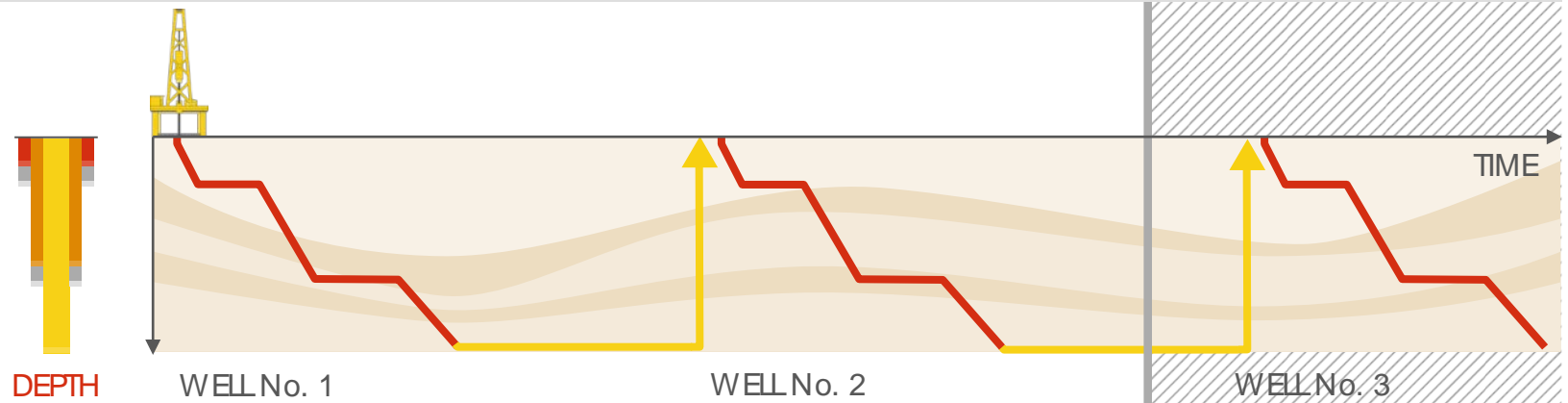
The automated rig adjusts the weight on bit and RPM to optimize ROP.



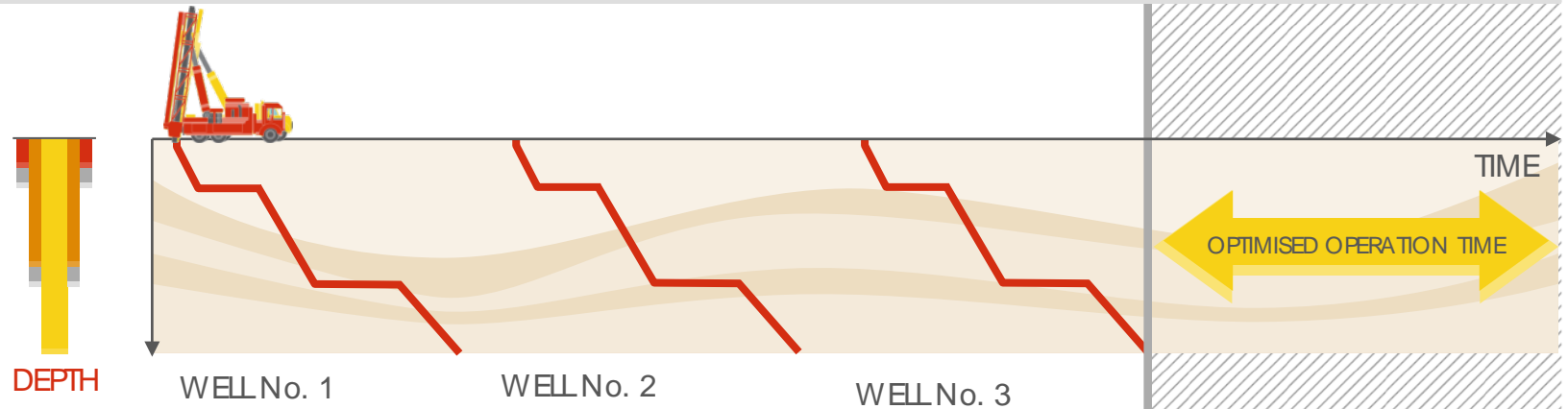
The WOB is automatically optimized to minimize the specific energy

WELL MANUFACTURING

CONVENTIONAL WELLS CONSTRUCTION

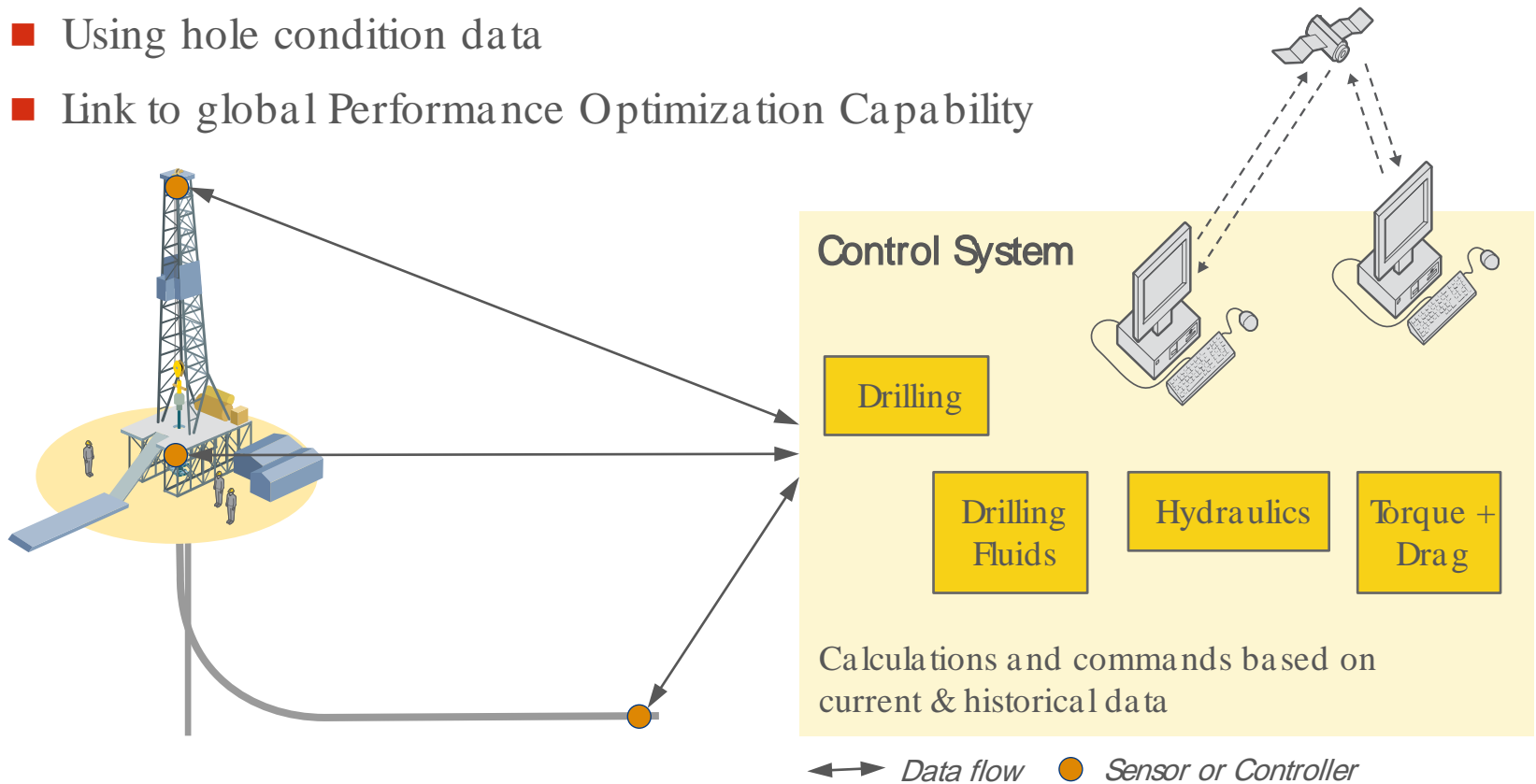


WELL MANUFACTURING SYSTEM (BESPOKE RIGS/ EQUIPMENT)



AUTOMATING RIGS WITH SCADADRILL

- Interface with existing rig controls
- Computer-based coordination of mud pumps, top drive and hoisting / lowering functions
- Using hole condition data
- Link to global Performance Optimization Capability



REMOTE DIRECTIONAL DRILLING

