

Lloyd's Register energy services

BOP and control systems – What's new post Macondo?

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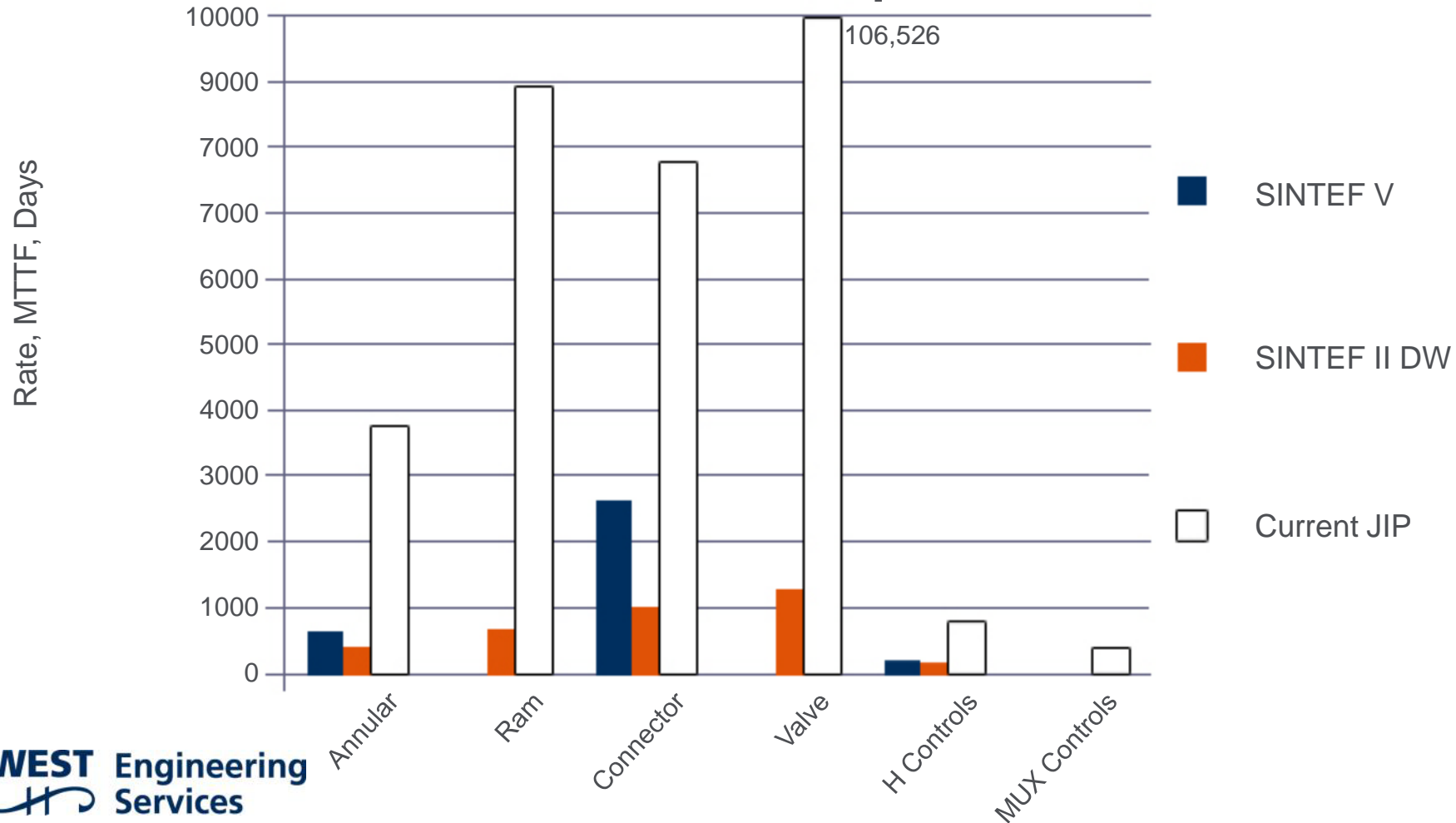
- Sr. Vice President Engineering
- 33-year oil and gas career
- Began with West in 1993
- 15 years at Shell in various positions in the Americas
- Degrees in Chemical and Petroleum Refining Engineering

Manufacturing, Testing, Maintenance, and Certification Requirements

- Current Status
- Issues

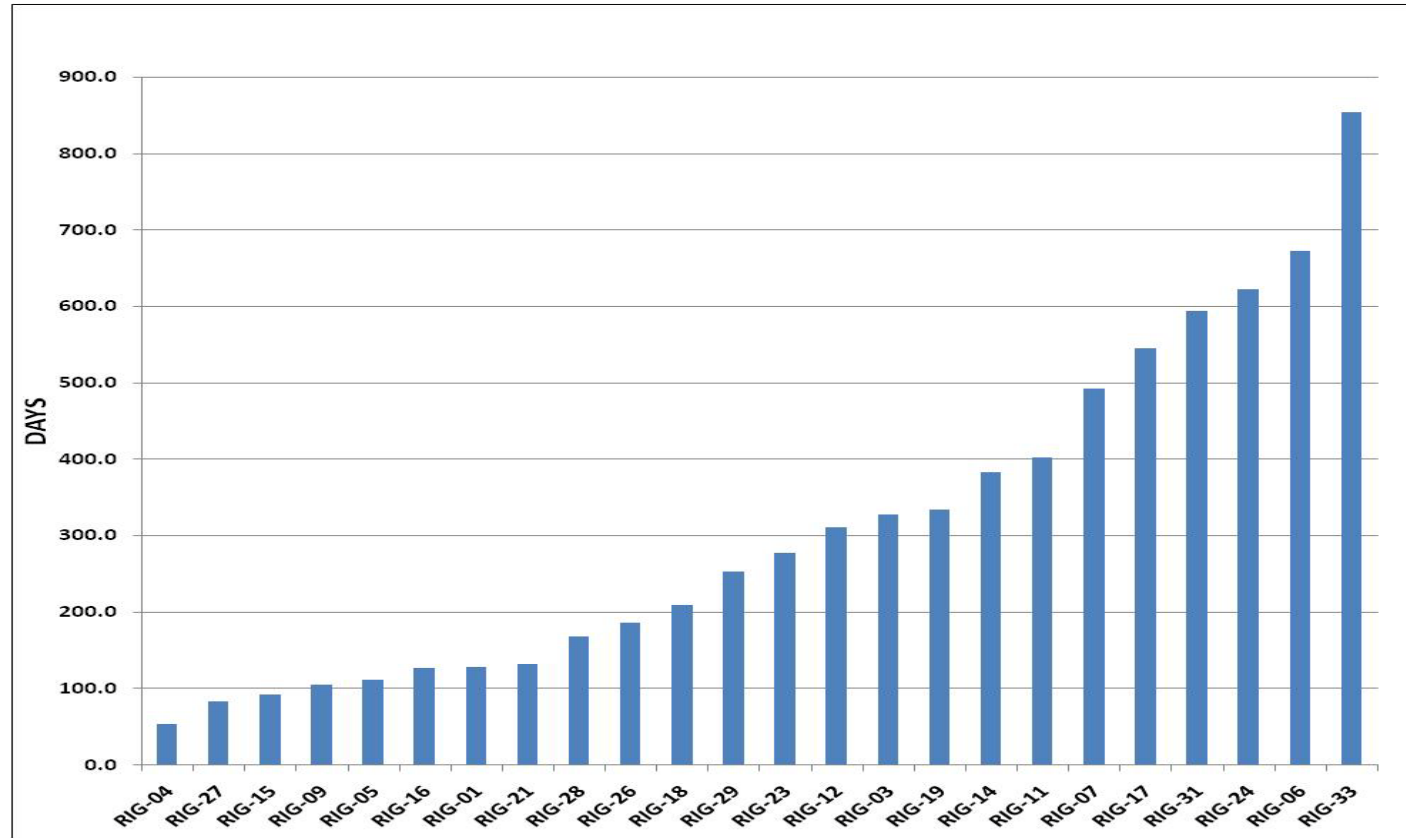
Current Status

- Subsea failure rate comparison



Current Status

- MTTF by Rig (Subsea)



13 (35%) of rigs had no associated failures

Current Status

- Existing standards
 - Class
 - API
 - Specifications (design and manufacture)
 - Recommended Practices (operations and maintenance)
 - Private
- Regulatory
- Generally considered minimums



Compliance to Standards

- Who verifies compliance?
- What are competence requirements?
- How often?



WEST Verification Process

- Procedure developed over 26 years
- Job specific
 - Regulations, standards, best industry practices
- Decide what is mandatory
- Includes controls (hydraulic and electronic)
- This standard is one among several in the oil industry

Unintended Consequences?

- Consideration of reduced redundancy
- Increased wellbore pressure testing
- Increased focus on repair work (non-floaters)

Issues

- Focus on asking questions
- Considerations
- And the answer is ?



Manufacturing Standards

- Base (minimum) requirements
- Compromises inevitable
- Consistent between manufacturers
- Gaps
- Technology advances

Maintenance Systems

- Centralized or decentralized?
 - Control vs optimization
 - _____ BEST ways to maintain?
- Is more better?

Repair

- No API standard
- Remanufacturers
 - Can OEM (Original Equipment Manufacturer) change?
 - What are criteria?



Repair

- Parts
 - RP 53 – “equal or better”
 - Mix and match
 - Buy out equipment
 - Upgrade (may not be available from OEM)
 - Discontinued

“Breaking News”?

- What is the responsibility of a verifier when they learn something from a rig failure?
 - Do nothing – verifier only verifies equipment is suitable at the time of the certificate
 - “Pull” all existing certificates to which this learning applies?
 - Other?

Wrap-up

Compliance related answers will vary by providers

- What is minimum standard?
 - and are we happy with minimum?

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