IVS 2019 - Industrial Valve Summit Conference ; Bergamo (Italy) - May 22/23, 2019

IOGP JIP33 End-Users Standardization Initiative

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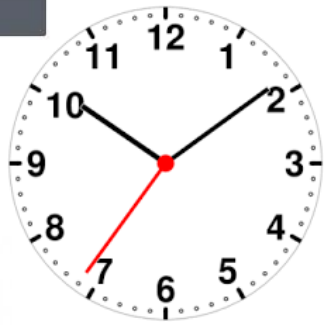
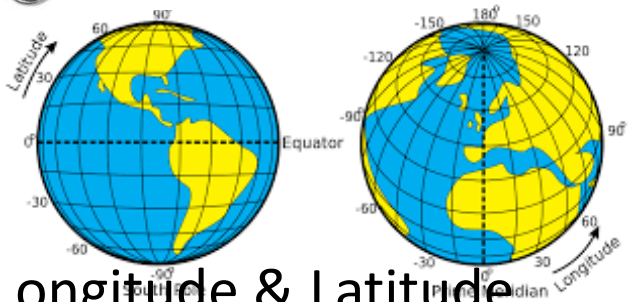
Conundrum - What can you tell me about the following objects and which one is the odd one out?





Longitude & Latitude

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About the IEC › What we do › Technology sectors › World Plugs

World plugs

Seasoned travellers are well aware of the many different plugs and sockets in use around the world.

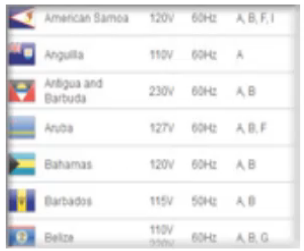
But which plug is used where?

First-time travellers to foreign countries may only find out when confronted with the problem of trying to plug their razor or hair-dryer into a socket with an unsuitable configuration, like pounding a square peg into a round hole.

With this problem in mind, the IEC created a plug and socket zone that is both informative and practical. It explains why things are as they are today and how

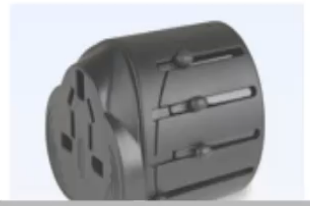
World plugs map

Map view of plug, electrical potential & frequency usage



World plugs list

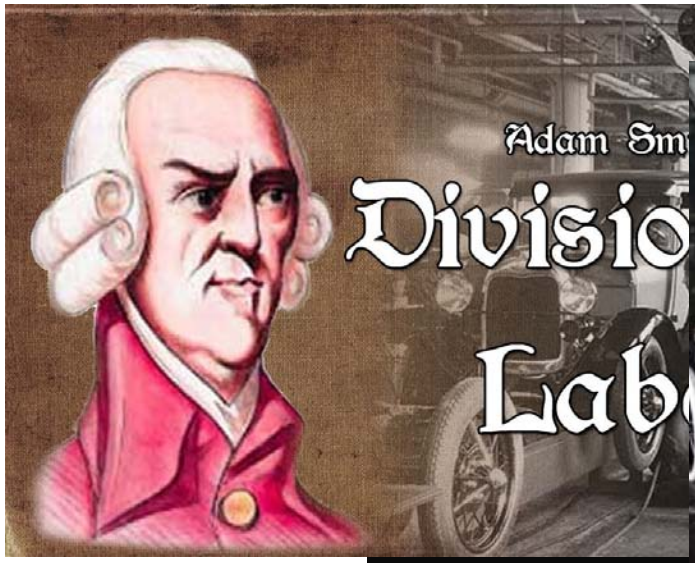
List view of plug, electrical potential & frequency usage

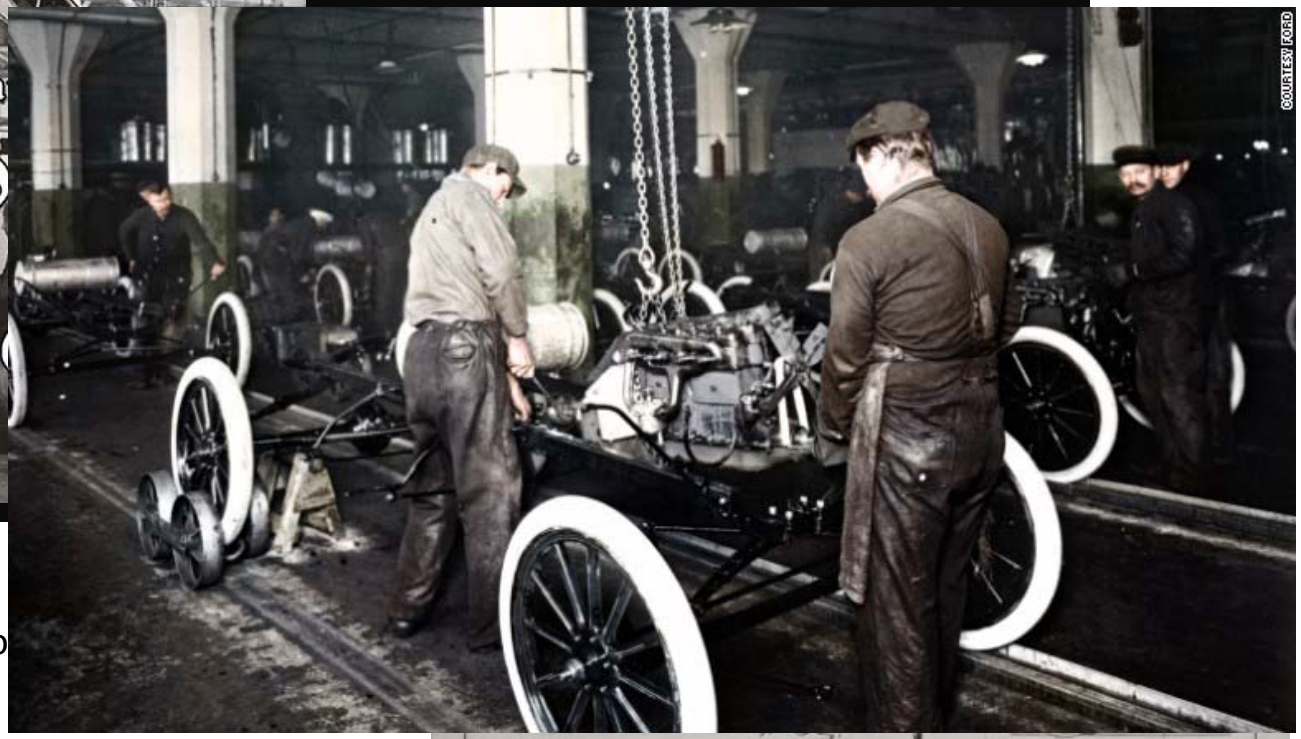


World plug types

- Type A
- Type B
- Type C
- Type D
- Type E
- Type F
- Type G
- Type H

So what exactly is Standardisation?





Source: http://blog.to

Successful standardization initiatives in other sectors were launched in times of disruptive market environments

Industry	Semiconductors	Automotive	Data servers
Disruptive market conditions	**Rising costs and market share decline** due to competition from Japanese OEMs	**Rising costs from bespoke electronics solutions** and declining profitability	**Rising capex and opex on server facilities** due to bespoke and antiquated designs
Impact of standard-ization	▪ 14 U.S. companies created industry consortium, SEMATECH ▪ Generated 60+ standard specifications, resulting in **50% cost reductions for certain components**	▪ 5 automakers create standards organisation, ASAM ▪ Creates **standardized software testing and interoperability methods** ▪ Industry-wide reduction in testing costs per vehicle	▪ Facebook and four other companies create non-profit Open Compute ▪ Shares and builds hardware specifications ▪ **$2B savings for Facebook alone** between 2011 and 2014

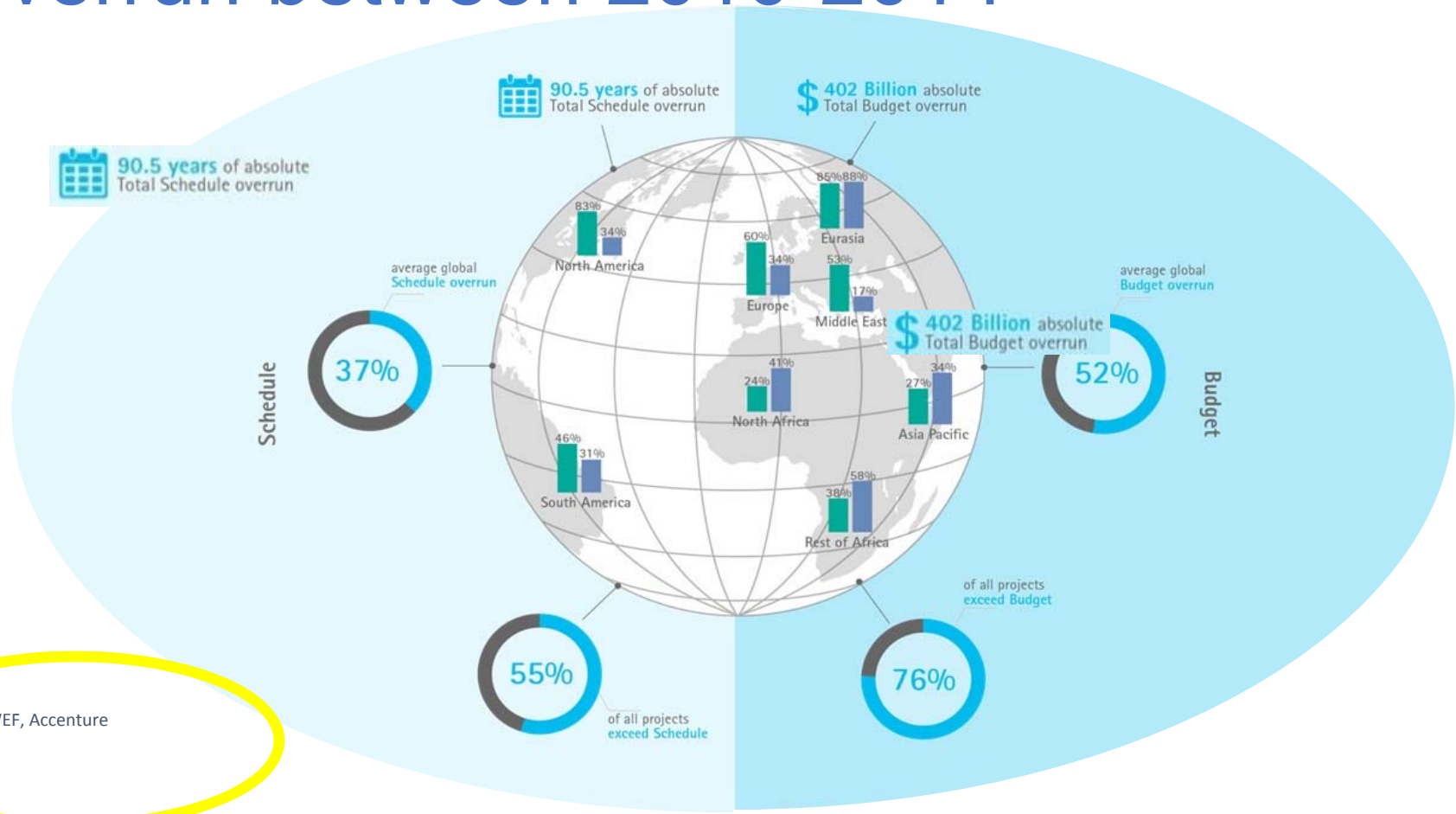
Source: Expert interviews, ASAM, Open Compute, Business Insider, SEMATECH academic research

Introduction to our talk today

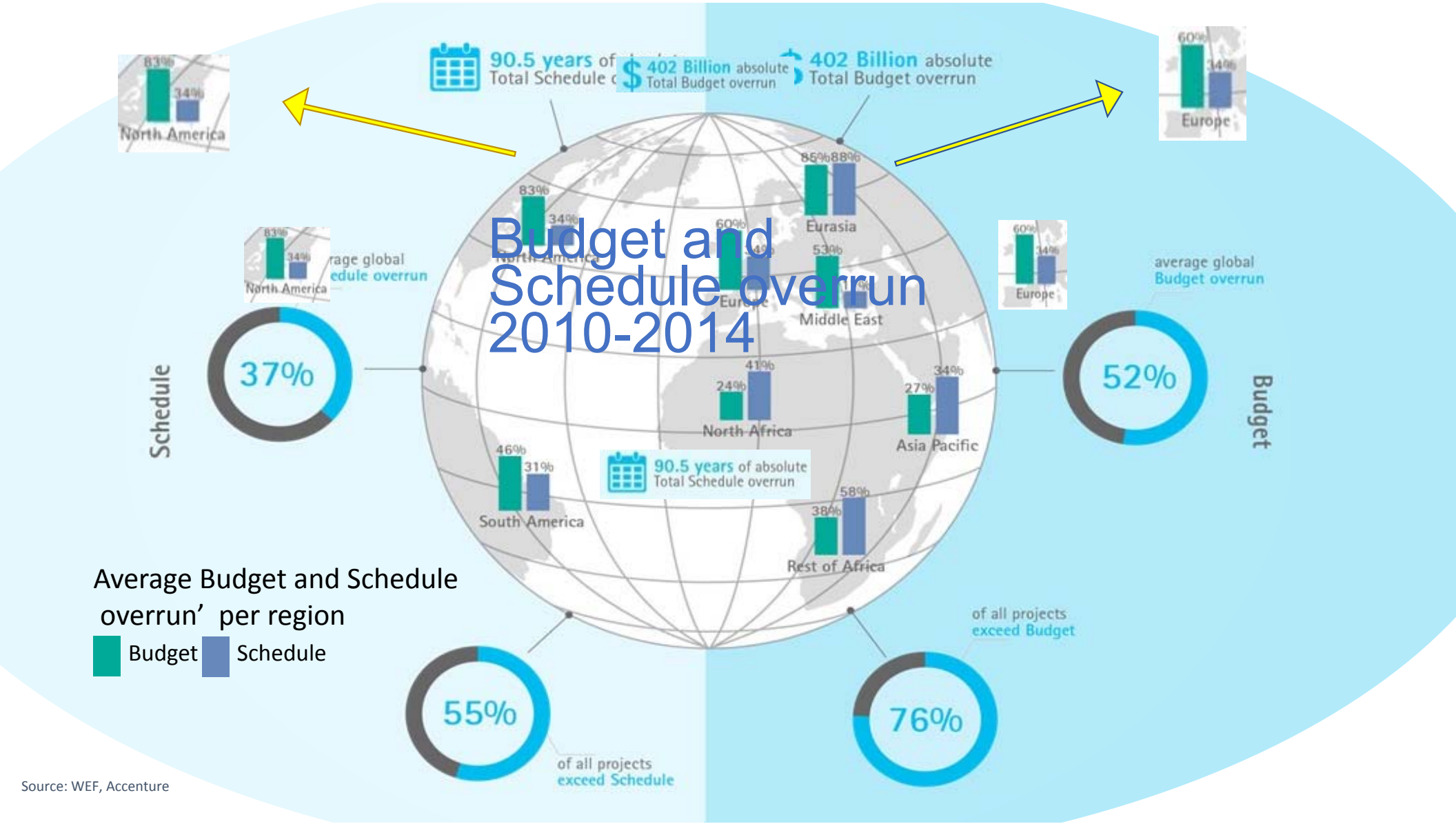
- A primer to the concept of Standardisation and the Benefits, which we have just covered.
- An outline of the state of the Oil & Gas Industry which will hopefully emphasise the justification for the work that I am presently involved in.
- An introduction to the World Economic Forum known as the WEF.
- Who are the International Association of Oil & Gas Producers known as the IOGP?
- How the WEF and the IOGP have commenced a project of standardisation to combat the current issue of overspend in the Oil & Gas sector known as the Joint Initiative Project 33 or JIP 33 for short.
- What are the perceived benefits to you and I of this endeavour?
- Questions and Answers.

Large E&P projects budget and schedule overrun between 2010-2014

The Current Situation



Source: WEF, Accenture



Source: WEF, Accenture

https://www.weforum.org/about/world-economic-forum

WORLD ECONOMIC FORUM

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About

Our Mission

- **Our Mission**
- Why does our work matter?
- What makes us unique?
- How do we do our work?

Klaus Schwab

Our Mission

The World Economic Forum

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

It was established in 1971 as a not-for-profit foundation and is headquartered in Geneva, Switzerland. It is independent, impartial and not tied to any special interests. The Forum strives in all its efforts to demonstrate entrepreneurship in the global public interest while upholding the highest standards of governance. Moral and intellectual integrity is at the heart of everything it does.

Our activities are shaped by a unique institutional culture founded on the stakeholder theory, which asserts that an organization is accountable to all parts of society. The institution carefully blends and balances the best of many kinds of organizations, from both the public and private sectors, international organizations and academic institutions.

We believe that progress happens by bringing together people from all walks of

Key organizations creating standards for the Oil & Gas Industry

AMERICAN PETROLEUM INSTITUTE

- Advocacy (US)
- Standards
  (US, global influence, no longer ISO)
  Greatest SME participation
- Training
- Certifications / Registrations

International Organization for Standardization

ISO/TC 67 & 153
"Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries"

- International Standards, can be adopted by national bodies
- "Global Standards used locally worldwide"
- Registrations via national bodies (e.g. ANSI) and accredited agencies (e.g. DNV).
- Countries have mirror committees (e.g. CEN/TC12, US TAG, BSI, DS75)

International Association of Oil & Gas Producers

- Advocacy (worldwide)
- Draft standards for ISO
  (ISO/sanctions work around)
  "ISO Liaison Member"
- Industry guidelines

Our Members

We have 79 Members.

About IOGP

IOGP's Members produce 40% of the world's oil and gas – safely, efficiently and reliably

IOGP works on behalf of the world's oil and gas companies and organizations to promote safe, responsible and sustainable exploration and production

The Association encompasses many of the world's leading publicly-traded, private and state-owned oil and gas companies, industry associations and major upstream service companies

- 78 Member Companies
- 3 offices – London, Brussels, Houston

Back to Standardisation

Project context, objective and vision

Context

Between 2010-2014, 75% of large E&P projects exceeded budget by 50% on average, and 50% of projects exceeded schedule by almost 40%.

Aim

The World Economic Forum seeks to drive a structural reduction in upstream project costs and schedule improvement with a focus on industry-wide, non-competitive collaboration and standardization.

JIP33 mission

We want to standardize specifications for procurement for oil & gas equipment and packages, facilitating improved standardization of major projects across the globe.

> *Standardization is a key lever we can pull as an industry to structurally reduce large capital project lifecycle costs*

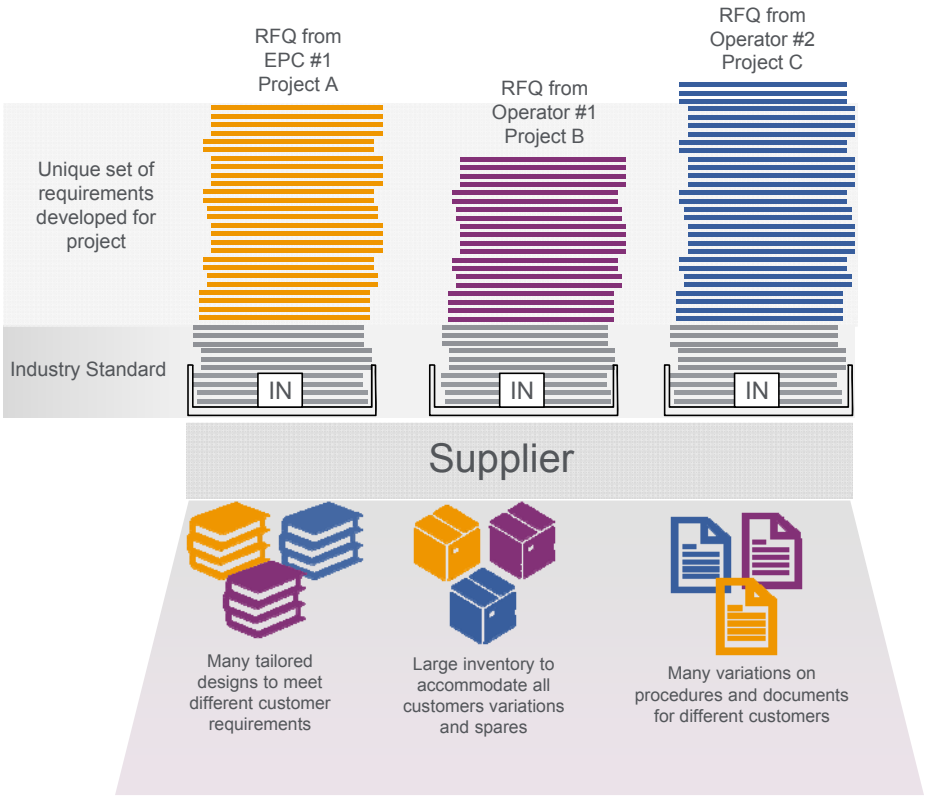
Source: McKinsey Energy Insights

Our Solution

JIP33: A supplier's perspective

Before

Significant variation between **projects**
Significant variation between **customers**

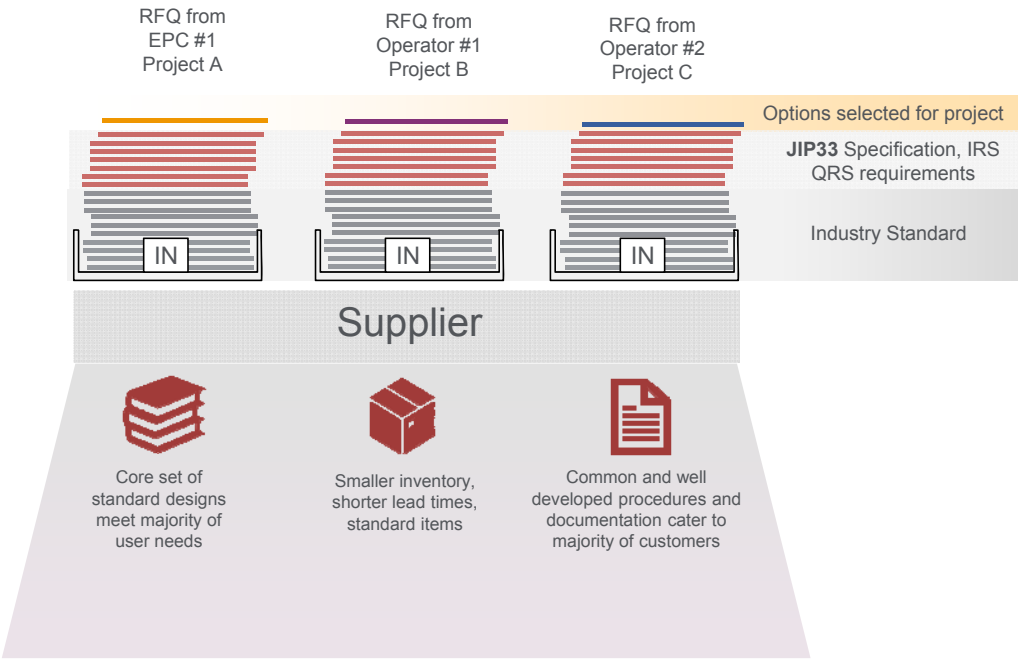


After

All customers working to **standard requirements** allows supplier to become more efficient at meeting them

Keeping to only the necessary **minimum requirements,** aligned with vendor optimises schedule and cost benefits for all

Selecting from options provided only, minimises change, maximises standardisation benefits



Driving value through standardization

1. Standardized requirements

- Industry adoption means repeatability for the supplier leading to improved efficiency, reducing schedule and cost risk.

2. Minimum requirements

- Standardize on a cost effective design
- Aim not to harmonize between operators specs but to minimise to core needs only.

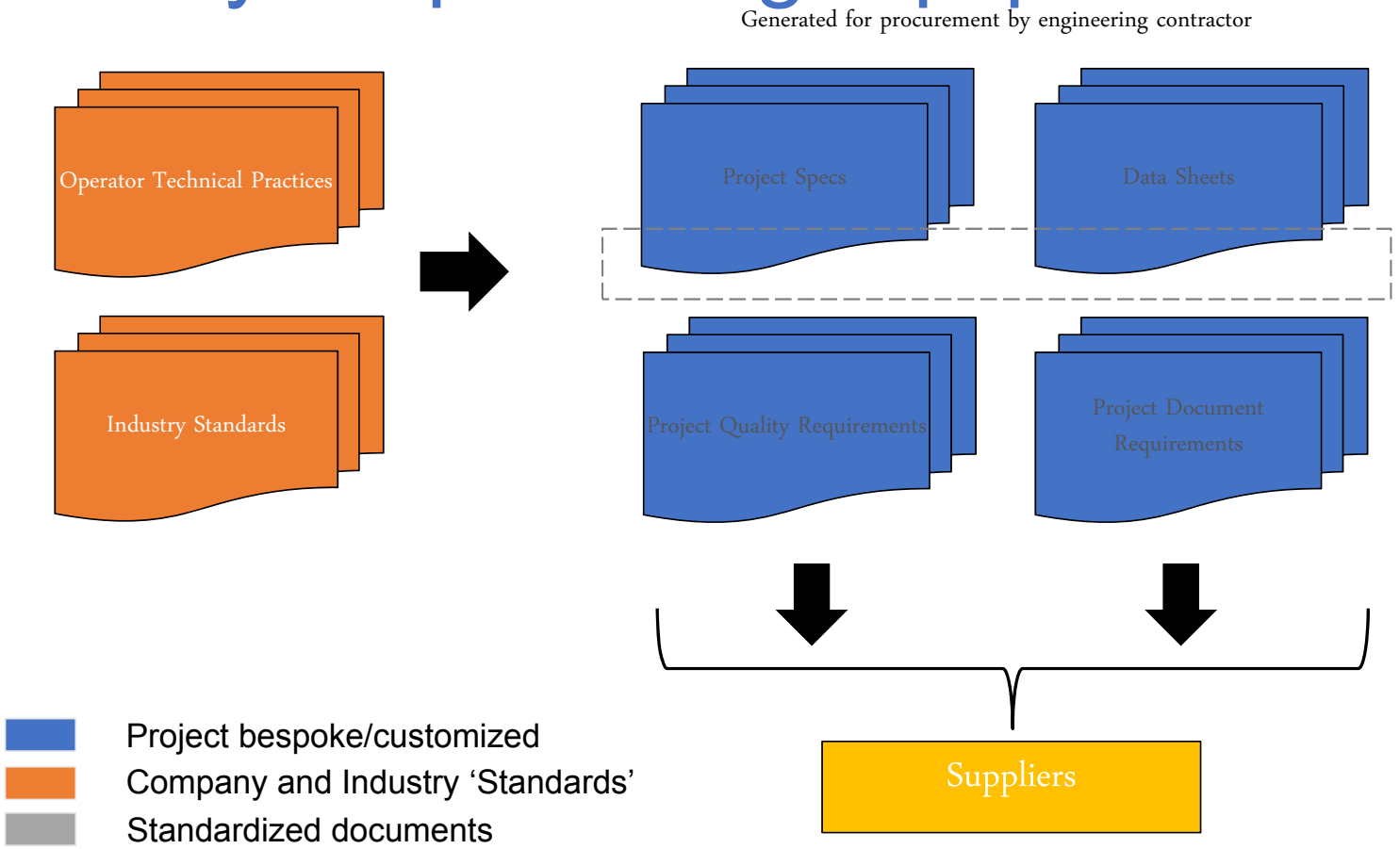
3. Choose from options, no additions

- The supply chain only remains “standardized” by choosing from options within the standardised specifications. Any supplementary requirements will erode the benefits of standardisation.

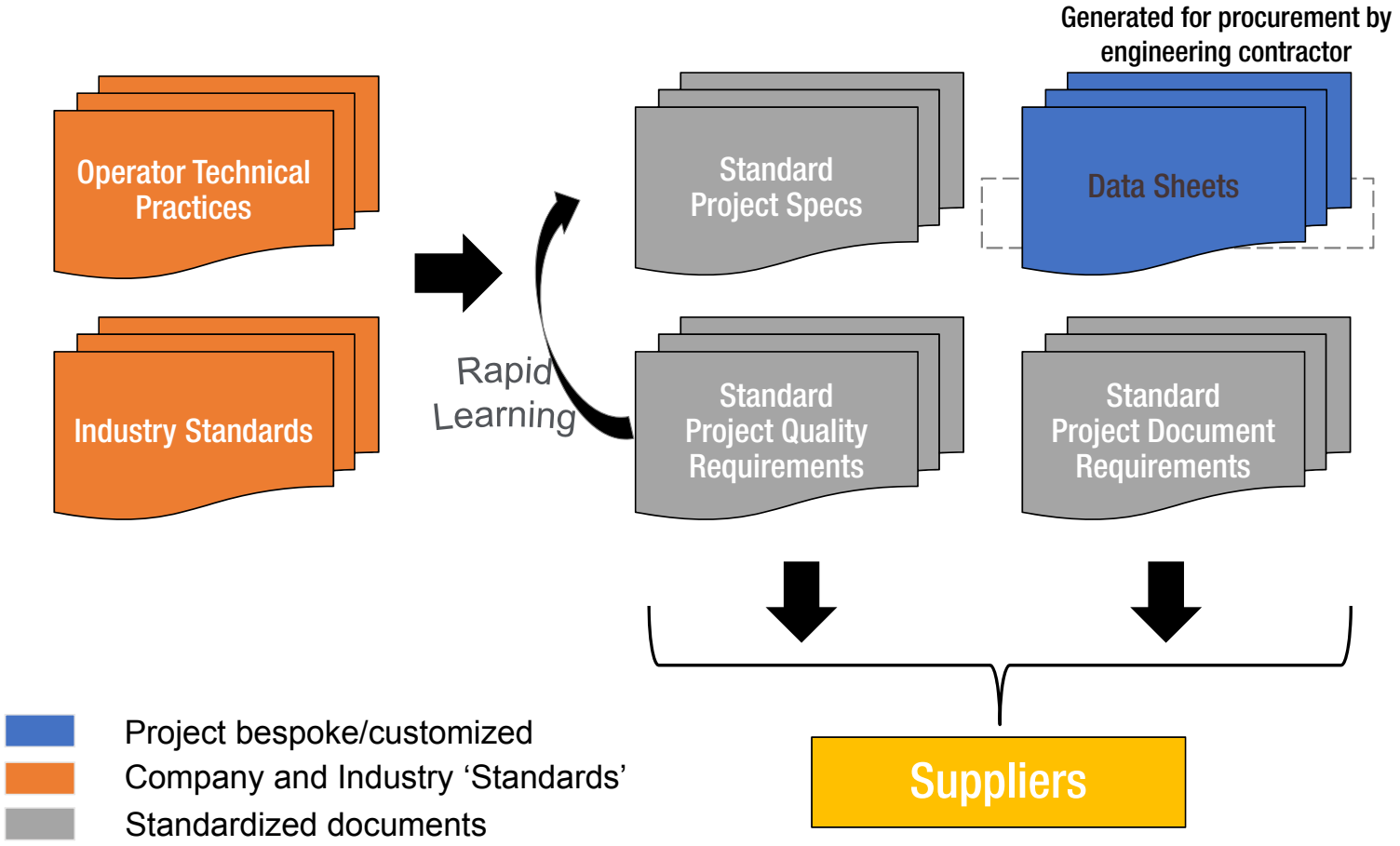
JIP33 framework

- The output of each JIP33 specification takes the form of:
  - A Supplementary Specification to an industry standard
    - Containing a set of “minimum requirements” sufficient to purchase equipment that meets the functional needs of the operators.
  - An Information Requirements Specification or “IRS”
    - Containing a list of pre-defined documents and data required to be delivered by the supplier
  - A Quality Requirements Specification or “QRS”
    - Containing the quality management system, inspection and testing activity
  - An Equipment Data Sheet Template
    - Containing the options the purchaser wishes to select, and project specific information.

“The old way” of procuring equipment



“The new way” with standard specs



JIP33 scale up

Phase 3 is a scale up from phase 1 and 2, incorporating packaged equipment and welcoming an additional 2 members to its membership.

Phase 4 – Scale up

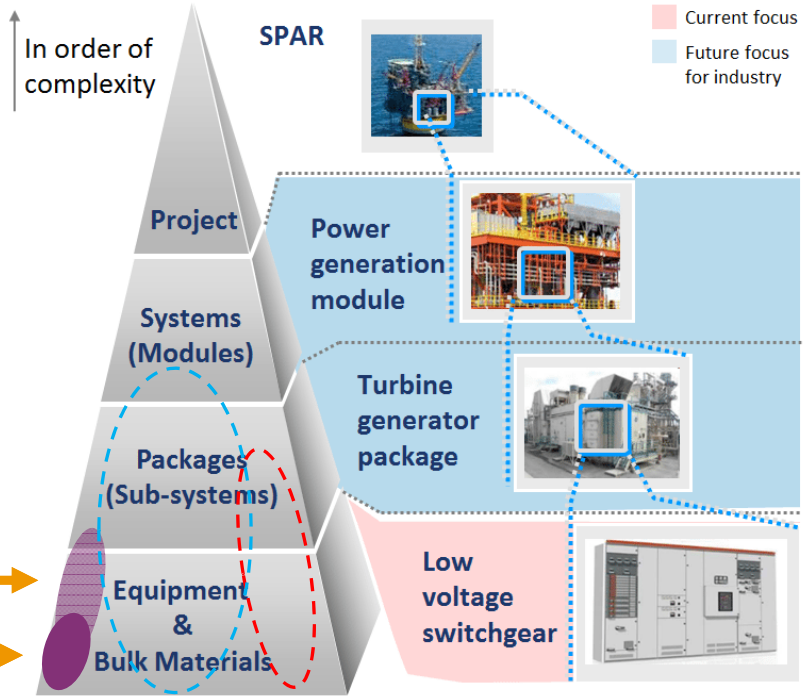
Phase 3 – Scale up

Scale Up – Number / Complexity

Proof of Concept

Phase 2

Phase 1 “Pilot”



bp Chevron eni ExxonMobil PETROBRAS Saudi Aramco Shell Statoil TOTAL woodside PETRONAS ConocoPhillips

Success from Phase 1 & 2

IOGP S-560 Low voltage switchgear, published November 2016

IOGP S-561 Subsea trees – Published December 2018.

IOGP S-562 Ball valves – Published January 2019.

IOGP S-563 Piping and valve materials – Published December 2018

IOGP S-612 Air compressor package – Published December 2018

IOGP S-613 Air dryer packages – Published December 2018

IOGP S-614 Heat exchangers – Published December 2018.

IOGP S-615 Centrifugal pumps – Published January 2019.

IOGP S-616 Line pipe material – Published January 2018.

IOGP S-617 Offshore cranes, supplement to EN – Published December 2018.

IOGP S-618 Offshore cranes, supplement to API – Published December 2018.

IOGP S-619 Unfired fusion welded pressure vessels – Published Dec 2018.

IOGP S-620 HV switchgear – Published October 2018.

LV Switchgear

In use

- All participating companies have adopted, or are in process of adopting, the JIP33 LV switchgear specification into their corporate libraries in some form

- Installed as retrofit on existing FPSO
- Smaller size enabled retrofit in space constraints
- Procured by Woodside for an FPSO refurb, with confirmed savings of 13%

woodside

- Order placed – offshore Caspian project
- Feedback from supplier:
  - 10% cost reduction
  - 4 weeks schedule reduction
- Additional benefits:
  - Length – 13.5% reduction
  - Weight – 10.0% reduction

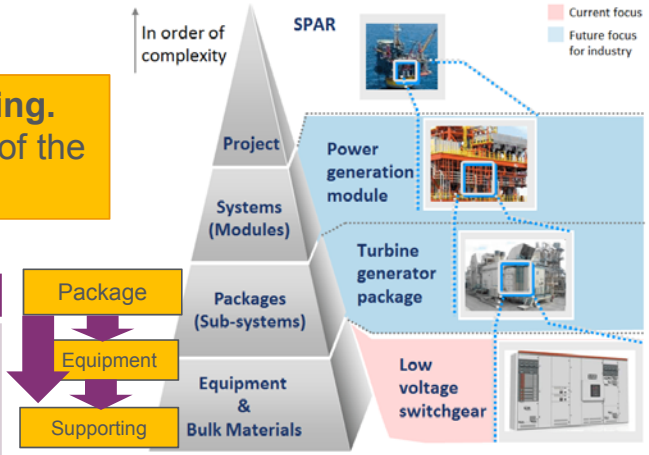
bp

- Quoted in FEED phase of offshore project

eni

Initial scope list for Phase 3

There are three categories of specifications for JIP33: **Package, Equipment and Supporting.** Supporting specs can be referenced by package and equipment specs to prevent repetition of the same requirements (e.g. a common painting spec referenced for all packages)



Packages	Equipment Specs	Supporting Spec (tbd during Framing)
• Uninterruptible Power System (UPS) • Diesel/Emergency Generator • Flare Packages • Air Cooled Heat Exchanger • Firewater Pump Package • Gas Dehydration (Glycol) Package	• Low Voltage Motors • High Voltage Motors • Stationary Batteries • DC Power Supplies • Low Voltage A.C. Drives • Transformers • Electric Process Heaters • Actuators for On/Off Valves • Pressure Relief Valves • Control Valves and Pressure Regulators • Elec Transmitters (Press/ Level/ Flow/ Temp) • Water Mist Fire Protection Package • Positive Displacement Pumps – Reciprocating (API 674) • Diesel Engines • General Purpose Gear Units (API 677) • Subsea valves • Deluge skid	• General Engineering Specifications for Packaged Equipment • Noise Control • Instrument Tubing and Fittings • General and Special Purpose Couplings (ISO 10441, ISO 14691 or API 671) • Lubrication, Shaft-Sealing, and Control-Oil Systems and Auxiliaries (ISO 10438) • Flange Bolts & Gaskets • Isolation of Packaged Equipment • Thermal Insulation of Piping and Equipment • Materials Specifications • Welding Specifications • Coating and Painting of Supplier Equipment

This list has been determined based on a survey to member operating companies to identify which have the most value.

Next tranche to be decided in course of 2019

IVS INDUSTRIALVALVESUMMIT

VALVE campus THE VALVE INDUSTRY THINK TANK

So what about valves?

IOGP S-562 Ball valves – Published January 2019.

IOGP S-563 Piping and valve materials – Published December 2018

IOGP S-611 API 600 Steel Gate Valves and to API 603 CRA Gate Valves – Published May 2019

All documents are available for download on IOGP web-site:
https://www.iogp.org/initiatives/jip33/

Example of Ball Valve supplement S-562

- **Amendment (exception) style specification, clauses have to be read in conjunction with API 6D**
- **Based on API 6D, 24th Edition, including Addendum 1 March 2015 and Errata 6, September 2015**
- **Annex Q : Materials selection options – Preferred and acceptable alternatives**
- **Material data sheets per S-563**

S-562 Design Structure

Design Standards and Calculations (Pressure containing elements)

- ASME BPVC Sec-VIII Div 1 or Div 2
  - Wall thickness ASME B16.34 (2004) + ASME VIII bolt hole effect inclusion
    - pipe loads & operating forces
      - Annex P – Load on Valves
        Table P.1 - Bending
        Table P.2 - Axial

ASME B16.34

Pressure & Temperature Rating

- Min & Max design temp + Min operable temp on Data Sheet.
  - Non-metallic seals suitable for min operable temp & max design temp.

Welding Ends

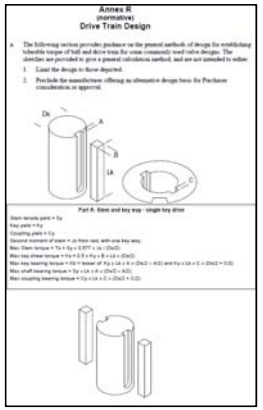
Table 9 – Pup lengths

Valve Size	Pup length
NPS 2 to NPS 8 (DN 50 to DN 200)	8 in (200 mm)
NPS 10 to NPS 20 (DN 250 to DN 500)	Minimum 1D or Maximum 20 in (500 mm)
NPS 22 (DN 550) and above	32 in (800 mm)

Note: "D" being NPS (DN).

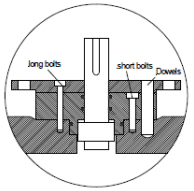
Drive Train

Annex R
Drive Train Design

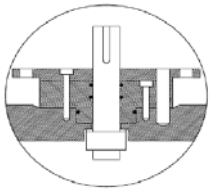


Stem Retention

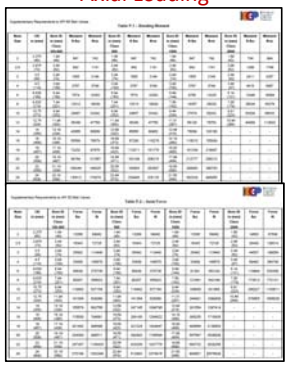
Annex R –
Retained by
bonnet bolting



Annex R –
Not retained by
bonnet bolting



Annex P1 / P2 – Bending & Axial Loading



S-562 Materials Structure

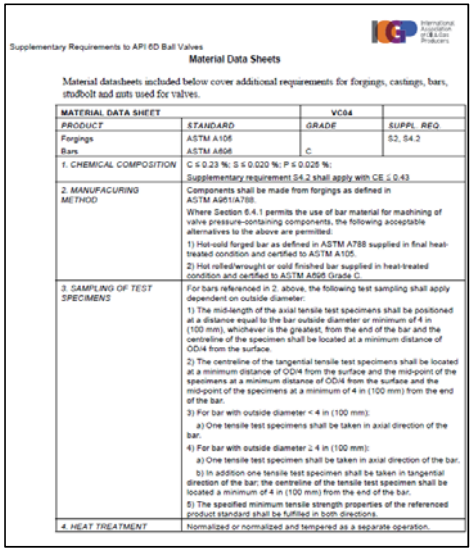
Material Specification

Standard & acceptable alternative materials

Annex Q - Material Table for Valves

Additional requirements for these materials

S-563 - Material Data Sheets



Supplementary Requirements to API 6D Ball Valves

Material Data Sheets

Material datasheets included below cover additional requirements for forgings, castings, bars, studbolt and nuts used for valves.

MATERIAL DATA SHEET		VC04	
PRODUCT	*STANDARD*	*GRADE*	*SUPPL. REQ.*
Forgings	ASTM A105		S2, S4.2
Bars	ASTM A668	C	
1. CHEMICAL COMPOSITION	C ≤ 0.23 %; S ≤ 0.020 %; P ≤ 0.025 %; Supplementary requirement S4.2 shall apply with CE ≤ 0.43		
2. MANUFACURING METHOD	Components shall be made from forgings as defined in ASTM A961/A788. Where Section 6.4.1 permits the use of bar material for machining of valve pressure-containing components, the following acceptable alternatives to the above are permitted: 1) Hot-cold forged bar as defined in ASTM A788 supplied in final heat-treated condition and certified to ASTM A105. 2) Hot rolled/wrought or cold finished bar supplied in heat-treated condition and certified to ASTM A668 Grade C.		
3. SAMPLING OF TEST SPECIMENS	For bars referenced in 2. above, the following test sampling shall apply dependent on outside diameter: 1) The mid-length of the axial tensile test specimens shall be positioned at a distance equal to the bar outside diameter or minimum of 4 in (100 mm), whichever is the greatest, from the end of the bar and the centreline of the specimen shall be located at a minimum distance of OD/4 from the surface. 2) The centreline of the tangential tensile test specimens shall be located at a minimum distance of OD/4 from the surface and the mid-point of the specimens at a minimum distance of OD/4 from the surface and the mid-point of the specimens at a minimum of 4 in (100 mm) from the end of the bar. 3) For bar with outside diameter < 4 in (100 mm): a) One tensile test specimens shall be taken in axial direction of the bar. 4) For bar with outside diameter ≥ 4 in (100 mm): a) One tensile test specimen shall be taken in axial direction of the bar. b) In addition one tensile test specimen shall be taken in tangential direction of the bar; the centreline of the tensile test specimen shall be located a minimum of 4 in (100 mm) from the end of the bar. 5) The specified minimum tensile strength properties of the referenced product standard shall be fulfilled in both directions.		
4. HEAT TREATMENT	Normalized or normalized and tempered as a separate operation.		

So what are the benefits to you and I?

Operator benefits

Standardization will create a mutually-beneficial outcome for industry by addressing safety, cost, schedule, quality, reliability

1. Estimated reduction from supplier based on Phase 1 LV switchgear specification and expert interviews for ball valves and subsea trees

Supply chain benefits

Optimization through simplification and standardization

Benefits

Bids and proposals

- **Standard bid template and clarification process**
  - Fewer questions to answer
  - Less deviation requests
  - Increased focus
  - Quicker response and decisions possible
- **Saved time, resources and costs**

Engineering and manufacturing

- **Harmonized engineering / more certain information**
  - Streamlined design and approval process
  - Fewer last-minute changes / interruptions
  - Fewer inspection hold points / quicker release
  - Repeatability enables continuous improvement
- **Enhanced efficiency and quality of supply**

Installation and commissioning

- **Streamlined equipment simplifies fleet management**
  - Reduced wiring / testing / tools / spare parts
  - Fewer items on secondary punch list
  - Condensed commissioning time
  - Reduced drawing updates required
- **Enhanced reliability and improved safety**

Thank you!

Questions?

Tony Smart
Shell

Loïc Deneuville
Total