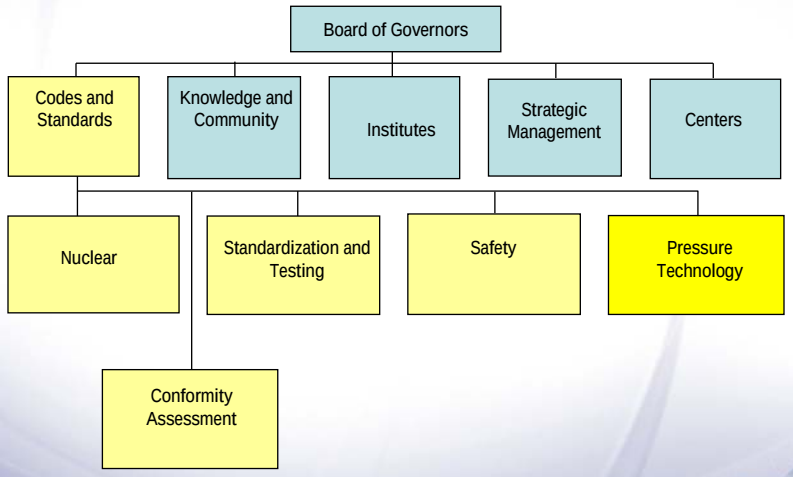
ASME Update on:

- Recent Changes to ASME Pressure Vessel and Piping Codes and Standards
- ASME Crane Standards and Crane Safety Issues
- Some Important ASME Initiatives

Pressure Technology



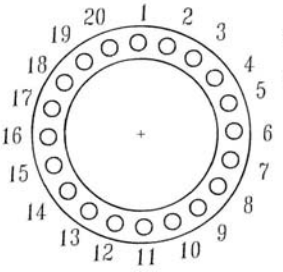
Pressure Technology

- New Codes and Standards
- Hydrogen Economy
- Weld Strength Reduction
- B&PV Committee Reorganization

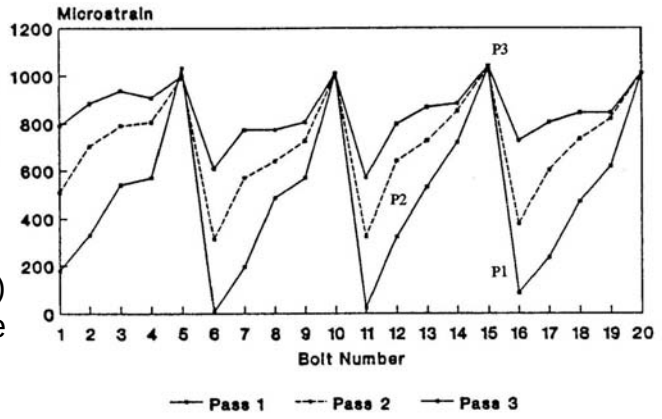
New Codes and Standards

- PCC-1 *Bolted Flange Joint Assembly*
- PCC-2 *Repair of Equipment and Piping*
- PCC-3 *Inspection Planning*
- API 579-1/ASME FFS-1 *Fitness-For-Service*
- B31.8S *Managing System Integrity of Gas Pipelines*
- B31E *Seismic Design and Retrofit of Above Ground Piping Systems*
- B31Q *Pipeline Personnel Qualification*

PCC-1 *Guidelines for Pressure Boundary*



NPS 16 (DN 400)
Class 300 Flange

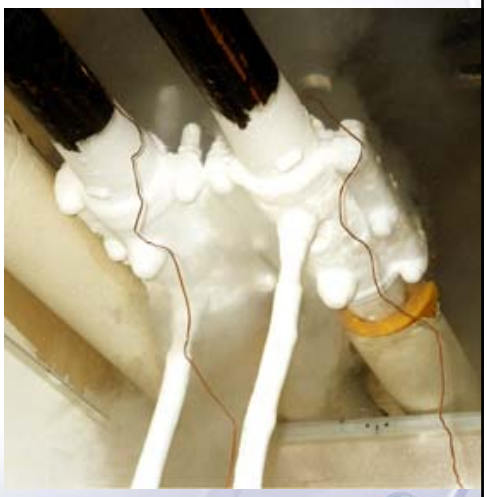


PCC-1 *Guidelines for Pressure Boundary Bolted Flange Joint Assembly*

- First Edition – 2000
- Used to develop joint assembly procedures
  - Snug up bolting
  - Tighten to 20% of target torque using cross pattern
  - Tighten to 50 to 70% of target torque using cross pattern
  - Tighten to 100% of target torque using cross pattern
  - Continue tightening to 100% target torque using rotational pattern until no movement
  - Wait 4 hours or longer and repeat rotational pattern to 100% target torque until no movement

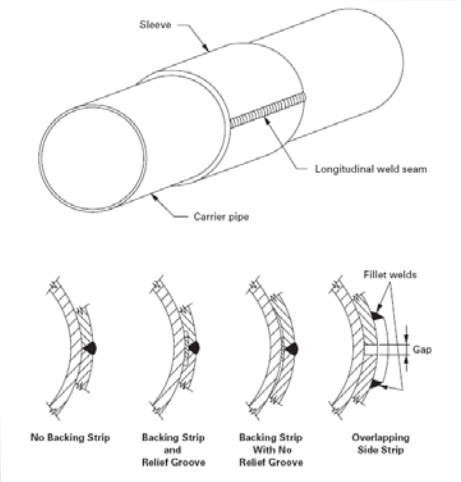
PCC-2 *Repair of Pressure Equipment and Piping*

- First Edition – 2006
- Provides specific repair methods
  - Examination & Testing (Leak testing, repairs without leak testing)
  - Mechanical Repairs (Freeze plugs, flange refinishing, alignment bending, hot bolting, etc.)



PCC-2 *Repair of Pressure Equipment and Piping*

- Provides specific repair methods
  - Nonmetallic and Bonded Repairs (Over wrapping, internal lining)
  - Welded Repairs (Insert plates, weld overlay, seal welding, welded leak box, etc.)



PCC-3 *Inspection Planning Using Risk Based Methods*

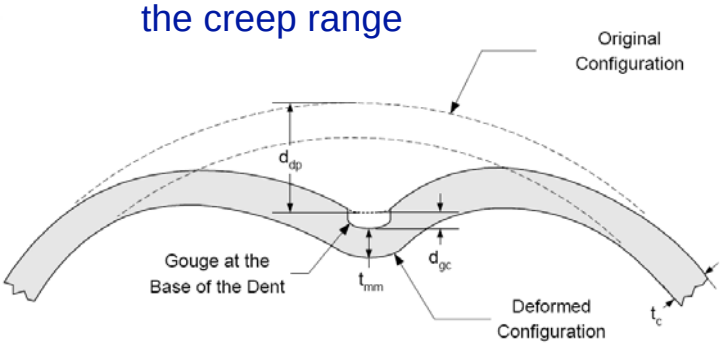
- First Edition – Under development
- Based on API 580 Risk Based Inspection
- A guide to help users determine
  - Inspection methods that should be used
  - Extent of Inspection (percent of total area to be examined or specific locations)
  - Inspection Interval (timing)
  - Other risk mitigation activities
  - The residual level of risk after inspection and other mitigation actions have been implemented

API 579-1/ASME FFS-1 2007 *Fitness-For-Service*

- First Edition – 2007
- Based on API 579 Fitness for Service
- Methods to evaluate flaws include:
  - general and localized corrosion
  - widespread and localized pitting
  - blisters and hydrogen damage
  - weld misalignment and shell distortions

API 579-1/ASME FFS-1 2007 *Fitness-For-Service*

- Methods to evaluate flaws include:
  - crack-like flaws
  - laminations, dents and gouges
  - remaining life for components operating in the creep range



B31.8S Managing System Integrity of Gas Pipelines

- First Edition – 2001
- Provides a systematic, comprehensive, and integrated approach to managing the safety and integrity of pipeline systems
  - Risk Assessment
  - Integrity Assessment
  - Repair and Mitigation
  - Integrity Management Plan
  - Performance Plan
  - Communications Plan
  - Management of Change

B31E Seismic Design and Retrofit of Above Ground Piping Systems

- First Edition – Planned for 2008
- Describes methods for determining needed restraint of piping to resist earthquake loads

  - Design by rule method used for non critical piping
  - Design by analysis method used for critical piping

B31Q Pipeline Personnel Qualification

- First Edition – 2006
- Provides for qualification of personnel who operate and maintain gas and hazardous liquid pipelines
- Covered tasks include
  - Troubleshoot in-Service Cathodic Protection System
  - Measure Corrosion
  - Visual Inspection of Installed Pipe and Components for Mechanical Damage
  - Compressor Start-Up and Shutdown
  - Pump Preventive Maintenance

Hydrogen Economy

- Metallic Pressure Vessels
- Hoop Wrapped Pressure Vessels
- Fully Wrapped Pressure Vessels
- Piping

Metallic Pressure Vessels

ASME B&PV Code, Section VIII, Division 3,

Article KD-10: *Special Requirements for Vessels in High Pressure Gaseous Hydrogen Transport and Storage Service*

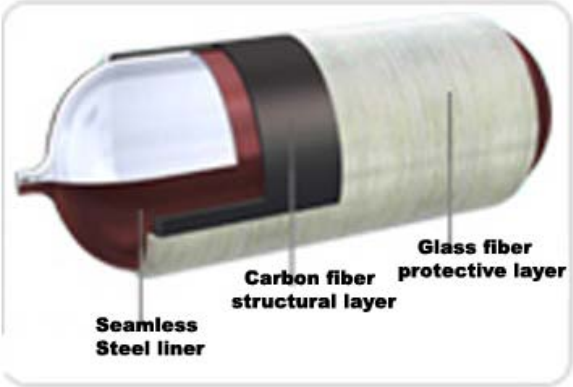
Metallic Pressure Vessels

Article KD-10 Requires

- Requires testing of each lot of material for
  - Threshold stress intensity factor for hydrogen assisted cracking
  - Fatigue crack growth rate test
- Fracture mechanics evaluation
- Fatigue life calculations

Hoop Wrapped Pressure Vessels

ASME B&PV Code Case 2579:
Composite Reinforced Pressure Vessels for Gaseous H_2 Service



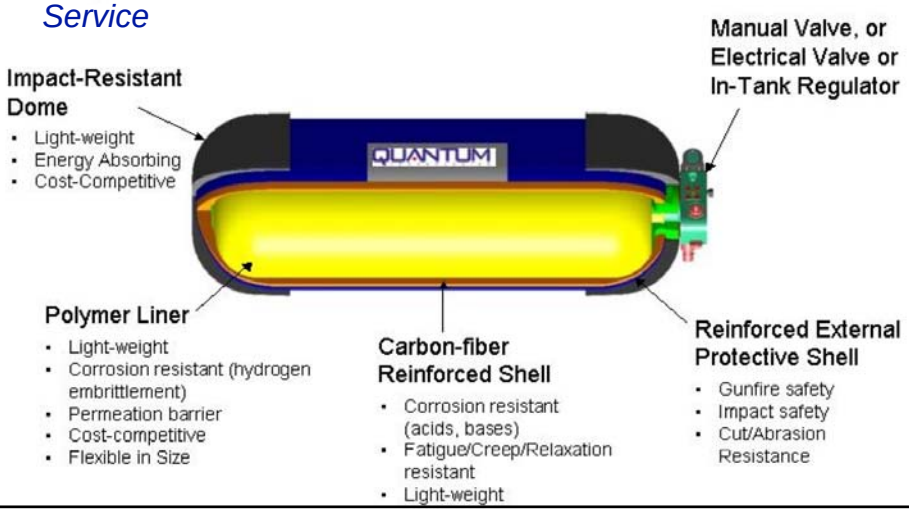
Hoop Wrapped Pressure Vessels

Code Case 2579 requires

- Metallic liner designed according to rules of Section VIII, Division 3
- Axial load is taken solely by the liner
- Hoop load is shared by the liner and the laminate
- Maximum stress in the laminate is 36% of ultimate tensile at operating pressure

Fully Wrapped Pressure Vessels

ASME B&PV Code Case ZZZ: *Fully Wrapped Fiber Reinforced Composite Pressure Vessels with Non-Load Sharing Liners for Gaseous Hydrogen in Stationary Service*



Fully Wrapped Pressure Vessels

Code Case ZZZ requires design qualification testing

- Hydraulic Pressure (1.5 times design pressure)
- Burst (Glass Fiber 3.5 X Design Pressure, Carbon Fiber 2.25 X Design Pressure)
- Fatigue (no leaks with 4 times lifetime cycles)
- Creep (1.5 times design pressure for 2000 hours, then burst test)
- Flaw (1.2 mm deep longitudinal cuts, then burst test @ 2 X P plus fatigue to 1000 cycles)
- Permeability (0.15 standard ml per hour per liter capacity)
- Torque (valve tightened to 150% of the maximum torque)

Piping

ASME B31.12 – Hydrogen Piping

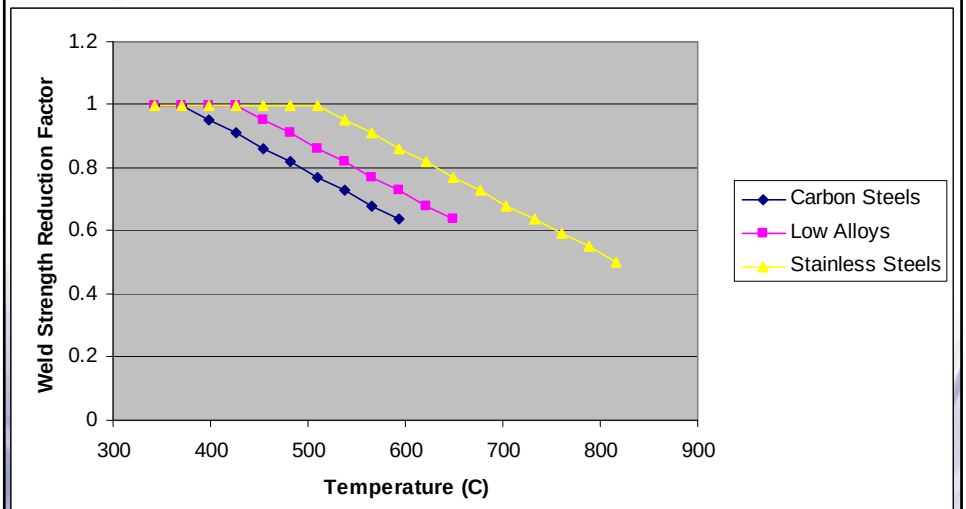
- First edition probably 2009
- Three parts
  - Industrial piping
  - Pipeline systems
  - Commercial/residential piping (future addition)

Weld Strength Reduction

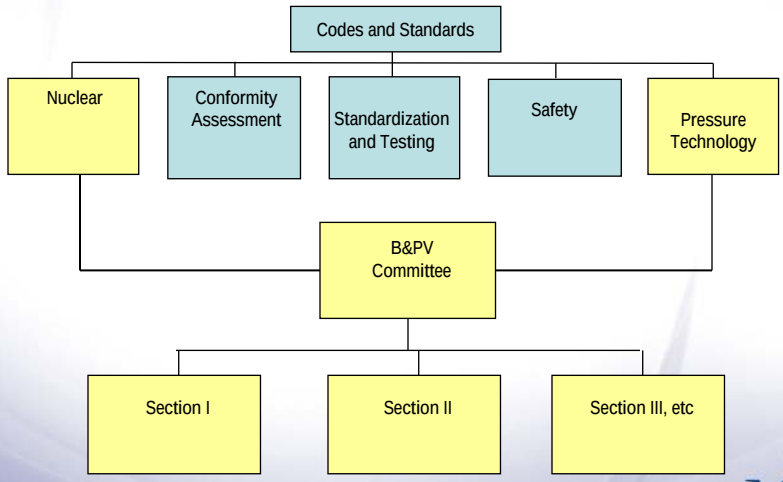
- The use of creep strength enhanced ferritic alloys, such as Grade 91, has become popular for high temperature applications.
- Since Grade 91 has higher allowable stresses, a thinner component can be used.
- During the past two decades, Grade 91 has been used successfully in fossil power plants.
- Some incidents of premature failures
- Primary cause: Deposited weld metal has lower creep strength

Weld Strength Reduction

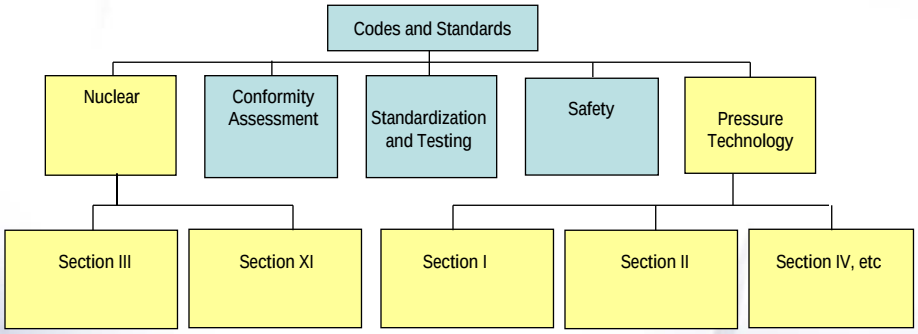
Next editions of B31.1, B31.3 and B&PV Code Section I will require the use of a weld strength reduction factor



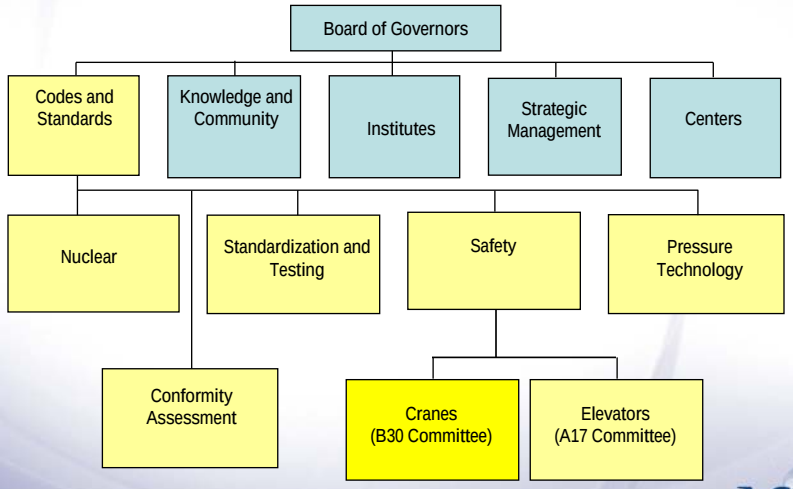
B&PV Committee Reorganization



B&PV Committee Reorganization



Cranes



Cranes

- ASME Crane Standards
- ISO TC96 Crane Standards
- Crane Safety Issues

ASME Crane Standards

- Date back to an eight-page standard, “Code of Safety Standards for Cranes” published by ASME in 1916.
- The Charter of the B30 Committee is:

  “to develop, maintain, and interpret safety codes and standards covering the construction, installation, operation, inspection, testing, and maintenance of cranes and related equipment.”

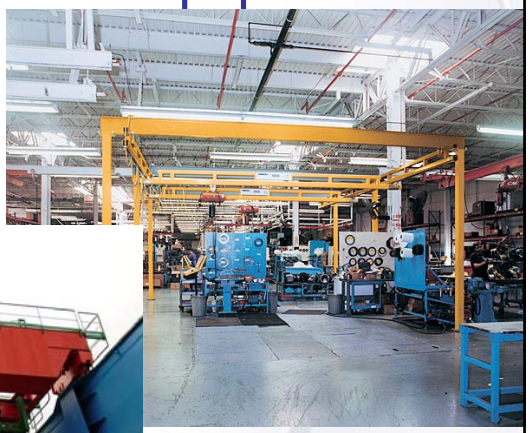
Purposes for the B30 Standards

- to prevent injury to workers, and otherwise provide for the protection of life, limb and property;
- to provide direction to manufacturers, owners, employers, users and others concerned with, or responsible for, their application; and
- to guide regulatory bodies in the development, promulgation, and enforcement of appropriate safety directives

B30 Standard Classifications

- Industrial (Indoor) Cranes and Equipment
- Construction (Outdoor) Cranes and Equipment
- Related Lifting Equipment

Industrial Cranes/Equipment



Industrial Cranes/Equipment

- B30.2 - Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
- B30.7 - Base Mounted Drum Hoists
- B30.11 - Monorails and Underhung Cranes
- B30.13 - Storage/Retrieval (S/R) Machines and Associated Equipment
- B30.16 - Overhead Hoists (Underhung)
- B30.17 - Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
- B30.18 - Stacker Cranes
- B30.21 - Manually Lever Operated Hoists
- B30.24 - Container Cranes
- B30.28 - Balance Lifting Units

Construction Cranes/Equipment

Construction Cranes/Equipment

- B30.3 - Construction Tower Cranes
- B30.4 - Portal, Tower and Pedestal Cranes
- B30.5 - Mobile and Locomotive Cranes
- B30.6 - Derricks
- B30.8 - Floating Cranes and Floating Derricks
- B30.12 - Handling Loads Suspended from Rotorcraft
- B30.14 - Side Boom Tractors
- B30.19 - Cableways
- B30.22 - Articulating Boom Cranes
- B30.25 - Scrap and Material Handlers
- B30.27 - Material Placement Systems

Related Lifting Equipment

Related Lifting Equipment

- B30.1 - Jacks
- B30.9 - Slings
- B30.10 - Hooks
- B30.20 - Below-the-Hook Lifting Devices
- B30.23 - Personnel Lifting Systems
- B30.26 - Rigging Hardware

Related ASME Standards

- ASME HST Series
  - Design and Performance of Hoists
- ASME NOG and NUM
  - Construction of Nuclear Overhead and Gantry Cranes
  - Construction of Nuclear Cranes, Monorails and Hoists
- ASME BTH-1 Standard
  - Design of Below-the-Hook Lifting Devices

ISO TC96 Crane Standards

- SC 2 – Terminology
  - ISO 4301 Classification
  - ISO 4306 Vocabulary
  - ISO 7296 Graphic symbols
  - ISO 11994 Availability – Vocabulary
  - ISO/TS 15696 List of equivalent terms
- SC 3 – Selection of Wire Ropes
  - ISO 4308 Selection of wire ropes
  - ISO 4309 Wire ropes - Care, maintenance, installation, examination and discard

ISO TC96 Crane Standards

- SC4 – Test Methods
  - ISO 4310 Test code and procedures
  - ISO 9373 Accuracy requirements for measuring parameters during testing
  - ISO 11629 Measurement of the mass of a crane and its components
  - ISO 11630 Measurement of wheel alignment
  - ISO 13202 Measurement of velocity and time parameters
  - ISO 14518 Requirements for test loads

ISO TC96 Crane Standards

- SC 5 – Use, Operation and Maintenance
  - ISO 9926 Training of drivers
  - ISO 9927 Inspections
  - ISO 9928 Crane driving manual
  - ISO 9942 Information labels
  - ISO 10973 Spare parts manual
  - ISO 12478-1 Maintenance manual – General
  - ISO 12480-1 Safe use - General
  - ISO 12482-1 - Condition monitoring – General
  - ISO 15513 Competency requirements for crane drivers (operators), slingers, signallers and assessors
  - ISO 23813 Training of appointed persons
  - ISO 23814 Competency requirements for crane inspectors
  - ISO 23815-1Maintenance - General
  - ISO 23853 Training of slingers and signallers

ISO TC96 Crane Standards

- SC 6 – Mobile Cranes
  - ISO 4305 Determination of stability
  - ISO 7752-2 Controls -- Layout and characteristics - Basic arrangement and requirements
  - ISO 8087 Drum and sheave sizes
  - ISO 8566-2 Cabins
  - ISO 8686-2 Design principles for loads and load combinations
  - ISO 10245-2 Limiting and indicating devices
  - ISO 10972-2 Requirements for mechanisms
  - ISO 11660-2 Access, guards and restraints
  - ISO 11661 Presentation of rated capacity charts
  - ISO/DIS 11662-2 Experimental determination of crane performance
  - ISO 13200 Safety signs and hazard pictorials
  - ISO 15442 Safety requirements for loader cranes
  - ISO/TR 19961 Safety code on mobile cranes

ISO TC96 Crane Standards

- SC 7 – Tower Cranes
  - ISO 7752-3 Controls - Layout and characteristics
  - ISO 8566-3 Cabins
  - ISO 8686-3 Design principles for loads and load combinations
  - ISO 9374-3 Information to be provided for enquiries, orders, offers and supply
  - ISO 10245-3 Limiting and indicating devices
  - ISO 10972-3 Requirements for mechanisms
  - ISO 11660-3 Access, guards and restraints
  - ISO 12480-3 Safe use
  - ISO 12485 Stability requirements
  - ISO/TR 27245 Standards for design, manufacture, use and maintenance requirements and recommendations

ISO TC96 Crane Standards

- SC 8 – Jib Cranes
  - ISO 7752-4 Controls - Layout and characteristics
  - ISO 8566-4 Cabins
  - ISO 8686-4 Design principles for loads and load combinations
  - ISO 9374-4 Information to be provided for enquiries, orders, offers and supply
  - ISO 10245-4 Limiting and indicating devices
  - ISO 10972-4 Requirements for mechanisms
  - ISO 12210-4 Anchoring devices for in-service and out-of-service conditions
  - ISO 12480-4 Safe use
  - ISO 12488-4 Tolerances for wheels and travel and traversing tracks
  - ISO/TR 25599 Standards for design, manufacturing, use and maintenance requirements and recommendations

ISO TC96 Crane Standards

- SC 9 – Bridge & Gantry Cranes
  - ISO 7752-5 Controls - Layout and characteristics
  - ISO 8566-5 Cabins
  - ISO 8686-5 Design principles for loads and load combinations
  - ISO 9374-5 Information to be provided for enquiries, orders, offers and supply
  - ISO 10245-5 Limiting and indicating devices
  - ISO 10972-5 Requirements for mechanisms
  - ISO 11660-5 Access, guards and restraints
  - ISO/TR 16880 Standards for design and manufacturing requirements and recommendations

ISO TC96 Crane Standards

- SC 10 – Design Principals and Requirements
  - ISO 4302 Wind load assessment
  - ISO 4304 General requirements for stability
  - ISO/FDIS 20332-1 Proof of competence of steel structures

Crane Safety Issues

Crane Safety Issues

The increased pace of construction and the growth of the rental industry has resulted in

- more inexperienced operators and maintenance personnel
- uncertainty regarding who is responsible for maintenance

Crane Safety Issues

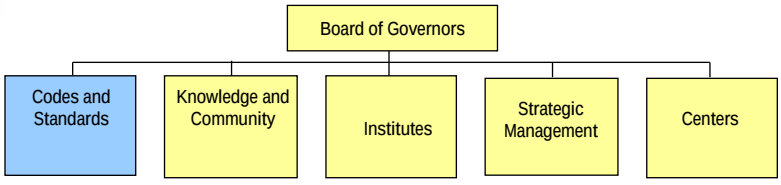
In order to be successful

- Training must be provided for
  - Operators
  - Riggers
  - Signalers
  - Inspectors
  - Maintenance personnel
- For each lift
  - Accurately determine load
  - Determine capacity and stability of crane for lift & reach combination

Crane Safety Issues

- Many US states now require operator certification (mobile, tower and increasingly overhead cranes).
- *National Commission for the Certification of Crane Operators (NCCCO)* is the pioneer and biggest player in this area in the US.

Other ASME Initiatives



Important Initiatives

- Improve communication with members
- Improve member benefits
- Offices in China, India & Brussels
- Annual Meeting
- International Participation
  - Members
  - Codes & Standards

Improve Communication

Communication Audit

- Phase 1: to identify and prioritize ASME critical audiences – completed
- Phase 2: to understand the information needs of each audience and assess the performance of ASME communication vehicles in addressing those needs – completed
- Phase 3: benchmarking ASME's effectiveness in using these communications vehicles – in progress

Improve Communication

Communication Audit

- Phase 4: provide recommendations to ASME based on the survey data and analysis.

Audit is due to be complete by the Annual Meeting.

Improve Member Benefits

In April, the Board of Governors voted to

- Adopt the strategy: Increase member satisfaction
- Executive Director & President will form a group of staff and volunteers to decide what to do

Improve Member Benefits

The responsible TF recommended:

- ❑ The group would decide what to do based on the resources that include
  - Voice of the Customer
  - Communication Audit
  - "Decision to Join"
- ❑ Likely areas for improvement include
  - Access to more specific technical information
  - Improve member awareness member benefits
  - Improve our magazine, newsletters and other regular member publications
  - Provide benefits/programs that target specific groups

Offices in China, India & Belgium

China Will establish independent office in June. Primary activities:

- – Arrange for meetings between ASME officers and Chinese government contacts
- – Exploring possibilities for future meetings & conferences in China
  - BPE
  - Nuclear
  - Gas Turbine

Offices in China, India & Belgium

India Established office earlier this year. Primary activities:

- identify opportunities to engage industry leaders and government officials in discussions regarding the use ofASME Codes & Standards
- seek opportunities to bring ASME training programs to India
- help to support membership growth

Offices in China, India & Belgium

Belgium Established office last year. Primary activities:

- raising ASME's visibility throughout Europe
- providing a local face and support to members and Sections
- Examples: training courses in Italy, Nuclear Industry Roundtable, gas turbine conference in Germany

Annual Meeting

- To be held in June in place of the SAM
- Focused on professional development
- Specific topics this year
  - Envisioning the Future
  - Critical Skills Needed
  - Interdisciplinary Approaches Keys to Success
  - Career Fair
  - Workshops

International Participation

- Members outside North America increased by 2% over the last year
- Codes & Standards Participants outside North America increased 21% last year and by 7% so far this year.

ASME

setting the standard …

… in engineering excellence

… in knowledge, community & advocacy