Christian Cremonesi
Application & Project Engineering Manager
ATV SpA

Associazione Italiana Strumentisti

ISA Italy Section

ATI Associazione Termotecnica Italiana Sezione Lombardia

VALVOLE DI CONTROLLO E INTERCETTAZIONE, SISTEMI DI AZIONAMENTO, DISCHI DI ROTTURA E DISPOSITIVI DI SICUREZZA UTILIZZATI NELL'INDUSTRIA DI PROCESSO

Milano, 18 Aprile 2018

Auditorio TECNIMONT

ATV

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The Technology of Valves for Subsea Applications

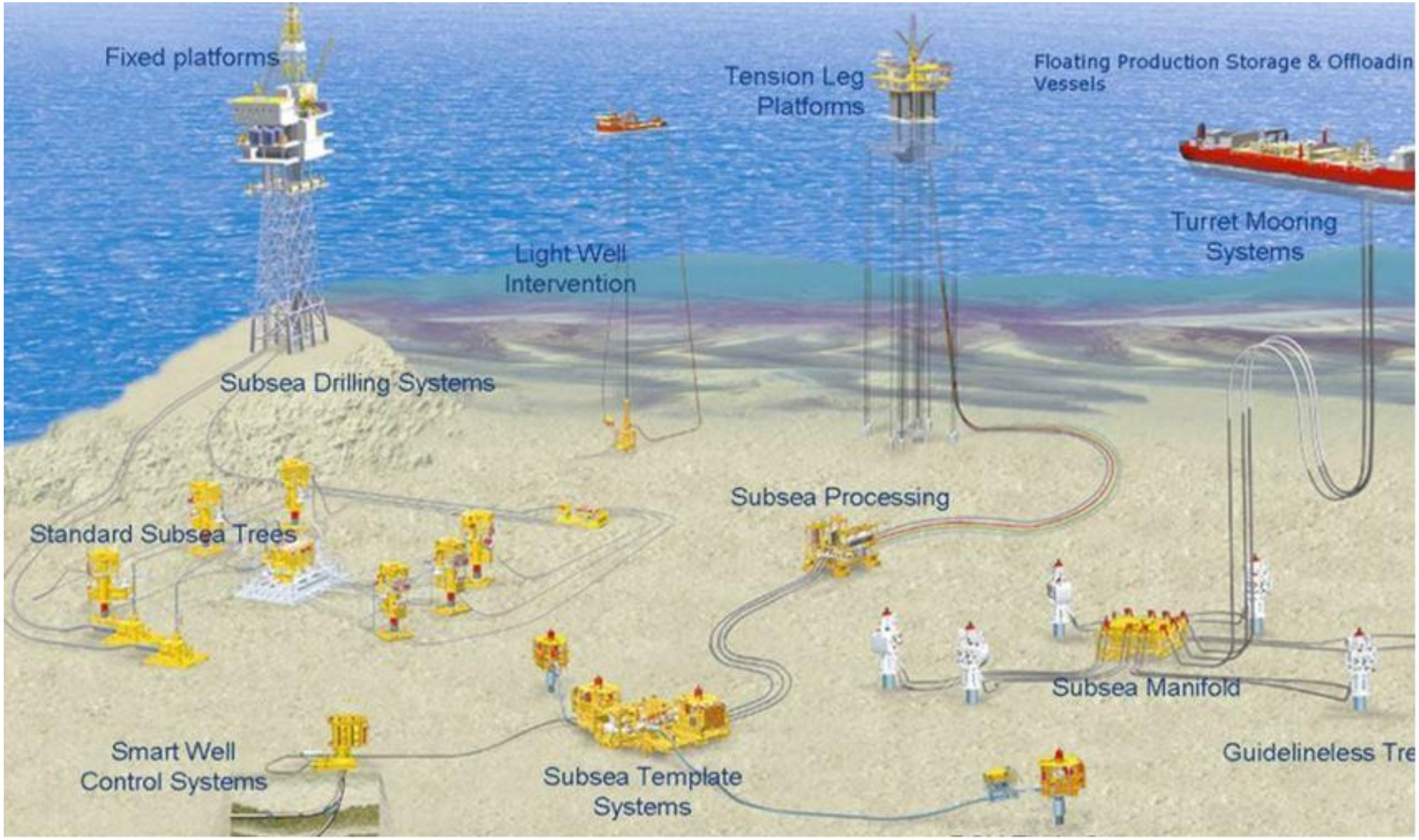
ADVANCED TECHNOLOGY VALVE (ATV) – COMPANY BACKGROUND

- Established in February 2006, ATV is a privately owned Company having the mission to design and manufacture products with high content of technology and quality for the energy industry
- ATV offers a full range of products for the most severe Oil & Gas applications:

  Valve and Actuators → Offshore/Subsea

  Valves → Onshore/Topside
- ATV founders have over 40 years experience in valve industry
- ATV is located in Colico (Italy), on the eastern shore of lake Como, 100 km north from Milan: a modern integrated manufacturing facility with the latest machining technology, in-house state-of-art welding shop and testing shop
- 460 Employees

Typical Subsea Production System



26” Ball Valve 330 barg
1500 m Water Depth

10” 10000 psi

FSC operated

2000 m. W.D

SSIV - 24” S.E. Ball Valve Installation

SSIV 14” Class API 1500 c/w ROV retrievable actuator

Top Entry Ball Valve
7 1/16” Class API 15000
Designed for 2256 m WD (7400 ft)
Hydraulic FSC Actuator

<u>Qualified for HPHT (15000 psi @ 400°F)!</u>

SWING CHECK 44” 152 bar

Slab Gate Valve, Hydraulic Actuator FAI + ROV
5 1/8” Class API 15.000

<u>The first worldwide 5 1/8” T.C. Slab Gate Valve qualified for HPHT (15000 psi @ 400°F) - January 2016!</u>

HIPPS T.C. Slab Gate valves 5 1/8” class API 15000

Emergency *capping stack*, the tool to contain oil spills in case of well blow-out on the seabed

Oil Industry is continuosly driving the valve manufacturer to provide solution to difficult challanges:

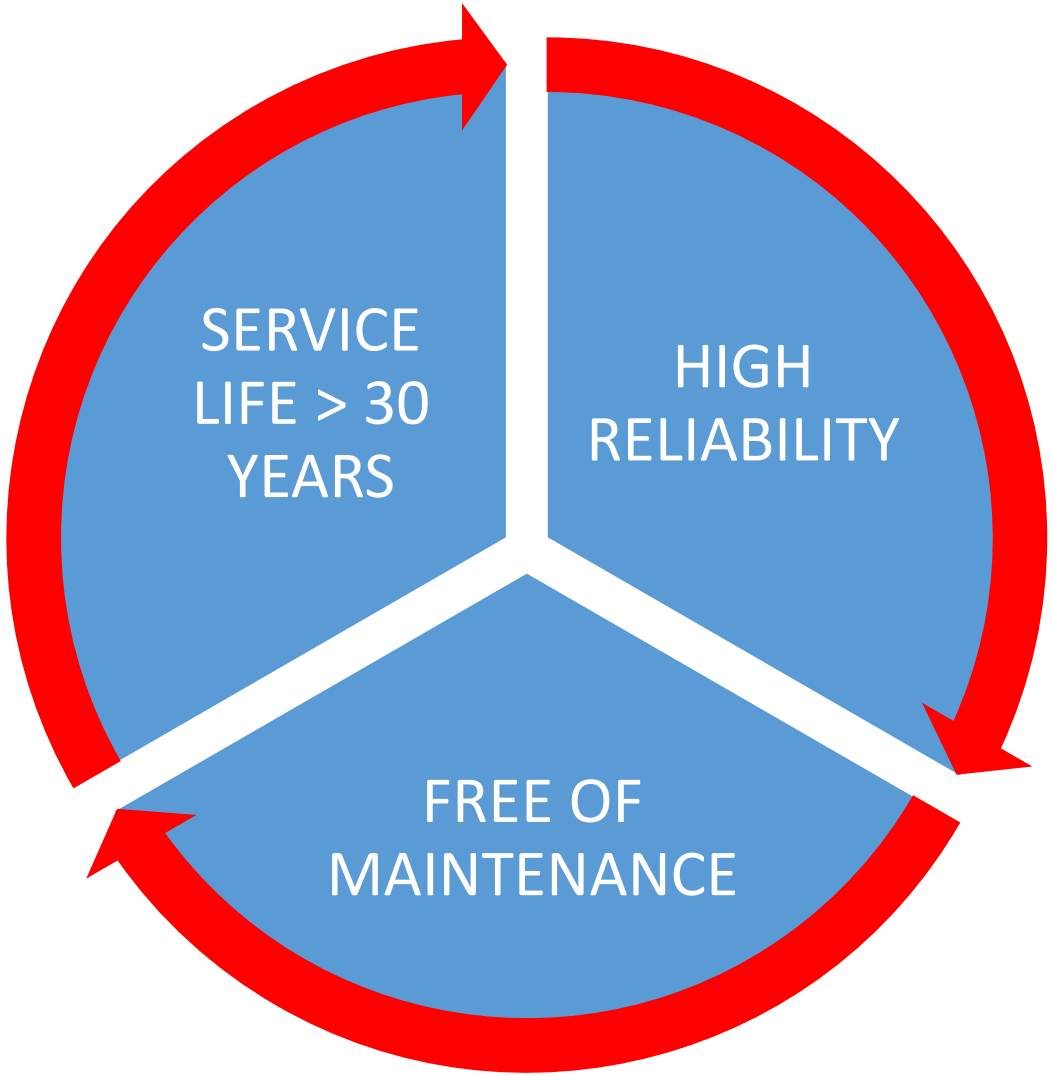
- Large sizes:

- More severe service conditions
  - High pressure (15ksi – 20ksi)
  - High temperature (400F!)
  - Water depth (>3000 m)
  - Corrosion (>18% H2S)
  - Erosion
  - ……

- Longer in service

- Short time-frame for product development

SUBSEA VALVES



IS IT POSSIBLE…….?

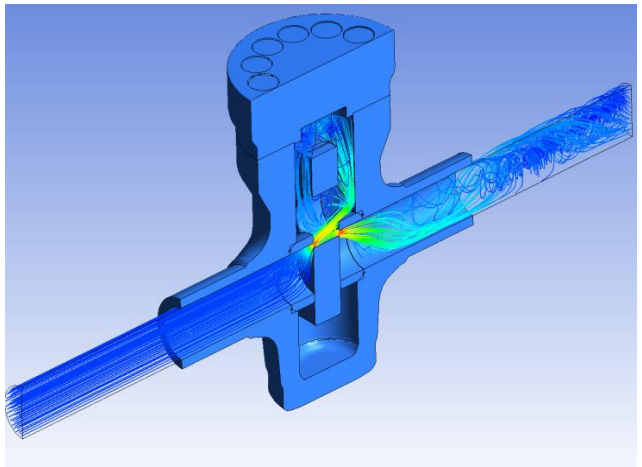
……the response to the challenges

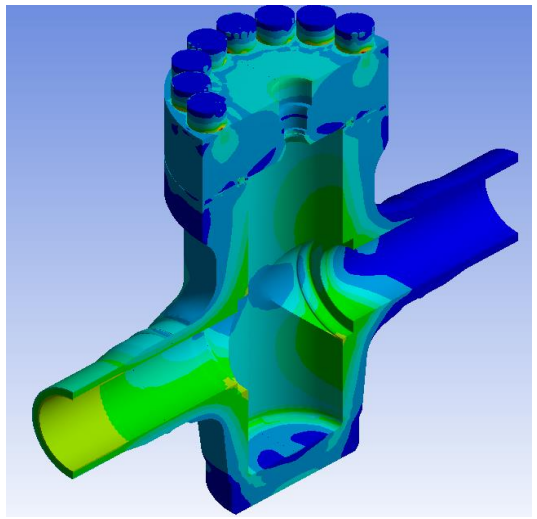
Design process – Engineering, the brain of the Company

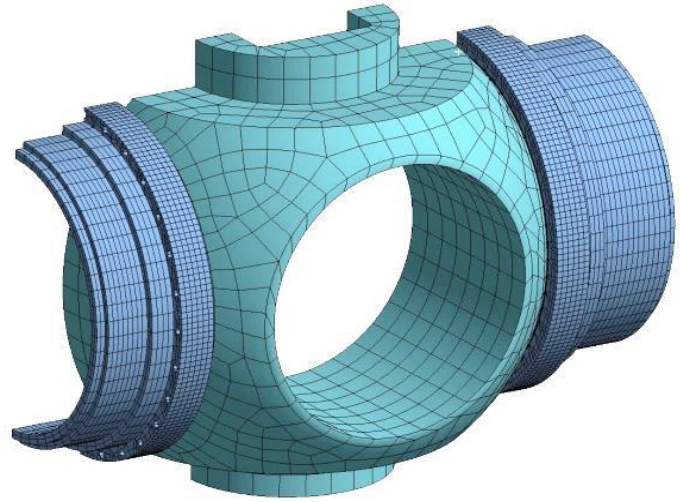
Robust design process with risk based methodologies including FMECA process to assure the products reliability and safety, giving a complete reliance in the Company products

FEA and CFD tools verify the design and optimize the products performance

ATV holds proprietary technology for metal seated valves.
Fatigue damage and lifetime evaluation assessment ensures high reliability products

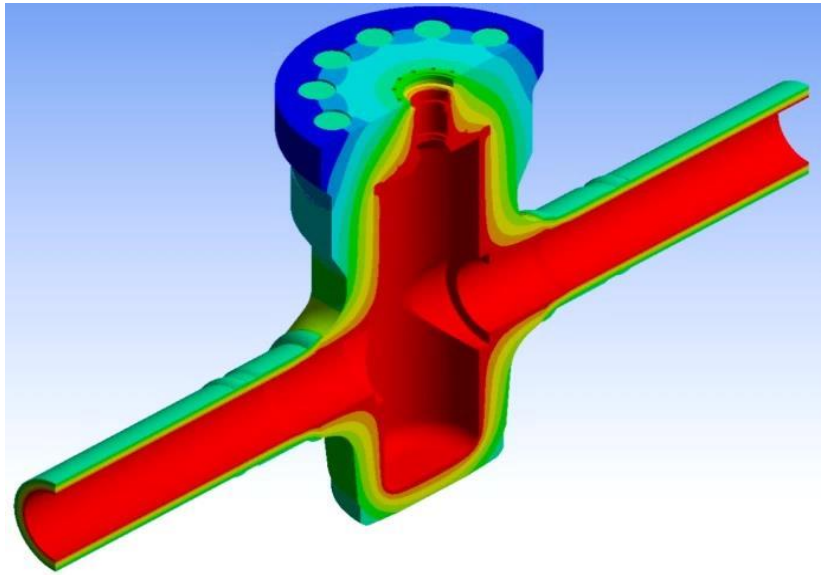


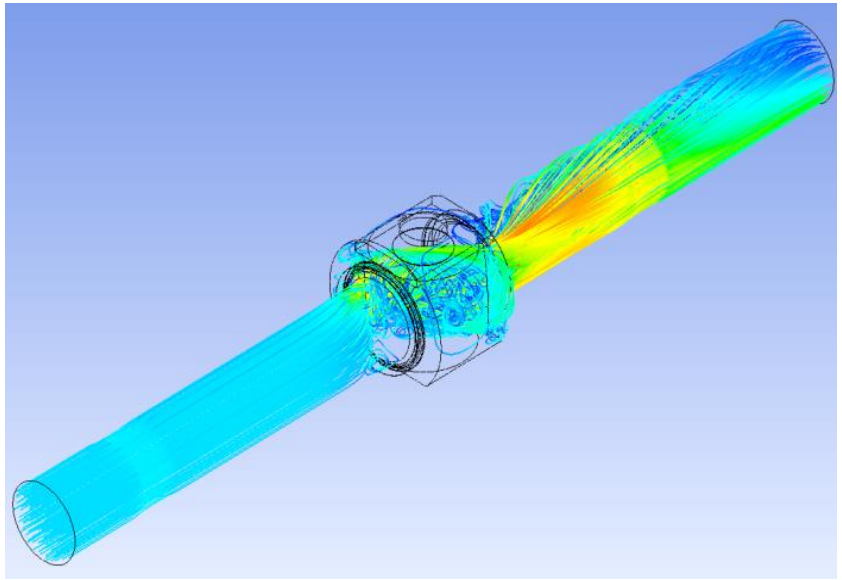




ATV pushes the limits with its R&D program in anticipation of challenging requirements

- HPHT
- Seal Technology
- Fracture Mechanics
- Laser and Surface Engineering
- Advanced NDE (AE)





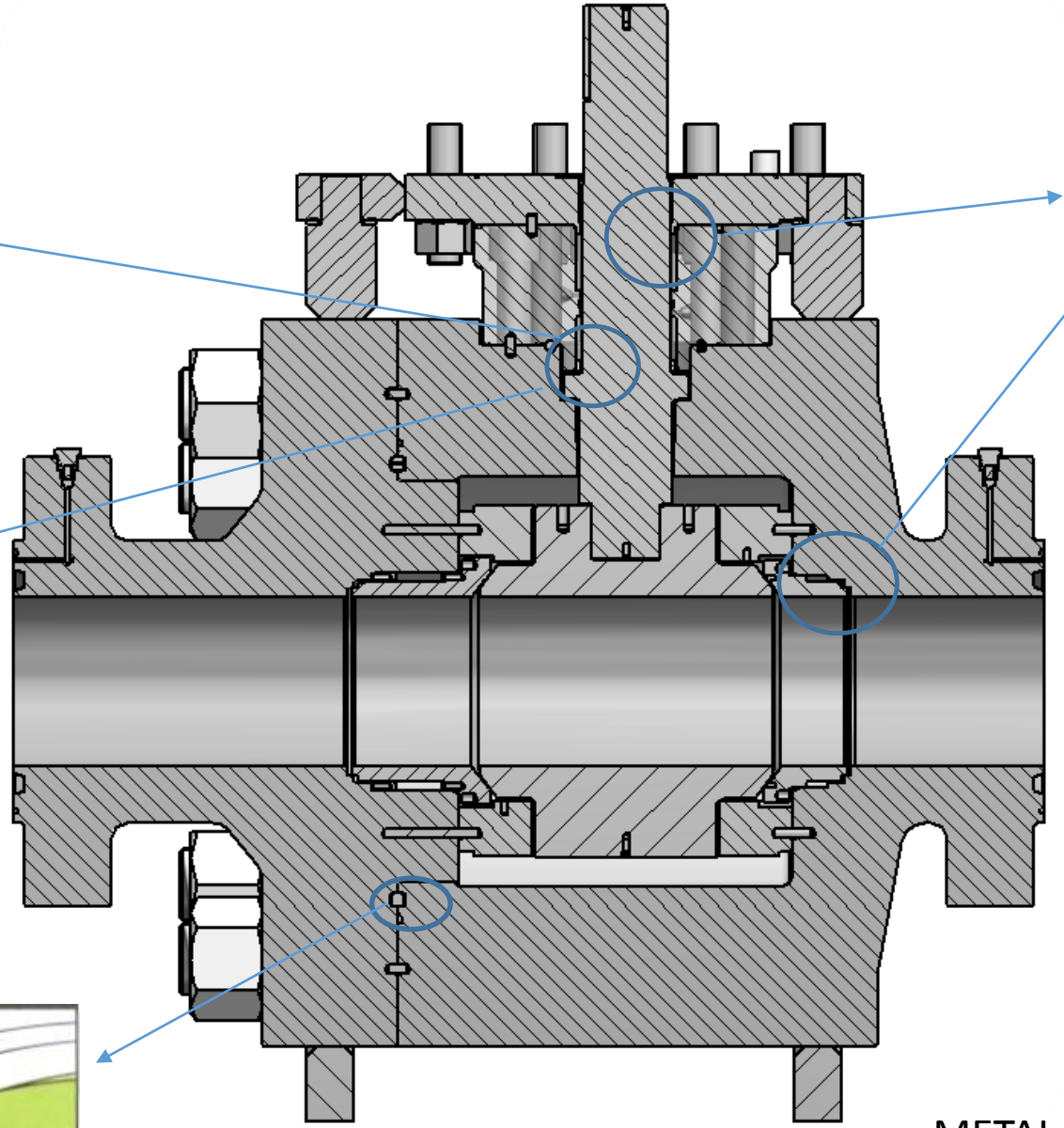
MAIN FEATURES

STEM V-PACK

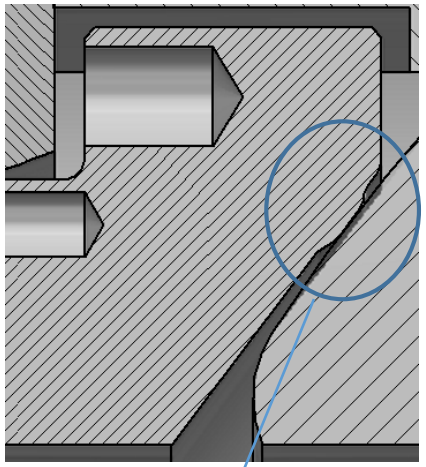
METALLIC GASKET

STEM METALLIC GASKET

METALLIC GASKET - BX



LIPSEAL



METAL TO METAL CONTACT – TUNGSTEN CARBIDE HARDFACING

MATERIAL: Material engineering is THE key discipline of current valve technology development

- Development of new material grades with improved properties…or rediscovery of existing ones

- Trend to use top-of-the-line more costly specifications, to reduce any remote risk of failure and reduce maintenance related OPEX costs

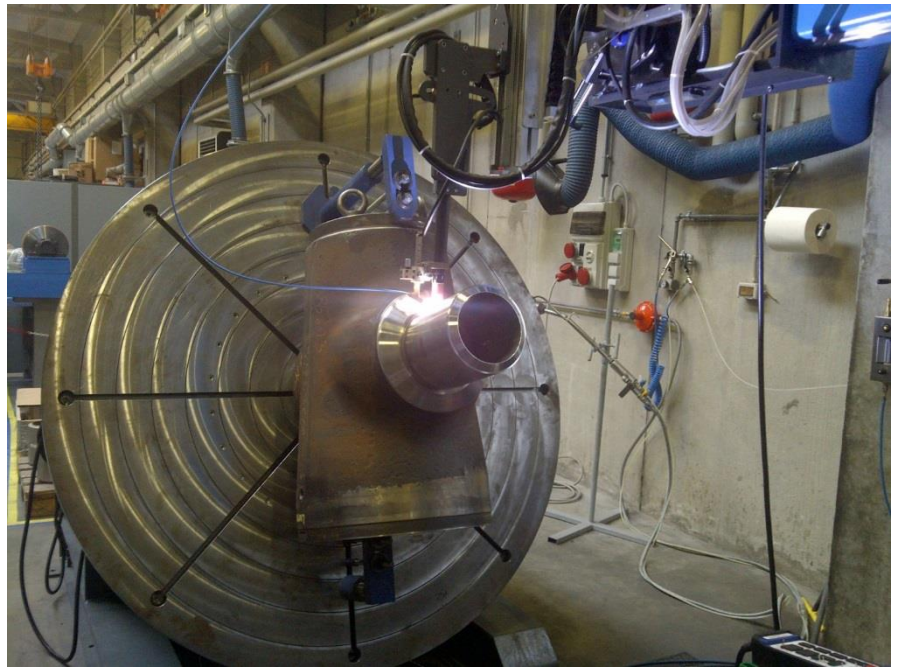
- Focus on sub-sea bolting, after a number of publicized failures……**API 20E BSL2/3 CAN HELP??**

- Development of new coatings based on nano-technologies or advanced deposition techniques:
  - *Reduce coefficient of friction ****the alchemists's philosophical stone of valve designers*
  - *Withstand higher contact stresses in HPHT or very fast stroking applications*
  - *Reduced porosity*
  - *High resistance to corrosion*
  - *Compliance to improve tightness*

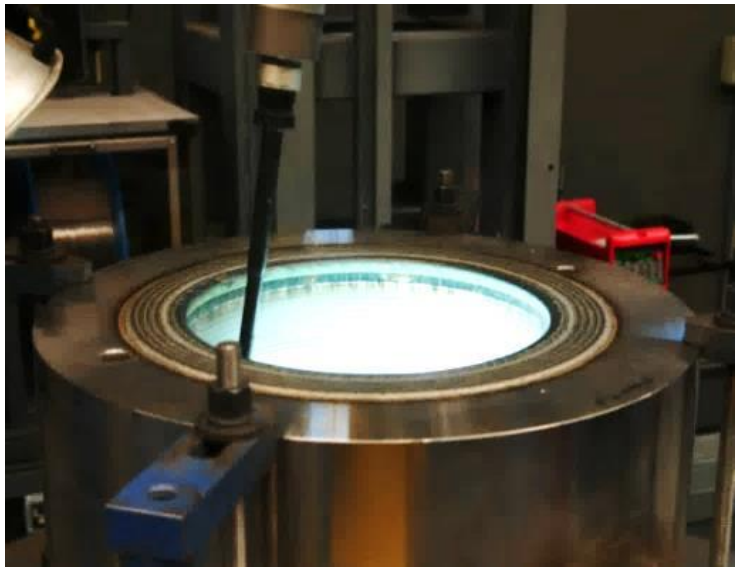
WELDING

Valve manufacturers are facing with welding even bigger challenges than with materials

- Strongly different opinions and technical doctrines between oil companies leading to the need to re-qualify welding procedures with variations
- Extensive use of cladding in alloy 625
- Material grades with complex metallurgies, which is some cases are ….not yet fully understood
- Welds on the transition with valve bodies much thicker than on the abutting piping
- Welds between dissimilar materials, where valve bodies are in high strenght CMn steels with alloy 625 overlay and piping are in duplex and where special solutions have to be adopted in order to allow stress reliefing on the CMn steel avoiding the same treatment on the abutting duplex grade
- Requirements to use Nb-free nickel alloy consumables to avoid solidification cracking but at the expense of less welder-friendly metal



(GTAW) WELDING PUP IN SDUPLEX TO VALVE BODY IN F60 W/ALLOY 59



(GMAW) INCONEL 625 OVERLAY

NDE

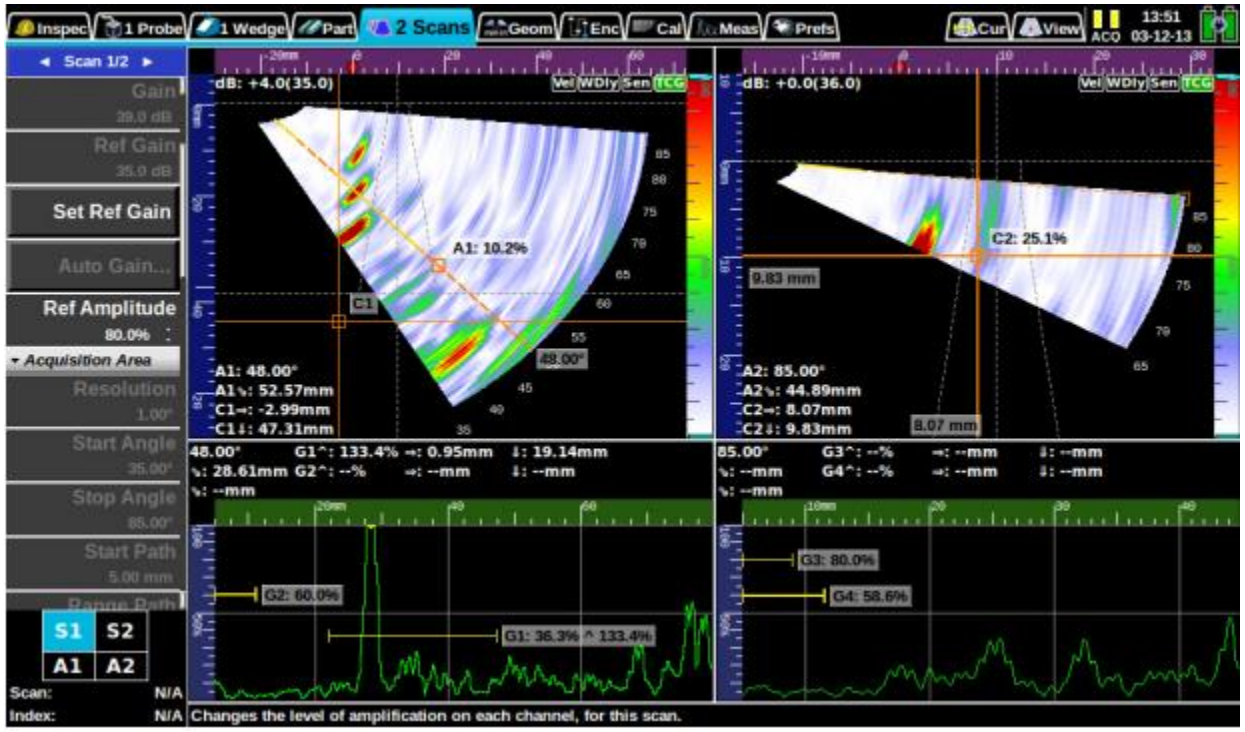
NDE requirements are becoming more complex as result of:

- Heavy thickness of welds
- Duplex an superduplex material structures
- Dissimilar weld joints
- Advanced fracture mechanics design approaches which require postulated defect size and probabilistic methodologies
- Limitations of traditional RT techniques

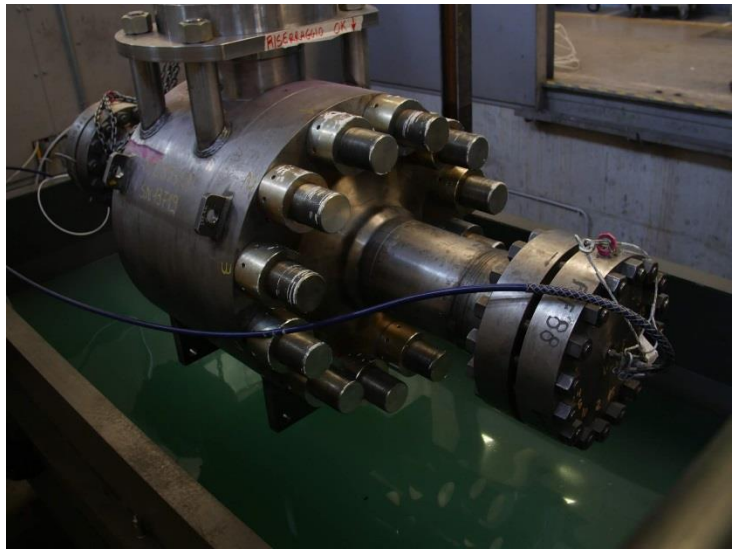
Under these conditions….

- Increase in the size and technical capabilities of in-house NDE staff
- Need to quantify the POD of the NDE technique with simulation software
- Implementation of advanced PAUT techniques
- Implementation of AE techniques

PAUT INSPECTION ON DISSIMILAR METAL WELDS



TESTING & QUALIFICATION



INTENSIVE QUALIFICATION
TESTING PROGRAM :

SUBMERGED GAS TEST
PR2
HYPERBARIC
ENDURANCE
BENDING TEST

THANK YOU

GRAZIE

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