



# INNOVATIONS AND UPGRADES WITHIN THE SUBSEA VALVE MARKET



**PETROLVALVES GROUP**  
enabling your energy flow

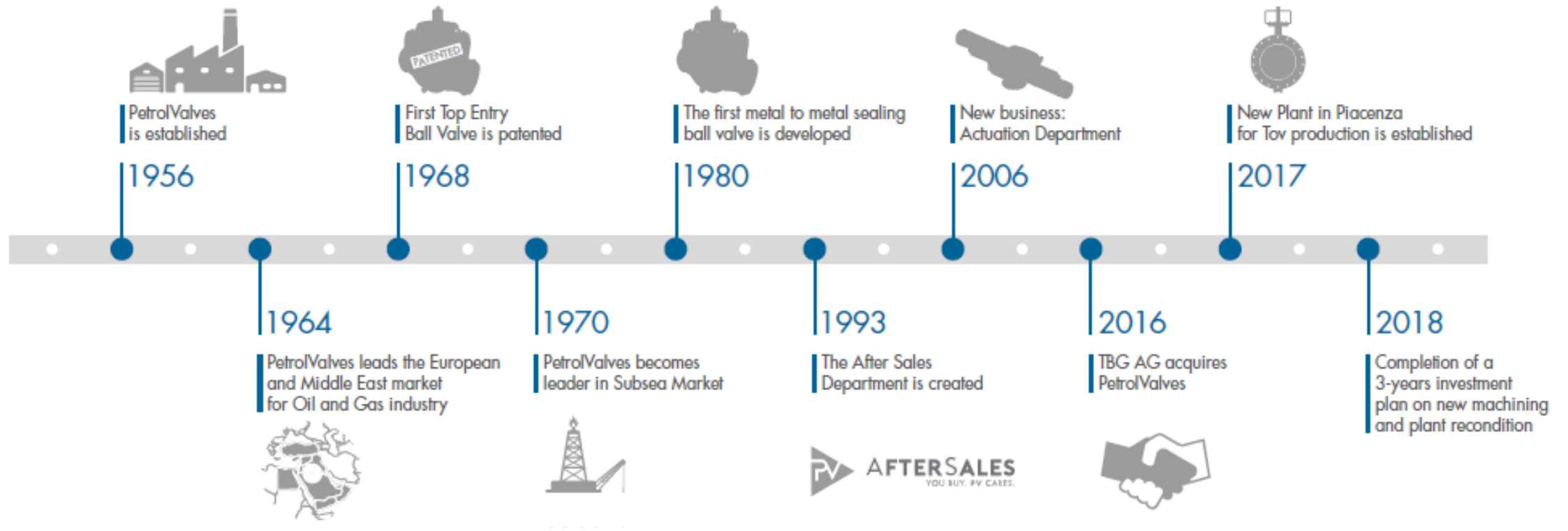
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Castellanza, Italy  
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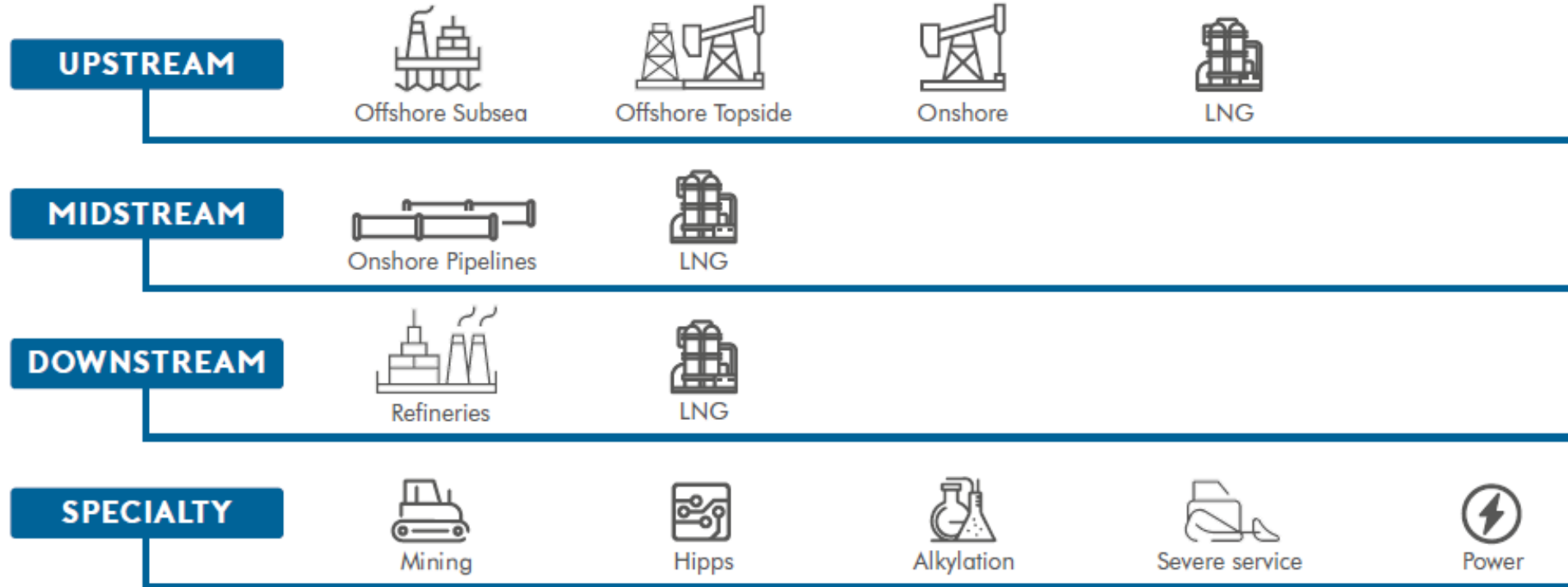


# COMPANY GENERAL INTRODUCTION



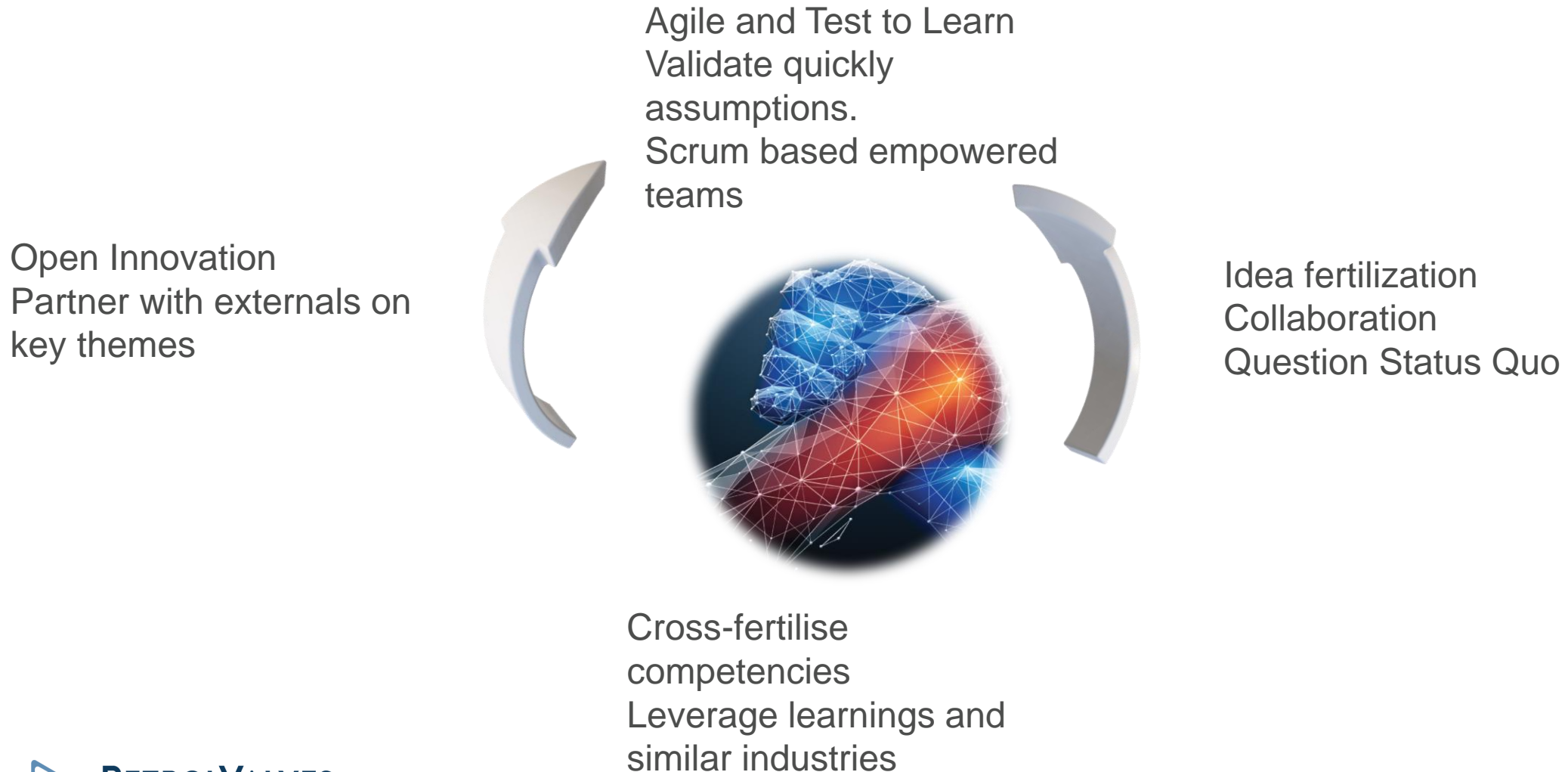


# PETROLVALVES PRODUCT APPLICATIONS





# INNOVATION IN PETROLVALVES

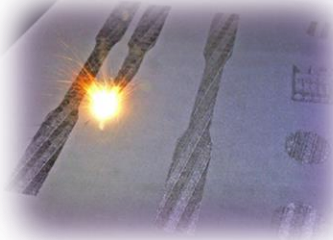




# TECHNOLOGIES IN THE WORKS

## Materials & Manufacturing

- Additive Manufacturing
- New coatings
- Materials



## New Architecture

- New Architectures
- Actuator Optimisation
- System integration



## Renewable Platform

- Hydrogen
- CCS
- WTE

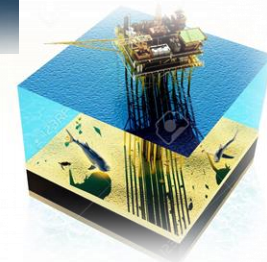
## Continuous improvement

- Sealing mechanism
- Advanced sealing



## Digital

- RM&D
- Digital Twin
- Test Integration



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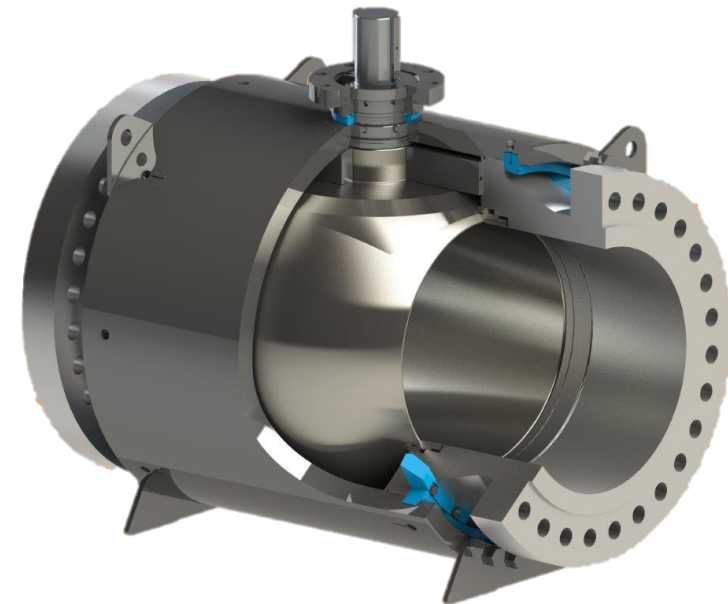
## BRAVA: INNOVATION AND DESIGN

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PetrolValves is able to design its products following the specific needs of the processes and the Clients.

The **innovation spirit and expertise in design** can be seen also in the **PV BRAVA** (Boltless Reliable Advanced VALve).

BRAVA technology is based on a compression retaining ring, to reduce weight, dimensions, assembly time, maintenance, and total cost of ownership.



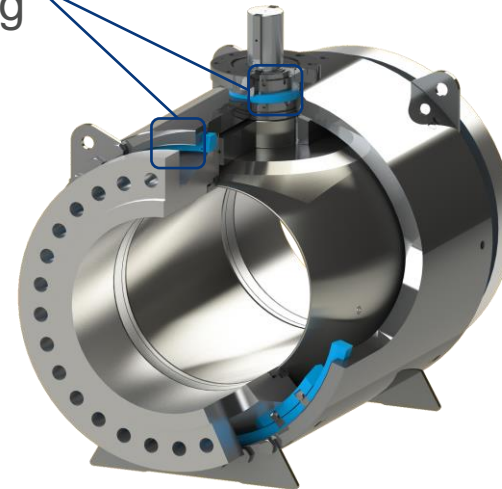


## BRAVA: CONCEPT IDEAS

Cross Fertilize Well Proven and Reliable Technologies  
Creating a Step Change



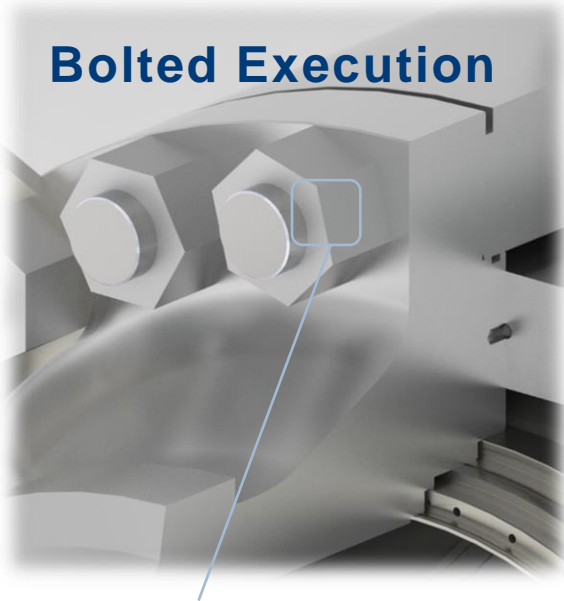
Retaining  
Ring





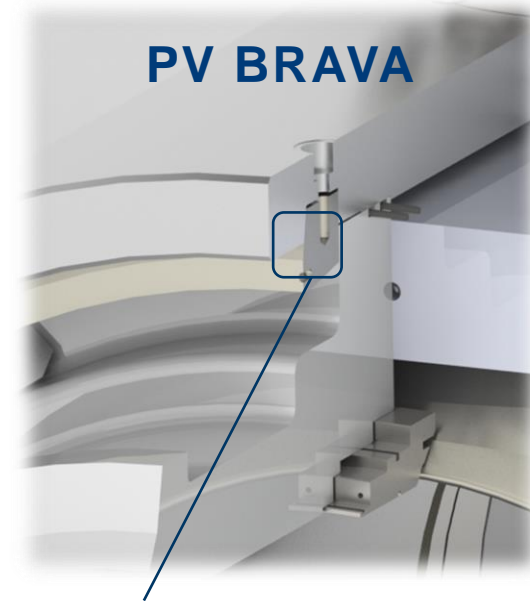
## BRAVA: COMPONENTS BENCHMARK & RETAINER RING

### Bolted Execution



- ▶ Many bolts
- ▶ Thick Body to allow bolts diameter
- ▶ Long Assembling duration

### PV BRAVA



- ▶ No bolting needed
- ▶ Thin Body wall thickness
- ▶ Reduction in carbon footprint
- ▶ Easy and fast Assembling

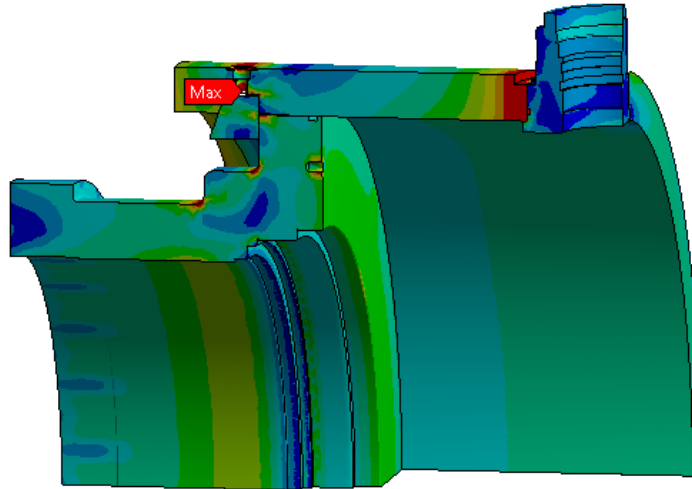
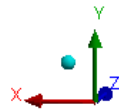




# BRAVA: DESIGN VALIDATION THROUGH FEA

**A: ope\_shell test\_Finale**  
Equivalent Stress 6  
Type: Equivalent (von-Mises) Stress  
Unit: MPa  
Time: 2  
20/11/2019 12:36

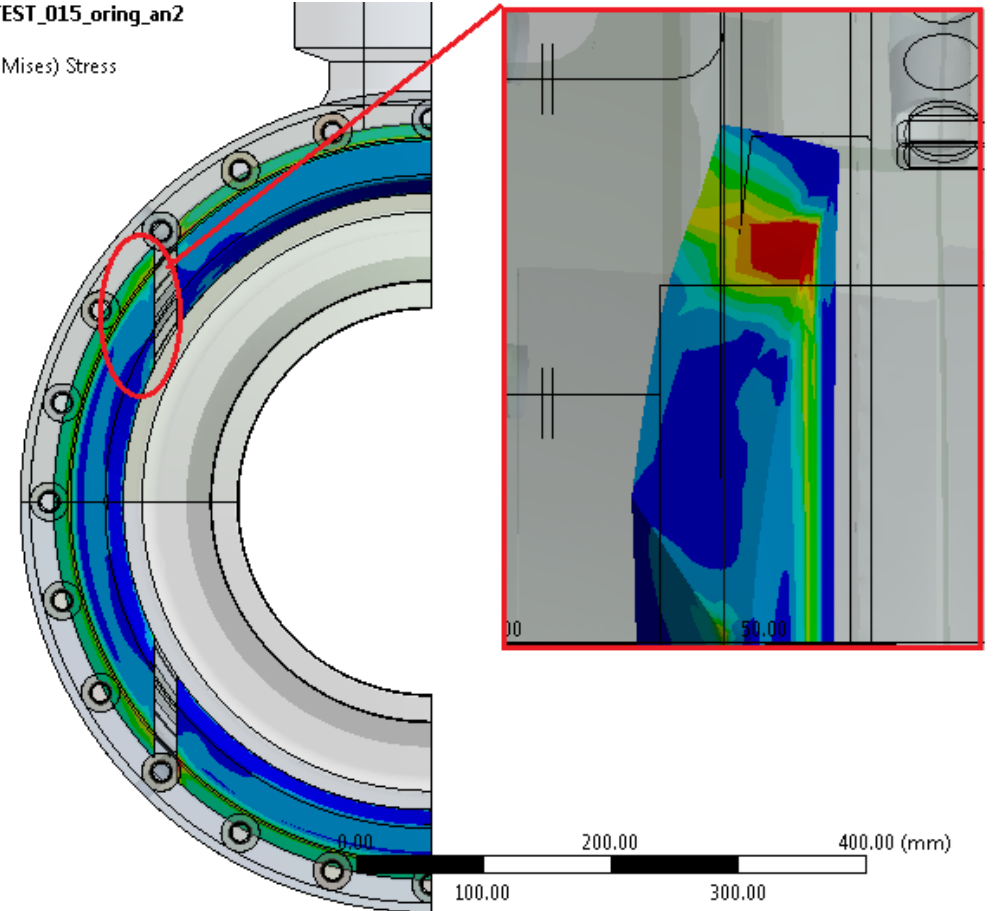
1082.7 Max  
327  
286.16  
245.33  
204.49  
163.66  
122.82  
81.99  
41.155  
0.31948 Min



0.00 150.00 300.00 450.00 600.00 (mm)

**L: 5\_mod3\_centrest TEST\_015\_oring\_an2**  
Equivalent Stress 5  
Type: Equivalent (von-Mises) Stress  
Unit: MPa  
Time: 3

2083.5 Max  
650  
568.99  
487.98  
406.96  
325.95  
244.94  
163.93  
82.917  
1.9049 Min



FEA simulations have been carried out to optimize valve design and provide the maximum load-capacity during service conditions and heavy-duty operations.



# BRAVA: DESIGN VALIDATION CAMPAIGN



## SUBSEA APPLICATION:

(-29°C / +121°C - 2,000m water depth)

- ▶ 200 cycles PR2 Test (API 6A)
- ▶ 200 cycles Endurance (API 17D)
- ▶ 200 cycles Hyperbaric Test (API 17D)
- ▶ External Bending Moment Test (2/3 SMYS magnitude).





# BRAVA VS BOLTED EXECUTION: MAIN BENEFITS

## CAPEX BENEFITS

- ▶ Cost optimization
- ▶ Shorter delivery
- ▶ Weight & Dimensions

## CARBON FOOTPRINT REDUCTION

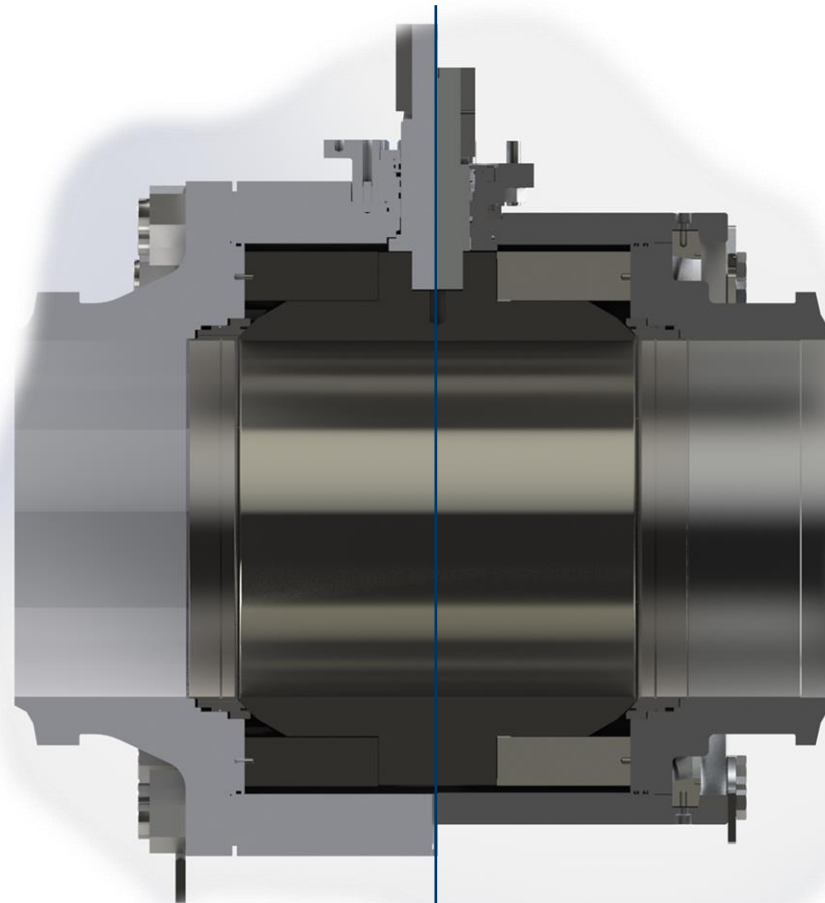
- ▶ Reduced energy and materials consumption

## OPEX BENEFITS

- ▶ High valve reliability and service operations simplification
- ▶ Lower lifecycle cost of ownership

## FULLY EQUIVALENT

- ▶ Range of Products
- ▶ Features
- ▶ Applications

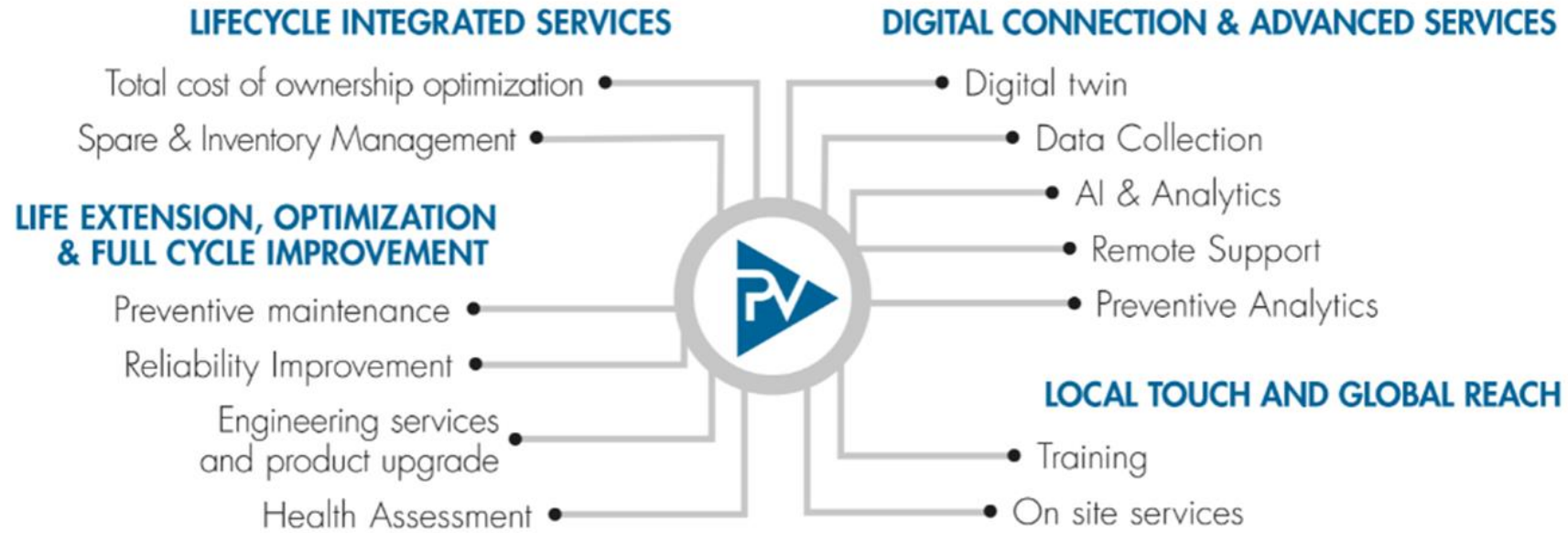


standard  
design

optimized  
design



# VALVE NEW LIFE



AN END TO END APPROACH GUARANTEEING EFFICIENCY AND HIGHER PERFORMANCES

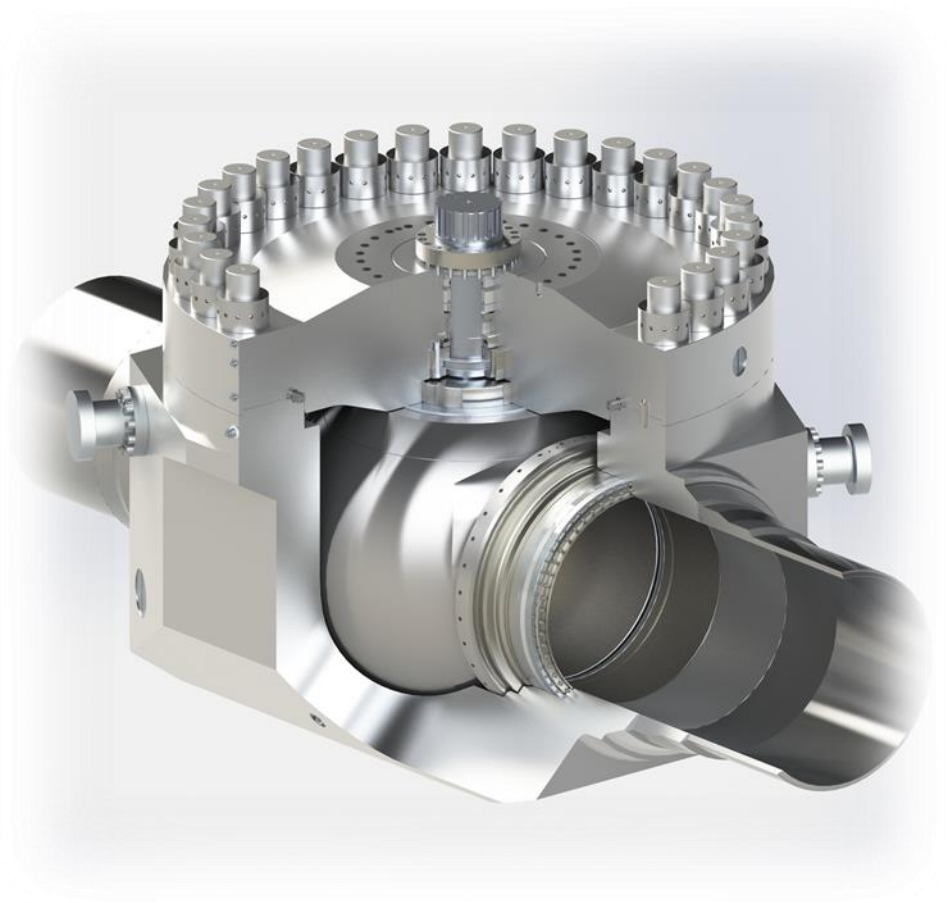
**VALVE NEW LIFE** is a successfully business model that PetrolValves has developed to refurbish and upgrade Customer existing valve (supplied by PetrolValves or third party) that allow to reduce CAPEX investment up to 40%. Thanks to PetrolValves' reverse engineering capabilities and its proven manufacturing experience, we have been able to regionalize VALVE NEW LIFE technology in key geographies.





## HYDROGEN & CARBON CAPTURE PLANT

- Challenges in the hydrogen and CCS primarily materials driven
- Critical question related to service fit on existing valves changing operating profile and process fluid
- Regulation changing rapidly, adapting to new requirements
- PV embraced the Northern Light CCS In Northern Europe and Hydrogen Liquefaction/Production platform

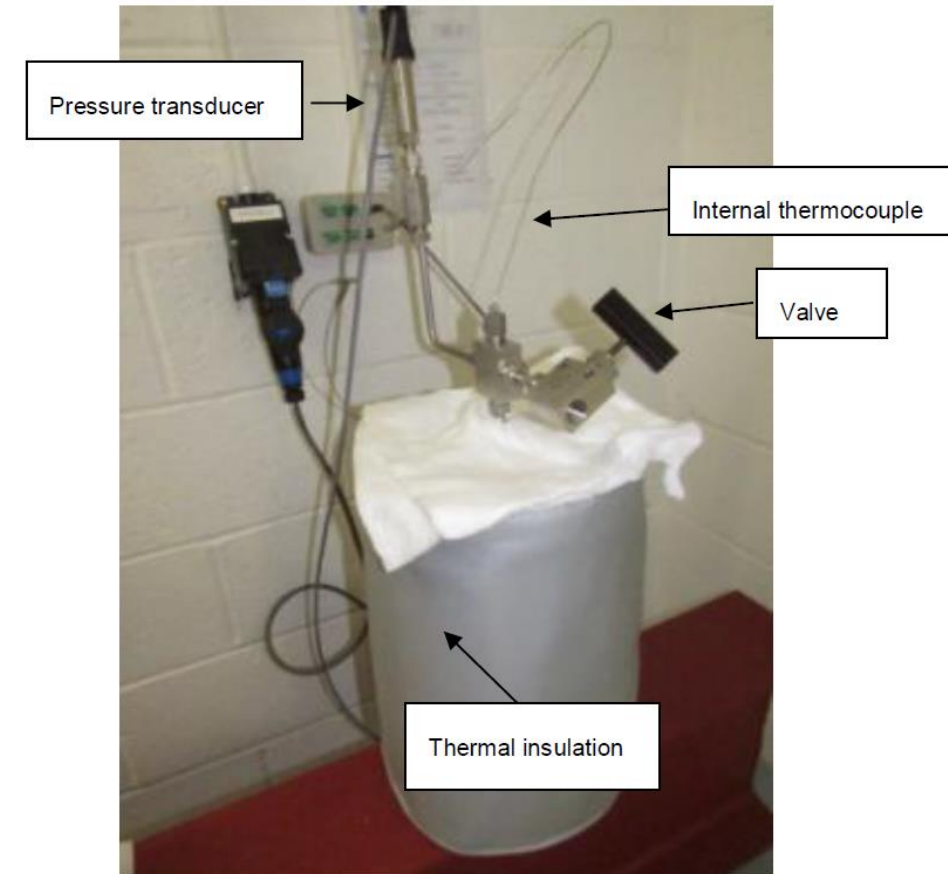
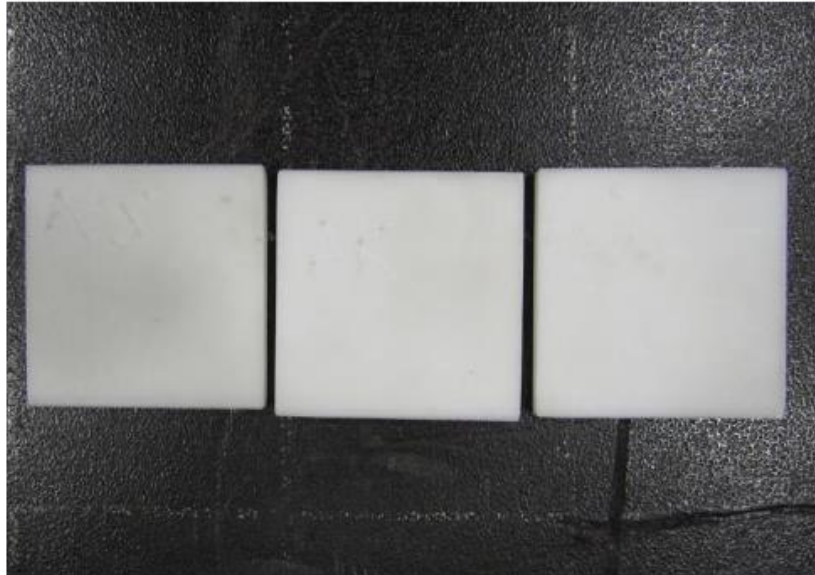




# CARBON CAPTURE PLANT – SUBSEA PROJECT

Challenge faced: thermoplastic materials qualification:

- Definition of materials
- Definition of testing setup
- Definition of acceptance criteria





# QUESTIONS?

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Q U E S T I O N S ?

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