DYNAMIC POSITIONING CONFERENCE
October 13-14, 2015

THRUSTERS

Major New Developments on Gearless Thrusters: More Power, Less Cost, Improved Maintainabililty

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ABB

Kimmo Kokkila, Product Manager, DP Conference, 13th Oct 2015

Major new development on gearless thrusters:
More power, less cost, improved maintainability

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Photo: AP/Gerald Herbert

Power and productivity for a better world™

Azipod® – gearless thruster family
Power range 2…22 MW

Azipod® – gearless thruster
References from all vessel segments

Azipod® – gearless thruster
Experience

25 years

4,500 megawatts

11 million operation hours

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Azipod® – gearless thruster
Azipod® Global Service

★ Azipod factory or service workshop

● ABB Marine Service Center

Azipod Global Service headcount: >**100** persons

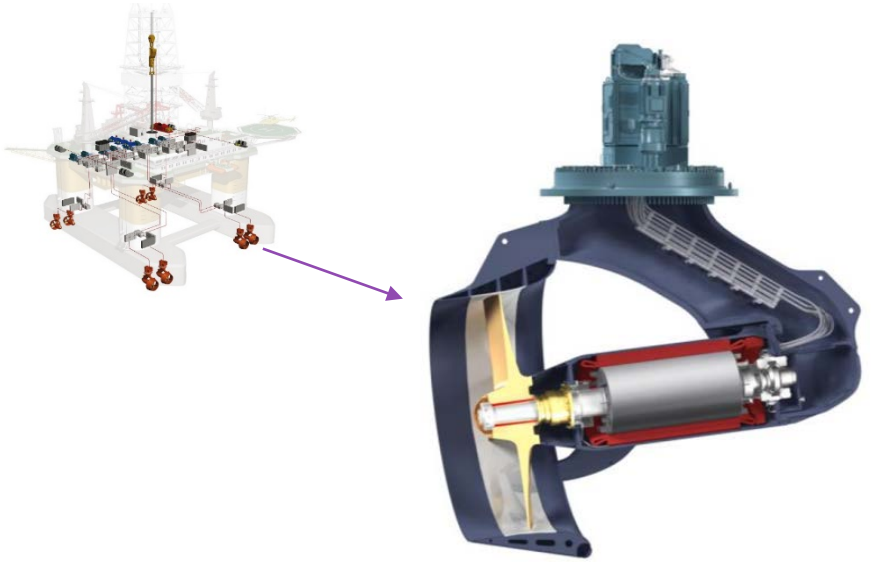
>**50 %** of Azipod installed base covered by maintenance agreements

Global **24/7** Technical Support

Remote Diagnostic Services (**RDS**) available

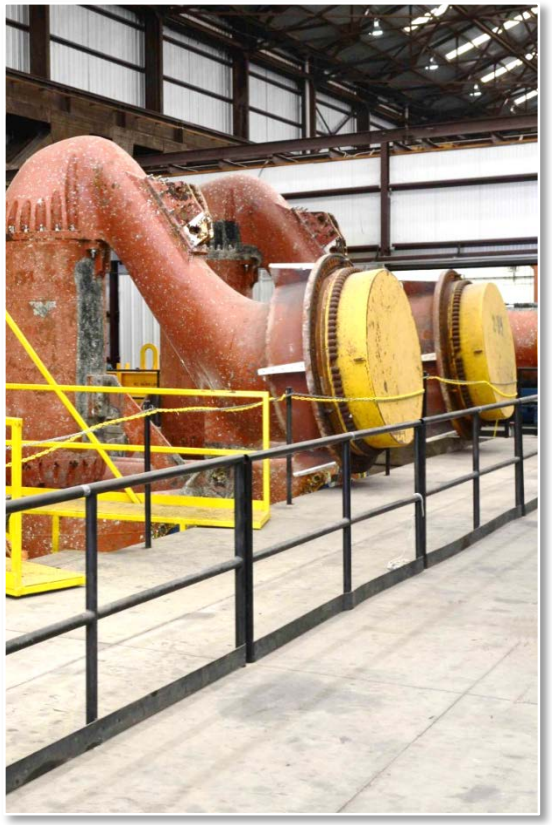
Major new development on gearless thrusters
1st Azipod® installation on drilling vessel

- 16 gearless Azipod thrusters delivered for two rigs in 2004
- Service rotation done with 5 spare thruster
- Last 3 thrusters demounted for scheduled overhaul after about 9 years in operation



(Photo: AP/Gerald Herbert)

DPC 2014: 10 years overhaul interval with ABB gearless thrusters
Components after 9 years in operation



Summary of components

- Condition of all components excellent considering long operation time
- None of the components showed signs of possible breakdown in foreseeable future

- Further info: *Kokkila, K., Varis, J. & Aho, J., "10 years overhaul interval with gearless Azipod thruster", DP Conference 2014*

Major new development on gearless thrusters
New Azipod® D product series

- Open (DO) and ducted (DZ) propellers
- Power range 2…7 MW

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New gearless thruster – Azipod® D
Complements the Azipod® family

	Azipod® C	**Azipod® D**	Azipod® X	Azipod® V
Power (MW)	2 – 4.7	**2 – 7**	7 – 22	6 – 17
Cooling	Sea	**Air + Sea**	Air	Air
Motor technology	Permanent magnet (PM)	**PM & induction**	Synchronous	Synchronous
Ice class	Up to 1A	**Up to 1AS**	Up to 1AS	UP to PC1
Max thrust	93 t	**125 t**	-	-

More power, less cost, improved maintainability

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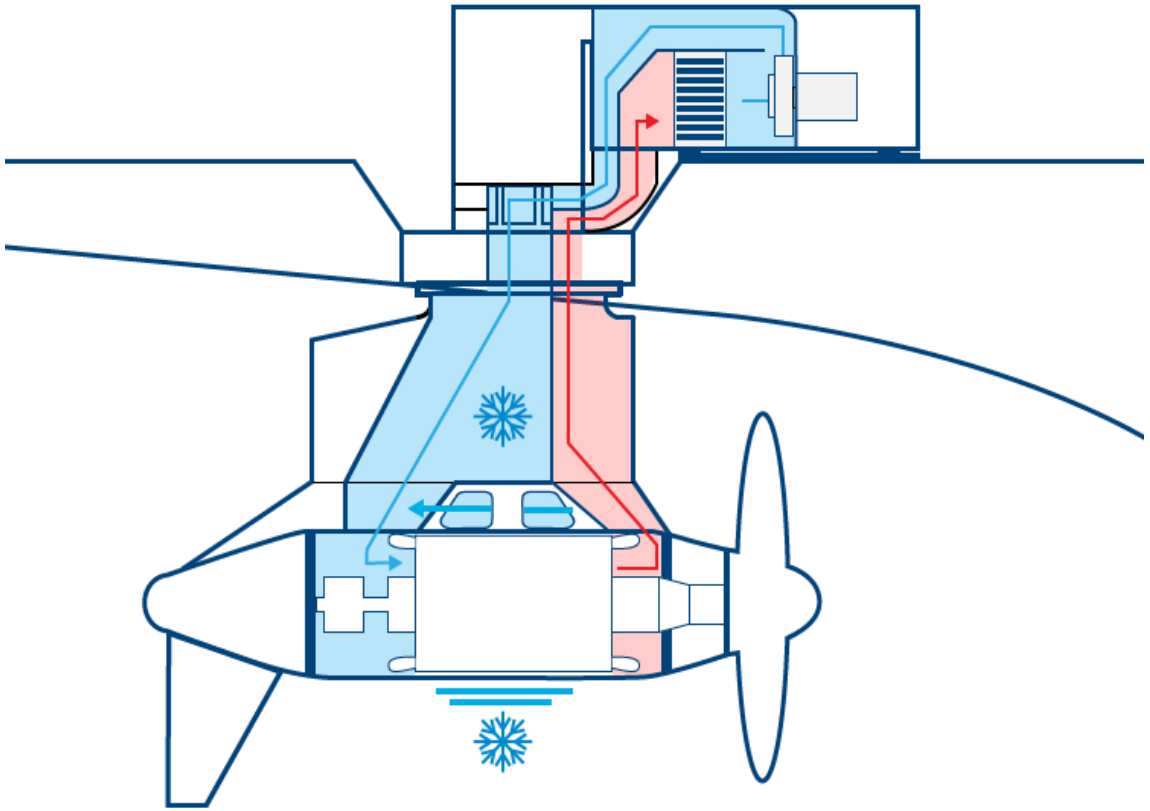
Azipod D motor technology:
More power, less cost

Azipod D motor technology
More power, less cost

- New hybrid cooling combines
  - Sea water cooling used in Azipod C (15 years)
  - Active air cooling from Azipod V/X (25 years)
- Larger motors up to 7 MW
- Both permanent magnet and induction motor
- Increases motor power and **reduces investment cost**



Azipod D motor technology
More power, less cost

Frame size, motor diam. [mm]	Azipod DZ	Azipod CZ	Voltage
980	2.3 MW	1.9 MW	690 V
1100 (new)	3.1 MW	-	690 V
1250	4.2 MW	3.3 MW	690 V
1400	5.5 MW	4.7 MW	3000 V / 690 V
1600 (new)	7.0 MW	-	3000 V

On average, the hybrid cooling
increases propulsion power 20 %

Bearings

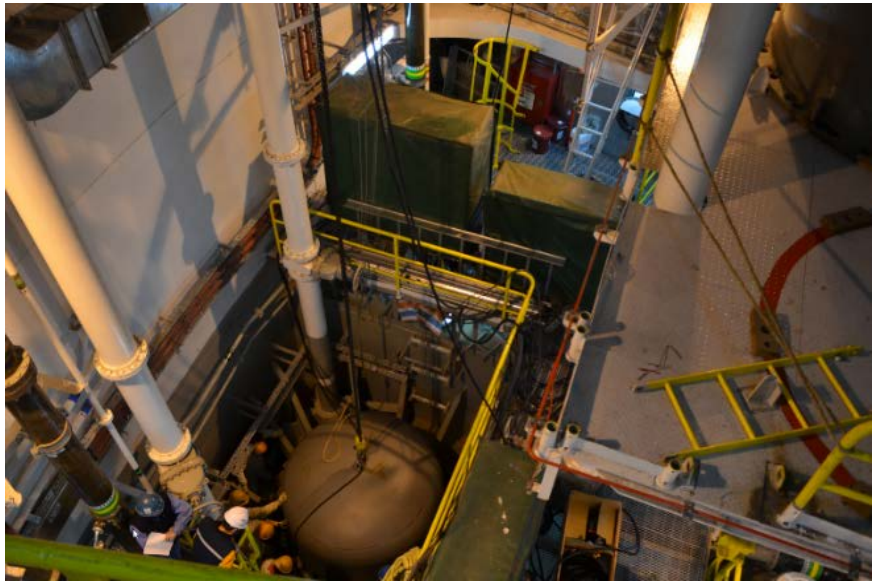
Major new development on gearless thrusters
Bearings

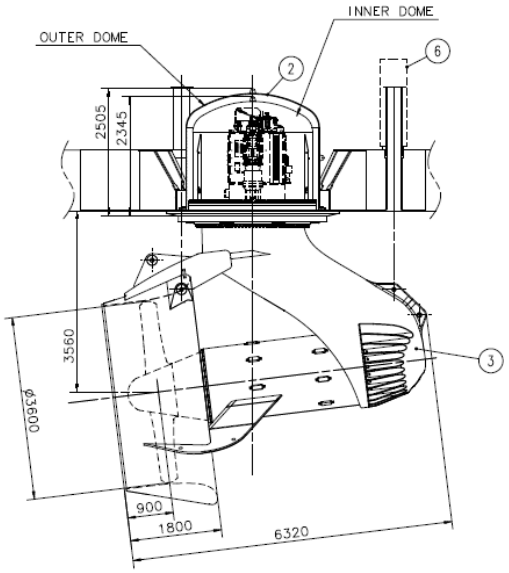
- Realibility of bearings have been excellent in Azipod C thrusters
- All bearing types and arrangements in Azipod D are same as in Azipod C
- Improvements for better condition monitoring

Azipod thruster components after long-term operation: *Kokkila, K., Varis, J. & Aho, J., "10 years overhaul interval with gearless Azipod thruster", DP conference 2014*

Domeless under-water mounting solution: **saves space and time**

Under water mounting
Traditional solution uses large domes

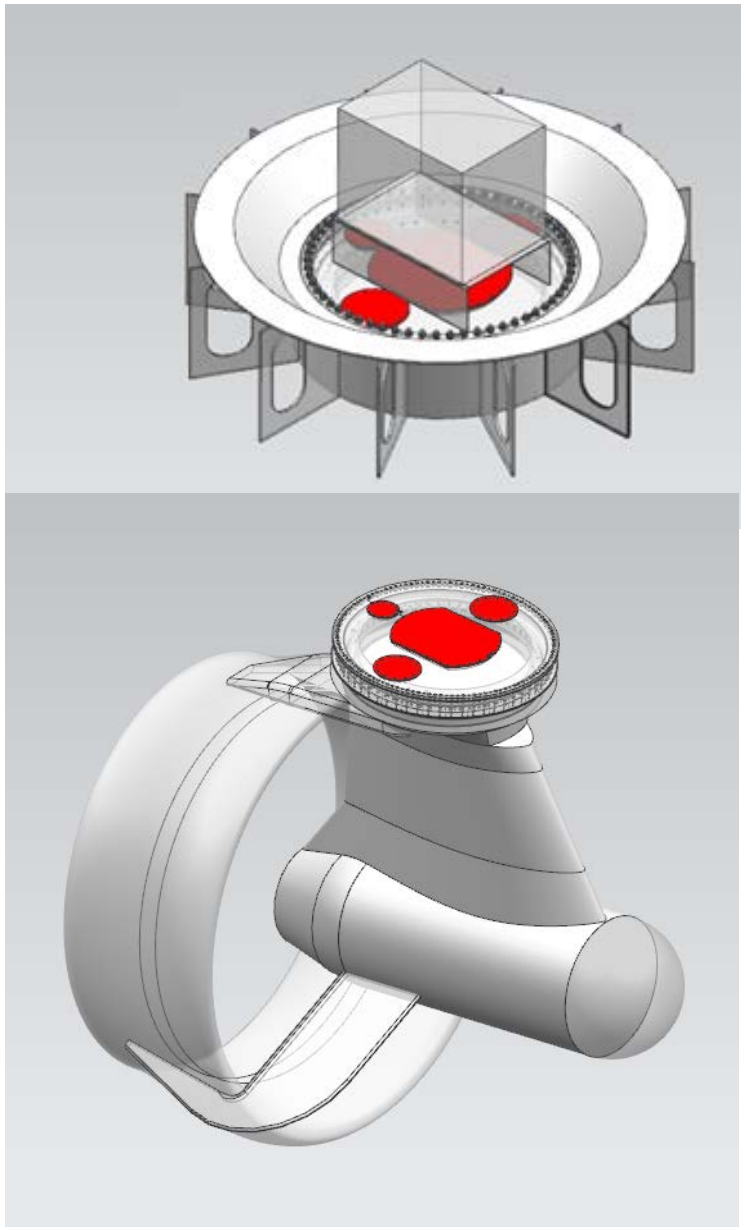


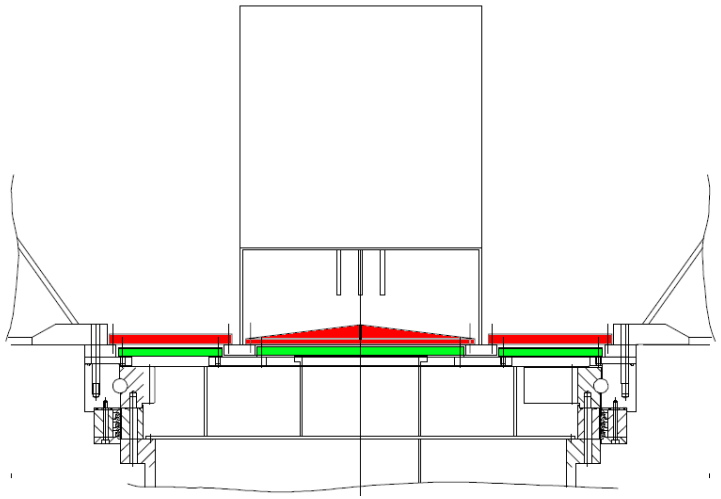


- Whole thruster (Propulsor + Steering Module) assembled as a single unit in factory

Under water mounting
Domeless UW mounting solution

- Eight small flanges instead of large domes
- Steering Module pre-installed and permanently connected to vessel systems
- Fast connections between Propulsor and Steering Module
- Only Propulsor changed UW – less lifting capacity needed!
- Faster change-out and less space needed onboard

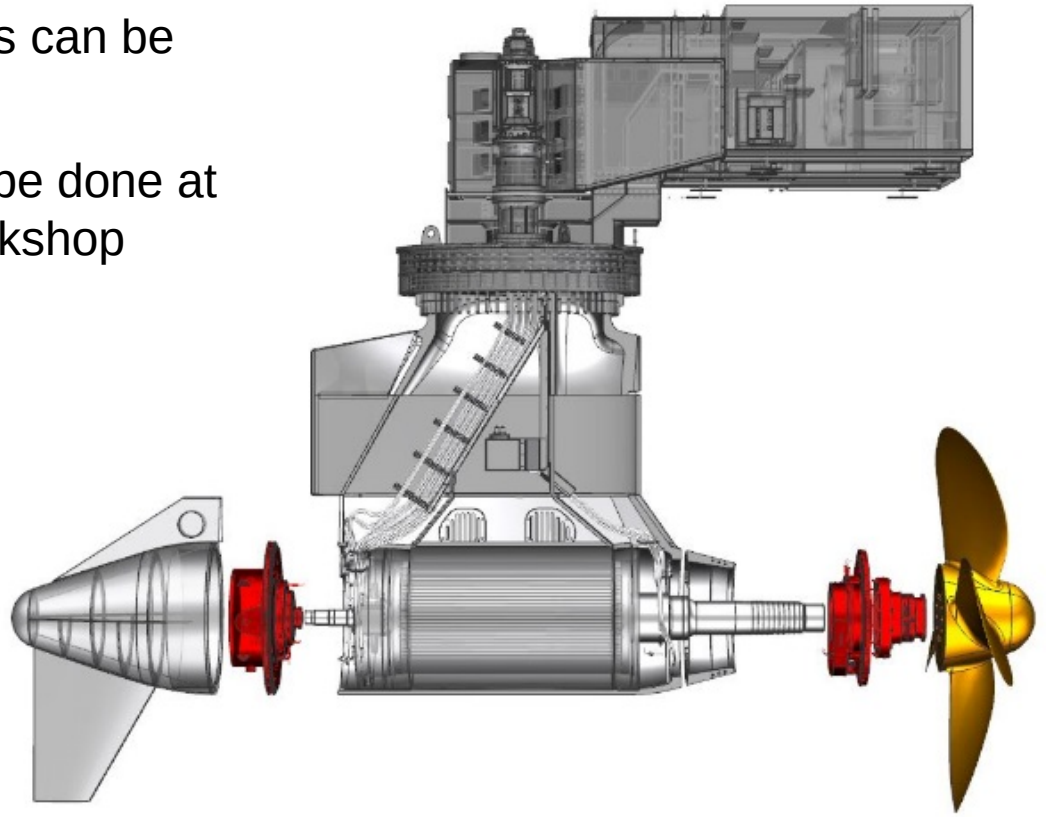




Maintainability:
easy and fast maintenance

Major new development on gearless thrusters
Maintainability

- Overhaul interval up to **10 years**
- Underwater-mountable types can be swapped **in 24 hours**
- Normal major overhaul can be done at the dry-dock or onshore workshop within **48 hours***



* ABB working time after yard preparations

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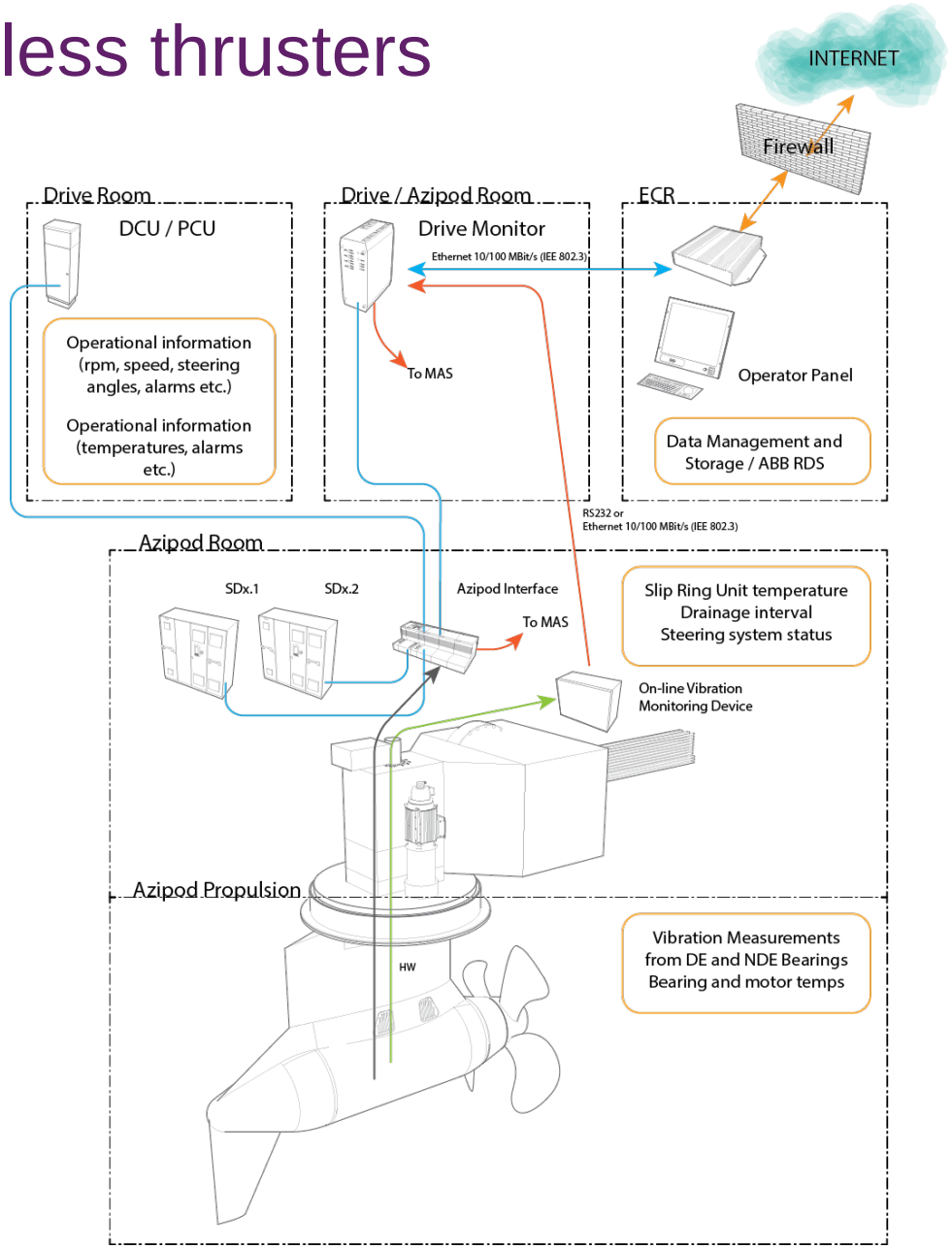
Condition monitoring system

Major new development on gearless thrusters

Condition monitoring



Verification of the Azipod D design

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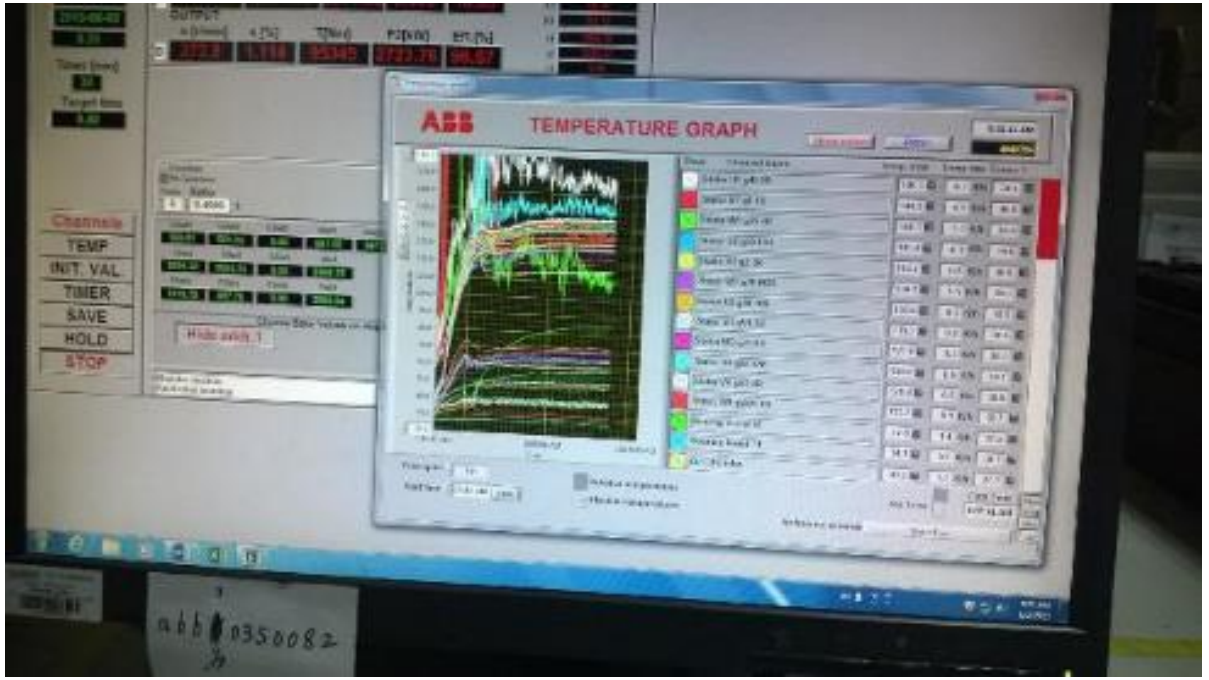
Major new development on gearless thrusters
Azipod® D Prototype test in factory – verification of the new design



Conclusion

Major new development on gearless thrusters
Conclusion

Azipod D combines **proven solutions** based on 25 years of experience

20 % more power up to **7 MW**

Easy and fast maintenance

Azipod DZ
UW-mounting

Power and productivity
for a better world™