smart fibres™

Pioneering Optical Fibre Sensing

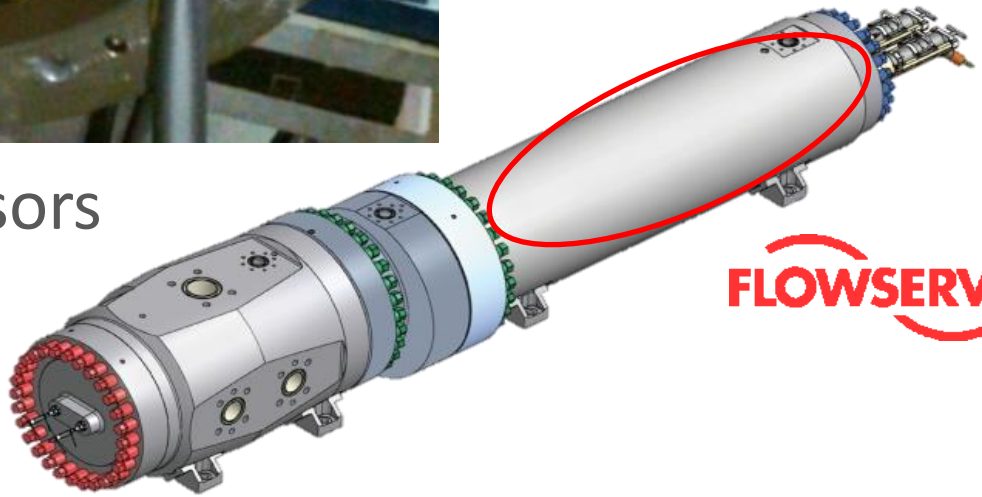
Case Study: Subsea pump Pump Condition Monitoring

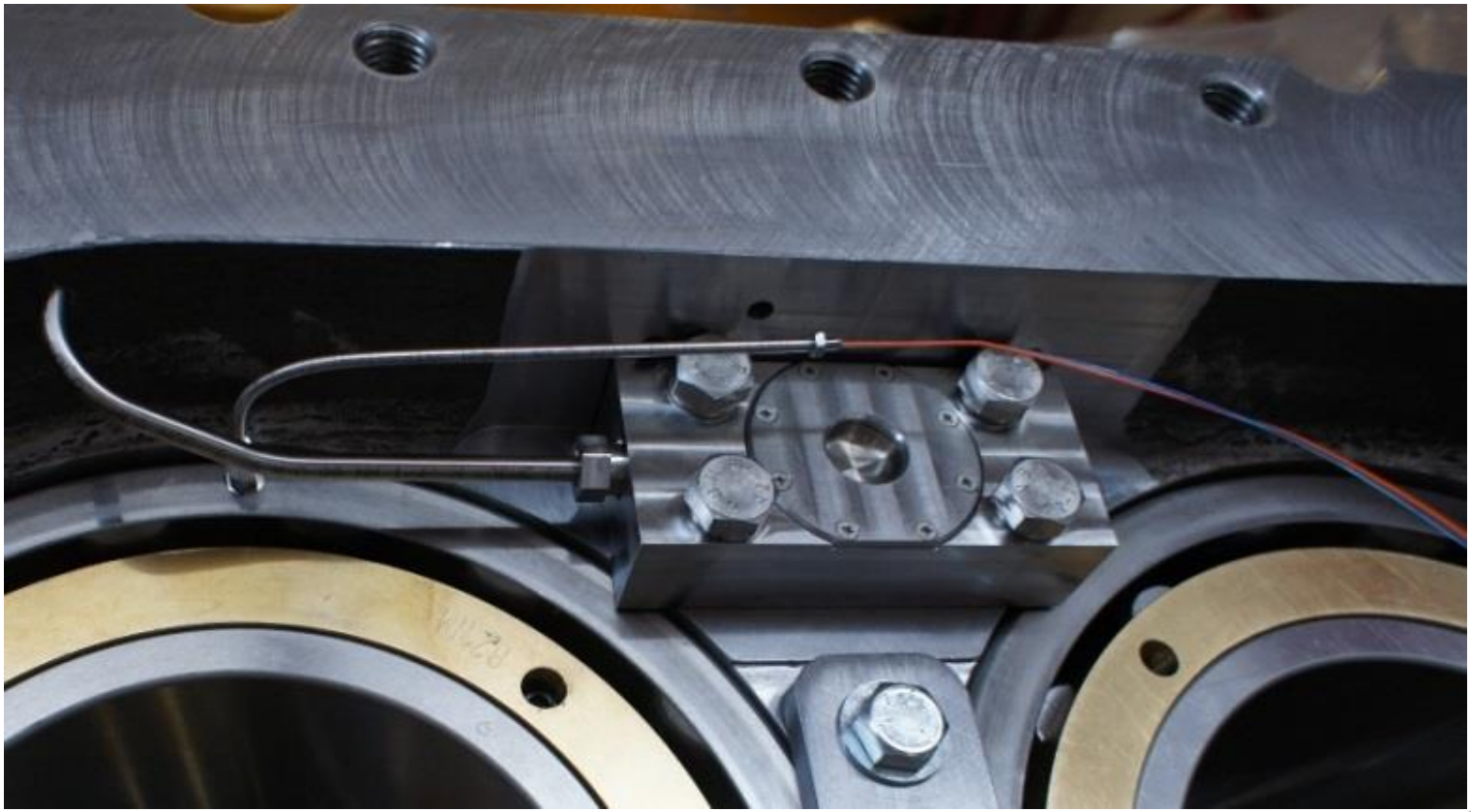
2007-2010

Partners: Smart Fibres, Flowserve, SKF, Teledyne ODI
Project Sponsor: Shell Upstream Americas – Deepwater

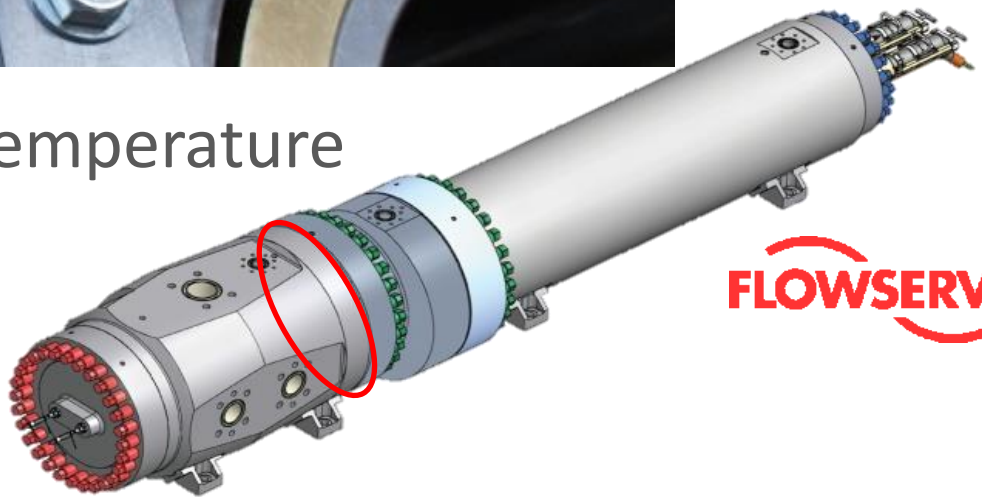
Platform: Subsea twin-screw pump and motor
Objective: Develop fibre optic condition monitoring
Why fibre: Harsh environment, no subsea electronics

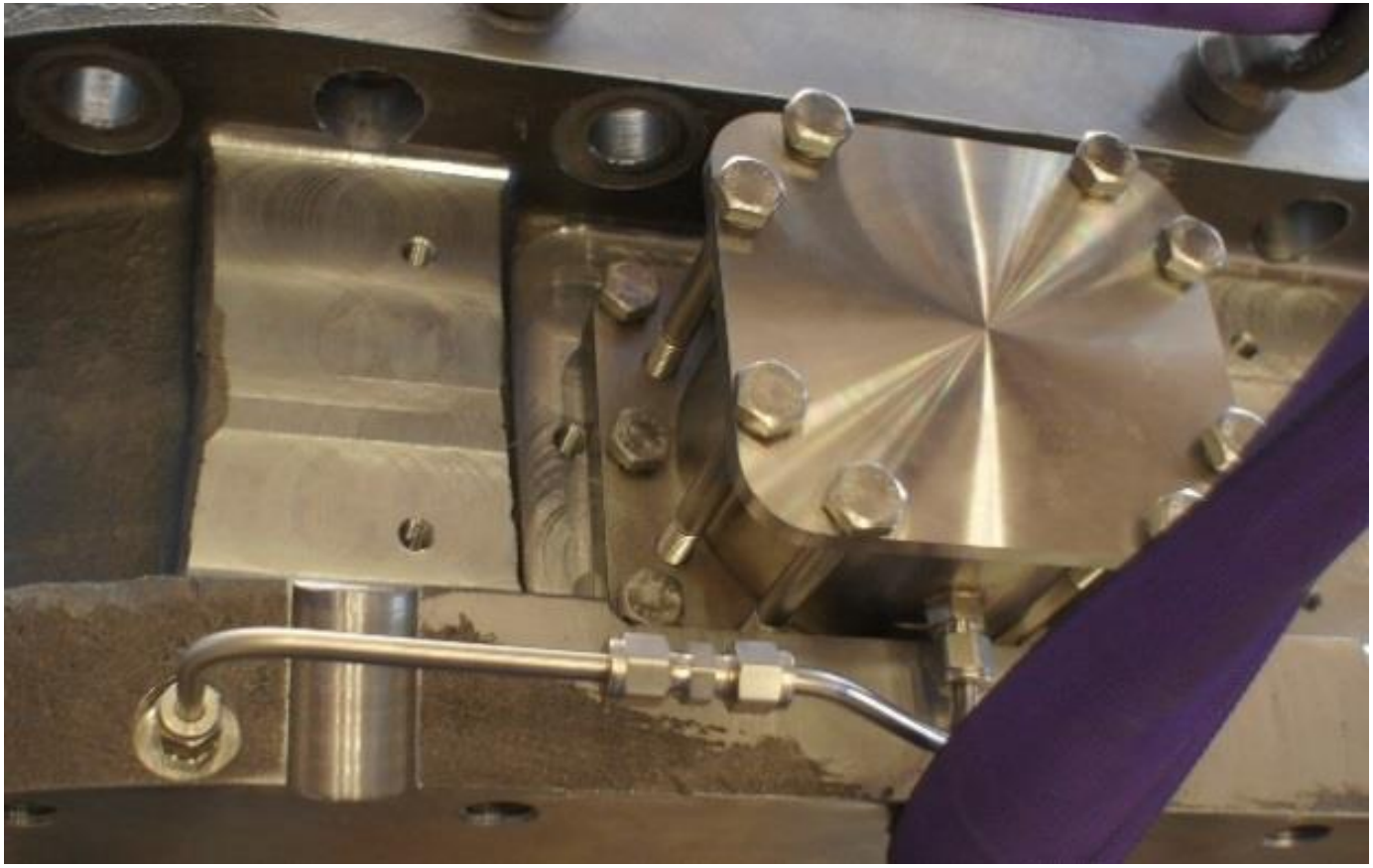
18 motor temperature sensors



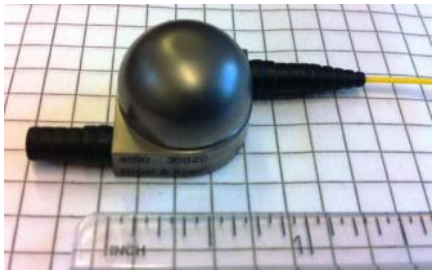


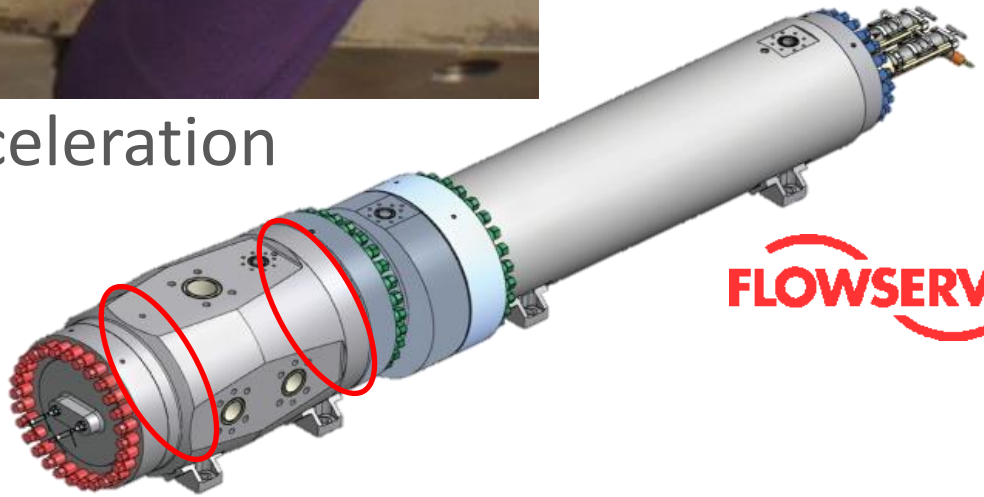
Pump lube oil pressure & temperature

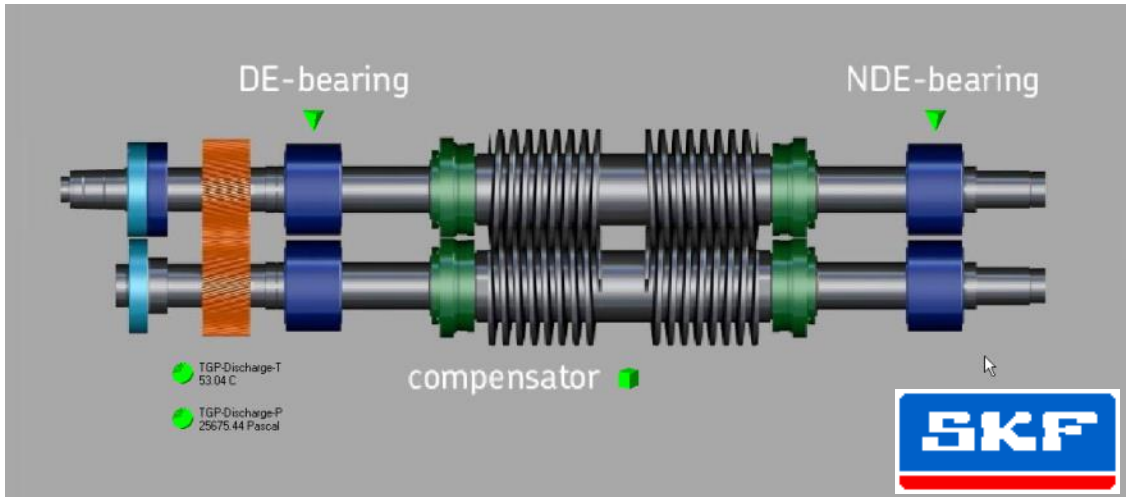


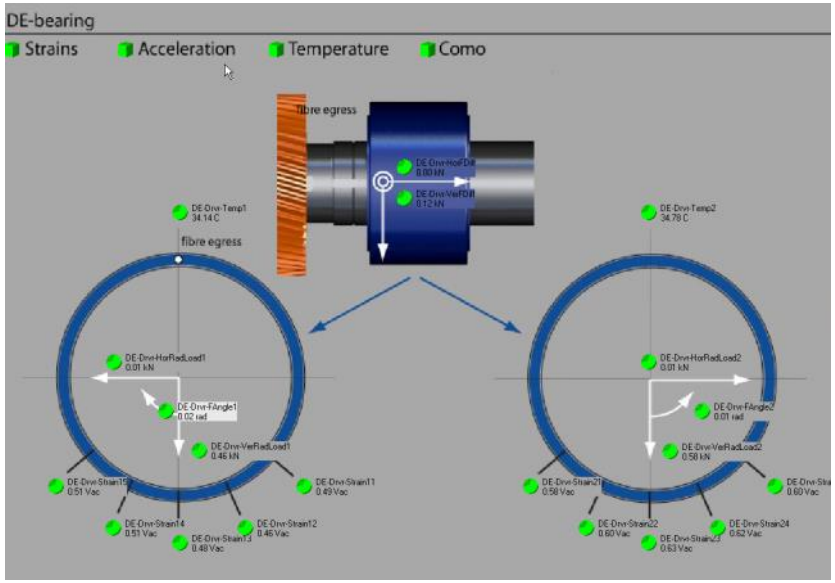


Bearing housing tri-axis acceleration

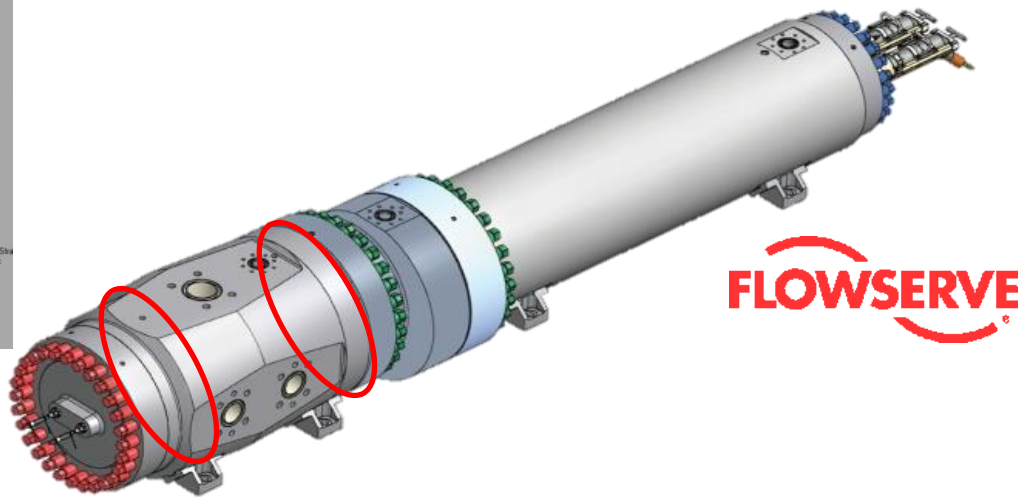


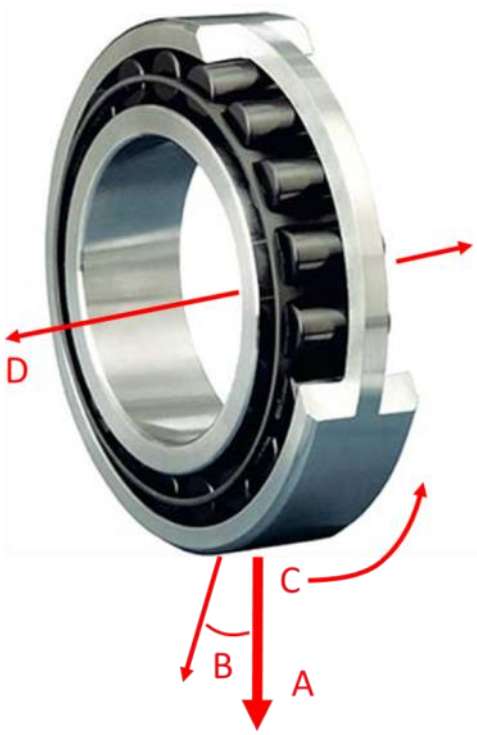


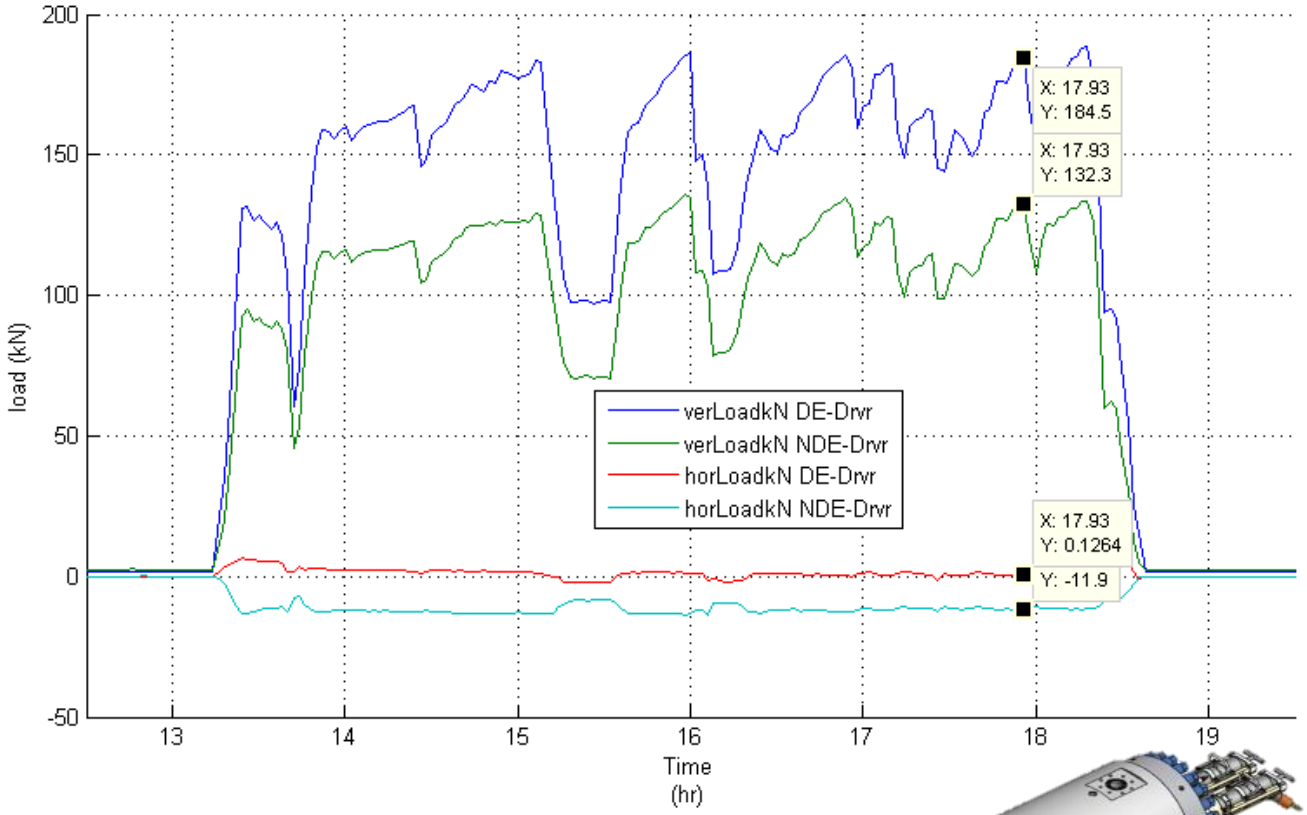




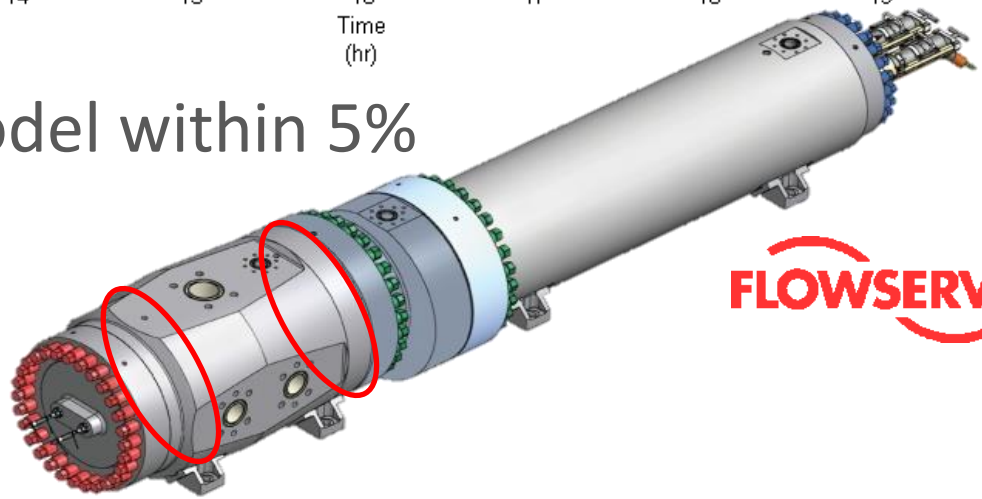
Bearing condition monitoring (with SKF)







Bearing loads match FE model within 5%



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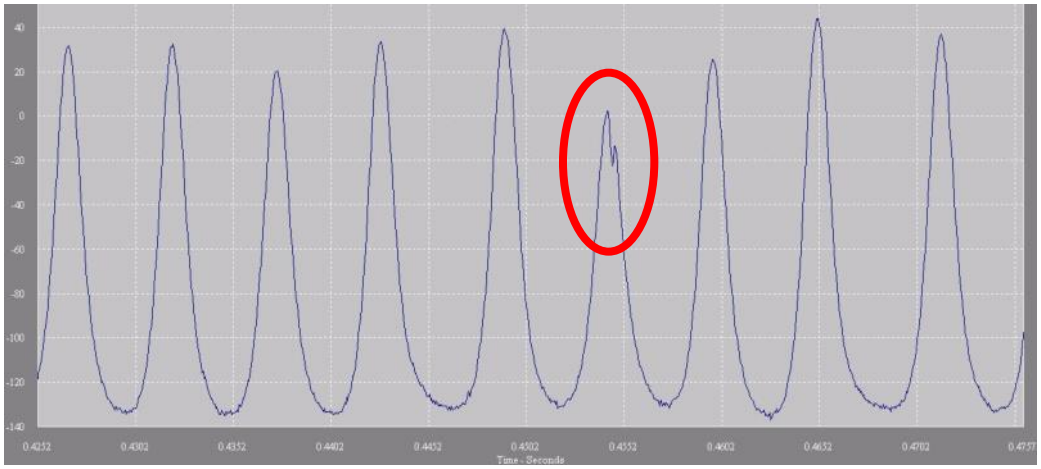
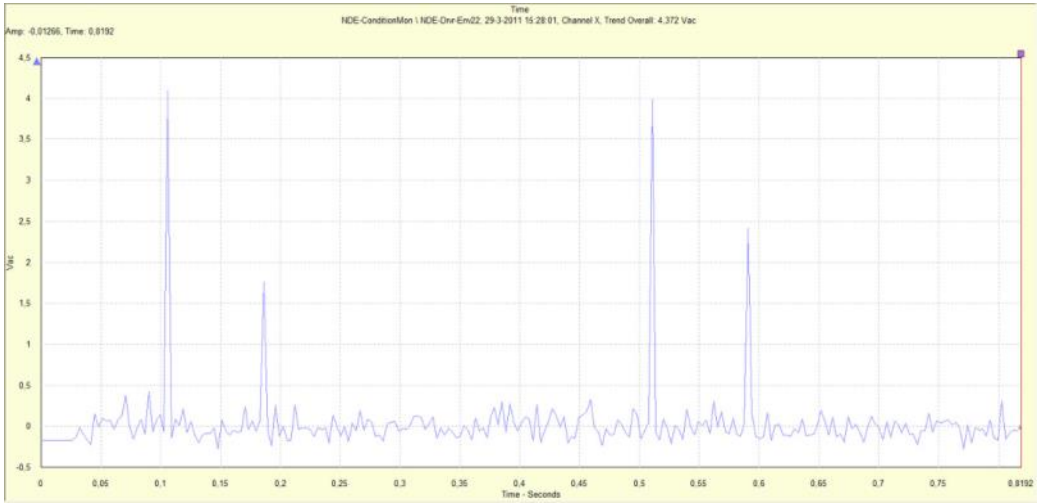
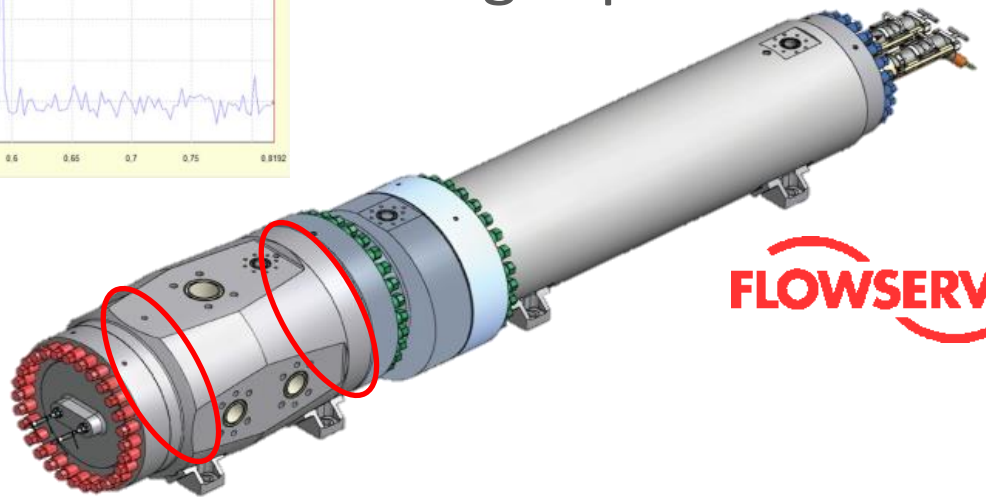


10 kHz raw data. Odd signal on one roller



Enveloping shows defect. Time period = cage speed



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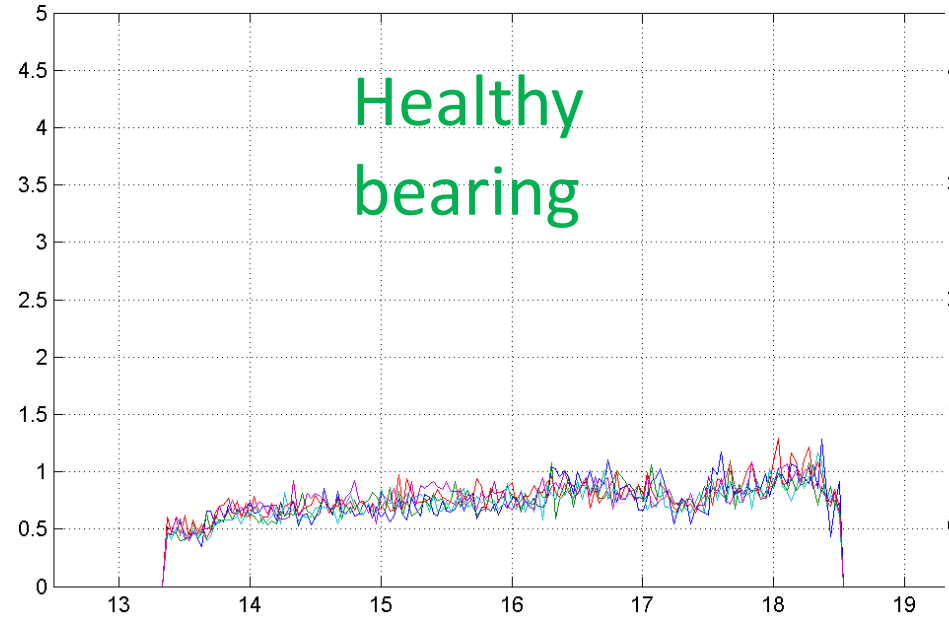
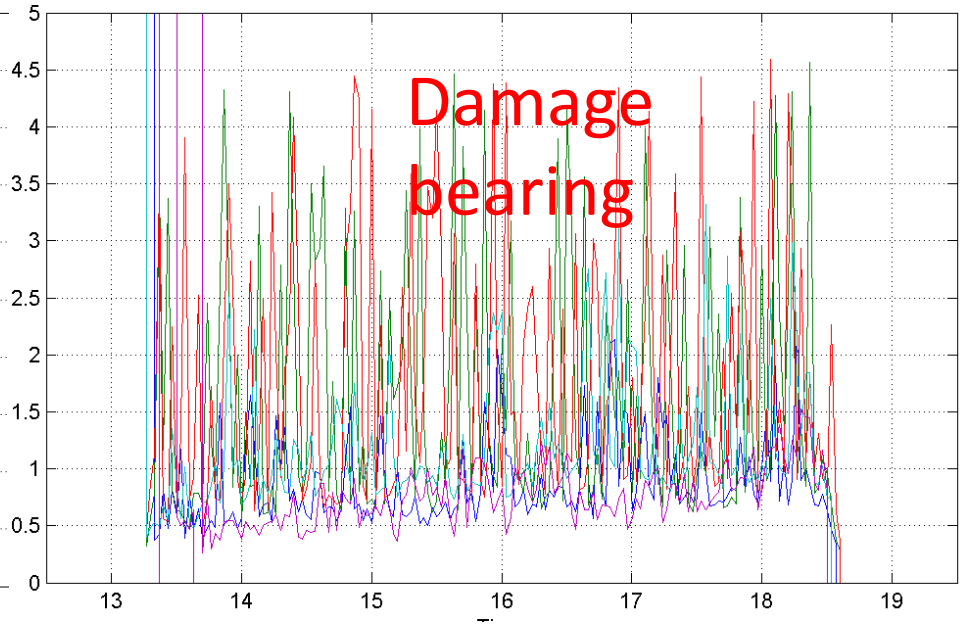
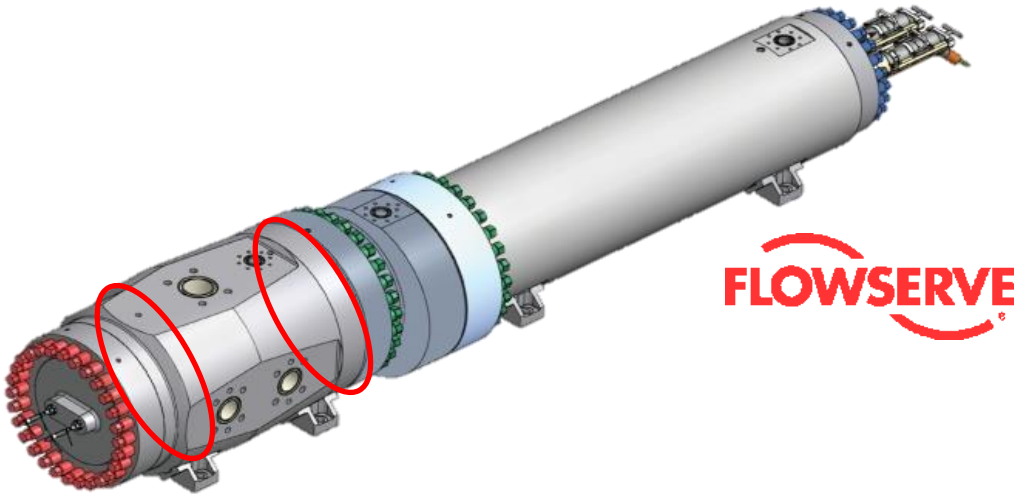
Enveloping of FFT







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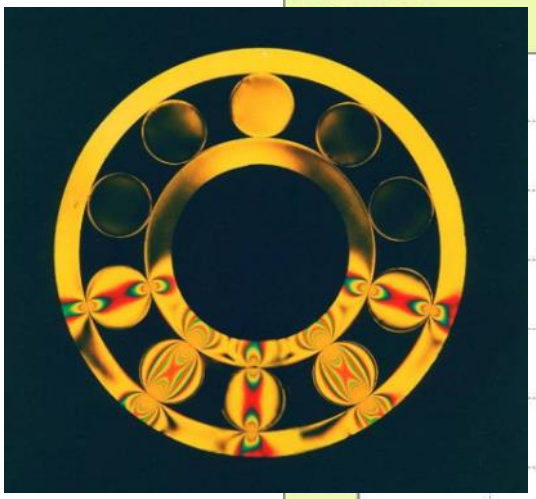
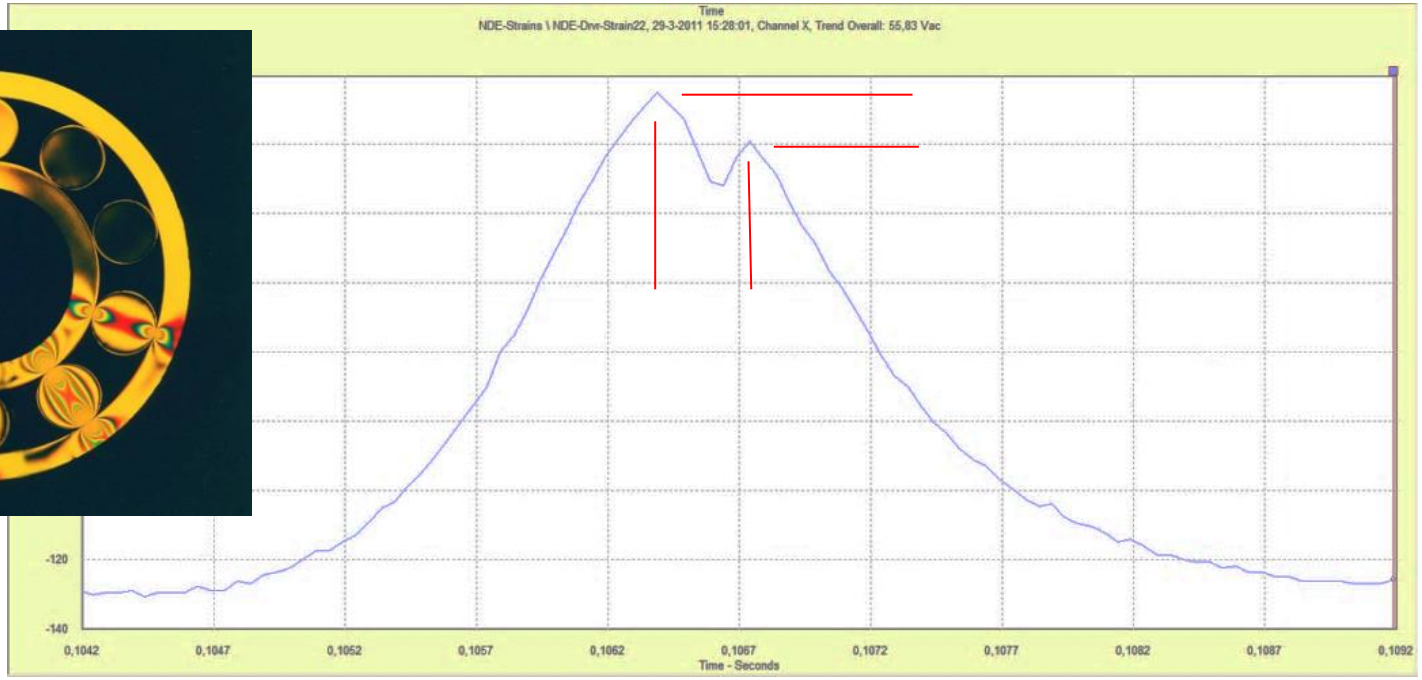
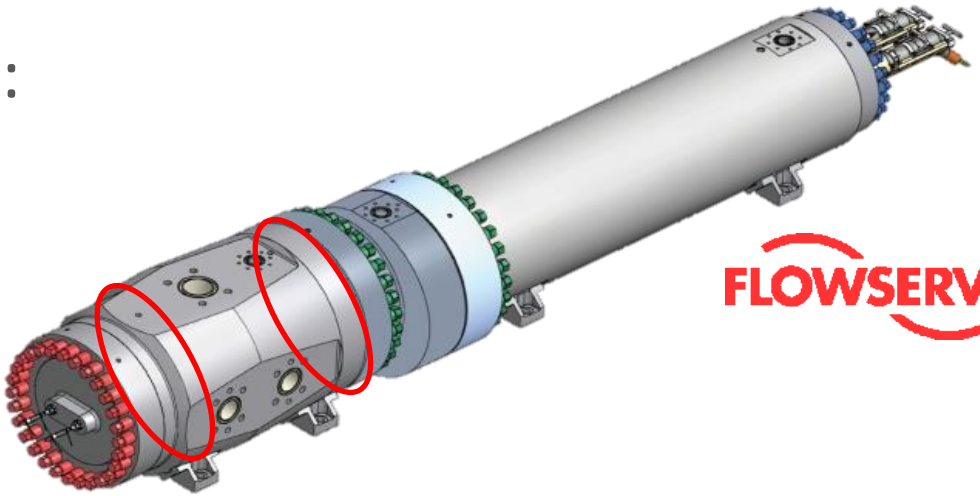
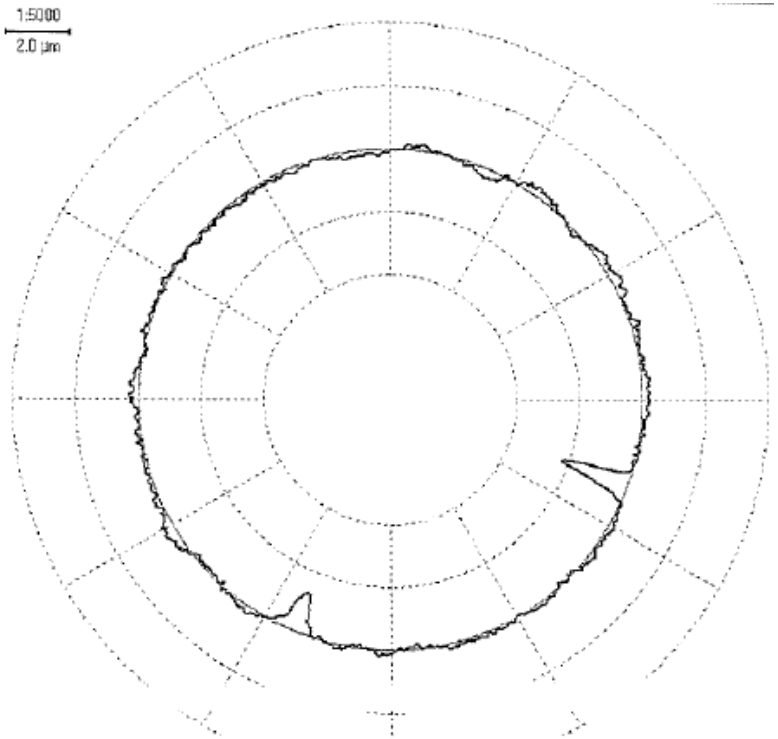




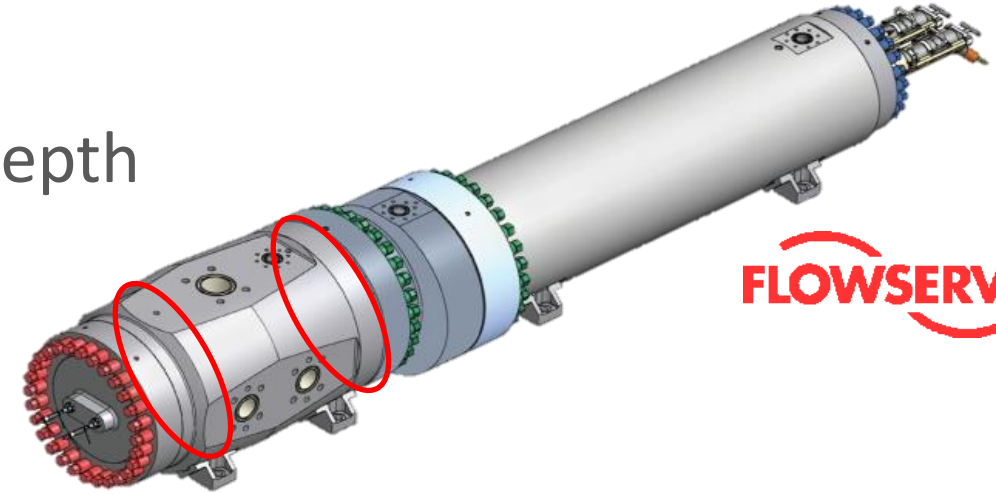
Data analysis predicted:
3.0 mm scratch length,
minimal scratch depth



SKF



Inspection found…
3mm scratch length,
and 2 micron scratch depth



SKF

visible on an instrument here

A 2 micron scratch here

on a bearing inside here

Image c/o S

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Thank You

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