

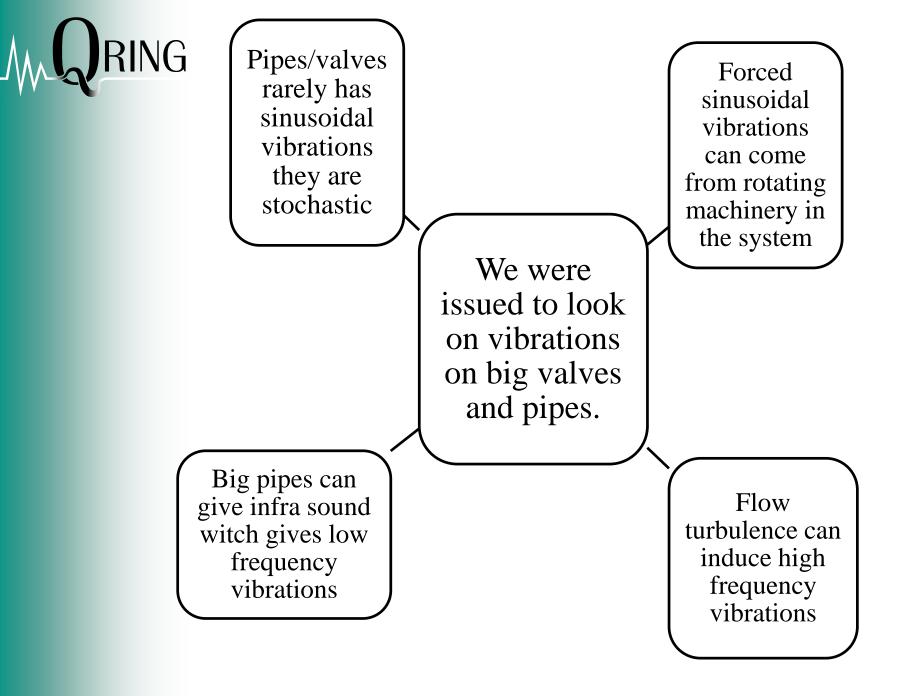
Advantages and disadvantages with different types of transducers measuring valve vibration

Elisabet Blom

www.qringtech.com

20 Aug, 2016

Qring - Ring & We Cure it

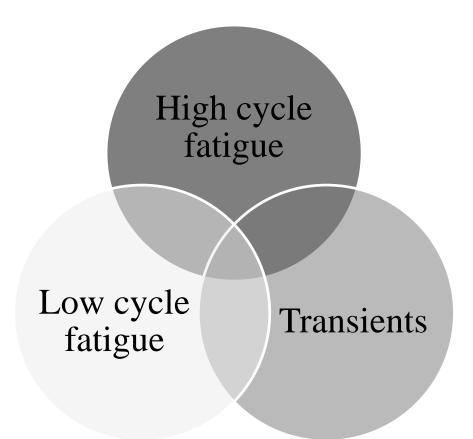




What phenomena is causing the damage?

What stress factors or stress situations cause damage?





RING

Transducer choice

- Transducer choice
 - The usual one, i.e. .
 - A planned one
 - A choise based on a discussion with other specialist.
 - A choise based on the damage seen on site



An example

Tests done on big high pressure valves The electrichydralic control valve has broken.

There have been more than one failure



Consequencies for production; several days reduced effect

One of the possible causes was vibrations. Another was pulsations



How did we face the problem?

The damage seems to be of transient behaviour



1st Step

- Fast improvisation;
 - Use equipment present on-site
 - 4x 10 mV/g PCB 356B21 Triaxial accelerometers
 - These had been used on another system the past year.
 - Mini 4-pole contacts on these accelerometers with limited life.
 - High ambient radiation
 - Allowed mounting time to be < 15 min.
 - 4x accelerometers and ~50 m cabling.
- Produced data with strange spikes in it.
 - Cabling glitches were suspected.
 - [Transducers and cabling later checked out OK on calibration table.]

RING

The Qring Way

2015-09-02_085706	2015-09-18 08:56	Filmap
2015-09-02_090208	2015-09-18 08:56	Filmag
2015-09-02_100207	2015-09-18 08:57	Filmag
2015-09-02_110208	2015-09-18 08:57	Filmap
2015-09-02_120207	2015-09-18 08:57	Filmap
2015-09-02_130207	2015-09-18 08:57	Filmap
2015-09-02_140207	2015-09-18 08:57	Filmap
2015-09-02_150208	2015-09-18 08:57	Filmap
2015-09-02_160208	2015-09-18 08:57	Filmap
2015-09-02_170207	2015-09-18 08:57	Filmap
2015-09-02_180207	2015-09-18 08:58	Filmag
2015-09-02_190208	2015-09-18 08:58	Filmag
2015-09-02_200208	2015-09-18 08:58	Filmag
2015-09-02_210207	2015-09-18 08:58	Filmap
2015-09-02_220207	2015-09-18 08:58	Filmap
2015-09-02_230208	2015-09-18 08:58	Filmap
2015-09-03_000208	2015-09-18 08:58	Filmap
2015-09-03_010207	2015-09-18 08:58	Filmap
2015-09-03_020207	2015-09-18 08:59	Filmap
2015-09-03_030208	2015-09-18 08:59	Filmap
2015-09-03_040207	2015-09-18 08:59	Filmap
2015-09-03_050207	2015-09-18 08:59	Filmap
2015-09-03_060207	2015-09-18 08:59	Filmag
2015-09-03_070208	2015-09-18 08:59	Filmap
2015-09-03_080207	2015-09-18 08:59	Filmap
2015-09-03 090207	2015-09-18 08:59	Filmap

2016-10-07

RING

The Qring Way

2015-09-02_085706	2015-09-18 08:56	Filmapp
2015-09-02_090208	2015-09-18 08:56	Filmapp
2015-09-02_100207	2015-09-18 08:57	Filmapp
2015-09-02_110208	2015-09-18 08:57	Filmapp
2015-09-02_120207	2015-09-18 08:57	Filmapp
2015-09-02_130207	2015-09-18 08:57	Filmapp
2015-09-02_140207	2015-09-18 08:57	Filmapp
2015-09-02_150208	2015-09-18 08:57	Filmapp
2015-09-02_160208	2015-09-18 08:57	Filmapp
2015-09-02_170207	2015-09-18 08:57	Filmapp
2015-09-02_180207	2015-09-18 08:58	Filmapp
2015-09-02_190208	2015-09-18 08:58	Filmapp
2015-09-02_200208	2015-09-18 08:58	Filmapp
2015-09-02_210207	2015-09-18 08:58	Filmapp
2015-09-02_220207	2015-09-18 08:58	Filmapp
2015-09-02_230208	2015-09-18 08:58	Filmapp
2015-09-03_000208	2015-09-18 08:58	Filmapp
2015-09-03_010207	2015-09-18 08:58	Filmapp
2015-09-03_020207	2015-09-18 08:59	Filmapp
2015-09-03_030208	2015-09-18 08:59	Filmapp
2015-09-03_040207	2015-09-18 08:59	Filmapp
2015-09-03_050207	2015-09-18 08:59	Filmapp
2015-09-03_060207	2015-09-18 08:59	Filmapp
2015-09-03_070208	2015-09-18 08:59	Filmapp
2015-09-03_080207	2015-09-18 08:59	Filmapp
2015-09-03 090207	2015-09-18 08:59	Filmapp

				and all the		
H_PA1_PB1_sep1 5_2015-09-06_08 0207_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_09 0207_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_10 0208_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_11 0207_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_12 0208_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_13 0207_Acceleratio n.png	H_PA1_PB1_sep 5_2015-09-06_14 0208_Acceleration n.png
H_PA1_PB1_sep1 5_2015-09-06_15 0207_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_16 0208_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_17 0207_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_18 0208_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_19 0207_Acceleratio n.png	HPA1_PB1_sep1 5_2015-09-06_20 0208_Acceleratio n.png	H_PA1_PB1_sep 5_2015-09-06_21 0207_Acceleration n.png
H_PA1_PB1_sep1 5_2015-09-06_22 0208_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-06_23 0207_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-09_08 0124_Acceleratio	H_PA1_PB1_sep1 5_2015-09-09_08 0656_Acceleratio n.png	H_PA1_PB1_sep1 5_2015-09-09_08 1159_Acceleratio	H_PA1_PB1_sep1 5_2015-09-09_08 1311_Acceleratio	H_PA1_PB1_sep 5_2015-09-09_08 1705_Acceleration n.png

2016-10-07

The Qring Way

1	2015-09-02_085706	2015-09-18 08:56	Filmapp
1	2015-09-02_090208	2015-09-18 08:56	Filmapp
l	2015-09-02_100207	2015-09-18 08:57	Filmapp
I.	2015-09-02_110208	2015-09-18 08:57	Filmapp
l	2015-09-02_120207	2015-09-18 08:57	Filmapp
l	2015-09-02_130207	2015-09-18 08:57	Filmapp
l	2015-09-02_140207	2015-09-18 08:57	Filmapp
1	2015-09-02_150208	2015-09-18 08:57	Filmapp
1	2015-09-02_160208	2015-09-18 08:57	Filmapp
1	2015-09-02_170207	2015-09-18 08:57	Filmapp
1	2015-09-02_180207	2015-09-18 08:58	Filmapp
1	2015-09-02_190208	2015-09-18 08:58	Filmapp
1	2015-09-02_200208	2015-09-18 08:58	Filmapp
1	2015-09-02_210207	2015-09-18 08:58	Filmapp
l	2015-09-02_220207	2015-09-18 08:58	Filmapp
l	2015-09-02_230208	2015-09-18 08:58	Filmapp
I	2015-09-03_000208	2015-09-18 08:58	Filmapp
1	2015-09-03_010207	2015-09-18 08:58	Filmapp
1	2015-09-03_020207	2015-09-18 08:59	Filmapp
1	2015-09-03_030208	2015-09-18 08:59	Filmapp
1	2015-09-03_040207	2015-09-18 08:59	Filmapp
1	2015-09-03_050207	2015-09-18 08:59	Filmapp
1	2015-09-03_060207	2015-09-18 08:59	Filmapp
1	2015-09-03_070208	2015-09-18 08:59	Filmapp
1	2015-09-03_080207	2015-09-18 08:59	Filmapp
1	2015-09-03 090207	2015-09-18 08:59	Filmapp

			يلب	turi dad di		
H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_s
5_2015-09-06_08	5_2015-09-06_09	5_2015-09-06_10	5_2015-09-06_11	5_2015-09-06_12	5_2015-09-06_13	5_2015-09-06
0207_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Accelera
n.png	n.png	n.png	n.png	n.png	n.png	n.png
H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_9
5_2015-09-06_15	5_2015-09-06_16	5_2015-09-06_17	5_2015-09-06_18	5_2015-09-06_19	5_2015-09-06_20	5_2015-09-06
0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceler
n.png	n.png	n.png	n.png	n.png	n.png	n.png
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_s
5_2015-09-06_22	5_2015-09-06_23	5_2015-09-09_08	5_2015-09-09_08	5_2015-09-09_08	5_2015-09-09_08	5_2015-09-09
0208_Acceleratio	0207_Acceleratio	0124_Acceleratio	0656_Acceleratio	1159_Acceleratio	1311_Acceleratio	1705_Accelera
n.png	n.png	n.png	n.png	n.png	n.png	n.png

🗋 🥶 🐇 🐂 🛱 🤊 🕫 🕌 🗊 🖹 🧶 Current Directory: CAWork 🗸 🛁 🗈

Shortcuts 🕐 How to Add 🕐 What's New				
Current Directory III 7 X Workspace		Command Window	-* ⊡ ₹ X	
🖻 🖆 👪 😼 -		New to MATLAB? Watch this <u>Video</u> , see <u>Demos</u> , or read <u>Getting Started</u> .	×	
All Files - 463pdtrans1 845pdtrans1 845pdtrans1 845pdtrans1 845pdtrans1 901_kma5pdtr P01_kma5pdtr P01_kma5pdtr P01_kma5pdtr P01_kma5pdtr 91201-1025_234125_Votage.toms 42001-1025_234125_Votage.toms	Type Folder Folder Folder Folder Folder Folder	Processing Ch: 21 MotBs:h for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 23 PPDS: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 23 PPDS: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 23 PPDS: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 25 PPDS: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 26 PPDS: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 27 PPDS: h for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 28 State:PH: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 28 State:PH: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 28 State:PH: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 28 State:PH: for Case: 415/1410, EU: g, Scf: 1, Offset: 0 or Case: 415/1410, EU: g, Scf: 1, Offset: 0 or Case: 415/1410, EU: g, Scf: 1, Offset: 0 or Case: 415/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 26 Virtual Case: 417/1410 = 416/1410, EU: Volts, Scf: 1, Offset: 0	^	
Command Hintoy → Datchplotdms → → Datchp0+19 07:51* → Datchplotdms → → 1 haplot →		Processing Ch: 3 BF105:15 for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 3 BF105:16 for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 3 BF105:16 for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 4 BF05: for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 5 BF05: for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 6 BF05: for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 7 Vakiptimit for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 9 Wakiptimit for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 9 Wakiptimit for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 9 Wakiptimit for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 10 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU: g, Scf: 1, Offset: 0 Processing Ch: 11 MotBrv for Case: 417/1410, EU:		
Start Busy			OVR	

2016-10-07

RING

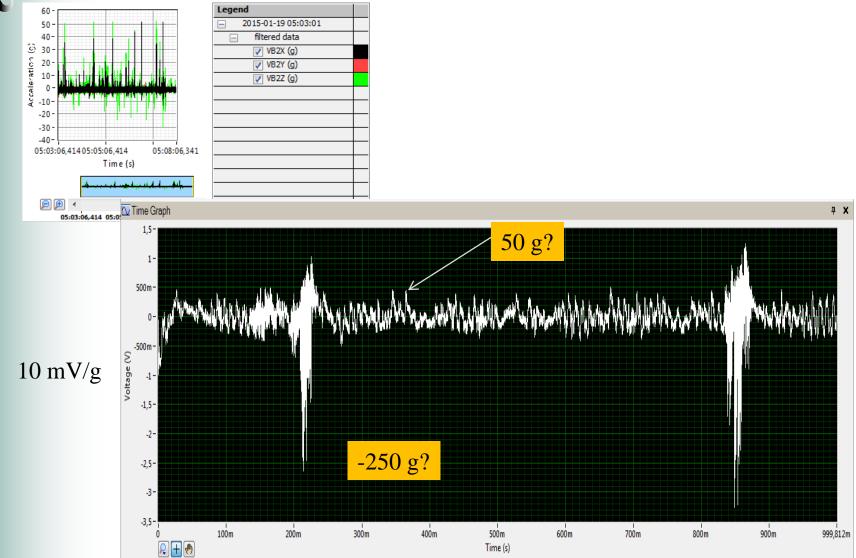
The Qring Way

			· · ·					· •	
2015-09-02_085706	2015-09-18 08:56	Filmen							
2015-09-02_085706	2015-09-18 08:56			and the second second	in the second se				The balance of the
2015-09-02_090208	2015-09-18 08:56 2015-09-18 08:57	Filmapp		A STATE OF A STATE OF A	the second second second		A state of the		and so which have
2015-09-02_100207	2015-09-18 08:57 2015-09-18 08:57	Filmapp	and a second second	and the second second	A HIMPORTONIA	1111			
2015-09-02_110208	2015-09-18 08:57	Filmapp Filmapp	T subject to	+	THE PARTY	+	·	hour	The second second
2015-09-02_120207	2015-09-18 08:57		H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1
		Filmapp	5_2015-09-06_08	5_2015-09-06_09	5_2015-09-06_10	5_2015-09-06_11	5_2015-09-06_12	5_2015-09-06_13	5_2015-09-06_14
2015-09-02_140207	2015-09-18 08:57	Filmapp	0207_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio
2015-09-02_150208	2015-09-18 08:57	Filmapp	n.png	n.png	n.png	n.png	n.png	n.png	n.png
2015-09-02_160208	2015-09-18 08:57	Filmapp							
2015-09-02_170207	2015-09-18 08:57	Filmapp		A				And A. (1997) 100 (1997)	August 1.000 (1.000)
2015-09-02_180207	2015-09-18 08:58			and a Manufacture	alexian lichte	and the second second	A A REAL PROPERTY.	An other Address of	a free and a first
2015-09-02_190208	2015-09-18 08:58	Filmapp	and and a concern		and a state of the	CARL CR. MANN		A DOLLAR DO	
2015-09-02_200208	2015-09-18 08:58		torrand .	A subdition	100 Amontal	distant line	a contraction of	and the second second	A CONTRACTOR OF
2015-09-02_210207	2015-09-18 08:58	Filmapp	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1
2015-09-02_220207	2015-09-18 08:58	Filmapp	5 2015-09-06 15	5 2015-09-06_16	5_2015-09-06_17	5_2015-09-06_18	5_2015-09-06_19	5 2015-09-06 20	5 2015-09-06 21
2015-09-02_230208	2015-09-18 08:58		0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio	0208_Acceleratio	0207_Acceleratio
2015-09-03_000208	2015-09-18 08:58	Filmapp	n.png	n.png	n.png	n.png	n.png	n.png	n.png
2015-09-03_010207	2015-09-18 08:58	Filmapp							
2015-09-03_020207	2015-09-18 08:59	Filmapp							
2015-09-03_030208	2015-09-18 08:59	Filmapp	and the second section	and indicates	A COLOR LAND	of this take when we		french block enabled	Contraction of the
2015-09-03_040207	2015-09-18 08:59	Filmapp		a second design of the			6	-	-
2015-09-03_050207	2015-09-18 08:59	Filmapp	Decision and a source of	den entre des	1400 AND AND A	a service and a service of the		as a Mandalas Parisona	(minimum and m
2015-09-03_060207	2015-09-18 08:59	Filmapp			· · · · · · · · ·	· · · · · · · ·		American	· · · · · · · ·
2015-09-03_070208	2015-09-18 08:59	Filmapp	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1	H_PA1_PB1_sep1
									5_2015-09-09_08
2015-09-03_080207 2015-09-03_090207	2015-09-18 08:59 2015-09-18 08:59		5_2015-09-06_22 0208_Acceleratio n.png	5_2015-09-06_23 0207_Accele n.png	5_2015-09-09_08 433 PD1 shir motorbyte o Currutative Histogra Citizki Meteochec	e for It	5_2015-09-09_08	5_2015-09-09_08 1311_Acceleratio n.png	1705_Acceleratio
_ 2015-09-03 090207	2015-09-18 08:59		0208_Acceleratio	0207_Accele	403 PD1 striv rodortyte o Currutetive Histogre DX49. Interactie:	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio	1705_Acceleratio n.png
2015-09-03 090207	2015-09-18 08:59 irectory: C:\Work	Filmapp	0208_Acceleratio	0207_Accele	403 PDI shir redorbite o Ourrebite Hologe Division Hologe Division Hologe	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio	1705_Acceleratio n.png
2015-09-03 090207 3	2015-09-18 08:59 irectory: C:\Work Comman	Filmapp	0208_Acceleratio	0207_Accele	4G PDI strir motolyte o Currettive Heastric Citaly Measure 000	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio	1705_Acceleratio n.png ⊂
2015-09-03 090207	2015-09-18 08:59 irectory: CAWork Comman	Filmapp	0208,Acceleratio n.png	0207_Accele	4G PDI strir motolyte o Currettive Heastric Citaly Measure 000	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio	1705_Acceleratio n.png
2015-09-03 090/207 ★ ★ ★ ★ ♥ ♥ ↓ ★ ௺ € ♥ Current Ditutes E How to Add Z What's New ■ Ditutes We with the to be to any ■ Ditutes We with the to be to any ■ Ditutes We with the to be to any	2015-09-18 08:59 irectory: CAWork Comman Type Folder of Process Process	Filmapp Window MATAB?Watch this <u>Yides</u> , see <u>Demos</u> , or read <u>facting Stated</u> sing Ch: 21 MotBS in for Case: 415/1410, EU: g, 2 ing Ch: 21 BPDSv for CCase: 415/1410, EU: g, 2	0208.Acceleratio n.png Sof: 1, Offmet: 0 Sof: 1, Offmet: 0	0207_Accele	403 PD1 emir resortigite o Currentier entergie Units i entergie Units i entergie	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio n.png	1705_Acceleratio n.png
2015-09-03 090207 2015-09-03 2015-09-0	2015-09-18 08:59 irectory: CAWork Commans Folder Folder Folder Folder Folder Folder	Filmapp MITABP Watch this Yiden, see <u>Demos.</u> or read <u>Getting Stated</u> MITABP With this Yiden, see <u>Demos.</u> or read <u>Getting Stated</u> sing Ch: 21 BPDSit p Cc Case: 415/1410, EU; g, 1 sing Ch: 22 BPDSit a Cc Case: 415/1410, EU; g, 2 sing Ch: 22 BPDSit a Cc Case: 415/1410, EU; g, 2	0208_Acceleratio n.png Scf: 1, Offset: 0 Scf: 1, Offset: 0 Scf: 1, Offset: 0	0207_Accele	43 P01 enrouedation Commeter elementation C C 43, Menoritation 2000 2000	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio	1705_Acceleratio
2015-09-03 090207 2 2015-09-03 090207 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2015-09-18 08:59 irectory: C/Work Type Folder Folder Folder Folder Folder	Filmapp Window MATAB?Watch this <u>Yides</u> , see <u>Demos</u> , or read <u>facting Stated</u> sing Ch: 21 MotBS in for Case: 415/1410, EU: g, 2 ing Ch: 21 BPDSv for CCase: 415/1410, EU: g, 2	0208.Acceleratio n.png Scf: 1, Offmet: 0 Scf: 1, Offmet: 0 Scf: 1, Offmet: 0 Scf: 1, Offmet: 0	0207_Accele n.png 	43 P01 enrouedation Commeter elementation C C 43, Menoritation 2000 2000	adder 2015 v for it Depo ter 22 Out 23 Part	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio n.png	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015 02 00 01 02 01 0	2015-09-18 08:59 weetary: C/Work Type Folder Fol	Filmapp Window MATABYWAthth Yides, septems, or read Setting Stated. Ising Ch: 21 MotBS:h for Case: 415/1410, EU: g, : sing Ch: 23 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 23 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 25 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 B	0208.Acceleratio n.png Scf: 1, Offset: 0 Scf: 1, Offset: 0	0207_Accele	43 P01 enrouedation Commeter elementation C C 43, Menoritation 2000 2000	2015 1111 2015	(2 Peet Emits) ind SYST 12 5 SYST 12 5 S	1311_Acceleratio	1705_Acceleratio
2015-09-03 090207 2015-09-03 09020 2015-09-03 09020 2015-09-03 09020 2015-09-03	2015-09-18 08:59 irectory: C/Work Type Folder Fo	Filmapp MATLAB? Watco. see <u>Demos. or read Getting Stated</u> ing Ch: 21 NotBS:h for Case: 415/1410, EU: g, ing Ch: 22 BPDS:r for Case: 415/1410, EU: g, ing Ch: 23 BPDS:r for Case: 415/1410, EU: g, ing Ch: 24 BPDS:h for Case: 415/1410, EU: g, ing Ch: 25 BPDS:r for Case: 415/1410, EU: g, ing Ch: 25 BPDS:r for Case: 415/1410, EU: g, ing Ch: 26 BPDS:r for Case: 415/1410, EU: g, ing Ch: 26 BPDS:h for Case: 415/1410, EU: g, ing Ch: 26 BPDS:h for Case: 415/1410, EU: g, ing Ch: 27 BPDS:h for Case: 415/1410, EU: g, ing Ch	0208 Acceleratio n.png Sof: 1, Offset: 0 Sof: 3, Offset: 0 Sof: 1, Offset: 0	0207_Accele	43 P01 enrouedation Commeter elementation C C 43, Menoritation 2000 2000	2015 1111 2015	(2 Peet Emits) ind SYST 12 5 SYST 12 5 S	1311_Acceleratio	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 20 What D ≥	2015-09-18 08:59 irectory: C/Work Folder Fo	Filmapp Window MATABYWAthth Yides, septems, or read Setting Stated. Ising Ch: 21 MotBS:h for Case: 415/1410, EU: g, : sing Ch: 23 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 23 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 25 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, : sing Ch: 26 B	0208,Acceleratio n.png Sof: 1, Offset: 0 Sof: 3, Offset: 0 Sof: 3, Offset: 0	0207_Accele		2015 1111 2015	(2 Peet Emits) ind SYST 12 5 SYST 12 5 S	1311_Acceleratio n.png 483.P01 etai mes 102	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2016 2017 2017 2017 2017 2017 2017 2017 2017	2015-09-18 08:59 irectory: C/Work Folder Fo	Window MMTABYWAththis Video. see Demos. or read Getting Stated. ang Ch: 21 NotBS:h for Case: 415/1410, EU: g, 1 ang Ch: 22 BPDS:a for Case: 415/1410, EU: g, 1 ang Ch: 24 BPDS:h for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 25 BPDB:a for Case: 415/1410, EU: g, 1 ang Ch: 28 EstactelB:read for Case: 415/141	0208,Acceleratio n.png Sof: 1, Offset: 0 Sof: 3, Offset: 0 Sof: 3, Offset: 0 U: g, Sof: 1, Offset: 0 U: g, Sof: 1, Offset: 0	0207_Accele	43 POI Infrared State	2015 1111 2015	d Peak Errents tool: 2015 Dirt 11:25 Nord	1311_Acceleratio n.png 483.P01 etai mes 102	1705_Acceleratio n.png
2015-09-03 090207 2015-09-03 090207 2015 20 100 10 20 20 20 20 20 20 2015 20 20 20 20 20 20 2015 20 20 20 2015 20 20 2015 20 20 2015 20 20 2015 20	2015-09-18 08:59 irectory: C/Wark Type Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder	Filmapp Window WMIABP Workship System see Demos. or read Gating Stated sing Ch: 11 NotBS:h for Case: 415/1410, EU; g, i sing Ch: 22 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 23 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 25 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BPDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BFDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BFDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BFDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BFDS:r for Case: 415/1410, EU; g, i sing Ch: 26 BFDS:r for Case: 415/1410, EU; g, case: 415/1410,	0208.Acceleratio n.png Scf: 1, Offset: 0 Scf: 1, Offset: 0 U: g, Scf: 1, Offset: 0 U: g, Scf: 1, Offset: 0	0207_Accele		2015 1111 2015	(2 Part Emris) inter STOT 122 - 22 250 - - 22 25	1311_Acceleratio n.png	1705_Acceleratio n.png
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2016 2017 2017 2017 2017 2017 2017 2017 2017	2015-09-18 08:59 irectory: C/Wark Type Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder Folder	Window MMTABYWaththi Yidea see Demos. or read Setting Santal MWindow MMTABYWaththi Yidea see Demos. or read Setting Santal ming Ch: 21 NotBS:h for Case: 415/1410, EU; g; ming Ch: 22 BPDS:a for Case: 415/1410, EU; g; ming Ch: 24 BPDS:a for Case: 415/1410, EU; g; ming Ch: 25 BPIDS:a for Case: 415/1410, EU; g; ming Ch: 25 BPIDS:a for Case: 415/1410, EU; g; ming Ch: 26 BPIDS:a for Case: 415/1410, EU; g; ming Ch: 26 BPIDS:a for Case: 415/1410, EU; g; ming Ch: 27 BPIDS:b for Case: 415/1410, EU; g; ming Ch: 28 BEabcellP:caf for Case: 415/1410, EU; g; ming Ch: 28	0208,Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0 Sof: 1, Offset: 0 Sof: 1, Offset: 0 Sof: 3, Offset: 0 Sof: 3, Offset: 0 Sof: 4, Offset: 0 Sof: 1, Offset: 0 U: g, Sof: 1, Offset: 0	0207_Accele		2015 1111 2015	(2 Part Emris) inter STOT 122 - 22 250 - - 22 25	1311_Acceleratio n.png 483.P01 etai mes 102	1705_Acceleratio n.png
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-09-04 2015 2015-09-09-04 2015	2015-09-18 08:59 irectory C/Work irectory C/Work Comman Folder	Window MATABYWAththi Yidea, see Demos, or read Setting Stated Mindow MATABYWAththi Yidea, see Demos, or read Setting Stated ming Ch: 21 NotBS:h for Case: 415/1410, EU: g, 1 ming Ch: 22 BPDS:r for Case: 415/1410, EU: g, 2 ming Ch: 24 BPDS:h for Case: 415/1410, EU: g, 2 ming Ch: 25 BPDS:r for Case: 415/1410, EU: g, 2 ming Ch: 26 BPIDS: for Case: 415/1410, EU: g, 2 ming Ch: 27 BPIDS:h for Case: 415/1410, EU: g, 2 ming Ch: 27 BPIDS:h for Case: 415/1410, EU: g, 2 ming Ch: 28 BPIDS:r for Case: 415/1410, EU: g, 2 ming Ch: 28 BPIDS:r for Case: 415/1410, EU: g, 2 ming Ch: 28 BratecuEP:rafor Case: 415/1410, EU: g, 2 m	0208,Acceleratio n.png Sof: 1, Offmet: 0 Sof: 3, Offmet: 0 Sof: 3, Offmet: 0 U: q, Sof: 1, Offmet: 0 U: q, Sof: 1, Offmet: 0 U: q, Sof: 1, Offmet: 0 Sof: 3, Offmet: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	Base 2015 1 Base 2015 10	(1 Parts Elevers) Internet (1 Parts (1	1311_Acceleratio n.png	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015 09 00 00 00 00 2010 00 00 00 00 2010 00 00 00 2010 00 00 2010 2010 00 2010 2010 2010 2010 2010	2015-09-18 08:59 intercept C/Wark Type Folder Fo	Filmapp Window MATARP Work this Yides, see Demos, or read Gating Stated MataRP Work this Yides, see Demos, or read Gating Stated ming Ch: 21 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 25 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 25 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 26 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 26 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 26 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 26 BPDS: 4 for Case: 415/1410, EU; g, 1 ming Ch: 26 BFDS: 4 for Case: 415/1410, EU; g, 2 ming Ch: 26 BFDS: 4 for Case: 415/1410, EU; g, 2 ming Ch: 26 BFDS: 4 for Case: 415/1410, EU; g, 2 ming Ch: 26 BFDS: 4 for Case: 415/1410, EU; g, 2 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 4 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 4 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 4 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 4 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 5 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 4 for Case: 417/1410, EU; g, 6 ming Ch: 26 BFDS: 417/14	0208_Acceleratio n.png Scf: 1, Offset: 0 Scf: 1, Offset: 0 U: q, Scf: 1, Offset: 0 U: q, Scf: 1, Offset: 0 U: q, Scf: 1, Offset: 0 Scf: 1, Offset: 0 Scf: 1, Offset: 0 Scf: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 2015-03 2	2015-09-18 08:59 intertary C/Work intert	Window WMTABYWAththy Yukes, see Demos, or read Setting Status MMTABYWAththy Yukes, see Demos, or read Setting Status ining Ch: 21 NotBS:h for Case: 415/1410, EU: g, 2 ining Ch: 22 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 ining Ch: 28 BPDSix for Case: 417/1410, EU: g, 3 ining Ch: 28 BPDSix for Case: 417/1410, EU: g, 3 ining Ch: 28 BPDSix for Case: 417/1410, EU: g, 3 ining Ch: 28 BPDSix for Case: 417/1410, EU: g, 3 ining Ch: 28 BPDSix for Case: 417/1410, EU: g, 3 ining Ch: 28 BPDS	0208,Acceleratio n.png Scf: 1, Offmet: 0 Scf: 1, Offmet: 0 U: g, Scf: 1, Offmet: 0 U: g, Scf: 1, Offmet: 0 Scf: 1, Offmet: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	Base 2015 1 Base 2015 10	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015 20 100 10 20 20 20 20 20 20 2015 20 20 20 20 20 20 2015 20 20 20 2015 20 20 2015 20 20 2015 20 20 2015 20	2015-09-18 08:59 interiory C/Work interi	Window MUTABWAththis Yideo. see Demos. or read Gatting Status MUTABWAththis Yideo. see Demos. or read Gatting Status sing Ch: 21 NotBS:h for Case: 415/1410, EU: g, 2 sing Ch: 22 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 24 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 25 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 415/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 28 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for Case: 417/1410, EU: g, 2 sing Ch: 48 BPDSix for	0208,Acceleratio n.png Sof: 1, Offmet: 0 Sof: 1, Offmet: 0 U: g, Sof: 1, Offmet: 0 U: g, Sof: 1, Offmet: 0 Sof: 1, Offmet: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 (63.901 starress 100 100 100 100 100 100 100 100 100 1	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 2015-	VII5-09-18 08:59 irectory: C/Wark Type Folder Fold	Window Wi	0208.Acceleratio n.png Scf: 1, Offset: 0 Scf: 1, Offset: 0 U: g, Scf: 1, Offset: 0 U: g, Scf: 1, Offset: 0 U: g, Scf: 1, Offset: 0 Scf: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2016 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2015-09-18 08:59 irectory: C/Work irectory: C/Work Community Com	Filmapp MILBOY Constraints of the sector of	0208,Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0 D: 0, Sof: 1, Offset: 0 D: 0, Sof: 1, Offset: 0 Sof: 1, Offset: 0 C: 1, Offset: 0 C: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 2015-	erectory C/Work rectory C/Work rectory C/Work rolder Folder Fo	Window Wi	0208,Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 Sof: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015	2015-09-18 08:59 interfory C/Work interfory C/Work interfory C/Work interfory C/Work interfory C/Work interfory Communication interformer Communicatio interformer Communicati	Window MATLABY Watch his Video, see Demos, or read Getting Shated Mindow MATLABY Watch his Video, see Demos, or read Getting Shated ming Ch: 21 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 22 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 24 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 25 BPDS: a for Case: 415/1410, EU: g, 1 ming Ch: 25 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 25 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 25 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 26 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 27 BPDS: h for Case: 415/1410, EU: g, 1 ming Ch: 28 ExtactelP:read for Case: 415/1410, EU: g, 1 ming Ch: 28 ExtactelP:read for Case: 415/1410, EU: g, 1 ming Ch: 28 DFDS: h for Case: 417/1410, EU: g, 2 ming Ch: 28 DFDS: h for Case: 417/	0208,Acceleratio n.png Scf: 1, Offset: 0 Scf: 1, Offset: 0 U: q, Scf: 1, Offset: 0 U: q, Scf: 1, Offset: 0 U: q, Scf: 1, Offset: 0 Scf: 1, Offset: 0 Q, Scf: 1, Offse	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2015-09-18 08:59 irectory: C/Work Interference Folder Fo	Window MMTABWWatchthu Yuden, see Demas, or read Gatting Statute Ming Ch: 21 MotBS:h for Case: 415/1410, EU: g, sing Ch: 21 BPDS:a for Case: 415/1410, EU: g, sing Ch: 22 BPDS:a for Case: 415/1410, EU: g, sing Ch: 24 BPDS:h for Case: 415/1410, EU: g, sing Ch: 25 BPDS:h for Case: 415/1410, EU: g, sing Ch: 25 BPDS:h for Case: 415/1410, EU: g, sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, sing Ch: 26 BPDS:h for Case: 415/1410, EU: g, sing Ch: 27 BPDS:h for Case: 417/1410, EU: g, sing Ch: 27 BPDS:h for Case: 417/1410, EU: g, sing Ch: 27 BPDS:h for Case: 417/1410, EU: g, sing Ch: 27 BPDS:h for Case: 417/1410, EU: g, sing Ch: 27 BPDS:h for Case: 417/1410, EU: g, sing Ch: 27 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 9 VAX:prim: for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/1410, EU: g, sing Ch: 10 BVDFPU for Case: 417/410, EU: g, sing Ch: 10 BVDFPU for Case:	0208_Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2016 0 to Add 2 What's New ent Directory * * * * * * *	2015-09-18 08:59 eectary: C/Work Folder Fol	Window WMTABY Wath this Yidea see Demos, or read Gating Santad Window MMTABY Wath this Yidea see Demos, or read Gating Santad ming Ch: 21 BPDS:x for Case: 415/1410, EU: g; 1 ming Ch: 22 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 22 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 25 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 25 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 26 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 27 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 26 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 27 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 27 BPDS:x for Case: 415/1410, EU: g; 2 ming Ch: 28 BPDS:x for Case: 417/1410, EU: g; 2 ming Ch: 28 BPDS:x for Case: 417/1410, EU: g; 2 ming Ch: 28 HPDS:x for Case: 417/1410, EU: g;	0208,Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0 U: g, Sof: 1, Offset: 0 U: g, Sof: 1, Offset: 0 Sof: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Rectory: C/Work Rector	Window MATLABY Watch this Yiden, see Demos, or read Gatting Statute Margen Statute Statute Statute Margen Statute Statute Statute Margen Statute Statute Statute Margen Statute Statute Margen Statute Statute Margen Ma	0208_Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 Sof: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio
2015-09-03 090207 2015-09-03 090207 2015-09-03 090207 2015 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Rectory: C/Work Rector	Window MMTABWWatchthu Yuken, see Demos, or read Gating Status MMTABWWatchthu Yuken, see Demos, or read Gating Status ming Ch: 21 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 22 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 23 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 415/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 417/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 417/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 417/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 417/1410, EU; g, 2 ming Ch: 25 BPDSix for Case: 417/1410, EU; g, 3 ming Ch:	0208_Acceleratio n.png Sof: 1, Offset: 0 Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 U: q, Sof: 1, Offset: 0 Sof: 1, Offset: 0	0207_Accele	433 POT INFORMATION CONTRACTOR OF MANAGER CONTRACTOR OF MANAGER CO	2010 - 2010 50 2010 - 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 2010 2010 - 201	12 Park Emerge Internet 2750 - 1728 - 5 2750 - 1750 -	1311_Acceleratio n.png 200 45.F01 dames 200 51- 200 51	1705_Acceleratio

2016-10-07

M Q RING

Example Time Signal



2016-10-07

RING



An example

Tests done on big high pressure valves The electrichydralic control valve has broken.

There have been more than one failure



Consequencies for production; several days reduced effect

One of the possible causes was vibrations. Another was pulsations



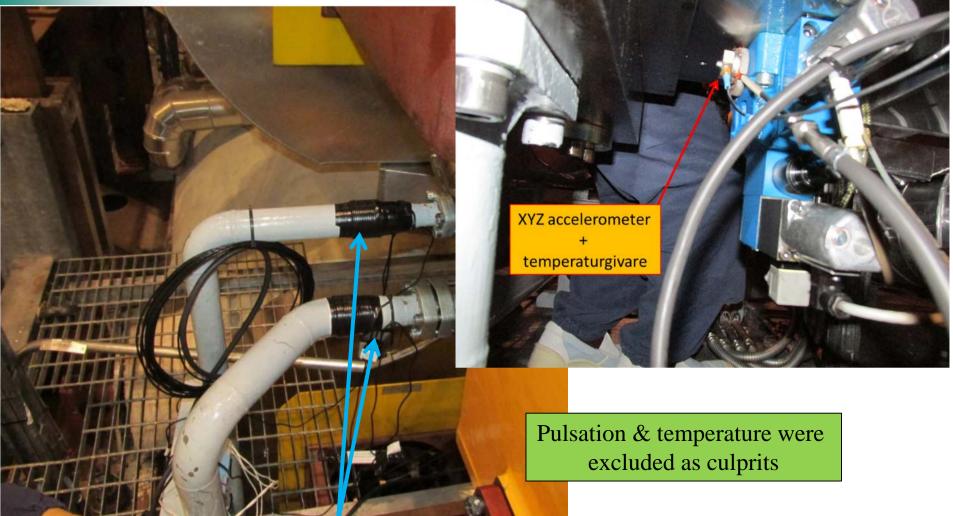


2nd Step

- Change transducers & place in optimal positions
 - Accelerometers
 - Brand new 100 mV/g industrial 3143D Dytran transducers with brand new cabling.
 - +/- 50 g, 0.5 3 000 Hz frequency range (±5%) & isolated chassis.
 - Intended for general purpose use
 - 25 kHz > internal resonance frequency
 - Pulsation measured using Piezocable
 - Temperature measured using PT100

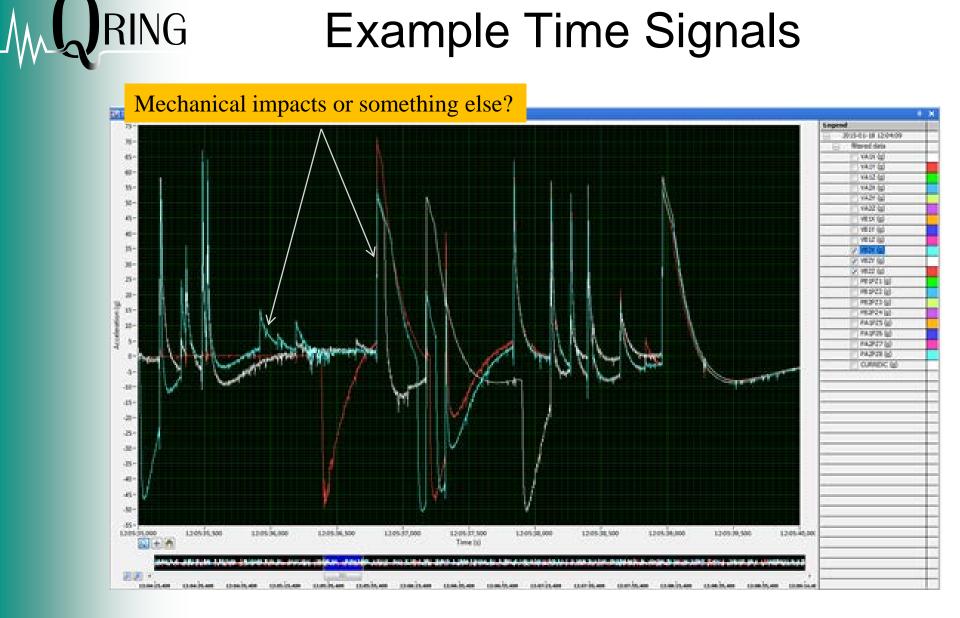


2nd Installation



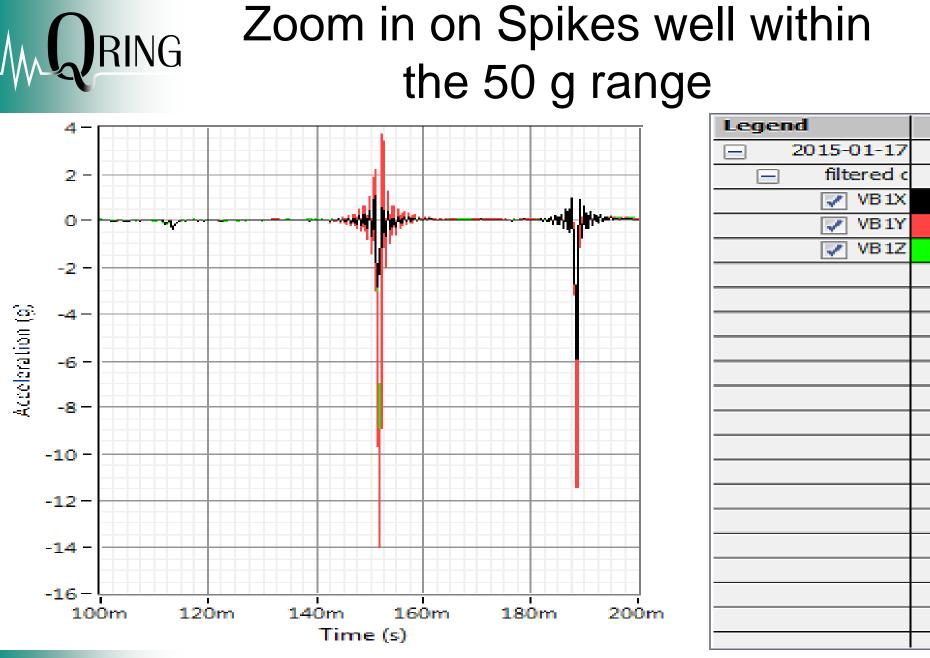
Figur 2 Installation av piezoelektrisk tråd. 2016-10-07

Example Time Signals



2016-10-07

RING



2016-10-07

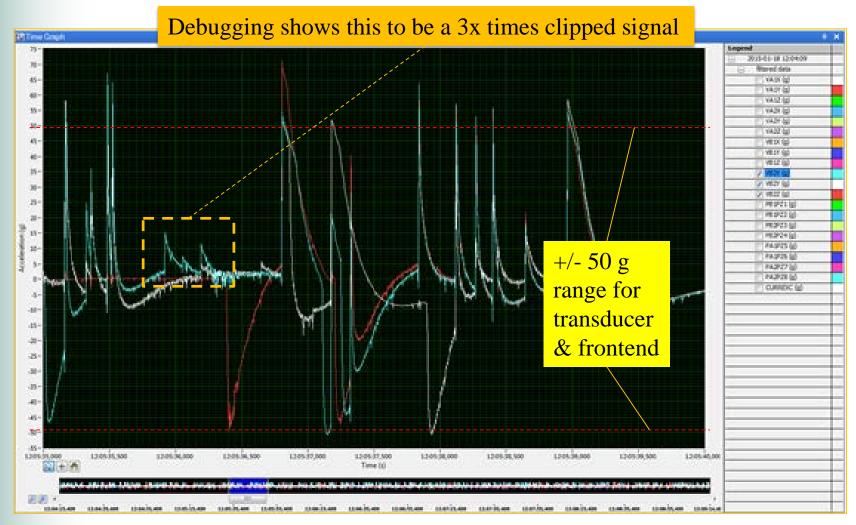


Debugging showed

- DC-offset
 - The measurement frontend was placed on metal bench that was in contact with (not connected) cable shield.
 - This was found to cause DC offset on input amplifier which could explain why a 50g accelerometer clips at 20g.
 - DC offset comes and goes without 50 Hz hum
- Spikes
 - There were still strange spikes present in the signal that sometimes clipped and sometimes did not clip.



Not so Easy to Interpret



20 Aug, 2016

RING

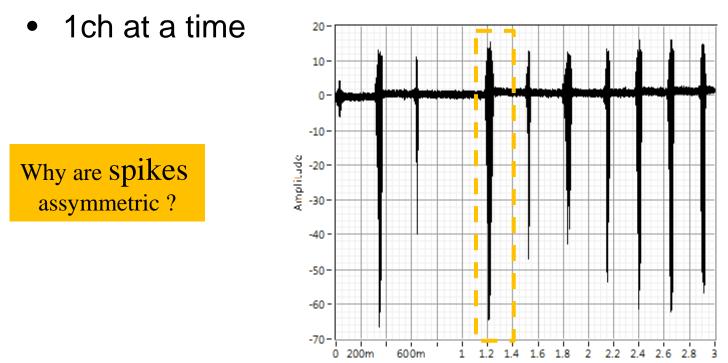
Why would a transducer clip at 10% of its amplitude range?

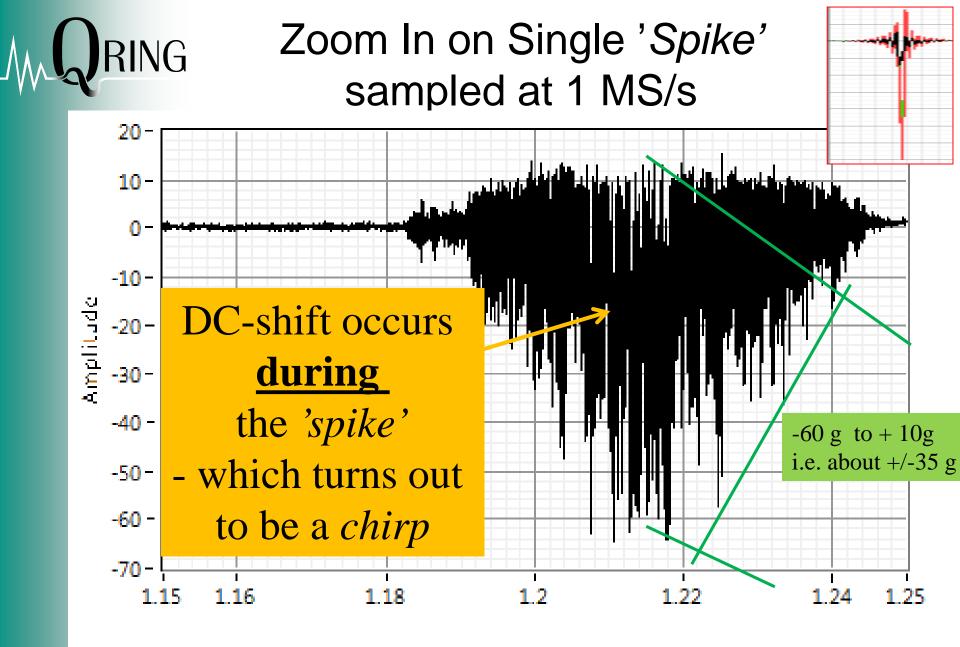
- Short duration mechanical shocks can excite up to very high frequency, i.e 100+ kHz?
- Overloaded piezosensors are shocked with a DC shift that remains for a long time (many minutes)
- Literature shows that shock accelerometers have
 - 80+ kHz resonance frequency & built in mechanical filters to avoid saturating accelerometer amplifier when driving sensor at resonance.
- Such excitation only exists <u>very</u> close to the mechanical impact.
 - (Not explained by valve closing)

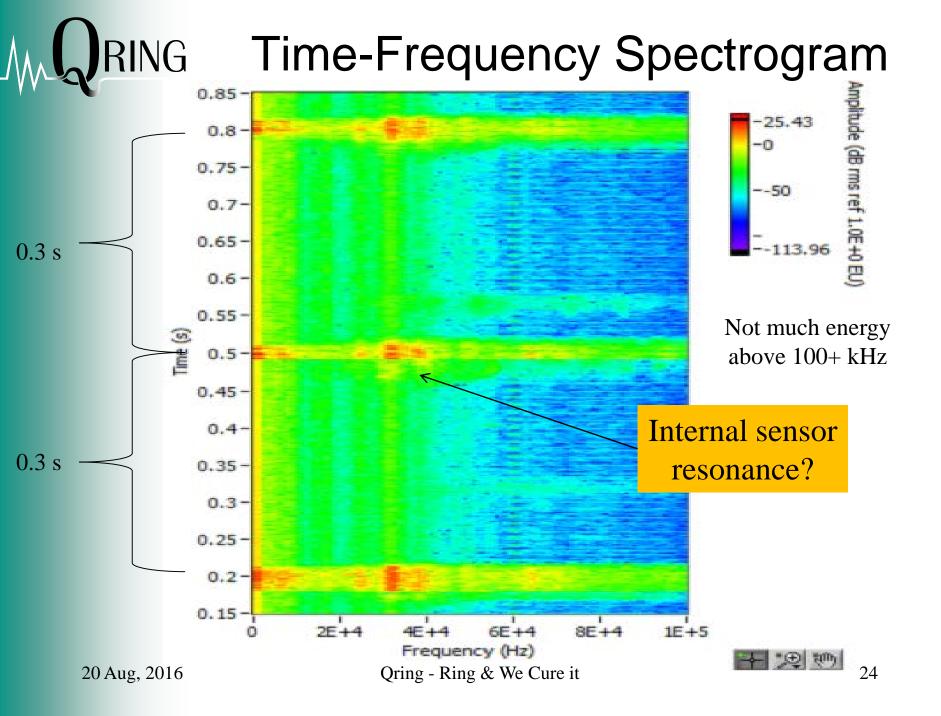


Extra Measurement

- 1 MS/s (390 kHz) frontend
- 10 V input range
- Battery operated ICP amplifier
- Measurement PC operated from battery







RING

Observations

- DC shift in sensor electronics when sensor is loaded at 25+ kHz resonance.
- Not 'Spikes' Chirps
 - *Transmission* of chirps may be explained by things like
 - Compression modes in mechanical components, e.g. a compression wave propagates at 5000 m/s in steel, a length of 2 m => $\lambda/2$ @ 1250 Hz.
 - The compression/shear wavelength at 25 kHz is 0.2 m/0.1 m which is small enough for resonance in the breast plate height direction, etc.
 - What is driving these chirps?
 - Is it a problem for the EHS?



A second opinion was called in

In this case there were 2 measurement systems on the same transducers



3rd Step.

Investigations why we got different & these strange results?

Goals were to

- Figure out what is the correct vibration level?
- Why do we get these strange spikes?
- •Are they harmful?



4th setup

•Vibration transducers of varying type, and make

–Dytran 3143D, 100 mV/g

-Wilcoxon 100 mV/g compression type

–PCB 356B21 10mV/g

–B&K 4381V/4382V with charge amplifers 1 mV/pc to 0.01 mV/pC

-Velocity transducer VT1613 with linearization amplifier

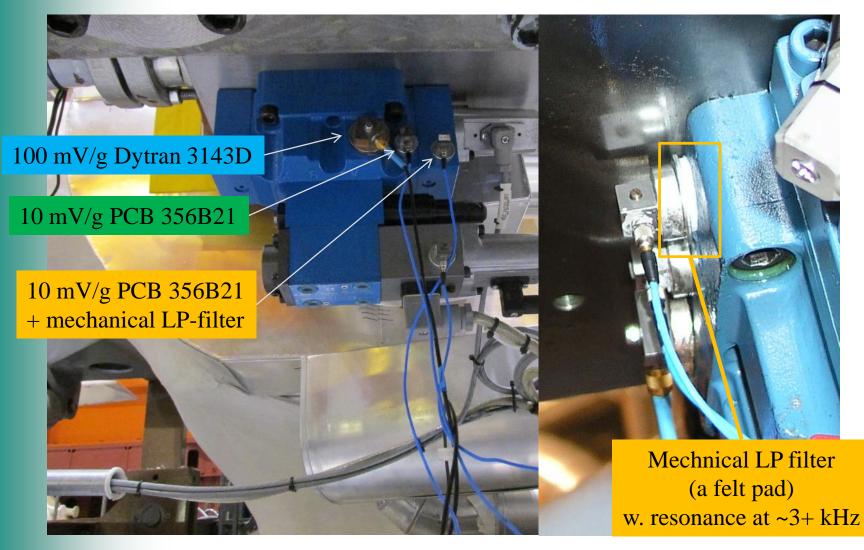
- •Piezostrain gauges on linkage to estimate valve loads.
- •NI cDaq frontend switched to VXI frontend

-20 V input range

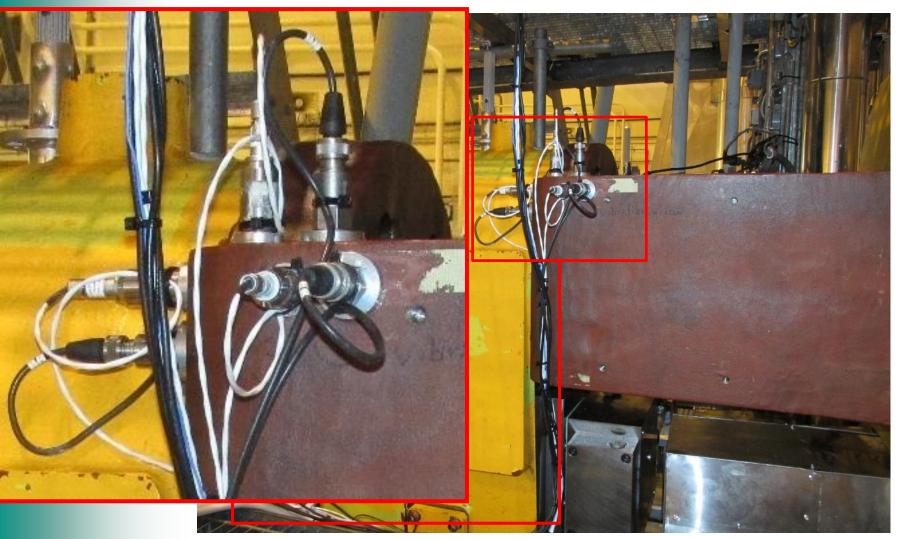
-30V ICP feed to maximize transducer range.

-OKG Multicabling & dSUB25 based cabling.

We added more transducers to figure out what was the problem

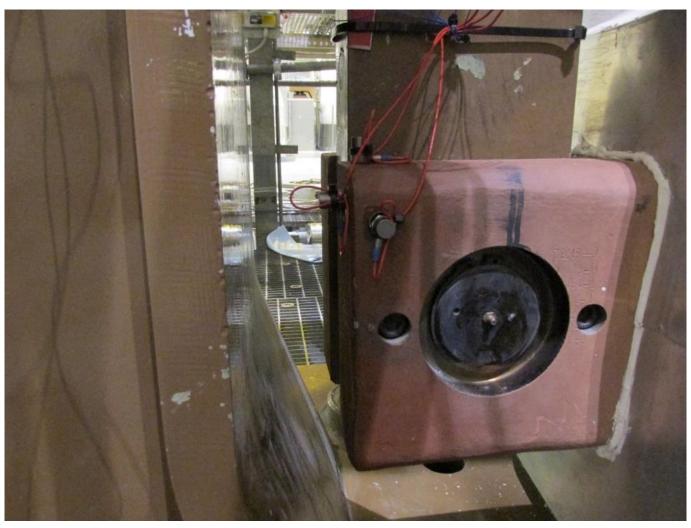


Industrial Accelerometer 100 mV/g & Velocity transducer





B&K 4381V/4382V 35 pC/g HighTemperature Accelerometer on Steam Valve



2016-10-07



Piezo electric strain transducers showed low vibration



2016-10-07



Comparison

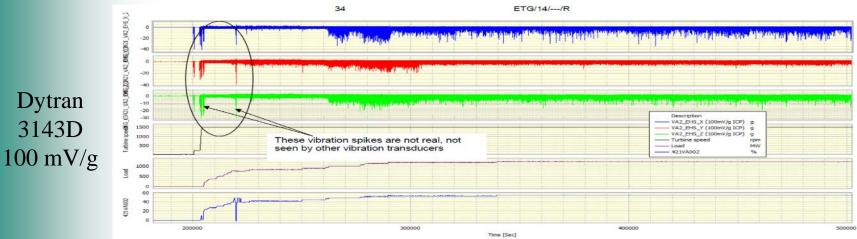
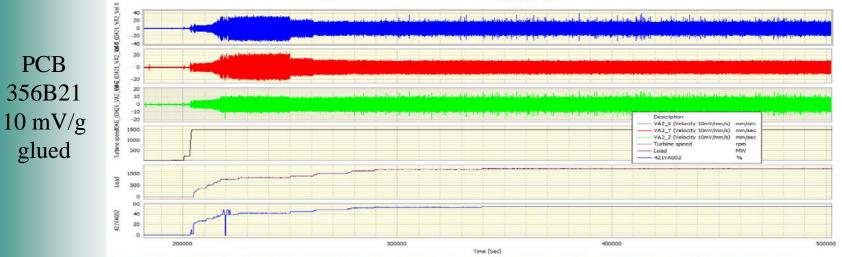


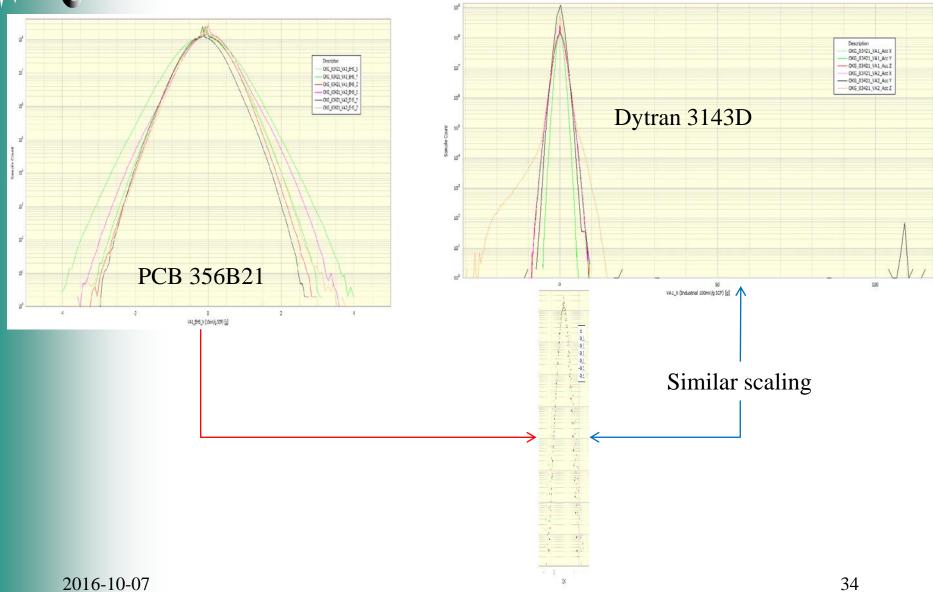
Figure 32 OKG 03: VA2: EHS Dytran 314D1 triaxial accelerometer (100 mV/g) vibration transducers X, Y, Z: Trend plot during load-up to 1200 MW 29th June 2015 to 2nd July 2015



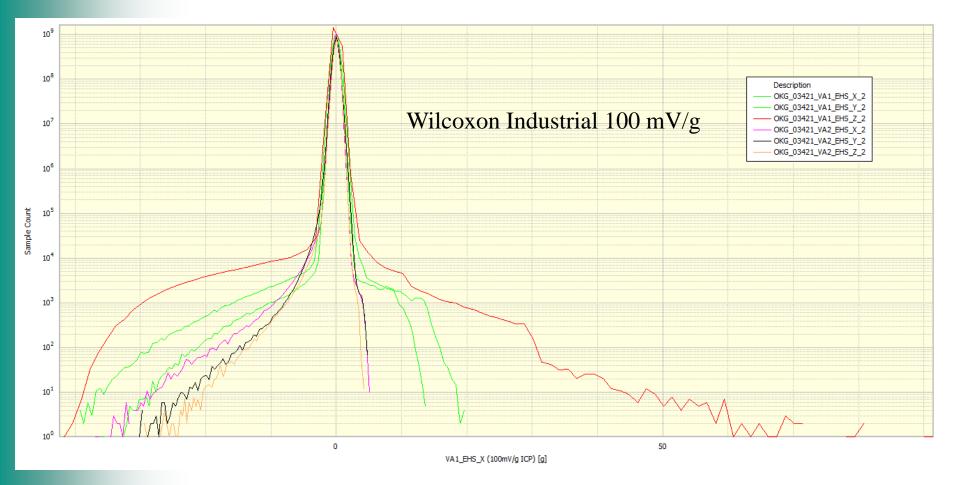
igure 31 OKG 03: VA2: Velocity 10mV/mm/s vibration transducers X, Y, Z: Trend plot during load-up to 1200 MW 29th June 2015 to 2nd July 2015

2016-10-07

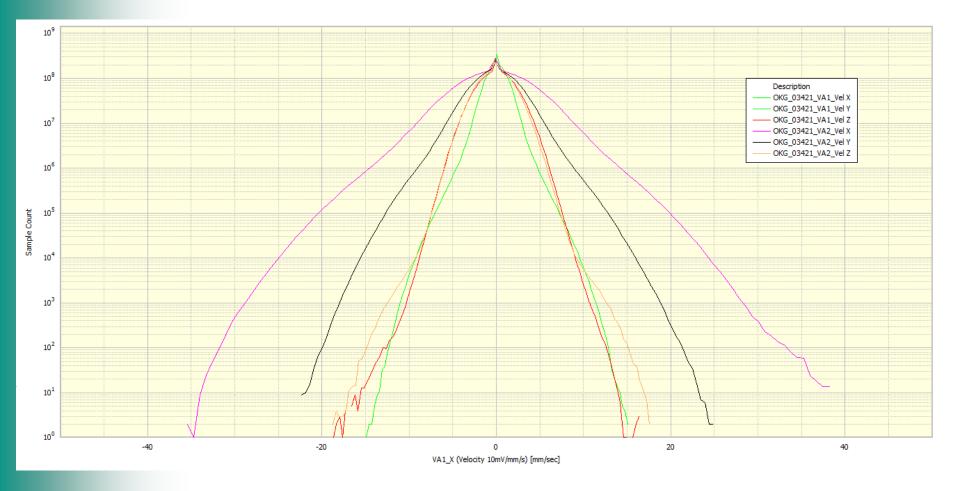
RING Comparison: Amplitude Histograms



RING Other Transducers: Industrial 100 mV/g



RING Velocity transducer VT1613



٨



Observations

- Dytran & Wilcoxon general purpose 100 mV/g industrial accelerometers did not provide usable signals.
- Velocity transducer VT1613 provides slightly asymmetric histogram.
- 356B21 (glued) 10 mV/g shows symmetric histogram.
- 356B21 w. mech. Filter not measured by 3rd party
- Data up to 60% load.



Project Stopped

 Root cause for EHS problem was identified not to relate to vibration at all.



Comparation to 3rd part

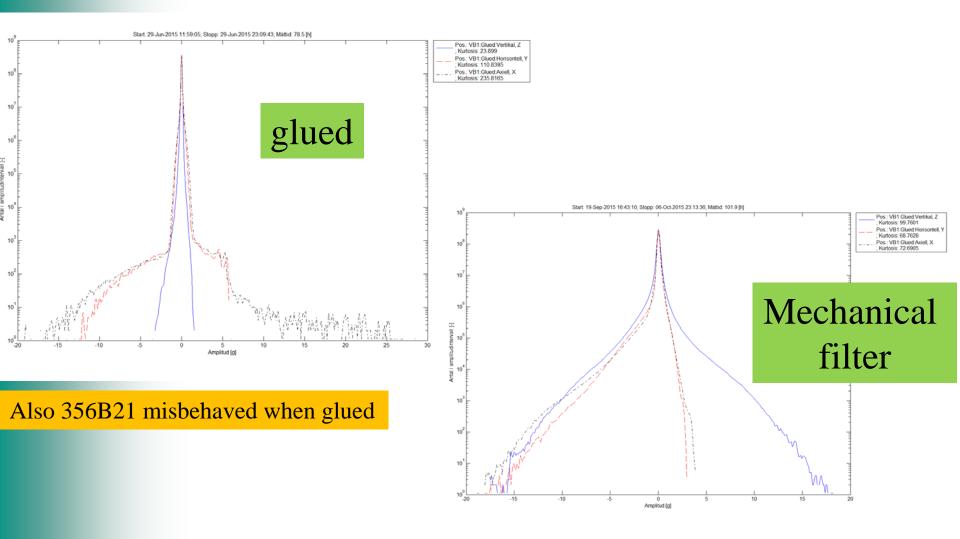
- He had 24 channels we had 96 channels.
- He measured to 60% load we measured 5 month continous.
- He could not take transducers of every configuration



Was 4th round measurement data used?

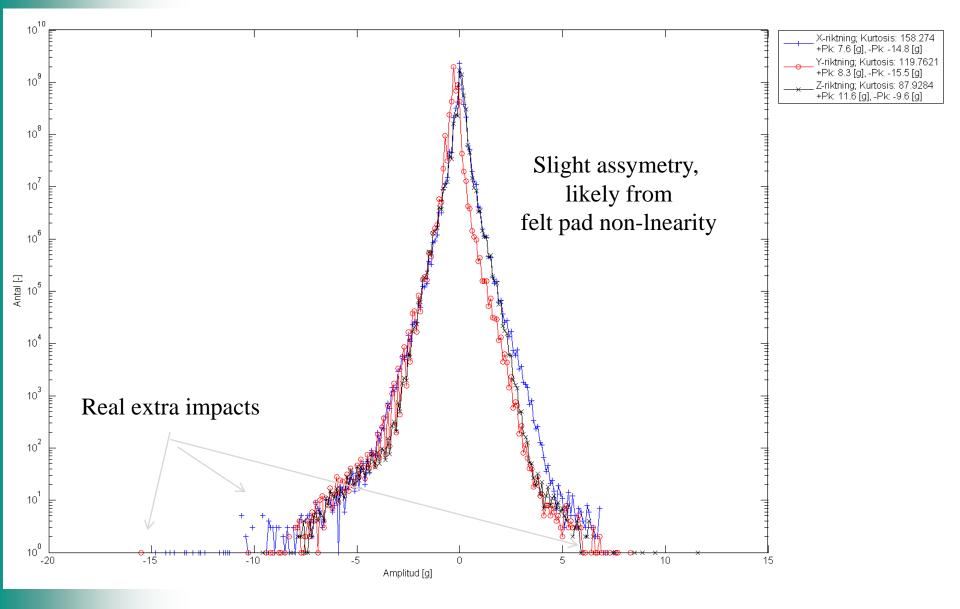
- Yes, we used it for accelerated testing of the new EHS.
- The transducer evaluation had to continue to do this.

Comparison: 356B21 glued/w. mechanical filter



RING

MRING Data used for Accelerated Testing



RING

Lesson Learned

- <u>All glued accelerometers were affected by</u> internal sensor resonance and zero shifted because of this.
- Accelerometer with mechnical filter & Velocity transducers worked best because they did not pick up high frequency vibration.
- 4x triaxials with filters were input.
 - 2x fell off after a while
 - 2x worked through the while measurement .

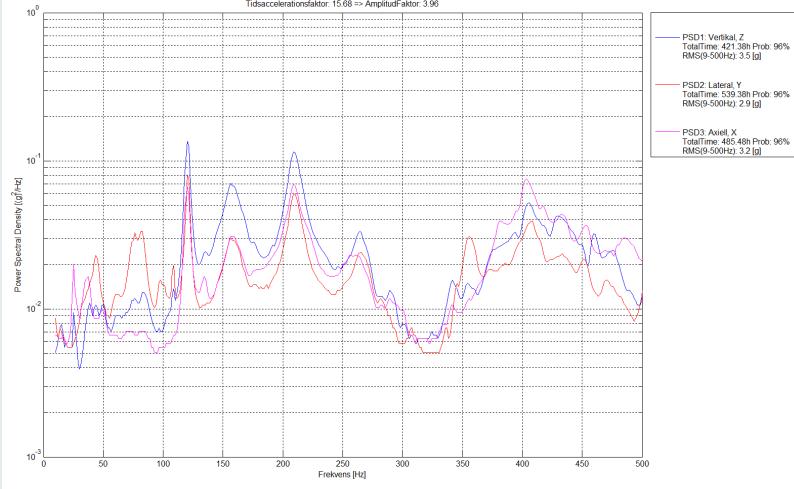


End Results

Accelerated Testing

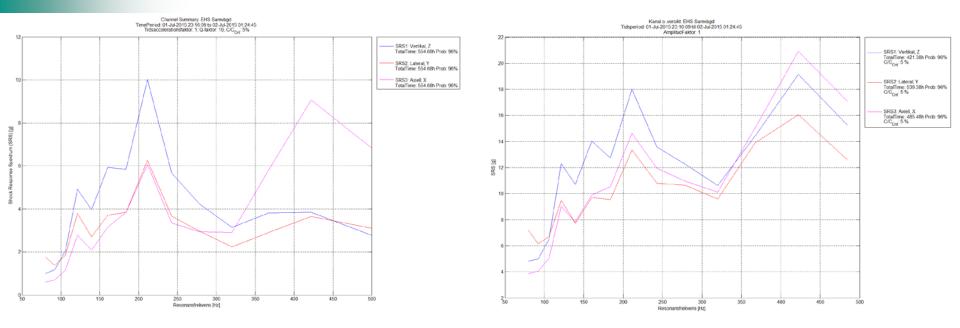
96% Probable PSD

Channel Summary: EHS Samvägd TimePeriod: 13-Jun-2015 17:19:38 to 19-Sep-2015 16:27:02 Tidsaccelerationsfaktor: 15.68 => AmplitudFaktor: 3.96



RING

Shock Response Spectrum Direct (time) & Indirect (spectral)



SRS shows the outlier peaks to be covered by the noise excitation variability

RING