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Vessel Motion Monitoring

Christer Widmark

VOLVO

Agenda

Vessel Motion Monitoring from Humphree Background.

VMM system Layout and Performance

VMM recordings

Post processing of "Big data"

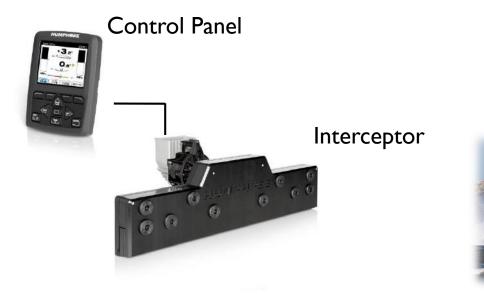
Questions and Answers



Humphree backround

Humphree is known for being a world leader in Trim & Stabilisation system

Our experience with improving boat handling and stabilisation has given us unique experience of recording accelerations and running conditions on board different vessels



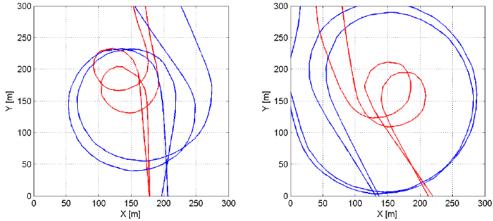




Sea Trial Recording

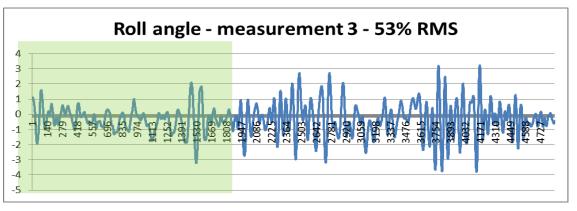
Maneuvering





Active Stabilisation



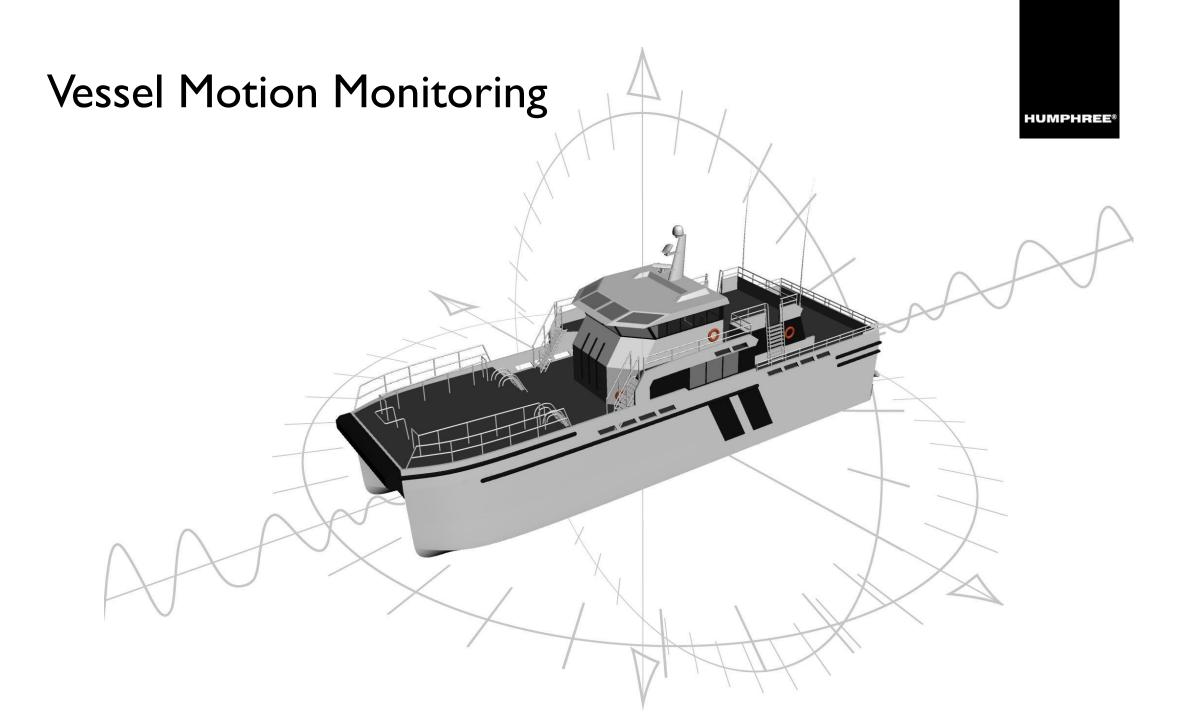


Performance Parameters

Trim and Stabilisation systems improves boat handling to get a more comfortable ride

With or without such system the crew and vessel will be affected by the sea conditions





Control panel at helm station **Vessel Motion Monitoring** HUMPHREE 4.7 36% 2.5 21 MIL 1.4 SENSI SENS2 SENS3 RESET GPS antenna HCU/RCU RECORDER (sensor 1) EXTERNAL MONITORING -MSU 501 (sensor 2) ٿ ٿ 🗂 LSU 501 Sensor Up to 3 sensors in one system -

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Sensor data

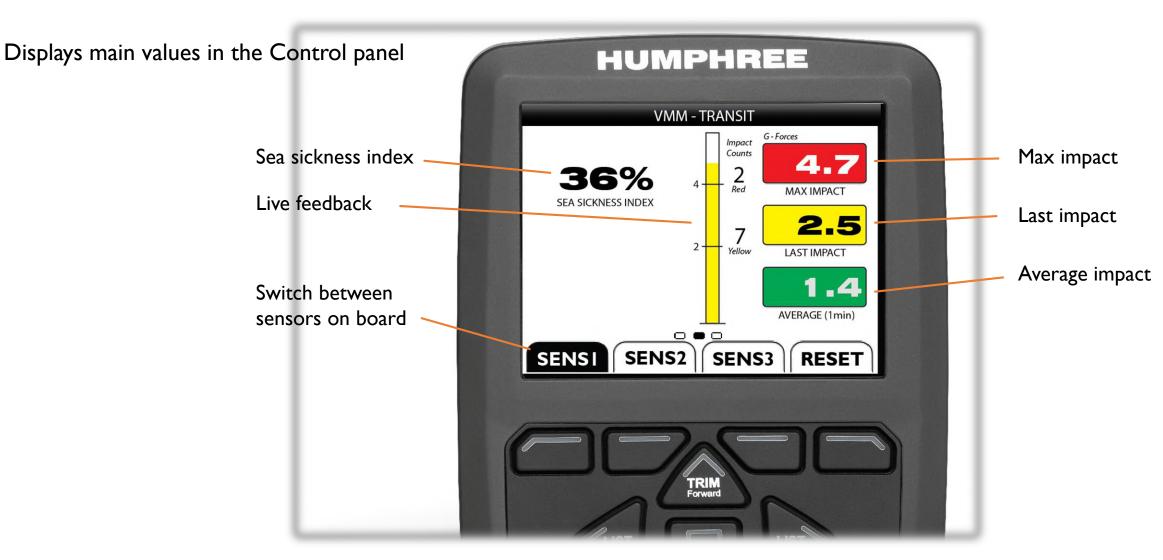
- Acceleration (x,y,z) Hz?
- Angles (x,y,z)
- Angle rate (x,y,z)
- GPS data (GPS antenna)

Derived data

- Landing force
- Heave
- MSI
- Trim (RMS)
- List (RMS)

External data

- NMEA input (wind, Engine RPM...)



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Recorder

- Possible data export to Excel, csv-format
- Detailed recording for 14 days
- Or 2 year event log of recording for warranty



Recorder

- Software for simplified analysis
- Export data to Excel for post analyse of data
- Humphree supports with written reports of vessel operation

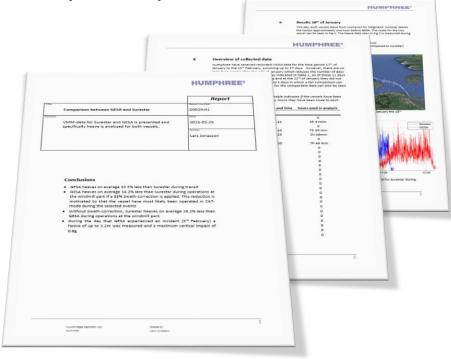
Export data to Excel (with included software)

Recorder



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1,501226+11 54.2		7.7964306		78		0.63		4.5						
1,501228+11 54.3		7.7942819		79		0.61		4.9						
1,501220+11 54.2		7.7917814				0.01		8.5						
1,501226+13 54.3		7.79054X7		84		0.0.1		4.9						
1,501220+11 54.3		7.7904977		87		0.01		8.5						
1,501226+11 54.2		7.7676832				0.81		2.5						
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1,50220+11 54.2		7.7876363 2.7868721				0.03		1.5						
1.501220-11 54.2		7.7967703				0.01		4.7						
1,501206+11 54.2		7.7601954				0.03		4.9						
1.50128-11 54.2		7.7960823		202		0.61		6.7						
1.301225+11 54.2		7.7657675		305		0.01		4.5						
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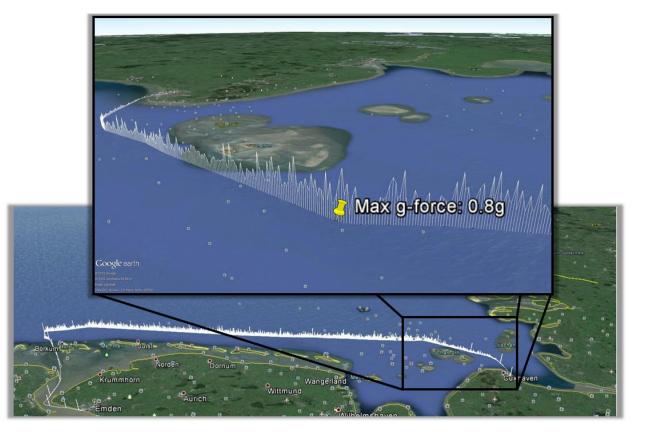
Humphree Report



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Recorder

- Export data to Google Earth
- Post analyse of operation

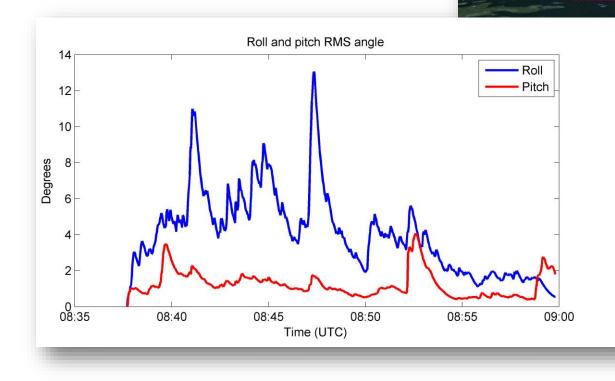




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Analyze Pitch and Roll motions during transit

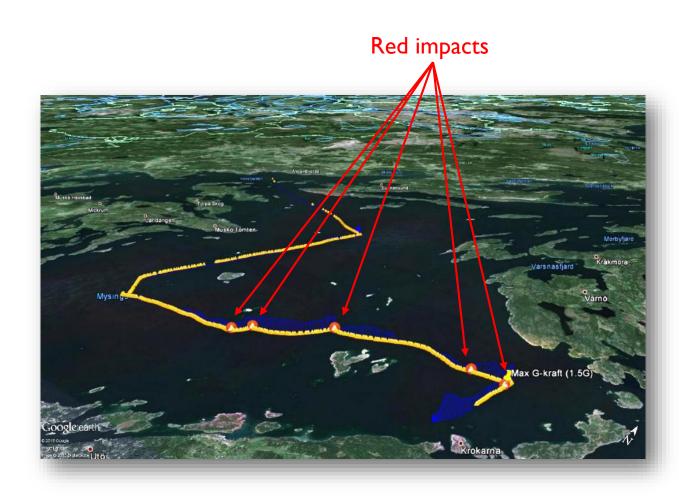


Recorded data exported to Google Earth

We can from recorded data see that the crew has been exposed to 5 "Red impacts"

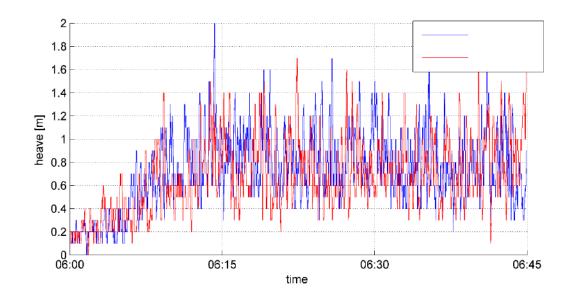
Max impact (G-force) was 1,5 G

The level for a "Red impact" can be set in the system



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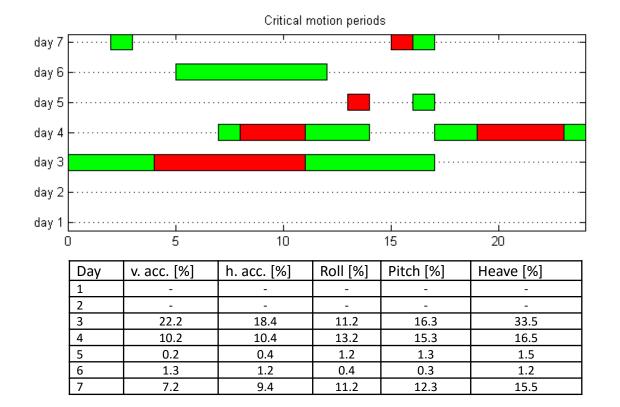
Comparing vessel motions for different vessels





Post Processing Recorded Data to identify the critical motion period.

Daily reports to monitor your operation , crew or vessel.



Cooperant responses

Day by day report for critical motion Periods

Map over Critical Motion Periods

Post Processing Recorded Data to identify the critical motion events.

Daily reports to monitor your operation, crew or vessel.

Landing forces

Number of yellow landing forces:	4
Number of red landing forces:	1
Maximum landing force:	633.2 kN

Table 3: Yellow landing forces

Day	Time	Long	Lat	Force [kN]	Heave [m]	Wave height [m]
03	05:30:22	-2.3242	65.3232	264.3	1.2	2.0
04	10:20:14	-2.1231	65.1112	350.0	0.5	0.8
06	10:01:02	-2.3242	65.3232	277.4	0.3	0.5
07	15:14:22	-2.3242	65.3232	533.3	1.5	2.0

Table 4: Red landing forces

Da	y Time	Long	Lat	Force [kN]	Heave [m]	Wave height [m]
07	02:30:12	-2.3242	65.3232	633.2	0.7	1.2



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Map over Critical Motion Events

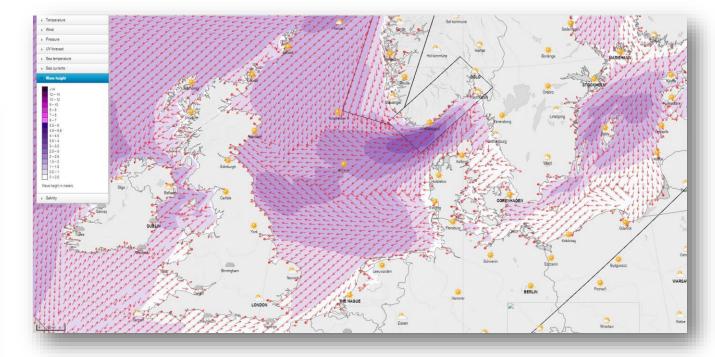
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Overlay recorded data with weather information to understand how certain weather conditions affects the environment on board

Weather information from

- Weather buoy
- Weather maps





Map over wave height

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QnA

What motions and data is important to record in

High Speed Operations?

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Questions?



