PLATFORM OMGEVINGSTECHNOLOGIE

PLOT SHOWCASE 2019

21 november 2019 NH Koningshof Eindhoven

Ad Bastiaanssen - ABTRONIX B.V.

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Hoe haal ik het beste uit mijn vibratie testen?

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ONTWERP

AFHANKELIJK VAN: **De Vorm**

De Functionaliteit

De Produceerbaarheid

De Testbaarheid

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VIBRATIE TESTEN ⇒ **Test specificatie**

Fixturing

Test-duur ⇒ **DESTRUCTIEF**

Test-duur ⇒ **Niet Destructief**

Test omstandigheden

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Wat gebeurt er met mijn product gedurende een trillingstest?

Het product wordt blootgesteld aan versnellingen bij verschillende frequenties en amplitudes

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METHODES VOOR VIBRATIE TESTEN

HAMER + VERSNELLINGSOPNEMERS

Shaker

Impact-Response Meting

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VALIDATIE TESTEN ⇨ **Test Specificatie**

Fixturing

Test-Duur (Verkorten van de levensduur)

Test omstandigheden

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Niets is Stijf !!!!

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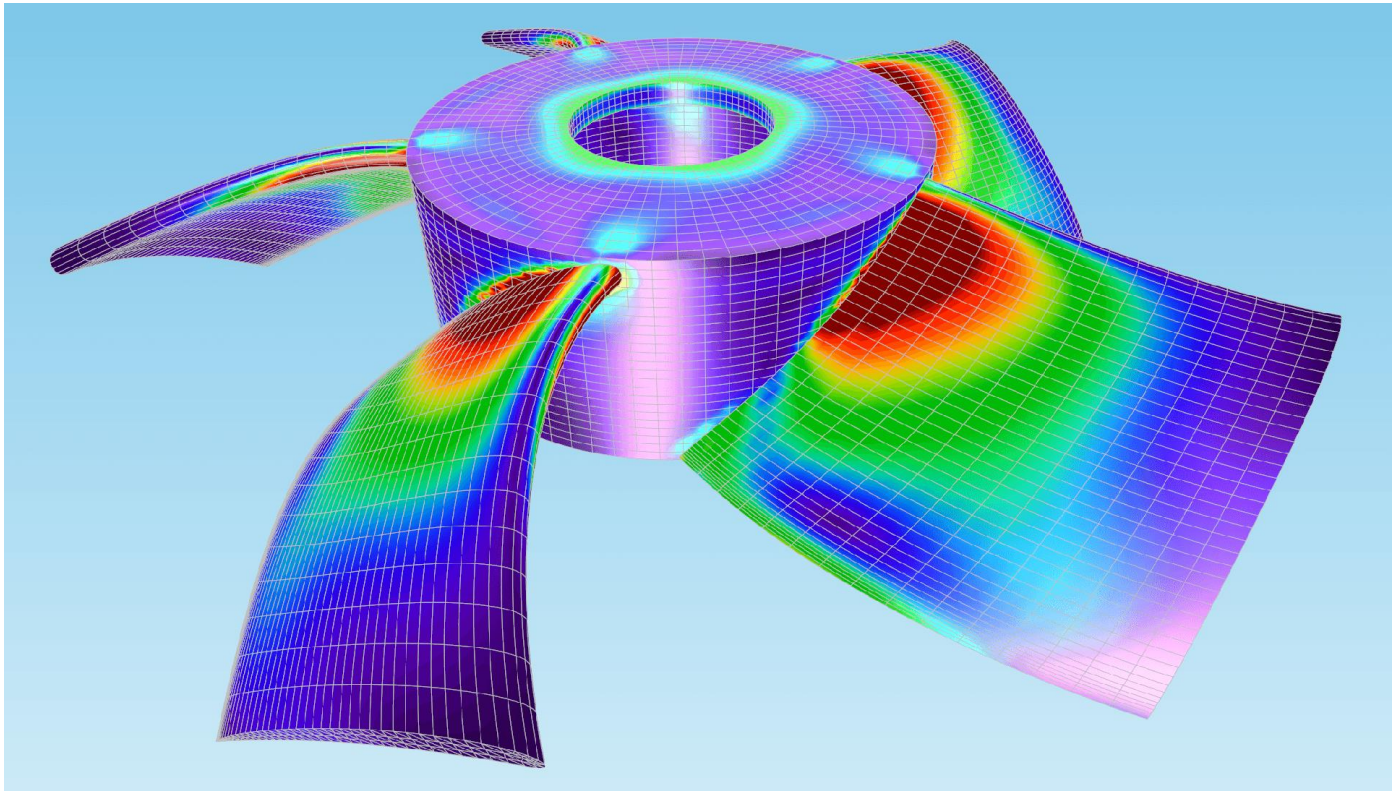

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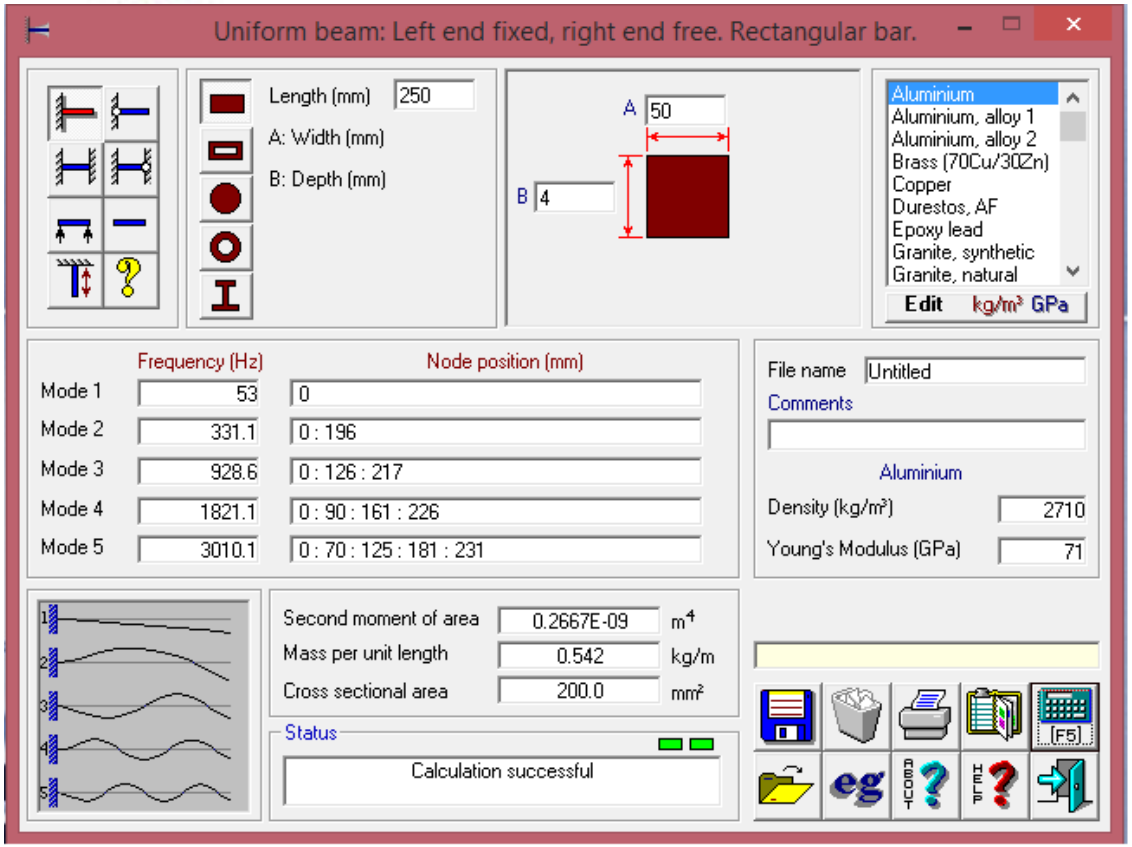

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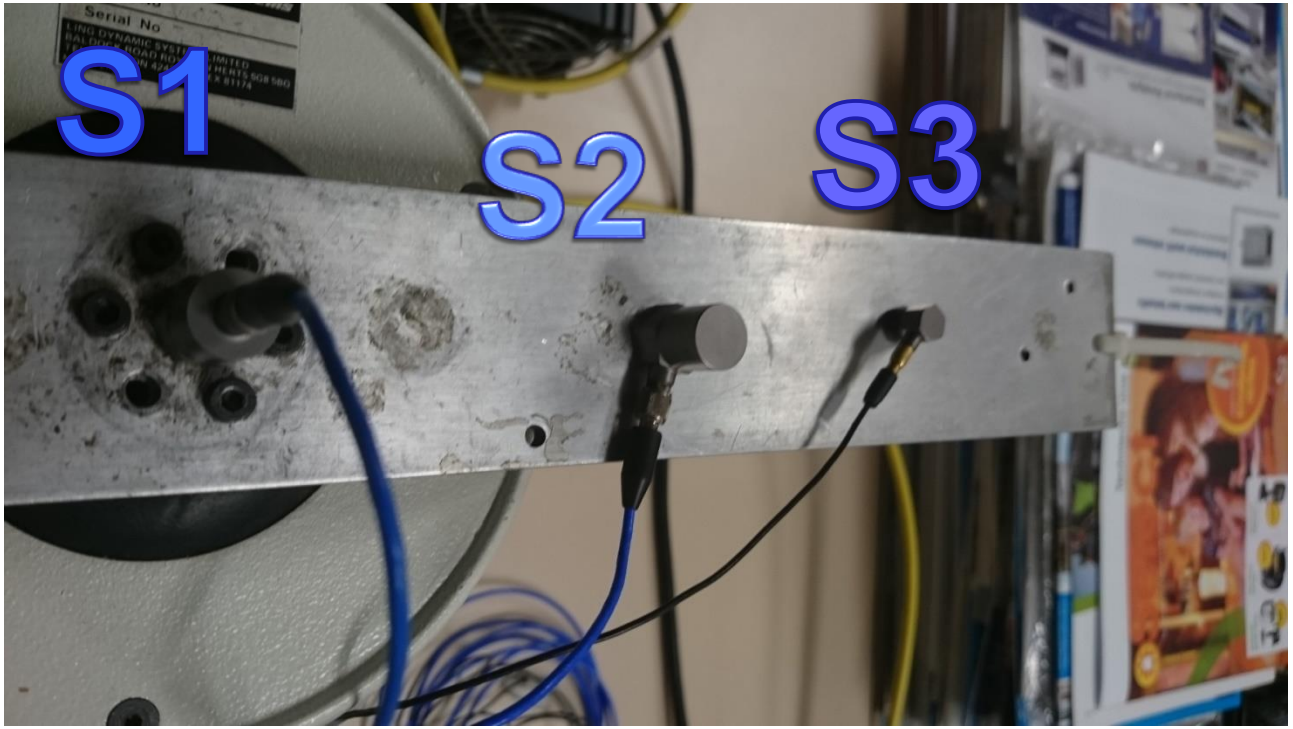

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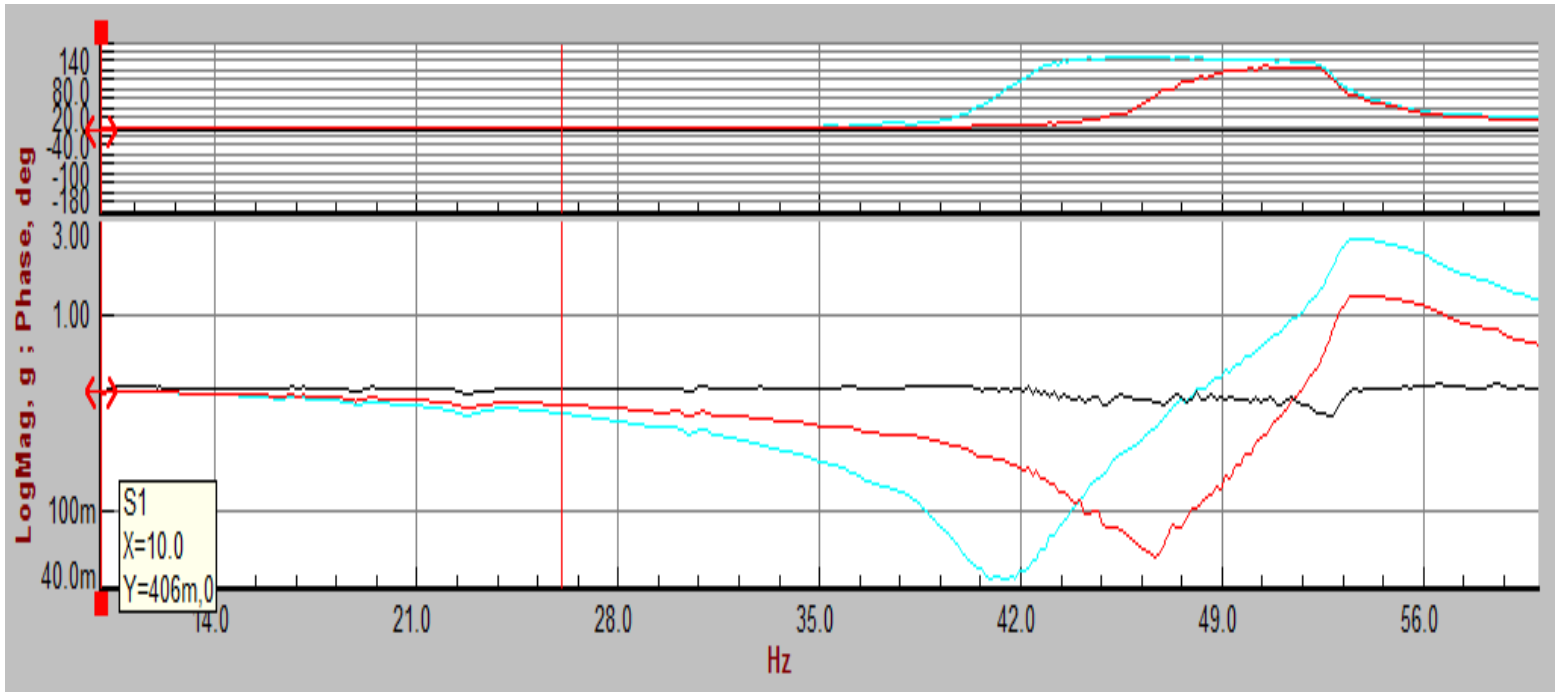
Test 0,5 g



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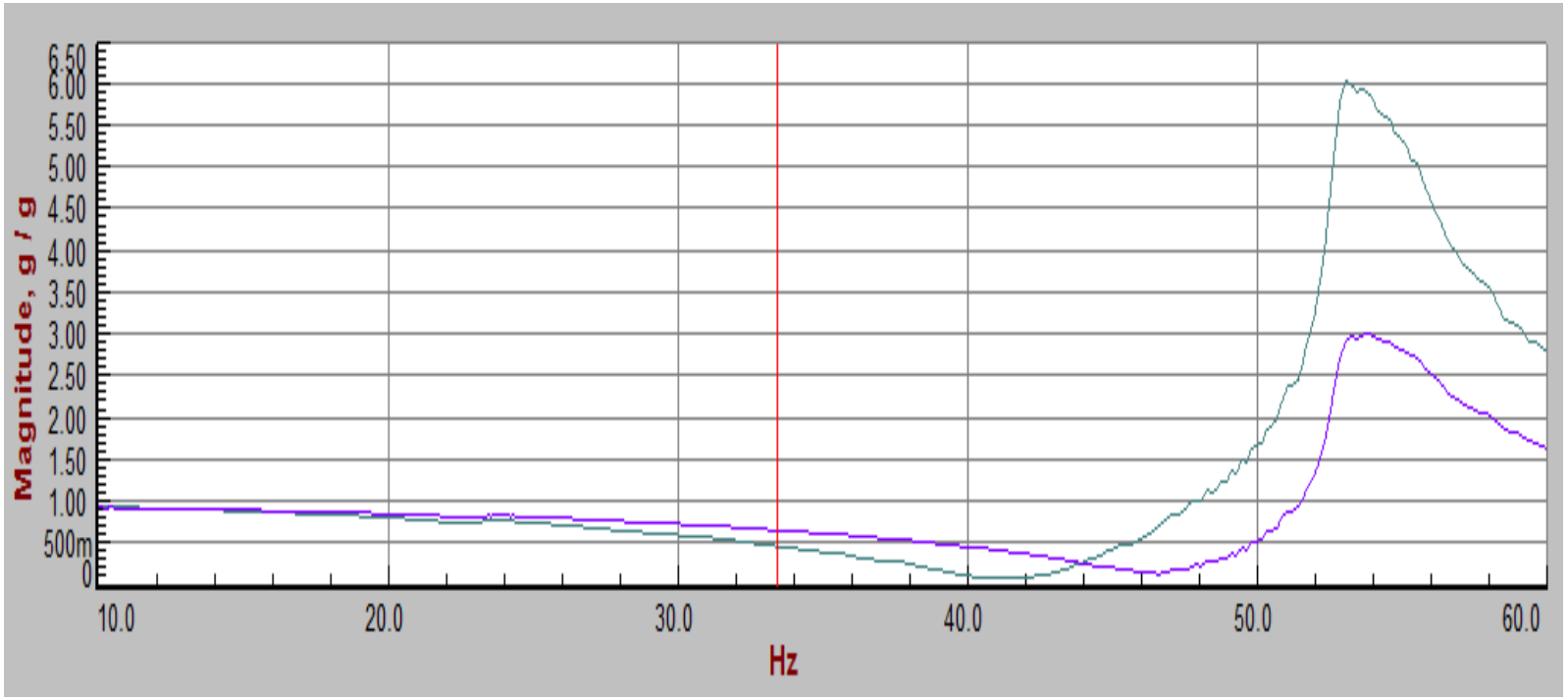
Transfer karakteristiek



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Waar moet ik mijn (control) sensoren plaatsen?

Wat zegt een test standaard hierover?

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MIL810-G method 514.6

Acceleration input control strategy.

Input control is the traditional approach to vibration testing.
Control accelerometers are mounted on the fixture at the test item mounting points.
Exciter motion is controlled with feedback from the control accelerometer(s) to provide defined vibration levels at the fixture/test item interface.
Where appropriate, the control signal can be the average (weighted average or maxima) of the signals from more than one test item/fixture accelerometer.
This represents the platform input to the materiel, and assumes that the materiel does not influence platform vibration.

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Specific to this method.

(1) Test fixture requirements.
(2) Test fixture modal survey requirements / procedure.
(3) Test item/fixture modal survey requirements / procedure.
(4) Vibration exciter control strategy.
(5) Test tolerances.
(6) Requirements for combined environments (i.e. temperature & humidity).
(7) Test schedule(s) and duration of exposure(s).
(8) Axes of exposure.
(9) Measurement instrumentation configuration.
(10) Test shutdown procedures for test equipment or test item problems, failures, etc.
(11) Test interruption recovery procedure.
(12) Test completion criteria.
(13) Assure that test requirements (force, acceleration, velocity, displacement) can be met. Seek approval for variation if required. Document any variation.
(14) Allowable adjustments to test item & fixture (if any); these must be documented in test plan and the test report.

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MIL810-G method 514.6

Vibration measurement.
Use a vibration measurement system that can provide acceleration spectral density measurements within ±0.5 dB of the vibration level at the transducer mounting surface (or transducer target mounting surface) over the required frequency range.
Do not use a measurement bandwidth that exceeds 2.5 Hz at 25 Hz or below, or 5 Hz at frequencies above 25 Hz.
Use a frequency resolution appropriate for the application (i.e., generally in wheeled vehicles a resolution of 1 Hz is sufficient).

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MIL810-G method 514.6

Test fixture resonance.

Prior to test, a test fixture survey should be conducted to ensure that the structural characteristics of the test fixture do not introduce uncontrollable resonances into the test setup.

The survey may be experimental or analytical.

If problematic resonances are identified, modifications should be made to the test fixture to shift the resonance beyond the frequency range of the test or to dampen the resonance in order to minimize the effect on the test.

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Table 514.6C-II. Category 4 - Common carrier (Break points for curves of Figure 514.6C-1).

Vertical		Transverse		Longitudinal	
Frequency, Hz	PSD, g^2/Hz	Frequency, Hz	PSD, g^2/Hz	Frequency, Hz	PSD, g^2/Hz
10	0.01500	10	0.00013	10	0.00650
40	0.01500	20	0.00065	20	0.00650
500	0.00015	30	0.00065	120	0.00020
rms = 1.04 g		78	0.00002	121	0.00300
		79	0.00019	200	0.00300
		120	0.00019	240	0.00150
		500	0.00001	340	0.00003
		rms = 0.20 g		500	0.00015
				rms = 0.74 g	

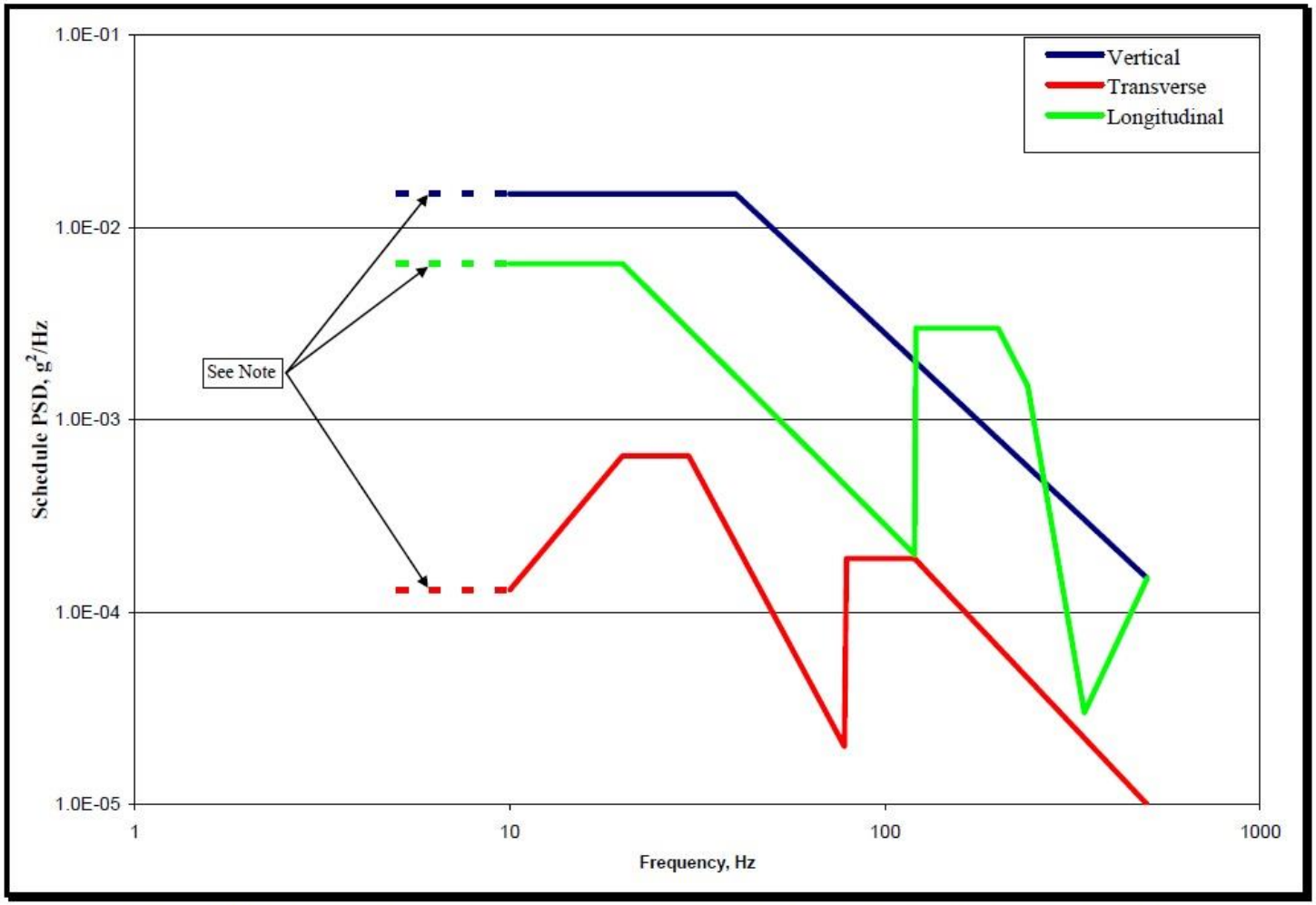

Figure 514.6C-1 – Category 4 - Common carrier (US highway truck vibration exposure).

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Voorbeeld:

Stel dat er op een bestaande print andere componenten moeten worden toegepast.

Hoe beïnvloedt dit de vibratie karakteristiek van de pcb?

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De gekozen testmethode is een low level swept sine met de print gemonteerd in het toestel

0,5 g in een frequentiebereik van 5 Hz tot 2000Hz met een sweep rate van 1 Octaaf per minuut

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The two PC boards used in the test:

Figure 3: old (left) and new board.

Z-axis

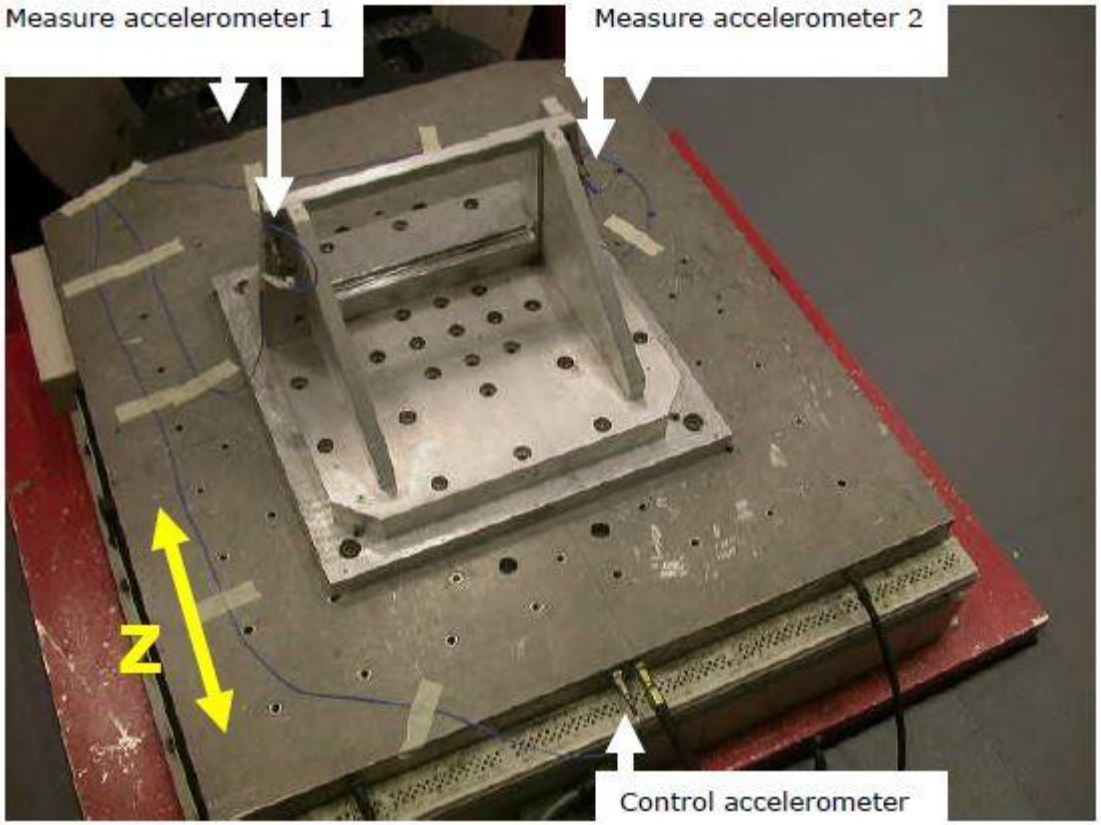

Figure 6: Z-axis accelerometers

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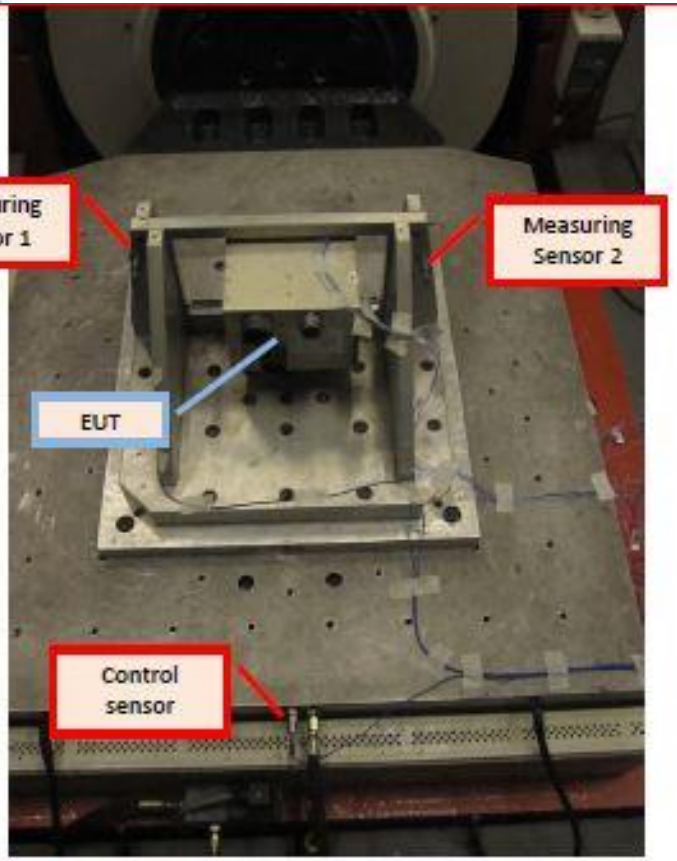

Figure 13: routing of sensor cables

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Meting op de fixture daar waar energie wordt overgedragen

op de DUT (vergeleken met 2 verschillende DUT's linker kant

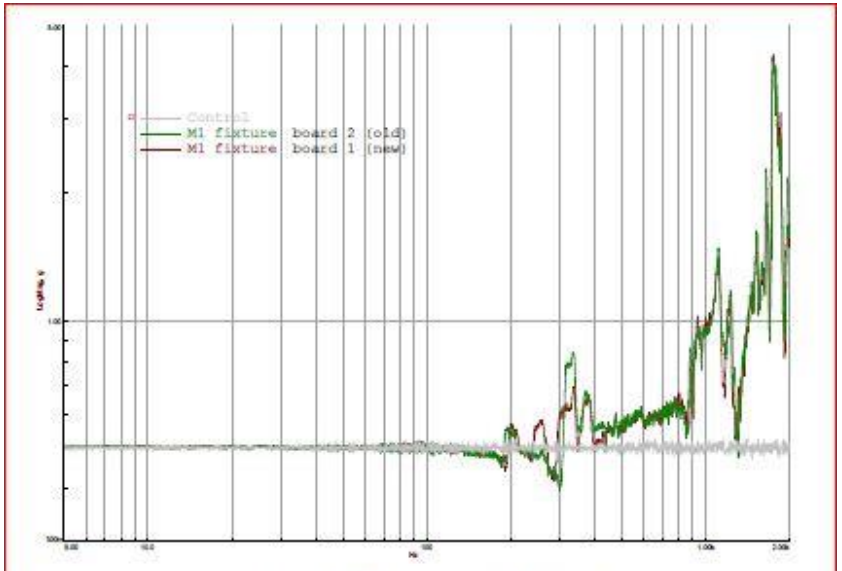

Figure 14: graph of the two measuring signals sensor 1 (fixture)

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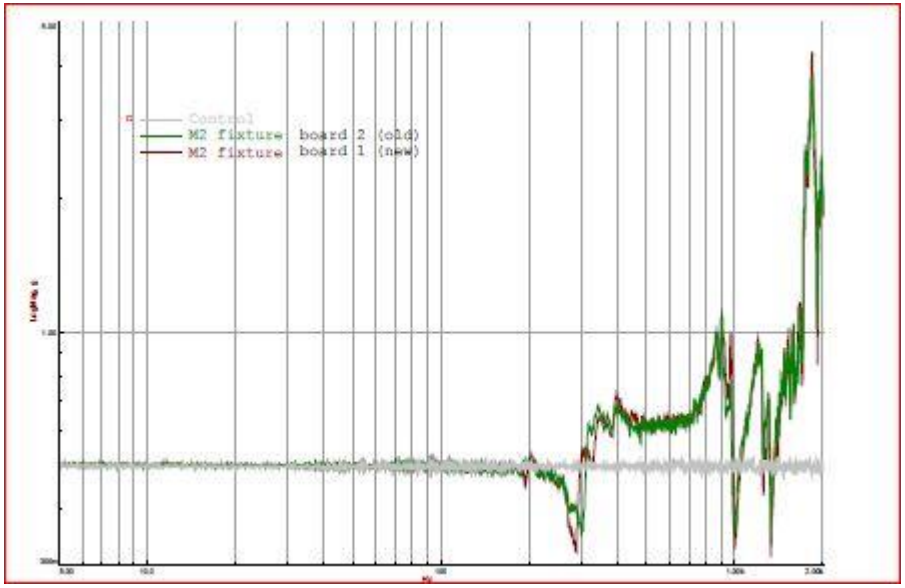
Meting op de fixture daar waar energie wordt overgedragen

op de DUT (vergeleken met 2 verschillende DUT's rechter kant.



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Plaatsing van de meet sensoren op de DUT

3.1.1 Sensor position (modal survey)

The accelerometers used for measuring the vibrations experienced by the PCBs, are attached on appropriate and significant locations, taking the available space into account. Accelerometers are attached to the PCBs using glue.

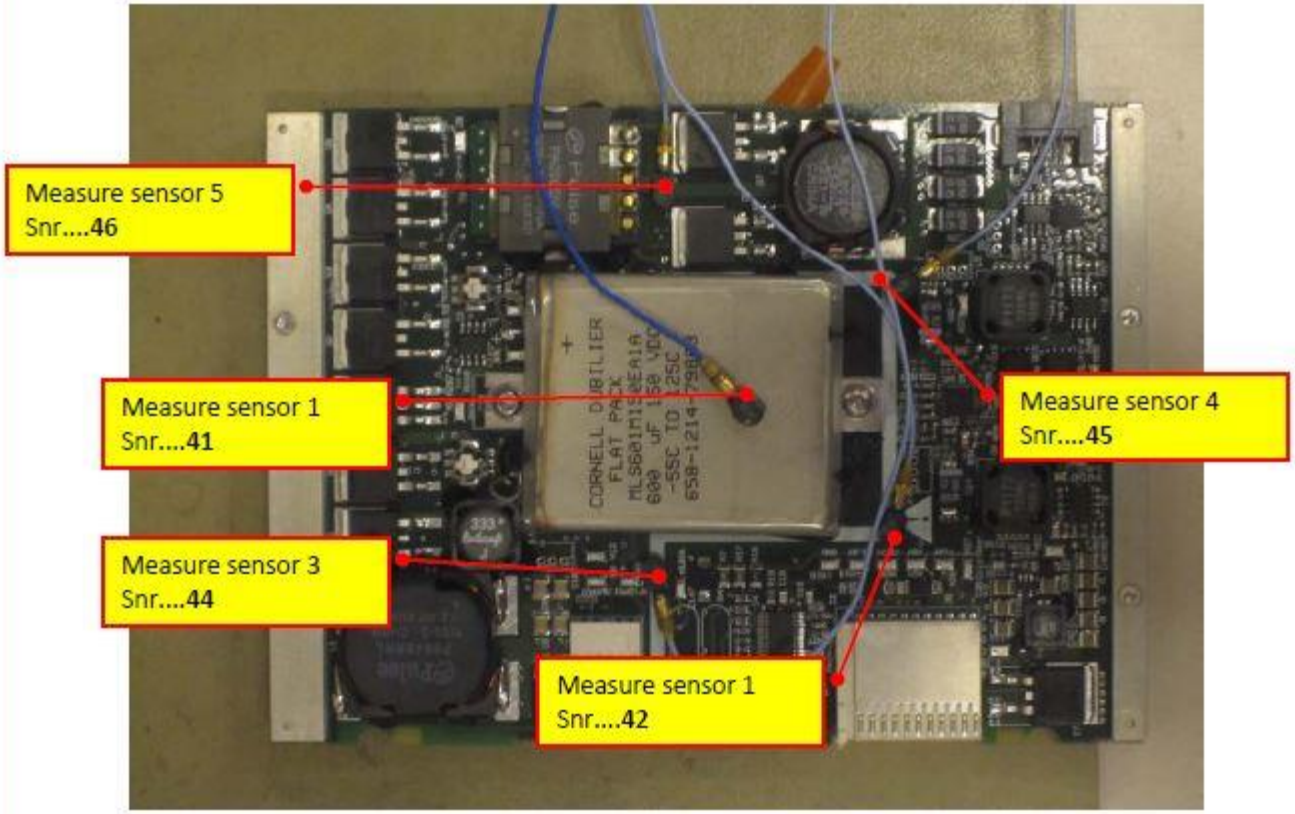

Figure 7: Five accelerometers on PS board during Z-axis vibration PC board 1

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Vragen ???

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