2014 HBM nCode Products User Group Meeting

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Sine Sweep and PSD Vibration Fatigue Life Prediction

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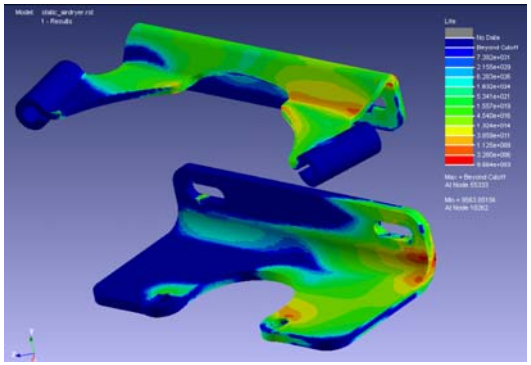
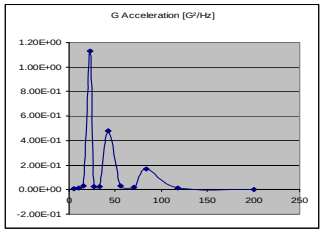
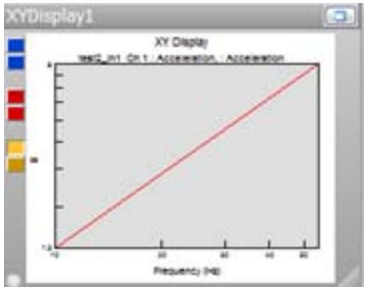






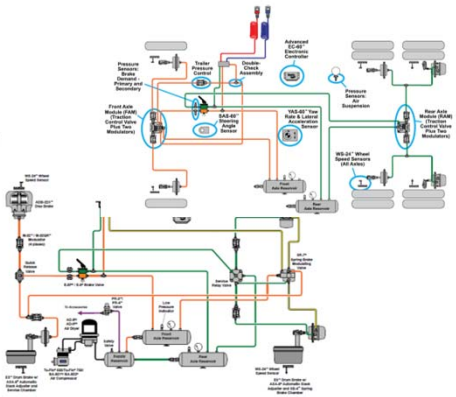
Intro to Bendix Commercial Vehicle Systems

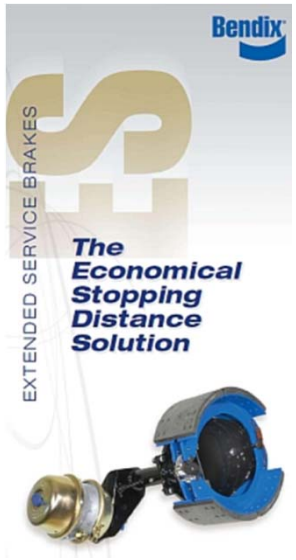
Bendix Commercial Vehicle Systems (Bendix CVS) member of Knorr-Bremse Group, is headquartered in Elyria, Ohio. Bendix CVS is a preferred OEM supplier of comprehensive air brake systems and components for major commercial truck, tractor, and bus builders. Bendix CVS offers a great variety of products for braking, stability, and traction such as air compressor, valves, air dryer, ABS, stability systems, driver assistance systems, and total foundation brake products through Bendix Spicer Foundation Brake – a joint venture with Dana Corporation.

The Bendix Vision

We will become the leading worldwide supplier of active vehicle safety systems within the commercial vehicle industry.

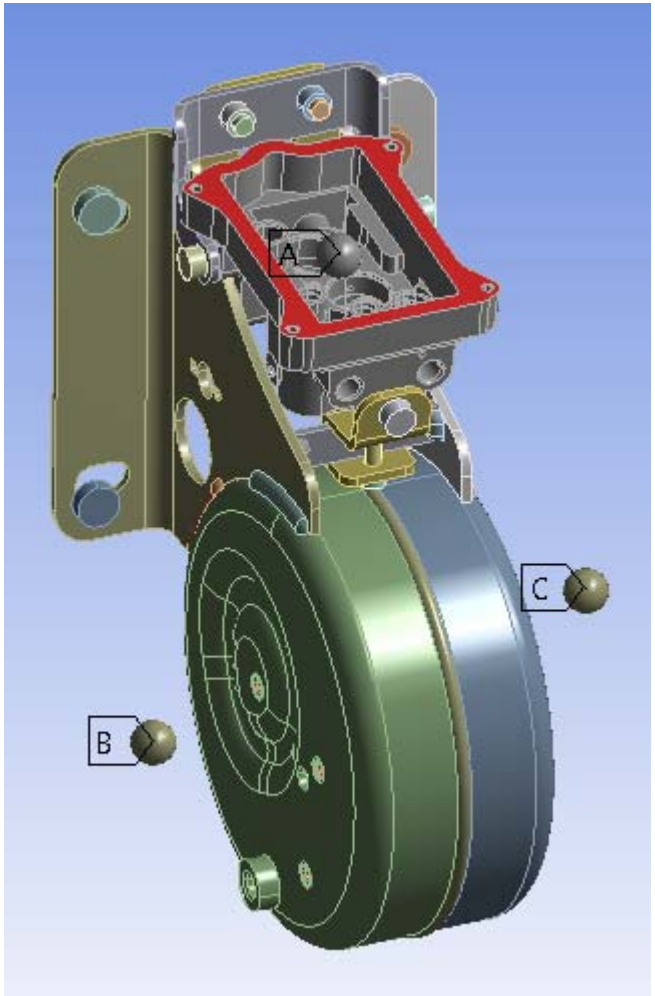
Engineering and R&D Group: Provide technical supports and engineering services for the whole company and customers.



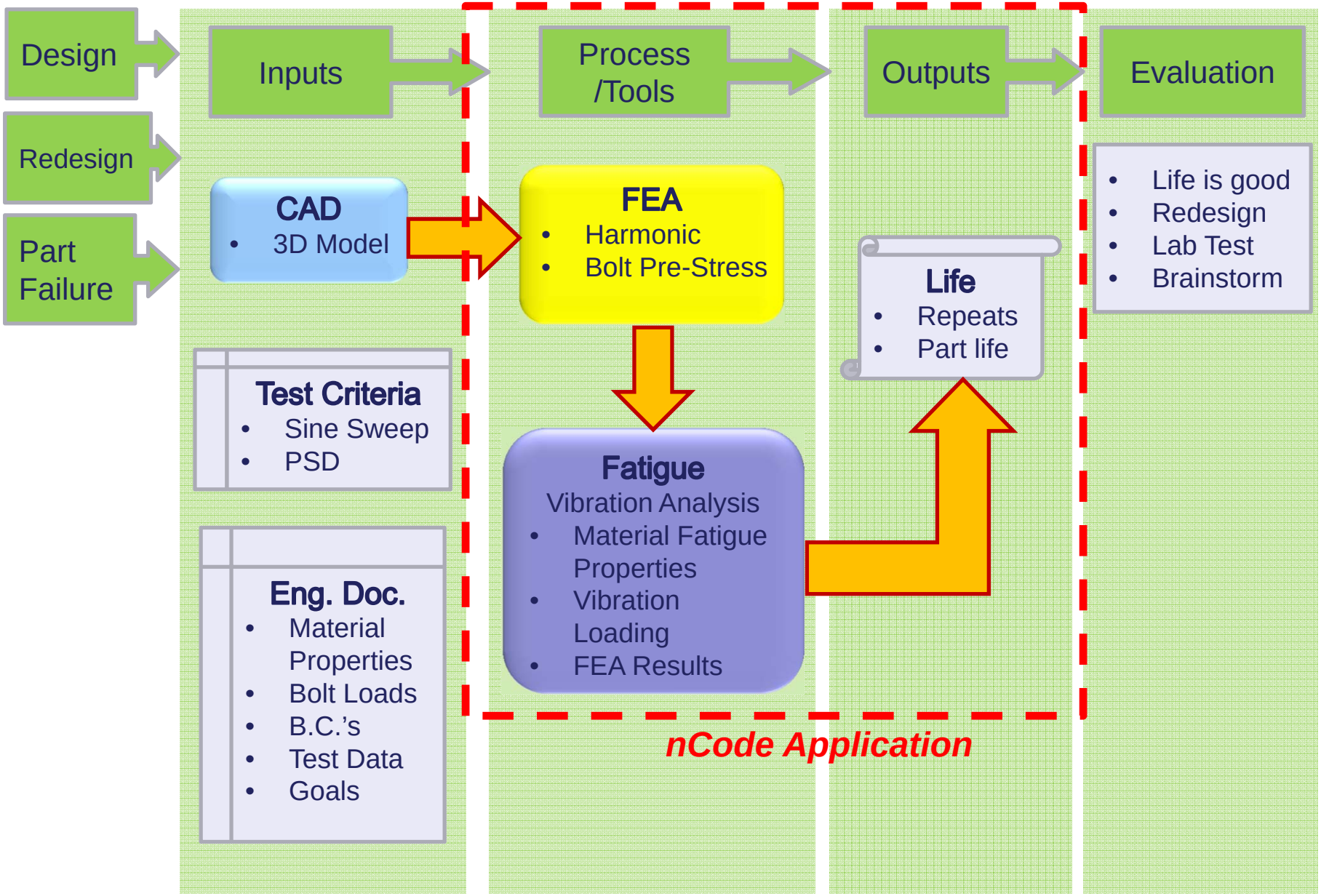


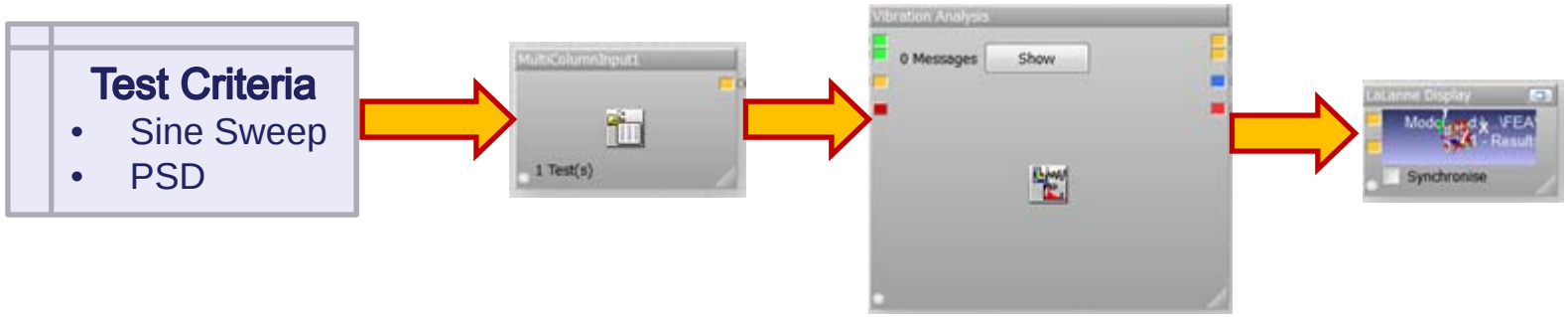
Air Dryer control unit mounting bracket fatigue life

Mechatronic products development has been a rising trend in industry. As a result, vibration testing is becoming more important especially for products with electronic components integrated. Most companies have specified test criteria and vibration profiles for testing their products. Traditional FEA can do modal and dynamic analyses including random vibration, and produce useful information such as natural frequencies, stress, strain, and etc. However, fatigue software like nCode can do even more; it can predict product life based on FEA results and vibration profile specified. nCode provides two loading methods in its vibration fatigue module, sine sweep and PSD. In this presentation, a DesignLife Vibration CAE Fatigue process with sine sweep test criteria and bolt pre-stress condition will be discussed.



Vibration Fatigue CAE Project Scope



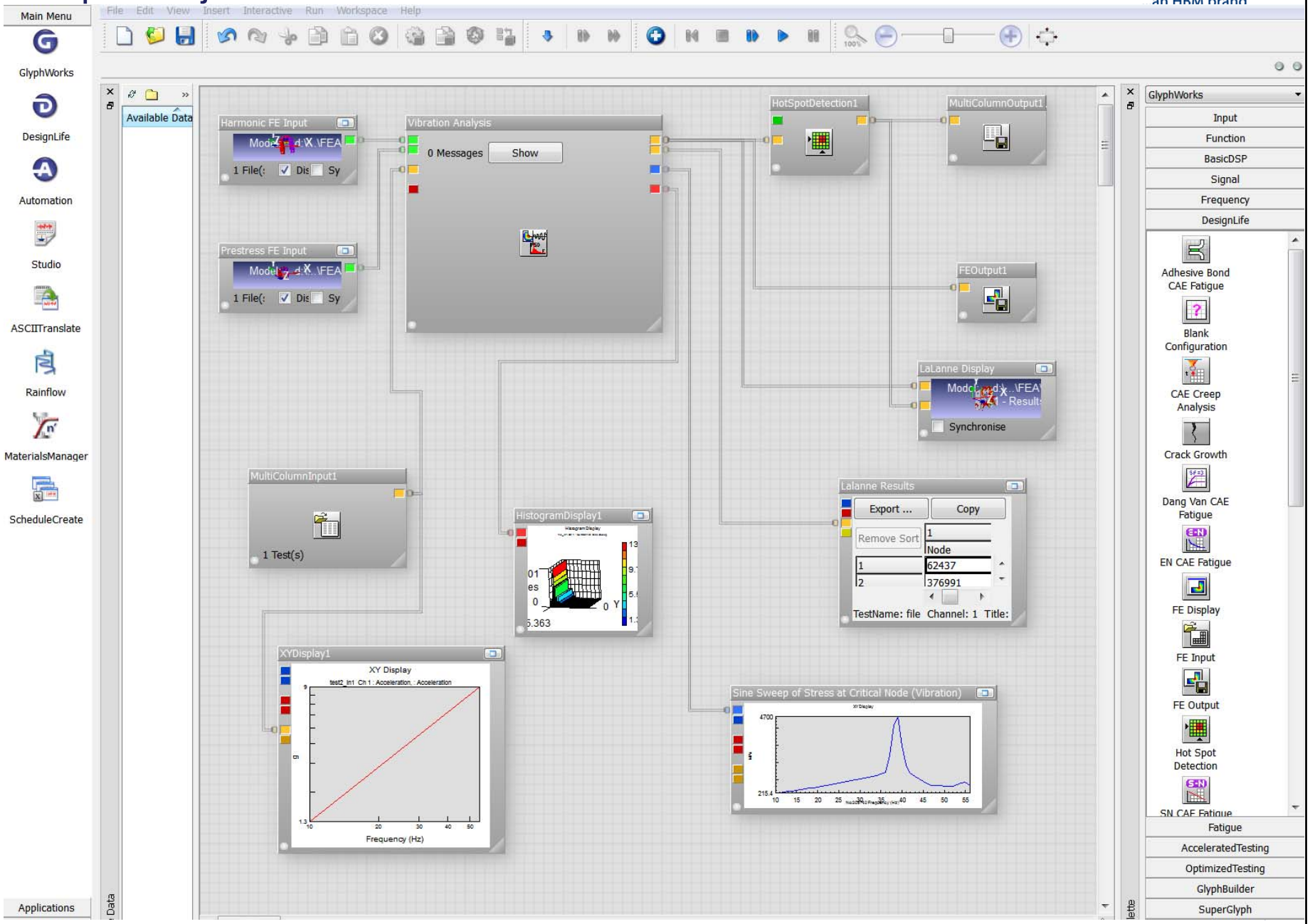


Sample Test Criteria:
Frequency Sweep: 10-55 Hz
Sweep Rate: 5.4 Oct/min
Acceleration at Frequency: 1.3g @ 20 Hz, 9.0g @ 55 Hz
Duration: 2 hours in x, y, and z directions individually

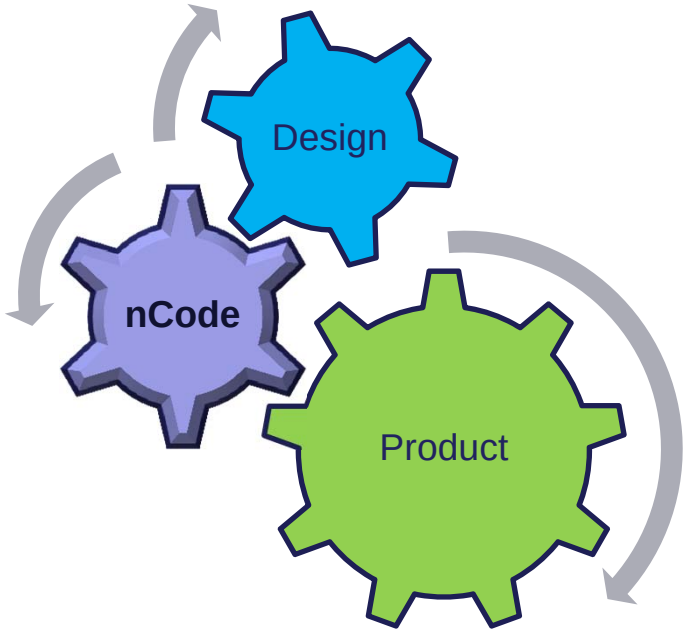
Goal: To predict life of the mounting brackets.

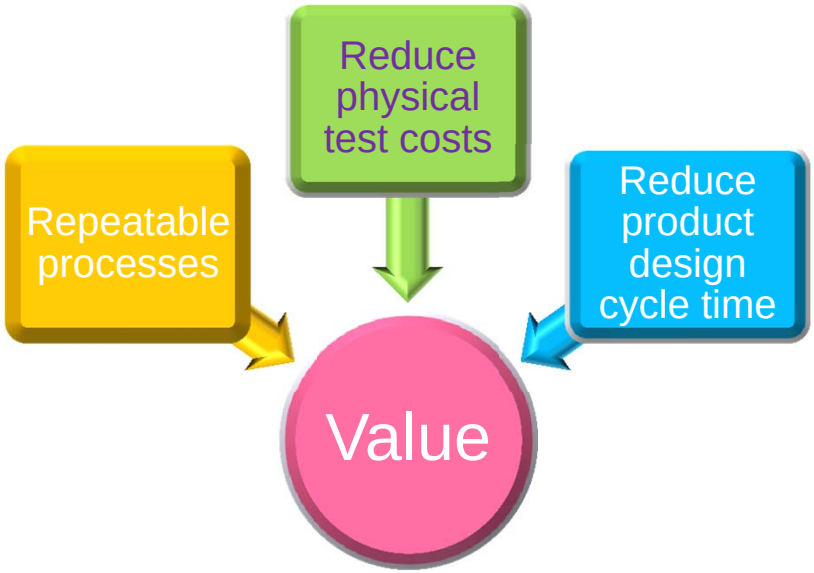
Sine Sweep task was simulated using nCode Vibration Fatigue module. According to the Sine Sweep specifications, the number of octaves is around 2.459 from 10 to 55 Hz. Therefore, 1 Repeat equivalent to 27 seconds. So, 2 hours = 7200 seconds = 267 Repeats.

Sample Project Connection



- How is nCode integrated as a solution?
- What is the added value of using nCode?





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Thank you!

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