Qualification Testing and the Benefits of Engaging Early

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Operations Manager Dynamic Test

AGENDA

- Qualification – It's not just about a certificate
- Product Life Cycle – Know Your Enemy
- Proving the Design – Confidence Testing
- Qualification Testing - Preparation
- Final Thoughts

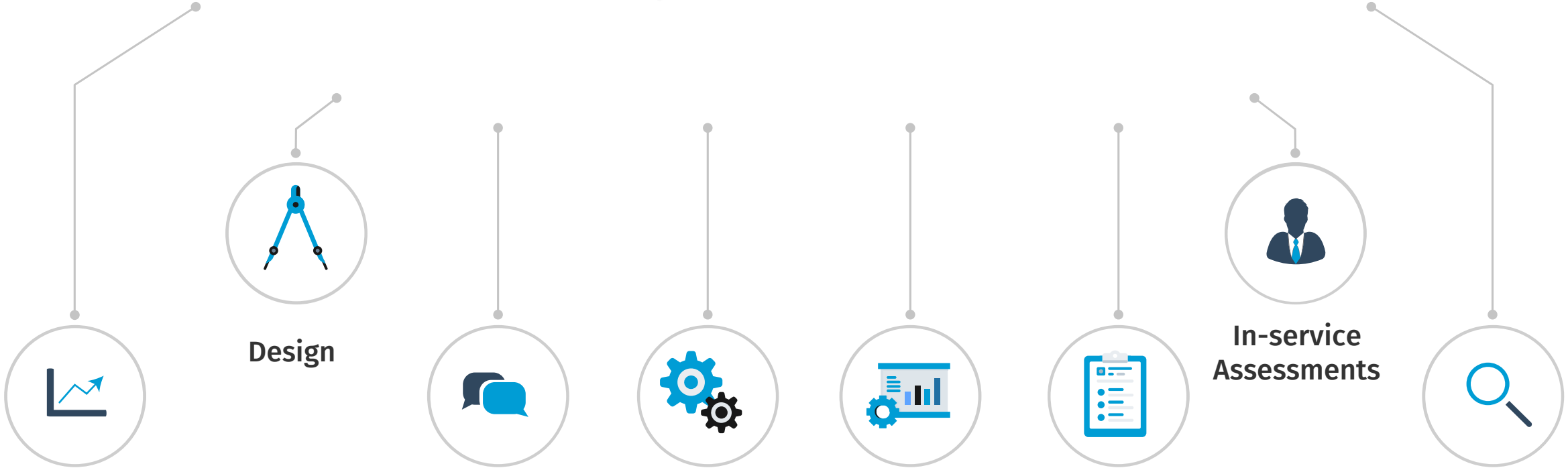
SLEEPER CARRIAGE – SYMPTOM OR CAUSE

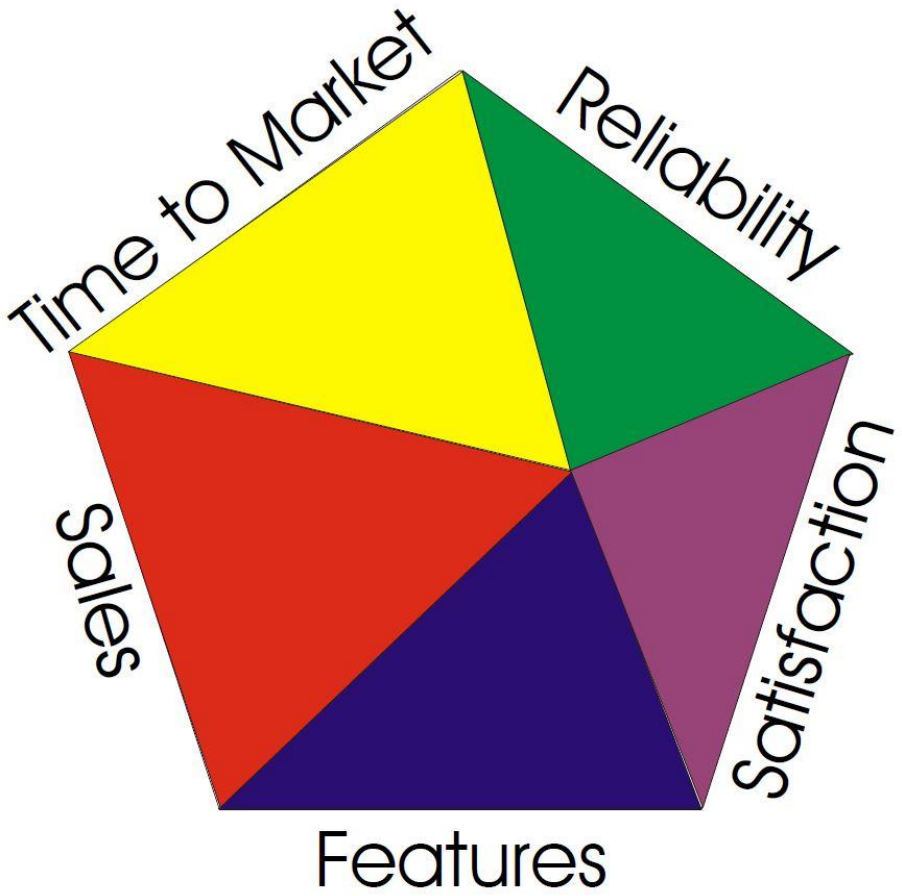
element

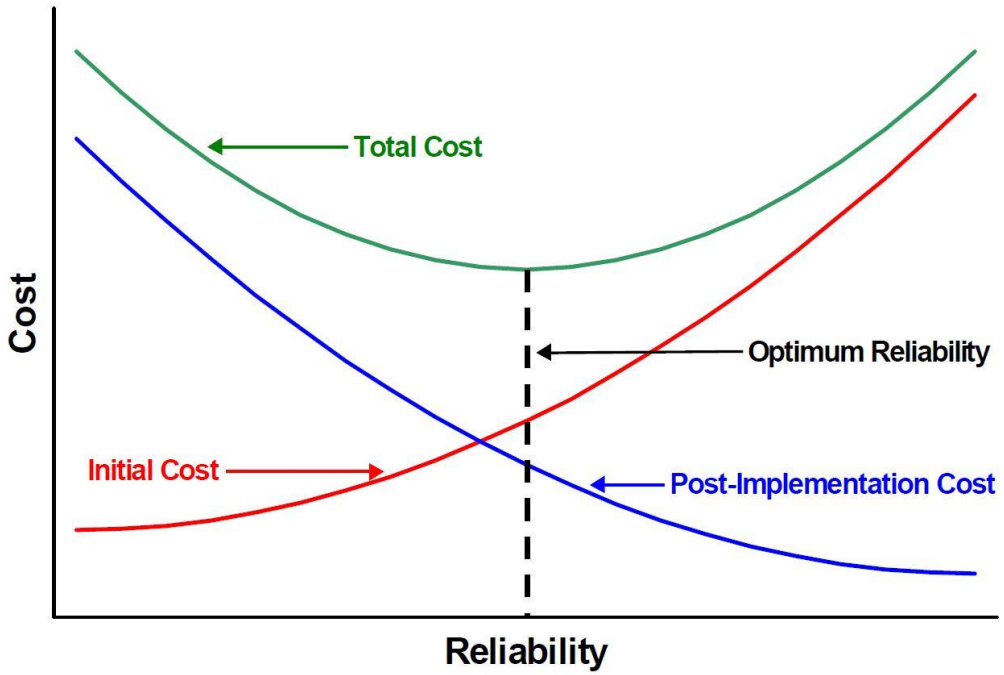
Holistic Process

element

Qualification




Time to Market
Reliability
Sales
Satisfaction
Features


Total Cost
Optimum Reliability
Initial Cost
Post-Implementation Cost
Cost
Reliability

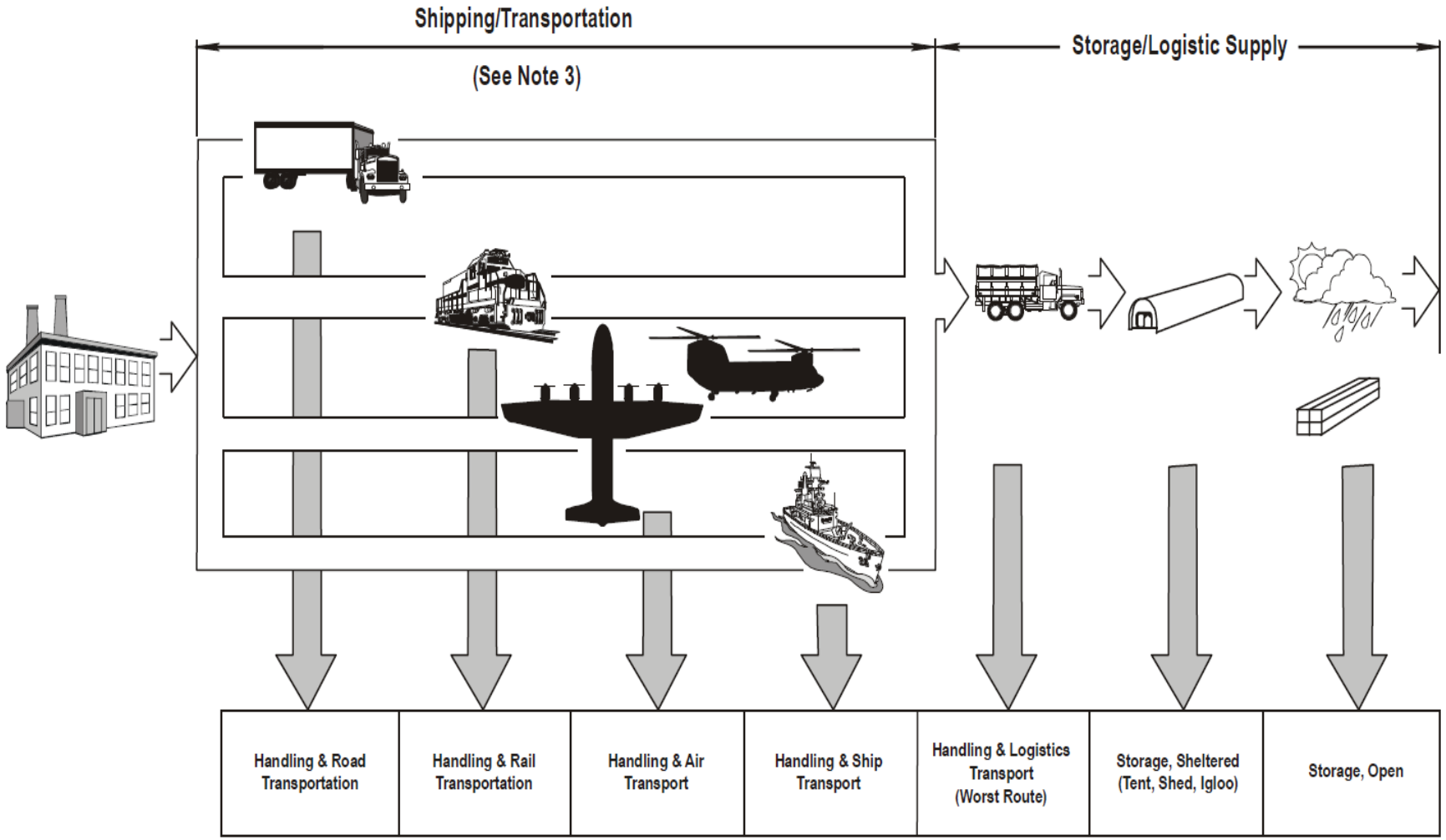

FIRST
AID

Qualification Testing

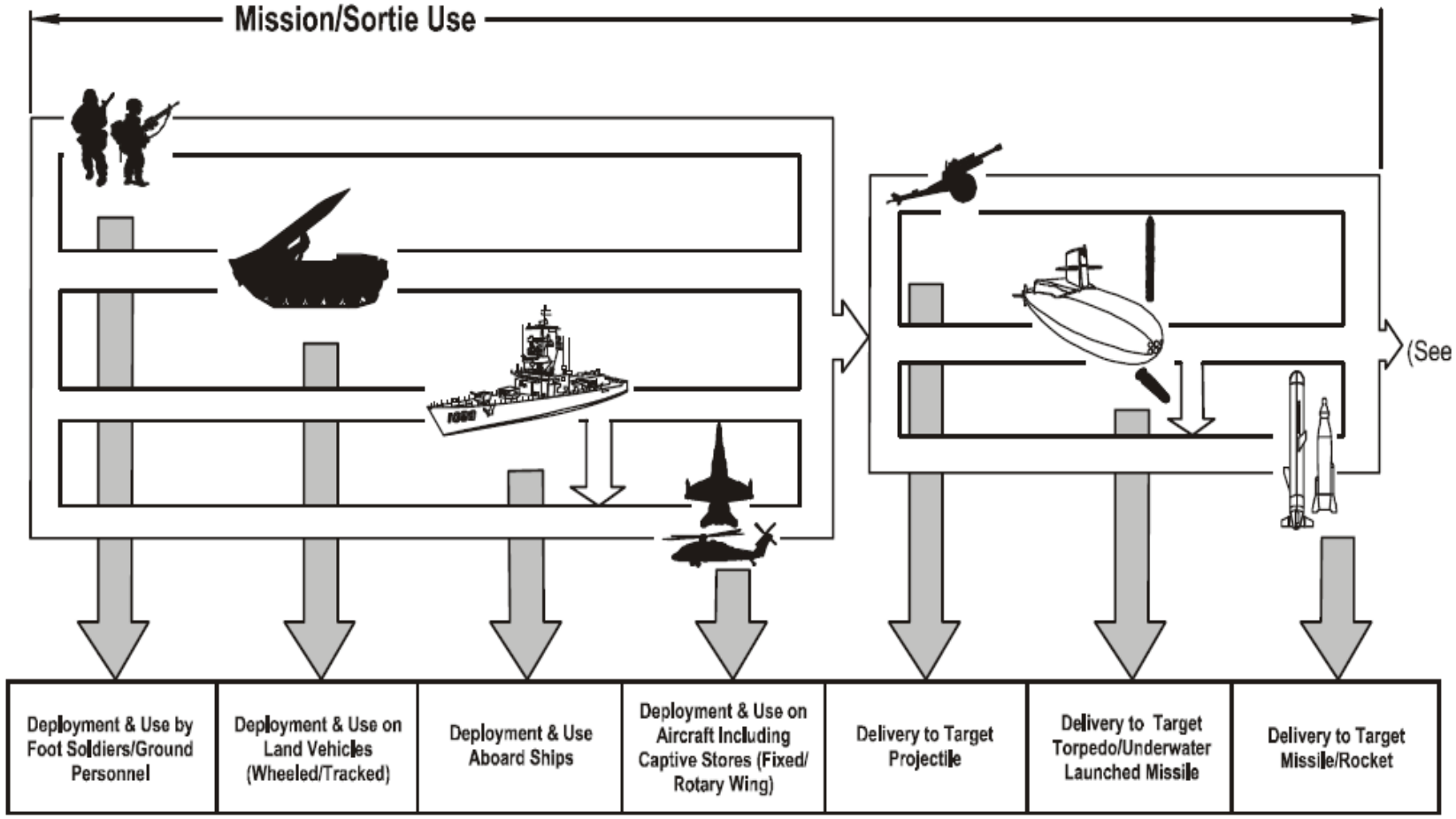
- it’s about using the appropriate engineering tools to understand and combat the combination of stresses that your product will see during its life

Product Life Cycle – Know your Enemy

Product Life Cycle – Before Use



Product Life Cycle



Which Test Standard?

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Tailored versus Standard?

element

Standard Tests - Pros

- Understood by customers and therefore have a wide acceptance
- Quick and easy to use
- Cheap – just find correct severities and go test

Tailored Tests - Cons

- Require time and intellect to determine life
- Time and expense to measure all real life events
- Time and expense to analyse measurements and determine test severities / levels
- Require co-operation of customers and therefore require time and effort to gain acceptance.

Standard Tests - Cons

- Can be very old / historic and don't relate to modern platforms / sources of vibration
- Generally very bad for test items with non-linear behaviour – combine too many vibration sources and are extreme and over-accelerated.

Tailored Tests - Pros

- Very relevant with specific platforms / environments
- Can be tuned so that they better reflect the distribution of real life stresses – far better for test items with non-linear behaviour
- Reduces margin of over-engineering

Tailored versus Standard

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General Advice

- Always be careful with standard tests with products with non-linear behaviour as test levels increase (investigate non-linearity!!)
- Always **consider** measuring **your OPERATING ENVIRONMENT – DO NOT RELY** on the standards
- Take care with Combined Transportation Standards, OK for low risk test items
- All tests have been accelerated and have margins built into them.

Product Life Cycle - Solar Powered HGV Trailer Tracking Device

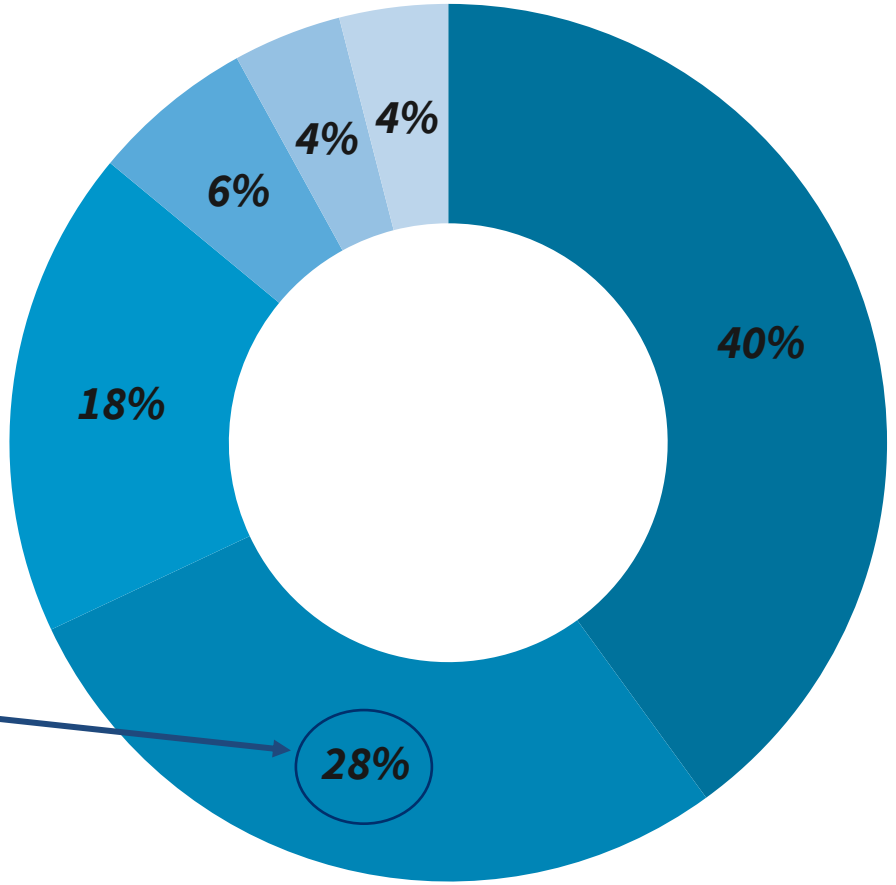
element

- Bench handling during assembly
- Transport and Storage
- Handling/pre-load during installation
- Combined vibration/temperature
- Mechanical Shock
- Solar heating
- Driving rain
- Thermal cycling

On top of this - demonstrate Functional Reliability

Confidence Testing – try things first

Typical environmental factors that cause products to fail from infancy to end of life



Vibration is the hardest to design for and to try in the factory

“Strengthening” the Product

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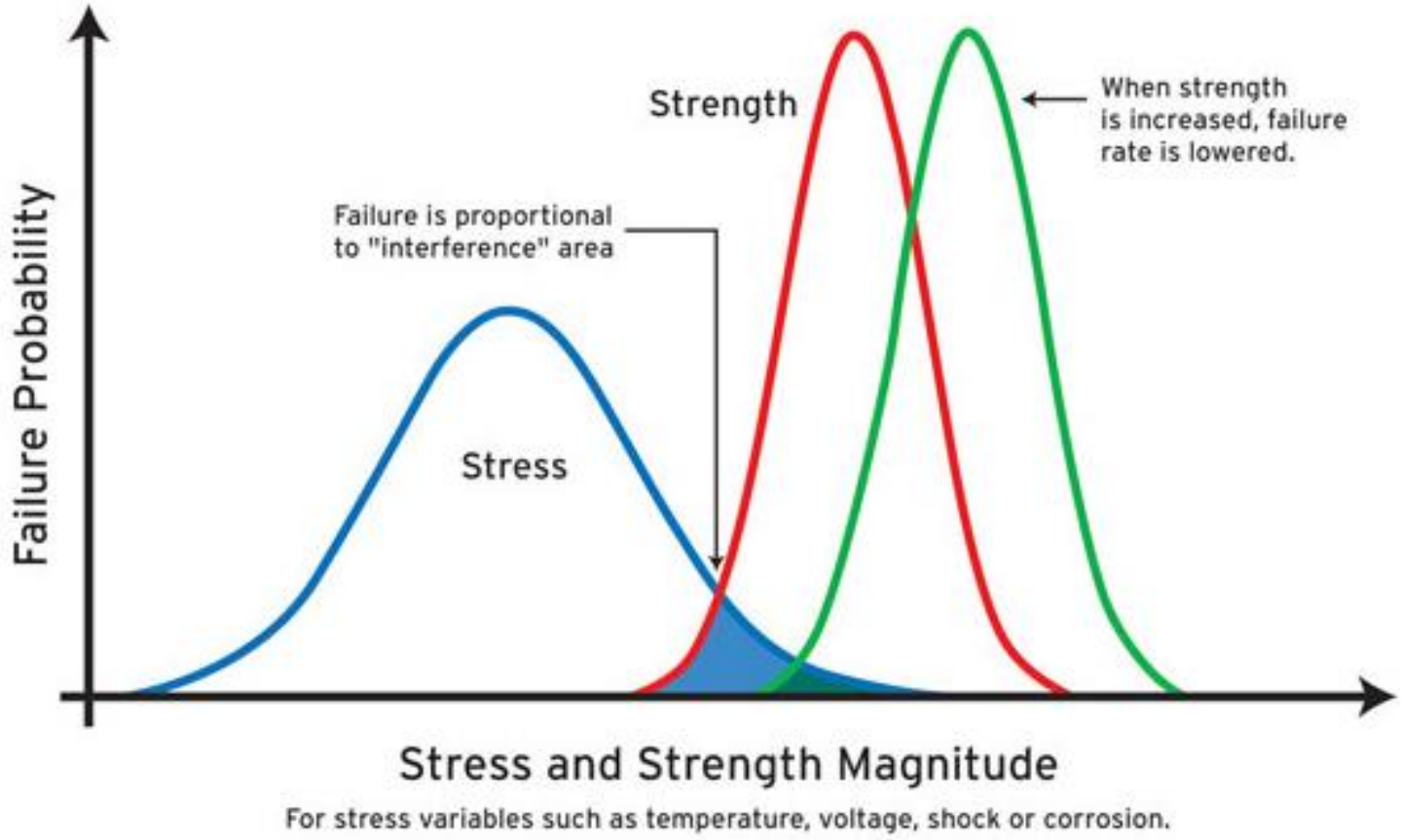
The Real Environmental and Product Resistance



Test Plan – The Key to the Best Outcome

- Standards mandate or recommend a Test Plan
- Write it yourself or get a Test House to produce it – either way liaise
- Involve all stakeholders, including the customer/Design Authority
- Define pass/fail criteria
- Detail all of the required functional aspects of the test item
- Detail represent in-service boundary conditions
- Detail all utilities and support equipment required for functional testing
- Reference the applicable Test Standards and ensure severities are defined
- Detail all tests, including confidence testing
- Include any measurement tolerances that are not specified in the standards
- Include a test and inspection log and/or results reporting forms

Ideally, Qualification Testing should be quoted against a Test Plan

Testing should only commence once the Test Plan has been approved

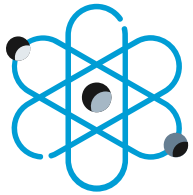
Test Readiness Review

element

Prior to travelling to the test house…….

- Ensure that the Test Plan is approved and has been issued to the test house
- Configure the test item and demonstrate full functional test setup, check cable lengths
- Fixturing and mounting fasteners
- Deliver the test item early – fit check against the fixture ahead of testing
- At the test laboratory use the Test Plan to inform all actions

Final Thoughts - Communication



Understand the environment and identify the qualification testing that you require from your product – communicate with the test house

Foster a culture of “Reliability” in your Organisation. Involve all personnel in the process and encourage feedback from design through commissioning to maintenance

Magnify the consequences of failure/poor reliability

Q&A


element
GRAZIE
TACK
DANKE
धन्यवाद
THANK YOU
감사합니다
one
element
شكراً جزيلاً
GRACIAS
DĚKUJEME
KIITOS
MERCI
謝謝
DANK U