DEVELOPING AND EVALUATING THE OPTIMAL PACKAGE
Presented by:

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Over-packaging?

Under-packaging?

Optimum Package?

The choice is yours!
Overview

- Review the 5 Step Procedure
- Briefly explain significance of each
- Define Pgk Perf vs. Pkg Integrity
- Pro’s & Con’s of each
- Typical Applications
- Trap of mixing them up
- Suggestions & Recommendations
Background:

“Scientific” package development began in the 1960’s and consisted primarily of the following steps:

1. Define the distribution environment
2. Determine PRODUCT fragility through testing
3. Determine PACKAGE material characteristics through testing
4. Design the package
5. Test the product/package system and redesign as necessary
Key Concepts

What makes this process work is the *quantitative* nature of the steps:

**Step #1: DEFINE THE DISTRIBUTION ENVIRONMENT**

- number & height of the impacts
- duration & intensity of the vibration
- the height of the top load
- max & min temperature & humidity levels, etc.
DEFINE THE DISTRIBUTION ENVIRONMENT

- Use a literature search
- Direct measurement using readily available equipment
Key Concepts

What makes this process work is the *quantitative* nature of the steps:

**Step 2: DETERMINE PRODUCT FRAGILITY**

- **max acceleration**
- **velocity change**

( before damage occurs)
DETERMINE PRODUCT FRAGILITY

- Shock test machine (ASTM D-3332)
- Vibration tester (ASTM D 3580)
Key Concepts

What makes this process work is the *quantitative* nature of the steps:

**Step 3:** CUSHIONS ARE QUANTIFIED
SHOCK ABSORPTION AND VIBRATION DAMPING ABILITIES
Key Concepts

What makes this process work is the *quantitative* nature of the steps:

**Step 4: PACKAGE DESIGN**

(the **numbers** are used to apply the correct amount of protection to that product in the intended distribution environment)
Key Concepts

What makes this process work is the *quantitative* nature of the steps:

**Step 5: TEST THE PRODUCT/PACKAGE SYSTEM**

(subject it to the 3 sigma level of the *known* inputs from the distribution environment while the level of response is measured on the product and compared to it’s known fragility)
This is called “Package Performance”

It’s a quantitative analysis.
More Background:

There is another method of package evaluation that I will call “Package Integrity”:

• It’s a simulation of the distribution environment hazards within the lab.

• If successful (no damage), then it is assumed that the package will “protect” the product.

• This is a qualitative test – no numbers are generated.
More Background (cont’d):

Essentially, **Pkg Integrity** test is an attempt to:

- “bring the distribution environment into the laboratory”
- subject the product/package system to the most intense portion of this environment
- and evaluate the results

Typical procedures include:

- ISTA test protocols
- ASTM D-4169 & 7386 procedures
- and similar
Package **Performance** Test

What’s GOOD about this (pro’s):

- **Quantitative test; numbers are generated**
- **Gives a clear pass/fail evaluation**
- **Gives a good “margin” (headspace) analysis**
- **Very useful for evaluating option A vs. B**
- **Helps optimize product/package systems**
- **Very handy for Logistics or Supply Chain work**
- **Can help evaluate trade-off’s between product ruggedness and package costs**
What’s bad about it (con’s):

• More expensive

• Requires instrumentation and knowledge thereof

• Requires knowledge in conducting the test and interpreting results

• Conflicts can arise between various requirements (ie, shock & vibration)

• Requires that one have accurate product fragility (sensitivity) data
Package **Integrity** Test

What’s good about this (pro’s):

- Legacy test – been around a long time
- Simple(r) and less expensive test to run
- May be good enough for some applications
- It’s basically a “simulation” test
- Pass/fail analysis only
- Widely used
Package **Integrity** Test

What’s bad about this (con’s):

- There is no margin or headspace analysis
- It’s value is based on the quality of the distribution environment measurement
- Over-packaging is common
- No good indication of how to fix a failed pkg
- Subject to “procedure creep”....
## Quick Summary:

### Package Performance
- Quantitative test
- Measurement involved
- Offers clear pass/fail
- Offers margin or headspace
- More expensive
- Requires more knowledge
- “Stimulation”
- Good pkg optimization tool
- Product ruggedization trade-off’s available
- Requires product fragility data

### Package Integrity
- Qualitative test
- No measurement
- Observable pass/fail only
- No margin analysis
- May foster over-packing
- No “fix” indications
- “Simulation”
- Works for anything shippable
THE QUESTION IS!

Which do I use to “optimize” my packaging?

Package Performance Test

Package Integrity Test
1. Margin analysis is a very powerful tool.
   • This is the major source of packaging cost reduction available
   • It gives the designer peace of mind knowing exactly where they’re at
   • Extra cost (often minor) can easily be recovered – and more – is lower pkg costs and lower damage-in-shipment rates
2. Exact knowledge of the distribution environment is not really necessary.

- You don’t really care because whatever it is (short of abusive), you’ve got it covered.
- The distribution environment will change over time – BUT you’re covered.
The Case For Package Performance Testing

3. Product Ruggedization is value added:

- “Protection” from the package gets thrown away but a more rugged product gives added value to the customer
- The best package is no package but we don’t know how close we are without the numbers
- The most sustainable product/package system is one with minimum “value” in the package and maximum “value” in the product
The Case For Package Integrity Testing

(NOT Herb’s choice)

- It’s cheap(er)
- It’s been around for a long time (old?)
- It’s quick
- It’s universal – one shoe fits all
- It’s “good enough” for many applications
OK.
Given all that, how should I proceed? How do I get to the “optimum package”?
Sometimes you don’t have a choice....

- “non-breakable” product
- Non-cushioned packages
- Most liquid products
- Many consumer products
- Others...
In these cases, the best you can do is to bring the distribution environment into the lab and simulate the effects on a valid sample size, then make a pass/fail decision.
Recommendations:
(Herb’s secret sauce)

1. Always design & test “by the numbers”

2. Educate yourself & others about the reality of (true) package performance vs an integrity test that tries to pass for something more significant.
3. Learn to interpret the data from a (quantitative) performance test

A. There’s lot’s of information there
   • Over/under-loaded cushion
   • Fatigue potential of cushion
   • Cushion damping properties

B. Pkg optimization is simple once the data is understood
   • Material comparisons are easy
   • Stability is clearly shown
   • Cost reductions are straightforward
REMEMBER:

OVER-PACKAGING?
UNDER-PACKAGING?
OPTIMUM PACKAGE?

THE CHOICE IS YOURS!
QUESTIONS?
THANK YOU!
LOCATIONS

Two Westpak Locations

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