



Green Packaging for WMT Suppliers-Zinus Case Study - 1

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Requirement

- Content 內容物：mattress 床墊卷屈如牙膏狀
- Packing 包裝方式：Inner Box + cartons先套一內盒(會空心)再加一外箱
- Weight 重量：60kg每一內容物淨重60公斤
- Stack 堆疊方式：5 layers stack堆疊五層
- Dimension 尺寸：111*45*44 cm公分(另有多種箱規尺寸)
- Current Paper Spec. 目前紙規：
 - Double wall, BC flutes/ BC楞，五層
 - 250 / 150(B) / 175 / 150(C) / 230(g/m²)
- Volume 需求量：每月需求約4,000~6,000pcs只(總量)

Case 1

- Structure: B+(Dual A) Flute , 6 layers

- Reinforcement:

- ZEO™ Glue

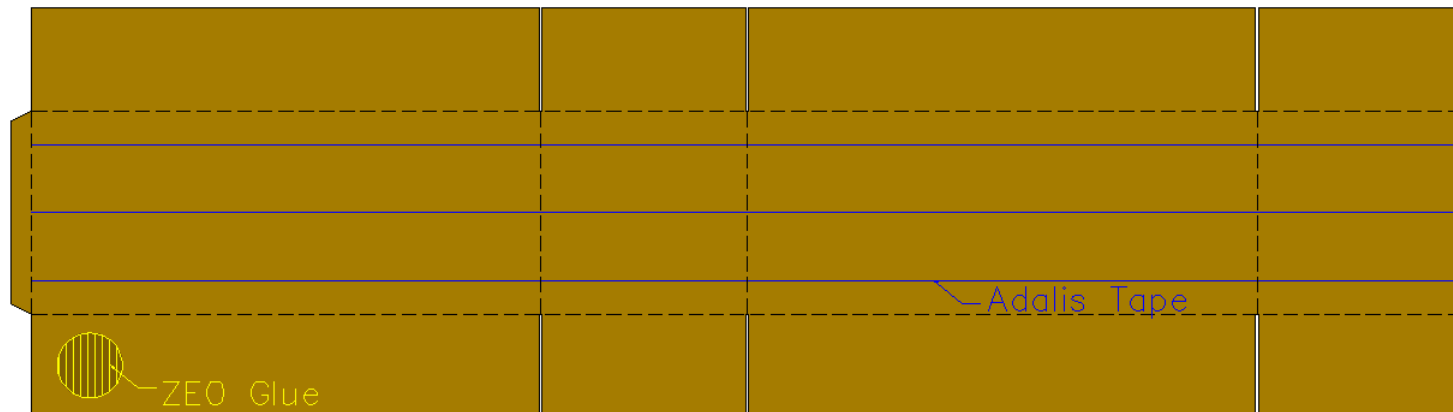
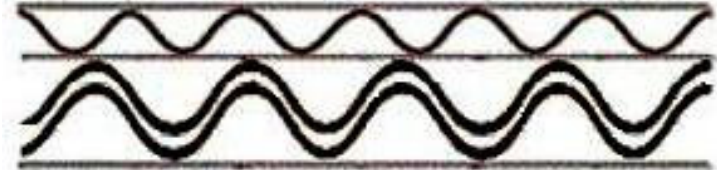
- 3 Adalis “String king” tapes

- Paper Spec.: 230 / 140(B) / 140 / 2*100(2A) / 170(g/m²)

- Theoretical Strength:

Burst: 20.7 kg/cm² , Edge Crush: 8270 N/m , Box: 904 kg

- Price:



Case 2

- Structure: AC Flute , 5 layers

- Reinforcement:

- ZEO™ Glue

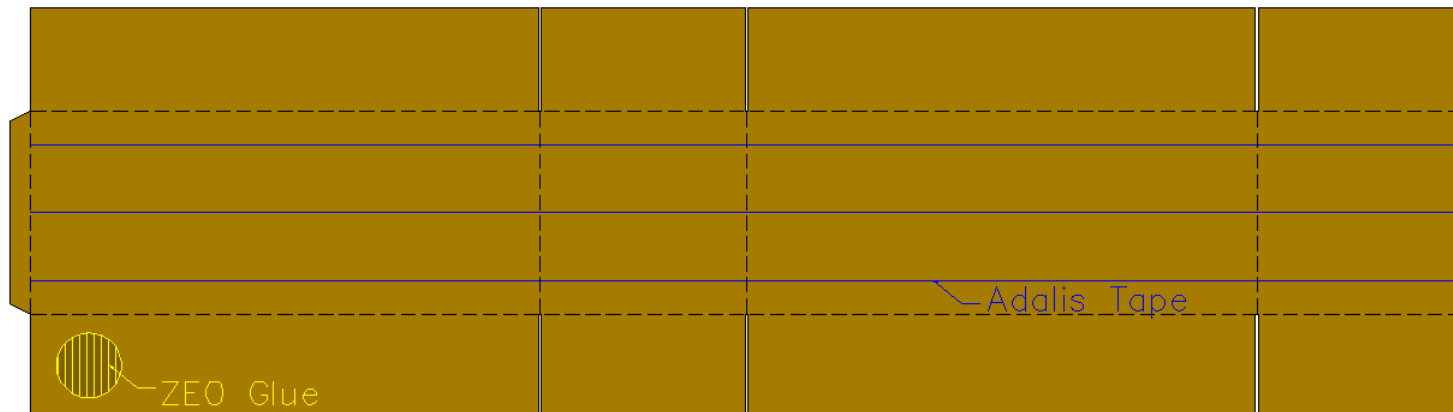
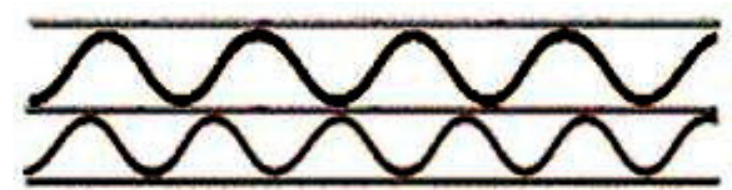
- 3 Adalis “String king” tapes

- Paper Spec.: 230 / 145(A) / 126 / 145(C) / 175(g/m²)

- Theoretical Strength:

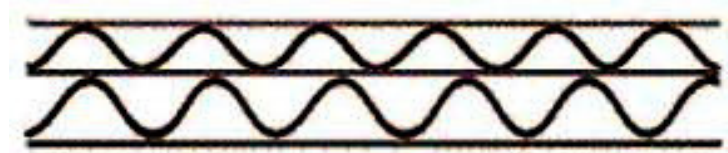
Burst: 21.9 kg/cm² , Edge Crush: 8680 N/m , Box: 927 kg

- Price :



Case 3

- Structure: BC Flute , 5 layers



- Reinforcement :

- ZEO™ Glue

- 1 Adalis “Sesame” tape + 2 Adalis “String king” tapes

- Paper Spec.: 250 / 145(B) / 175 / 145(C) / 230(g/m²)

- Theoretical Strength:

Burst: 25.4 kg/cm² , Edge Crush: 10184 N/m , Box: 1035 kg

- Price:



Box Strength Decrease

	Case 1 :	Case 2:	Case 3:
	<ul style="list-style-type: none"> ■ (B+Dual A) Flute ■ ZEO™ ■ Adalis tape 	<ul style="list-style-type: none"> ■ AC Flute ■ ZEO™ ■ Adalis tape 	<ul style="list-style-type: none"> ■ ZEO™ ■ Adalis Tape
Paper Spec	230/ 140(B)/ 140/ 2*100(2A)/ 170	230/ 145(A)/ 126/ 145(C)/ 175	25 / 145(B)/ 175/ 145(C)/ 230
Box Strength Decrease Ration by Length / Breadth	20%	10%	20%
Humidity Decrease Ration	24%	24%	24%
Simulated Box Strength over humidity decrease and length/breadth	506	<u>612</u>	580

Carton Dimension:111*45*44 cm

Note:

1. The Dimension of Box is Critical for $L/W > 2$. More box compression decrease is expected during humidity and transporation.
2. ZEO stone glue is more reliable in humidity test.
3. AC flute can give much better structural strength. Therefore, Case 2 is recommended.



Appendix A

- The box in this project is long in shape, so the box compression strength would decrease.

$$111(\text{Length}) : 45(\text{Width}) = 2.5 : 1$$

紙箱的【長寬比】對強度的影響：

一般情況下，紙箱的長寬比在1~1.8的範圍內，長寬比對抗壓強度的影響僅為±5%。其中紙箱的長寬比RL=1.2~1.5時，紙箱的抗壓強度最高。紙箱的長寬比為2：1時，其抗壓強度下降約20%，因此確定紙箱尺寸時，長寬比不宜超過2，否則會造成成本浪費。

As the ratio of length to width is 2:1, the box compression strength would decrease about 20%

<http://blog-packtech.blogspot.com/2010/03/ectedge-crush-strength.html>



Appendix B

	Temperature	Relative Humidity	Box Compression Strength	Percentage Decrease
ZEO™ Box (AB楞)	24 °C	52 %	523 kg	24 %
	30 °C	83 %	396 kg	
Normal Box (AB楞)	24 °C	52 %	445 kg	33 %
	30 °C	83 %	298 kg	