AirWrap Packaging, Inc.
Teaching Commentary

OVERVIEW

This is a very challenging case that gives students practice in customer value analysis, product costing, full cost versus marginal cost analysis, "capacity costing," and product line profitability. For students who are up to the challenge, it makes an excellent end-of-term review case or final exam. I have used it successfully in both contexts at both Tuck and Babson.

The case also provides an excellent vehicle to demonstrate the link between marketing strategy and financial analysis in a context where students must evaluate a choice between "stick to your knitting" and "be flexible as business conditions change."

ANSWERS TO ASSIGNMENT QUESTIONS

Questions 1 and 2 deal with profitability analysis for the base product (Air Seal), with accounting for excess capacity thrown in. Question 3 covers the break-even point and the issue of "operating leverage." Questions 4 through 7 deal with LCC for four different product situations drawn from the four cells in the LCC matrix in the case. The four examples illustrate the wide range of market attractiveness for AirWrap across different business settings.

Questions 8 and 9 deal with the overall attractiveness of producing AW on AS equipment, using the excess capacity. Questions 10 and 11 deal with the overall attractiveness of creating new manufacturing capacity dedicated to uncoated bubbles. All eleven questions are necessary to provide a full analysis of the new product (AW) opportunity. The calculations for each of the eleven questions are shown below.

Question 1
(a) What is the Return on Investment (ROI) for AirSeal for 1985?

Profit = $9.3 million, per Exhibit 1 in the case		
Investment		
A/R	(45 DSO)	= $ 4.3 million
Inventory	(4 Turns)	= $ 4.6 million
Gross Equipment Cost	($2.6 x 1/2 x 20)	= $26.0 million
TOTAL		= $34.9 million

ROI = Profit / Investment = 9.3 / 34.9 = 26.7% (before tax)

(b) How is the AirSeal product line doing, using the "DuPont formula?"

P/S = 9.3/34.8 = 27% = Great!

S/A = 34.8/34.9 = ~1= Marginal

P/A = 27% x 1 = ~26.7%

Doing quite well!

Question 2

How would the ROI change if excess capacity (Fixed Manufacturing Overhead, Factory Labor, and Manufacturing Equipment) were not charged to the product line?

1985 volume = 721 million sf
Capacity = 961 million sf
Excess capacity = 240 million sf (961 – 721) = 25%

a. Add 25% of Factory Labor and Fixed Manufacturing Overhead expenses back to product line operating income

9.3 + .25(10.3 + 2.6) = 9.3 + 3.2 = 12.5

b. Delete 25% of Equipment Cost from Investment

34.0 – (26 x .25) = 34.9 – 6.5 = 28.4

c. Recalculate ROI 12.5 / 28.4 = 44% = Pretty obscene!

Question 3

(a) Calculate the break-even sales volume in dollars for AirSeal in 1985.

Contribution Margin	= Sales – RM – VOH – Freight – Commissions (at 2% of Sales)	
CM	= \$34.8 – \$3.9 – \$1.4 – \$3.1 – \$.7	= \$25.7
CM % of sales	= \$25.7 / \$34.8	= 74%
Fixed Cost	= Factory Labor + Fixed Overhead + Other Expenses (less Commissions)	
Fixed Cost	= \$10.4 + \$2.6 + \$4.1 – \$.7	= \$16.4
Break Even	= Fixed Cost ÷ CM% of Sales = \$16.4 /.74	= \$22.2 million

(b) Discuss the "Operating Leverage."

Capacity Sales	= 961 ~~M~~ft² x \$48.32/1000	= \$46.4M
B/E as % of Capacity	= 22.2/ 46.4 = 48%	**which is pretty low.**
Fixed Costs	= \$16.4 million = 35% of Capacity Sales	**which is pretty high.**

AirSeal is a high contribution margin, high fixed cost business, which means it has a high degree of operating leverage.

Question 4

(a) Calculate the LCC to Noritake per shipment for AirSeal and AirWrap.

(b) Based on part (a), what is the market potential of AirWrap for this customer?

Part (a) **Life Cycle Cost (LCC)**

	AirSeal	AirWrap	
Packaging	\$ .67[1]	\$ .49[2]	[1] \$ 47.65 x .014
Other Shipping	\$ 3.05	\$ 3.05	[2] \$ 34.79 x .014
Total Shipping	\$ 3.72	\$ 3.54	[3] .015 (\$90. + \$3.72)
Breakage Loss	\$ 1.41[3]	\$ 3.74[4]	[4] .04 (\$90. + \$3.54)
Total	\$ 5.13	\$ 7.28	

Part (b) The "Value Proposition" for AirWrap (comparative LCC) is negative $2.15

This price/performance buyer in Cell I will continue to use AirSeal. The introduction of an uncoated product will not affect sales of AirSeal in this market segment.

Question 5

(a) Calculate the LCC for NEW per-shipment for AirSeal and AirWrap.

(b) Based on part (a), what is the market potential for AirWrap for this customer?

Part (a)

	Life Cycle Cost (LCC)	
	AirSeal	AirWrap
Packing material	$ 0.58[1]	$ 0.32[2]
Other shipping costs	$ 20.27[3]	$ 20.27
Total shipping	$ 20.85	$ 20.59
Breakage loss	$ 0.02[4]	$ 0.02[5]
Total	$ 20.87	$ 20.61

[1] $72.40 x .008
[2] $39.63 x .008
[3] $20.85 - 0.58
[4] .0001 x ($90 + $63 + $2.50 + $20.85)
[5] .0001 x ($90 + $63 + $2.50 + $20.59)

Part (b)
The "Value Proposition" for AirWrap = $20.87 — $20.61 = $0.26.
An uncoated bubble is the better choice for this application, which falls into Cell II.

The price/performance buyer in Cell II will switch from AirSeal to an uncoated product. An uncoated product will eventually dominate in Cell II. AirSeal currently has 32% SOM in the segment (25.5 – 12 = 13.5 / 42 = 32%). Although the introduction of AirWrap will cannibalize sales of AirSeal, an uncoated product will eventually take the sales anyway, even if AirSeal does not introduce its own uncoated line.

AirSeal is vulnerable here and will have to cut price 45% to match the competition.

Question 6

(a) Calculate the LCC per shipment for FAP for Air Cap, AirWrap, and "Loose Peanuts," using the data from the case.

(b) Based on part (a), what is the market potential for AirSeal and for AirWrap for this customer?

Part (a)

	Life Cycle Cost (LCC)		
	"Loose Peanuts"	**AirSeal**	**AirWrap**
Product Carton	$ .37	$ .37	$ .37
Packing labor	$ .21	$ .13	$ .13
Freight Cost	$ 2.05	$ 2.00	$ 2.00
Packaging Material	$ .45	$ .65[1]	$ .36[2]
Total Shipping	$ 3.08	$ 3.15	$ 2.86
Breakage Loss	$ .23[3]	$ .02[4]	$ .03[5]
Total	$ 3.31	$ 3.17	$ 2.89

[1] $72.40 x .009 = $ .65
[2] $39.63 x .009 = $ .36
[3] .005 x ($43. + $3.08) = $.23
[4] .0005 x ($43. + $3.15) = $.02
[5] .0006 x ($43. + $2.86) = $.03

Part (b)

AirSeal should dominate "peanuts" ($3.17 vs. $3.31), but the Purchasing Agent looks only at packaging materials cost and chooses "peanuts" ($ .45 vs. $ .65).

AirWrap would dominate "peanuts." Its LCC is lower ($2.89 vs. $3.31). The Purchasing Agent will miss this but will still see lower packaging cost ($ .36 vs. $ .45).

This Cell III customer (in the largest sales volume cell) offers a good potential market for uncoated bubble wrap because of lower packaging material cost versus "peanuts." Over time, if buyers can be convinced to look at LCC, a trend toward uncoated air bubbles would be even more pronounced.

This is a good opportunity for AirWrap at a 45% discount off AirSeal prices.

Question 7

(a) Calculate the LCC per carton for College-Craft Glassware for AirSeal, AirWrap, and Cardboard.

(b) Based on part (a), what is the market potential for AirSeal and AirWrap for this customer?

Part (a)

	Life Cycle Cost (LCC)		
	Cardboard	**AirSeal**	**AirWrap**
Shipping Carton	$ .45	$ .45	$ .45
Packing Labor	$ .12	$ .03	$ .03
Freight Cost	$ 2.30	$ 2.25	$ 2.25
Packaging Material	$ .55	$ .69[1]	$ .44[2]
Total Shipping	$ 3.42	$ 3.42	$ 3.17
Breakage Loss	$ .96[3]	$ .07[4]	$ .38[5]
Total	$ 4.38	$ 3.49	$ 3.55

[1] $57.25 x .012 = $ .69
[2] $36.63 x .012 = $ .44
[3] .02 x 12 x $4.00 = $ .96
[4] .0015 x 12 x $4.00 = $ .07
[5] .008 x 12 x $4.00 = $ .38

Part (b)

Although the "Value Proposition" for AirSeal is $ .89 per shipment ($3.49 vs. $4.38), the Purchasing Agent chooses cardboard because of the packaging material cost ($ .55 vs. $.69).

AirWrap shows a positive "Value Proposition" versus cardboard ($3.55 vs. $4.38), but the Purchasing Agent will not see this. AirWrap will be chosen anyway because packaging cost is lower ($ .44 vs. $ .55).

AirSeal should be the preferred material for this Cell IV customer, but Purchasing Agents don't value the full LCC perspective. But uncoated bubbles can still gain volume here over cardboard based solely on cost of packaging materials.

AirWrap should do well with customers like this.

Question 8

(a) What annual sales level for AirWrap can be supported using the excess capacity on the AirSeal equipment as of 1985? Assume average price of $29 to distributors.

Total Capacity	961 million sq ft.
Less Air Cap Sales	721 million sq ft.
= Available for Uncoated Volume	240 million sq ft. (per Question 2)
Maximum Uncoated Sales	240 million x $29 / 1000 = $6.96 million

(b) So what?

Maximum sales are only about 6.5% of the potential U.S. bubble wrap market in Cells II, III, and IV (7/108), which seems very modest. Assuming further growth for AirSeal in the United States and abroad, even less capacity will be available for uncoated.

New uncoated bubble wrap equipment costing $13 million would support sales of about $28 million (961 million x $29 / 1000), which is still only 26% of the current potential market in just the United States (28 / 108).

Overall, it seems inappropriate to assume that AirWrap will be produced for very long, if at all, using excess AirSeal capacity — perhaps in the first year, but not later.

Question 9

(a) Estimate the variable cost per 1,000 sq. ft., on average, to manufacture and ship AirWrap using the AirSeal Equipment. (Assume the average bubble thickness is 3/16 inch.)

Raw Material (weighted average of 2.90 and 9.11)		$3.22
Variable Manufacturing OH (given)		$1.94
Freight (from the case for 3/16" bubbles)		$2.64
Sales Commission (2%)		$ .58
	Total	$8.38

(b) Estimate the full cost per 1000 sq. ft., on average, to manufacture and ship AirWrap using the AirSeal Equipment.

Variable Cost (as above)		$ 8.38
Factory Labor Cost($10.3 million ÷ 961 million sq. ft.)		$10.72
Fixed Manufacturing OH ($2.6 million ÷ 961 million sq. ft.)		$ 2.71
	Total	$21.81

(c) Comment on the estimated contribution margin and gross margin of AirWrap when produced on AirSeal machinery.

Contribution Margin = $29. - $8.38 = $20.62 / 1,000 s.f. = 71% of sales

This compares favorably to 74% for AirSeal (Question 3)

Gross Margin less shipping and commission = $29. - $21.81 = $7.19 / 1,000 s.f. = 24.8%

This compares unfavorably to 36.5% for AirSeal (16.5 - 3.1 -.7 = 12.7 / 34.8 = 36.5%)

In short, AirWrap is an "okay CM, poor profit product" when produced on the AirSeal equipment.

Question 10

(a) Estimate the full cost per 1000 sq. ft. to manufacture and ship AirWrap using its own equipment.

Raw Material	$ 3.22 (assuming 3/16" is the "average" product)
Var Manufacturing OH	$ 1.94
Factory Labor	$ 6.45 ($6.2 million ÷ 961 million)
Fixed Manufacturing OH	$ 1.70 ($1.63 million* ÷ 961 million)
Freight	$ 2.64
Sales Commission	$ 58
	$16.53

*Depr. = $1.3 ÷ 2 = $.65; Other = $1.3 x 75% = .98; total = $.65 + $.98 = $1.63 million

(b) Comment

CM is the same as in Question 9, but GM less selling and shipping now is $29.00 - $16.53 = $12.47. This is 43%, which is substantially *better* than AirSeal (36.5%).

Question 11

(a) Estimate the ROI for AirWrap if it could operate at 90% of capacity in its own manufacturing facilities. Assume Selling and Marketing at 7% of Sales, R&D at zero, and Administrative cost at 3% of Sales. Assume the $29 average selling price.

Income Statement (Millions$)			
Sales		$25.1	(961,000 x .9 = 865,000 x $29.)
Raw Material	$ 2.8		(865,000 x $3.22)
Factory Labor	$ 6.2		Given
Variable OH	$ 1.7		($1.94 x 865,000)
Fixed OH	$ 1.6		(from Question 10)
Freight	$ 2.3		($2.64 x 865,000)
Selling & Mktg.	$ 2.5		(10%)
Administration	$ 0.8		(3% of $25.1)
Total Expenses		$17.9	
Operating Profit		**$ 7.2**	

Investment		
A/R	$ 3.1	(45 DS0)
Inventory	$ 3.0	(4 inventory turns: $12.3 ÷ 4)
Equipment (gross)	$13.0	
TOTAL	**$ 19.1**	

ROI = $7.2 / $19.1 = 37.7%, with excess capacity of 10% included in the costs.

(b) Comment

This is better than AirSeal in 1985 (27%). This result is very good, for a mostly undifferentiated product. With substantially higher volume over time, AirWrap might actually produce more total profit dollars than AirSeal, at a good ROI.

Air Packaging should definitely enter the uncoated market. Uncoated deserves its own manufacturing facilities. An AirWrap division should be created in two or three U.S. plants within two or three years, with further expansion later as justified by sales growth.

TEACHING STRATEGY

The case will easily support two class periods of ninety minutes each. In fact, I don't think it is fair to the students to ask them to prepare the case in one three-hour block (normal preparation time for one ninety minute class). When using the case over two class periods, I assign Questions 1 through 5 for day one, and Questions 6 through 11 for day two. This format allows time to discuss LCC calculations and ROA analysis on day one. Day two reviews both areas, covers the product costing issues for both AS and AW, and allows time to discuss management recommendations.

When used as a final exam, I distribute the case without the assignment questions before the exam. I allow students as much time as they want to read and study the case and make whatever calculations they think are relevant. I then allow three hours for the exam, handing out the eleven questions at the beginning of the exam period. Not many students will produce comprehensive answers to all eleven questions in that amount of time, but I typically get a good, full distribution of grades, which is the purpose of a final exam.