AuthenTECH Parts, Inc.

Team 4
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Agenda

Background

Proposals

Potential Issues

Q&A

Background

- AuthenTECH's business revolves around Azura Motors, which it has contracted with since 1986
  - Each year's minimum order is guaranteed at a fixed per-unit price
- Business has been very stable - ATP usually ends up with extra profits at the end of the year from its contract with Azura
- Currently, ATP uses **plastic injection molding** to produce part for Azura
  - An old-fashioned method, but it has been successful for ATP for over 50 years
- However, many of Azura's suppliers have been switching from traditional methods to additive ones like 3D printing
- **Selective laser sintering** is new 3D process ATP is considering switching to
  - Requires new equipment and training for staff, and production is slower than current process

Problem Statement

Should AuthenTECH switch its production process to the new, futuristic selective laser sintering process, or should it stick with the plastic injection molding process that has been in use for over 50 years?

Comparison of Two Technologies

Traditional (plastic injection molding):

- Per unit cost: around $23.00
- Per unit production: 250 frames per hour
- Running time limitation: 35 hours per week/ 8 months

3D Printing (selective laser sintering):

- Per unit variable cost: $22.56
- Per unit production: 10 frames per hour
- Running time limitation: 4 weeks downtime per year/ the whole year
- Price of equipment: $50,000 each
- Rip-out cost: $150,000
- Maintenance fee: $100,000

Unit Cost

- Per unit variable cost of $22.56 is the historical average of Unit Cost
- Volume of material (VolCI) and cavity complexity (CavComplex) change greatly from time to time
- Linear regression is more useful here than the historical average
  - Formula: UnitCost ~ VolCI + CavComplex
  - Coefficients:
    - Intercept -> 5.741
    - Volume of material (VolCI) -> 2.074
    - Cavity complexity (CavComplex) -> 2.313
- Prediction parameters:
  - Volume of material (VolCI) = 6.54
  - Cavity complexity (CavComplex) = 3
- Prediction result:
  - 5.741 + 2.074*6.54 + 2.313*3 = **$26.25**

Unit Cost with Period

- When including Period into the Linear regression
  - Formula: UnitCost ~ VolCI + CavComplex + Period
  - Coefficients:
    - Intercept -> 8.160
    - Volume of material (VolCI) -> 2.057
    - Cavity complexity (CavComplex) -> 2.281
    - Period -> -0.150
- Negative coefficient for Period indicates the unit variable cost decreases as time goes by, possibly due to more skilled labor or continuous decrease in material price

Unit Cost with Period

- Prediction parameters:
  - Volume of material (VolCl) = 6.54
  - Cavity complexity (CavComplex) = 3
- Prediction results:

Year	Period	Unit Variable Cost
2018	1	$28.305
2019	13	$26.507
2020	25	$24.709
2021	37	$22.911
2022	49	$21.113

- Unit variable cost is expected to decrease from 6% to 8% for every additional year of operation
- 3D Printing will have lower cost than traditional method in the 4th and 5th years

Unit Profit Calculation

	Contract Case	Best Case (Mold)	Best Case (3D)
Units	282,000	305,000	421,250
Price	$37.50	$37.50	$37.50
Cost	$23.00	$23.00	***$26.25**
Profit	$14.50	$14.50	**$11.25**

***From previous regression analysis**

Unit Cost Calculation

Scenario A: 282,000 Units with Molding System

Year	1	2	3	4	5
Revenue	$10,575,000.00	$10,575,000.00	$10,575,000.00	$10,575,000.00	$10,575,000.00
Cost	($6,486,000.00)	($6,486,000.00)	($6,486,000.00)	($6,486,000.00)	($6,486,000.00)
Subtotal	$4,089,000.00	$4,089,000.00	$4,089,000.00	$4,089,000.00	$4,089,000.00
Tax (40%)	($1,635,600.00)	($1,635,600.00)	($1,635,600.00)	($1,635,600.00)	($1,635,600.00)
Net Revenue	$2,453,400.00	$2,453,400.00	$2,453,400.00	$2,453,400.00	$2,453,400.00
WACC (10%)	$2,230,363.64	$2,027,603.31	$1,843,275.73	$1,675,705.21	$1,523,368.37
NPV	**$9,300,316.26**				

Unit Cost Calculation

Scenario B: 282,000 Units with 3D Printing System

Year	**1**	**2**	**3**	**4**	**5**
Revenue	$10,575,000.00	$10,575,000.00	$10,575,000.00	$10,575,000.00	$10,575,000.00
Cost	($7,401,090.00)	($7,401,090.00)	($7,401,090.00)	($7,401,090.00)	($7,401,090.00)
Ripping Out	($250,000.00)				
Depreciation	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)
Subtotal	$2,673,910.00	$2,923,910.00	$2,923,910.00	$2,923,910.00	$2,923,910.00
Tax (40%)	($1,069,564.00)	($1,169,564.00)	($1,169,564.00)	($1,169,564.00)	($1,169,564.00)
Net Revenue	$1,604,346.00	$1,754,346.00	$1,754,346.00	$1,754,346.00	$1,754,346.00
WACC (10%)	$1,458,496.36	$1,449,872.73	$1,318,066.12	$1,198,241.92	$1,089,310.84
NPV	**$6,513,987.97**				

Unit Cost Calculation

Scenario C: **Breakeven Units** for 3D Printing System (390,845 units)

Year	1	2	3	4	5
Revenue	$14,656,679.08	$14,656,679.08	$14,656,679.08	$14,656,679.08	$14,656,679.08
Cost	($10,257,721.13)	($10,257,721.13)	($10,257,721.13)	($10,257,721.13)	($10,257,721.13)
Ripping Out	($250,000.00)				
Depreciation	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)
Subtotal	$3,898,957.95	$4,148,957.95	$4,148,957.95	$4,148,957.95	$4,148,957.95
Tax (40%)	($1,559,583.18)	($1,659,583.18)	($1,659,583.18)	($1,659,583.18)	($1,659,583.18)
Net Revenue	$2,339,374.77	$2,489,374.77	$2,489,374.77	$2,489,374.77	$2,489,374.77
WACC (10%)	$2,126,704.34	$2,057,334.52	$1,870,304.11	$1,700,276.46	$1,545,705.87
NPV	**$9,300,325.30**				

Unit Cost Calculation

Scenario D: 305,000 Units with 3D Printing System (Output **Lower** than Molding System)

Year	1	2	3	4	5
Revenue	$11,437,500.00	$11,437,500.00	$11,437,500.00	$11,437,500.00	$11,437,500.00
Cost	($8,004,725.00)	($8,004,725.00)	($8,004,725.00)	($8,004,725.00)	($8,004,725.00)
Ripping Out	($250,000.00)				
Depreciation	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)
Subtotal	$2,932,775.00	$3,182,775.00	$3,182,775.00	$3,182,775.00	$3,182,775.00
Tax (40%)	($1,173,110.00)	($1,273,110.00)	($1,273,110.00)	($1,273,110.00)	($1,273,110.00)
Net Revenue	$1,759,665.00	$1,909,665.00	$1,909,665.00	$1,909,665.00	$1,909,665.00
WACC (10%)	$1,599,695.45	$1,578,235.54	$1,434,759.58	$1,304,326.89	$1,185,751.72
NPV	**$7,102,769.18**				

Unit Cost Calculation

Scenario E: 421,250 Units with 3D Printing System (**Maximum Output**)

Year	**1**	**2**	**3**	**4**	**5**
Revenue	$15,796,875.00	$15,796,875.00	$15,796,875.00	$15,796,875.00	$15,796,875.00
Cost	($11,055,706.00)	($11,055,706.00)	($11,055,706.00)	($11,055,706.00)	($11,055,706.00)
Ripping Out	($250,000.00)				
Depreciation	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)	($250,000.00)
Subtotal	$4,241,169.00	$4,491,169.00	$4,491,169.00	$4,491,169.00	$4,491,169.00
Tax (40%)	($1,696,468.00)	($1,796,468.00)	($1,796,468.00)	($1,796,468.00)	($1,796,468.00)
Net Revenue	$2,544,701.00	$2,694,701.00	$2,694,701.00	$2,694,701.00	$2,694,701.00
WACC (10%)	$2,313,365.00	$2,227,026.00	$2,024,569.00	$1,840,517.00	$1,673,197.00
NPV	**$10,078,674.00**				

Problem Solution Proposal

- At current state of production and Azure’s demands, if we **can’t find more** business, we should **stick with** the traditional process
- However, 3D printing allows for **more production capacity,** so if we can find **more business** to buy our increased production, then **switch to 3D printing**
  - We will use the 2017 production period of 8 months to attempt to acquire new business
  - If we can, we will switch to 3D printing to fulfill the 2018-2022 contract
  - If not, stick with traditional process
- Solution - find clients using old process until we meet breakeven point, then switch to 3D printing where we can meet capacity

Potential Issues

- Not being able to find new clients in time for signing of new contract
    - If we decide not to change to 3D printing at all, old process becomes **outdated** - Azura leaves us for more technologically advanced companies
    - In this case, if we switched to 3D printing right in 2017, our **excess production** would go to waste, as Azura may not want to purchase all that we produce since we can produce much more than their minimum
- Being able to find new clients in time for signing of new contract
    - If we can find new clients in 2017 and change to 3D printing in 2018, we may also face the risk of being **too slow to adapt to new technology** and lose competitive ability and therefore facing the danger of **losing clients**
    - Switch to 3D printing could also bring the risk of facing **financial issues** in the future because we have to renew equipment every 5 years

Questions?

```
Call:
lm(formula = UnitCost ~ VolCI + CavComplex, data = Dunphy)

Residuals:
    Min      1Q  Median      3Q     Max 
-4.1088 -1.2007 -0.2615  0.2907  6.6130 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)   5.7409     1.3705   4.189 0.000285 ***
VolCI         2.0742     0.1567  13.239 4.61e-13 ***
CavComplex    2.3130     0.4137   5.591 7.12e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 

Residual standard error: 2.452 on 26 degrees of freedom
Multiple R-squared:  0.891,	Adjusted R-squared:  0.8826 
F-statistic: 106.2 on 2 and 26 DF,  p-value: 3.083e-13
```

```
Call:
lm(formula = UnitCost ~ VolCI + CavComplex + Period, data = Dunphy)

Residuals:
   Min     1Q Median     3Q    Max
-4.366 -1.183 -0.125  1.116  4.540

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  8.16042    1.39864   5.835 4.38e-06 ***
VolCI        2.05693    0.13466  15.275 3.47e-14 ***
CavComplex   2.28064    0.35542   6.417 1.02e-06 ***
Period      -0.14983    0.04679  -3.202   0.0037 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.106 on 25 degrees of freedom
Multiple R-squared:  0.9227,	Adjusted R-squared:  0.9134
F-statistic: 99.43 on 3 and 25 DF,  p-value: 5.032e-14
```