

Title: New Lathe Decision.

Course: Year: 1993 Author(s): D. Smith

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Type:	Student Project
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Abstract: Consolidated Metco produces cast aluminum truck parts for class 8 trucks. The company has two plant locations and intends to expand in capacity to meet the increasing demand. The plant manager wants to purchase a new lathe or lathes to provide adequate capacity. The author assesses the capacity requirements and evaluates the candidate machines. He compares the technical and financial options. He conducts an economic analysis to reach the final decision.

New Lathe Decision

D. Smith

P9362

EMGT 535 FALLTERM 1993 NEW LATHE DECISION

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Background

Consolidated Metco produces cast aluminum truck parts for class 8 trucks. The company has two plant locations for permanent mold aluminum castings. One is in the Rivergate industrial area in Portland, Oregon, which also serves as the corporate headquarters. The other plant is located on the east coast in Monroe, North Carolina. The primary product is aluminum hubs for trucks. These hubs are specified by many truck and trailer OEMs when a light weight vehicle is required. Product sales have been very good in 1993 and hub sales are at an all time high.

In the Portland plant the hubs are turned in two operations in two lathes that are side by side. One lathe is left handed and one is right handed so that the loading doors are side by side. One lathe operator feeds both machines and does inspection on the parts. Currently there are two of these two lathe combinations in the Portland plant.

The demand has exceeded the machining capacities for most of the year. An outside machining source has been handling the overflow at a cost premium of \$6 per hub. The plant manager wants to purchase a new lathe or lathes to provide adequate capacity.

Current Lathes

The current lathes are Warner Swassey, Titan T-18 purchased in 1987 and have a book value of \$63,594. Typical production from the lathes is 79 hubs per shift including setup. (See Table 1) Two lathes together perform the complete turning operations on the hubs. The throughput of the two machines is governed by the operation with the longest cycle time.

The maintenance and operating costs of the current Warner Swassey lathes are not calculated separately, but are lumped in the overhead for the department.

Since the plant manager does not intend to retire the current machines the salvage value is not a factor.

Capacity Requirements

The estimated hub sales for 1993 are 280,000 hubs. The estimates for 1994 through 1996 are 291,000, 270,000, and 270,000 hubs. The production will be split between two plants. Traditionally the Rivergate plant machines a broader variety of hubs than the Monroe plant. This causes shorter runs and more setups than at the Monroe plant. A partial explanation may be that the design engineers are based in Portland and can oversee special hubs more easily. This does not seem to be sufficient cause to give Monroe the long runs, but hub plant sourcing is decided by upper management.

Presuming that the split remains close to fifty-fifty there will again be a shortfall of machining capacity at the Rivergate plant. The outsourced machining costs are \$6 more than the fully burdened in-house costs. The 1993 burden rate of \$64.4 per hour gives an average (including setup time) hub machining cost of \$6.49. The 1994 rate will increase to \$7.05. If the current production rate is maintained, 16,700 hubs will have to machined outside in 1994. In addition to the cost, There have been quality problems with the outside machining source.

New light weight trailer hub and drive hub designs were introduced in 1992 and both designs have been in production during 1993. The old designs will be nearly phased out by the end of 1993. The reduction of part numbers will reduce the number of setups required. The current machines will be slightly more productive if fewer setups are required.

ABS brakes will be offered at a reduced cost by Freightliner in 1994 and will become standard in 1995. Freightliner is the largest customer for drive and steer axle hubs. The ABS option currently requires an additional machining cut to accommodate the 100 tooth tone ring. This operation is currently run on the lathe with the shorter machining cycle time and does not incur any extra cost. If the machining sequence remains the same, there is a chance that the ABS cut can be added to all drive hubs. This would cut part numbers and inventory. If the production sequence is changed by the new lathe to reflect actual chip cutting time this will have to be reevaluated.

Candidate Machines

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Manufacturing engineers identified three candidate machines. These machines are; Mazak, Okuma & Howa, and Cincinnati. The quotations for these machines are shown below:

Cost	* Hubs	Per Shift
	Claimed	Adjusted
\$ 480,000	150	125
\$ 375,000	110	92
\$ 438,000	120	100
	Cost \$ 480,000 \$ 375,000 \$ 438,000	Cost * Hubs Claimed \$ 480,000 150 \$ 375,000 110 \$ 438,000 120

* Since the Okuma & Howa machines are equal to the current Warner Swassey lathes in operation today, a baseline of 92 hubs per shift was used to factor the claimed throughput.

As preliminary step, the machine shop manager called a meeting to set some guidelines for the new lathe requirements. The evaluation matrix shown in the table below was used to establish direction. Discussion in the meeting lead to the Okuma & Howa machine being the most desirable choice.

	MACHINE	MAZAK	OKUMA	CINCINNATI
ATTRIBUTE	WEIGHT 1-10	· · · ·	• •	
Output	10	10	8	6
Setup	10	2	5	3.5
Quality of Lathe	10	9	7	5
Reliability	10	4	8	5
(Complexity is a factor)				
Process confidence	10	5	10	8
Service	9	10	6	7
Technical Support	7	10	8	6
Weighted Total	•	460	490	380

The Mazak and Cincinnati lathes both have robot loading features. This leads to a perception that they would be more complex and therefore less reliable. It was decided that a stand alone robot should be investigated separately. The machine shop manager did present the argument that a stand alone robot would be resented by the union employees, whereas an automatic loader on a lathe would not seem as job threatening. This is

because a stand alone robot is easily seen out as machine doing the job of a man. An integrated auto loader just looks like a fancier machine.

The automatic loading features cost approximately \$ 150,000. Currently one man tends each two lathe combination. He loads a rough hub into the first lathe, then unloads it after the first operation. He then inverts the hub and loads it into the second lathe for the finish operation. This is continuous so that each cycle produces a completely turned hub. The operator visually inspects each hub and takes SPC measurements. To have any labor savings from the new lathe, the operator would have to perform additional duties. Not considered in the evaluation is the fact that the operator controls the timing of the cycle. An automatic device could provide a more reliable cycle time.

Financial Options

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The current discount rate used by Con Met is 12% and the tax rate is 40%. For tax purposes a 7 year MACRS depreciation schedule is used. Straight line depreciation of 6 years is used for allocation of costs to determine burden. Table 3 shows the depreciation calculations used for the analysis.

Economic Analysis

A generalized cash flow analysis is shown in table 4 for each of the three lathes evaluated. The Cost savings and assumptions in table 2 were used. From this analysis it would seem that the Mazak would be the best choice. The IRR is rather low on the other two lathe options. This implies a higher risk for either the Cincinnati or Okuma & Howa lathes.

The Sales forecasts usually lack accuracy due to the uncertainty of the truck market. To see the effect of a 20% error in the forecasts the analyses were redone using 20% higher and lower forecasts. (Reference tables 5-8) Figure 1 shows the results of this analysis. The Okuma and Cincinnati options become losers if the sales forecast is just 5% too high.

Similar analysis of the throughput of the lathes shows that even the Mazak proposal will be a loser if the output drops from the estimated 125 hubs per hour to below 100 hubs per hour. Since the output of the machine can be controlled better than the market, It is a good idea to get the highest confidence level possible on the machines' capabilities.

In closing, the final decision has not been made yet. More answers are being sought from the lathe manufacturers to finish the analysis.

Weekly Machine Shop Production Report Date: MAY 24, THRU MAY 28, 1993

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	TOTAL
WARNER SWASSEY 1-2 SHIFTS SETUPS	254 3 1	190 3 2	260 3 2	229 3 5	201 3 2	1134 15 12
WARNER SWASSEY 3-4 SHIFTS SETUPS	232 2.5 1	266 3 2	239 3 2	276 3 2	195 3 1	1208 14.5 8

AVERAGE HUBS PER SHIFT INCLUDING SETUP	79.4
AVERAGE HUBS PER SHIFT WITHOUT SETUP	92.2
AVERAGE SETUPS PER SHIFT	0.7
AVERAGE SETUP TIME FOR MAY	1.64 HRS
HUBS PER HOUR WITH SETUP	9.9
HUBS PER HOUR EXCLUSIVE OF SETUP	11.5
HOURS PER HUB WITH SETUP	0.101
HOURS PER HUB EXCLUSIVE OF SETUP	0.087

MACHINING COST PER HUB

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INING COST PER HUB	BURDEN	
	1993	1994
· · ·	64.4	70
0.101 HOURS/HUB	\$6.489	\$7.054
0.087 HOURS/HUB	\$5.588	\$6.073

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THREE SHIFT CAPABILITIES OF CURRENT LATHES

HUBS PER SHIFT	1	79.4
TIMES 2 LATHES		158.8
TIMES 3 SHIFTS		476.4
TIMES 5 DAYS		2382
TIMES 50 WEEKS		119100

ANNUAL	1993	1994	1995	1996	1997	1998
VOLUME						
TOTAL	280000	291000	270000	270000	270000	270000
RIVERGATE 50%	140000	145500	135000	135000	135000	135000
SHORTFALL	20900	26400	15900	15900	15900	15900
SAVINGS		158400	95400	95400	95400	95400
(6\$ PER HUB) assun	ne the rate of	outside cos	t rises the s	ame as Coi	n Met	

ADDITIONAL SAVING DUE TO HIGHER PRODUCTIVITY

Assume that new lathes will run at capacity for 3 shifts and old machines will run at less capacity.

MACHINING COST PER HUB			Remaining				
	1994		hubs @ 7.0)54 ea.			
BURDEN \$/hr	70	Year	1994	1995	1996	1997	1998
Okuma (same as current Warr	ner Swassey)	Volume	145500	135000	135000	135000	135000
0.101 HOURS/HUB	7.054	hubs	85950	75450	75450	75450	75450
Hubs per year	59550	cost	606274.1	532209.2	532209.2	532209.2	532209.2
Mazak							
0.074166 HOURS/HUB	5.191597		64600	54100	54100	54100	54100
Hubs per year	80900		455675.8	381610.8	381610.8	381610.8	381610.8
Annual Savings			\$150,598	\$150,598	\$150,598	\$150,598	\$150,598
Cincinnati							
0.092707 HOURS/HUB	6.489496		80780	70280	70280	70280	70280
Hubs per year	64720		569806.2	495741.3	495741.3	495741.3	495741.3
Annual Savings			\$36,468	\$36,468	\$36,468	\$36,468	\$36,468

	Year	1994	1995	1996	1997	1998
Okuma & Howa	Outsource	\$158,400	\$95,400	\$95,400	\$95,400	\$95,400
	Productivity	\$0	• \$0 **	\$0	\$0	\$0
Total		\$158,400	\$95,400	\$95,400	\$95,400	\$95,400
O la alla a 41	•	A.F.A. 400	AOE 400	A05 400		
Cincinnati	Outsource	\$158,400	\$95,400	\$95,400	\$95,400	\$95,400
·	Productivity	\$36,468	\$36,468	\$36,468	\$36,468	\$36,468
Total		\$194,868	\$131,868	\$131,868	\$131,868	\$131,868
Mazak	Outsource	\$158,400	\$95,400	\$95,400	\$95,400	\$95,400
	Productivity	\$150,598	\$150,598	\$150,598	\$150,598	\$150,598
Total		\$308,998	\$245,998	\$245,998	\$245,998	\$245,998

[LATHE.XLW]savings

Depreciation Using MACRS 7 Year

		Mazak	Okuma	Cincinnati
Purchase Price		\$480,000	\$375,000	\$438,000
Year	%		i	
1994	14.29	\$68,592	\$53,588	\$62,590
1995	24.49	\$117,552	\$91,838	\$107,266
1996	17.49	\$83,952	\$65,588	\$76,606
1997	12.49	\$59,952	\$46,838	\$54,706
1998	8.93	\$42,864	\$33,488	\$39,113
TOTAL		\$372,912	\$291,338	\$340,282
End Book		\$107,088	\$83,663	\$97,718
Salvage	• 4 4 •	\$192,000	\$150,000	\$175,200
Tax Gain		\$84,912	\$66,338	\$77,482
Taxes		\$33,965	\$26,535	\$30,993
Net Proceed	İs	\$158,035	\$123,465	\$144,207

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Analysis for Mazak Lathe

Generalized cash flow table

\$\$							
0	1	2	3	4	5		
	1994	1995	1996	1997	1998		
(\$480,000)							
	•				\$158,035		
	\$185,399	\$147,599	\$147,599	\$147,599	\$147,599		
	\$27,437	\$47,021	\$33,581	\$23,981	\$17,146		
(\$480,000)	\$212,836	\$194,620	\$181,180	\$171,580	\$322,779		
33%					······································		
(\$480,000)	\$190,032	\$155,150	\$128,960	\$109,042	\$183,154		
\$286,337			•				
	0 (\$480,000) (\$480,000) 33% (\$480,000) \$286,337	0 1 1994 (\$480,000) \$185,399 \$27,437 (\$480,000) \$212,836 33% (\$480,000) \$190,032 \$286,337	0 1 2 1994 1995 (\$480,000) \$185,399 \$147,599 \$27,437 \$47,021 (\$480,000) \$212,836 \$194,620 33% (\$480,000) \$190,032 \$155,150 \$286,337	0 1 2 3 1994 1995 1996 (\$480,000) \$185,399 \$147,599 \$147,599 \$27,437 \$47,021 \$33,581 (\$480,000) \$212,836 \$194,620 \$181,180 33% (\$480,000) \$190,032 \$155,150 \$128,960 \$286,337	0 1 2 3 4 1994 1995 1996 1997 (\$480,000) \$185,399 \$147,599 \$147,599 \$147,599 \$27,437 \$47,021 \$33,581 \$23,981 (\$480,000) \$212,836 \$194,620 \$181,180 \$171,580 33% (\$480,000) \$190,032 \$155,150 \$128,960 \$109,042 \$286,337		

Analysis for Okuma & Howa Lathe

Generalized cash flow table

	2								
Item	0	1	2	3	- 4	5			
		1994	1995	1996	1997	1998			
- Investment	(\$375,000)			- -					
+ Net proceeds from sale						\$123,465			
+(.06) revenue		\$95,040	\$57,240	\$57,240	\$57,240	\$57,240			
-(.06) expenses									
+(.04) Depreciation		\$21,435	\$36,735	\$26,235	\$18,735	\$13,395			
Net Cash Flow	(\$375,000)	\$116,475	\$93,975	\$83,475	\$75,975	\$194,100			
IRR	14%								
Present Value @ 12% discount	(\$375,000)	\$103,996	\$74,916	\$59,416	\$48,284	\$110,138			
Net Present Value	\$21,749		,						

Analysis for Cincinnati Lathe

Generalized cash flow table

1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	IF CONTRACTOR CONTRACTOR								
ltem	0	1	2	· 3	4	5			
• • • •		1994	1995	1996	1997	1998			
- Investment	(\$438,000)			,					
+ Net proceeds from sale		•				\$144,207			
+(.06) revenue		\$116,921	\$79,121	\$79,121	\$79,121	\$79,121			
-(.06) expenses		•	•						
+(.04) Depreciation	· · · · · · · · · · · · · · · · · · ·	\$25,036	\$42,906	\$30,642	\$21,882	\$15,645			
Net Cash Flow	(\$438,000)	\$141,957	\$122,027	\$109,763	\$101,003	\$238,973			
IRR	17%								
Present Value @ 12% discount	(\$438,000)	\$126,747	\$97,279	\$78,127	\$64,189	\$135,600			
Net Present Value	\$63,943					5.			

THREE SHIFT CAPABILITIES OF CURRENT LATHES

HUBS PER SHIFT	79.4
TIMES 2 LATHES	158.8
TIME'S 3 SHIFTS	476.4
TIMES 5 DAYS	2382
TIMES 50 WEEKS	119100

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ANNUAL	1993	1994	1995	1996	1997	1998
VOLUME		1				
TOTAL	280000	349200	324000	324000	324000	324000
RIVERGATE 50%	140000	174600	162000	162000	162000	162000
SHORTFALL	20900	55500	42900	42900	42900	42900
SAVINGS		333000	257400	257400	257400	257400
(6\$ PER HUB) assun	ne the rate of	outside cos	t rises the s	ame as Col	n Met	

ADDITIONAL SAVING DUE TO HIGHER PRODUCTIVITY

Assume that new lathes will run at capacity for 3 shifts and old machines will run at less capacity.

MACHINING COST PER HUB			Remaining				
	1994		hubs @ 7.0	054 ea.	•		
BURDEN \$/hr	70	Year	1994	1995	1996	1997	1998
Okuma (same as current War	ner Swassey)	Volume	333000	257400	257400	257400	257400
0.101 HOURS/HUB	7.054	hubs	273450	197850	197850	197850	197850
Hubs per year	59550	cost	1928862	1395594	1395594	1395594	1395594
Mazak							
0.074166 HOURS/HUB	5.191597	÷ .	252100	176500	176500	176500	176500
Hubs per year	80900		1778263	1244996	1244996	1244996	1244996
Annual Savings			\$150,598	\$150,598	\$150,598	\$150,598	\$150,598
Cincinnati							
0.092707 HOURS/HUB	6.489496		268280	192680	192680	192680	192680
Hubs per year	64720		1892394	1359126	1359126	1359126	1359126
Annual Savings			\$36,468	\$36,468	\$36,468	\$36,468	\$36,468

	Year	1994	1995	1996	1997	1998
Okuma & Howa	Outsource	\$333,000	\$257,400	\$257,400	\$257,400	\$257,400
· ·	Productivity	\$0	\$0	\$0	\$0	\$0
Total		\$333,000	\$257,400	\$257,400	\$257,400	\$257,400
Cincinnati	Outsource	\$333,000	\$257,400	\$257,400	\$257,400	\$257,400
	Productivity	\$36,468	\$36,468	\$36,468	\$36,468	\$36,468
Total		\$369,468	\$293,868	\$293,868	\$293,868	\$293,868
Mazak	Outsource	\$333,000	\$257,400	\$257,400	\$257,400	\$257,400
	Productivity	\$150,598	\$150,598	\$150,598	\$150,598	\$150,598
Total		\$483,598	\$407,998	\$407,998	\$407,998	\$407,998

THREE SHIFT CAPABILITIES OF CURRENT LATHES

HUBS PER SHIFT	79.4
TIMES 2 LATHES	158.8
TIMES 3 SHIFTS	476.4
TIMES 5 DAYS	2382
TIMES 50 WEEKS	119100

ANNUAL	1993	1994	1995	1996	1997	1998
VOLUME						
TOTAL	280000	232800	216000	216000	216000	216000
RIVERGATE 50%	140000	116400	108000	108000	108000	108000
SHORTFALL	20900	-2700	-11100	-11100	-11100	-11100
SAVINGS		0	0	0	0	0
(REDED HUD) AND	no the rote of	autolda ana	t ricco the e	ama an Cal	n klat	

(6\$ PER HUB) assume the rate of outside cost rises the same as Con Met

ADDITIONAL SAVING DUE TO HIGHER PRODUCTIVITY

Assume that new lathes will run at capacity for 3 shifts and old machines will run at less capacity.

(,
		Remaining			*	
1994	4 hubs @ 7.054 ea.					
70	Year	1994	1995	1996	1997	1998
r Swassey)	Volume	232800	216000	216000	216000	216000
7.054	hubs	173250	156450	156450	156450	156450
59550	cost	1222071	1103567	1103567	1103567	1103567
	-					
5.191597	-	151900	135100	135100	135100	135100
80900		1071473	952968.7	952968.7	952968.7	952968.7
		\$150,598	\$150,598	\$150,598	\$150,598	\$150,598
					х. Х.	
6.489496		168080	151280	151280	151280	151280
64720		1185603	1067099	1067099	1067099	1067099
		\$36,468	\$36,468	\$36,468	\$36,468	\$36,468
	1994 70 r Swassey) 7.054 59550 5.191597 80900 6.489496 64720	1994 70 Year 70 Volume 7.054 hubs 59550 cost 5.191597 80900 6.489496 64720	1994 Remaining hubs @ 7.0 70 Year 1994 70 Year 1994 r Swassey) Volume 232800 7.054 hubs 173250 59550 cost 1222071 5.191597 151900 80900 1071473 \$150,598 \$150,598 6.489496 168080 64720 1185603	Remaining hubs @ 7.054 ea. 70 Year 1994 1995 70 Year 1994 1995 r Swassey) Volume 232800 216000 7.054 hubs 173250 156450 59550 cost 1222071 1103567 5.191597 151900 135100 80900 1071473 952968.7 \$150,598 \$150,598 6.489496 168080 151280 64720 1185603 1067099	Remaining hubs @ 7.054 ea. 70 Year 1994 1995 1996 70 Year 1994 1995 1996 r Swassey) Volume 232800 216000 216000 7.054 hubs 173250 156450 156450 59550 cost 1222071 1103567 1103567 5.191597 151900 135100 135100 80900 1071473 952968.7 952968.7 \$150,598 \$150,598 \$150,598 \$150,598 6.489496 168080 151280 151280 6.489496 168080 151280 151280 6.489496 168080 151280 151280 6.489496 168080 151280 151280 6.489496 168080 151280 151280 6.489496 168080 151280 151280 6.489496 168080 151280 151280 6.489496 168080 151280 167099 </td <td>Remaining hubs @ 7.054 ea. 70 Year 1994 1995 1996 1997 70 Year 1994 1995 1996 1997 r Swassey) Volume 232800 216000 216000 216000 7.054 hubs 173250 156450 156450 156450 59550 cost 1222071 1103567 1103567 1103567 5.191597 151900 135100 135100 135100 80900 1071473 952968.7 952968.7 952968.7 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 3</td>	Remaining hubs @ 7.054 ea. 70 Year 1994 1995 1996 1997 70 Year 1994 1995 1996 1997 r Swassey) Volume 232800 216000 216000 216000 7.054 hubs 173250 156450 156450 156450 59550 cost 1222071 1103567 1103567 1103567 5.191597 151900 135100 135100 135100 80900 1071473 952968.7 952968.7 952968.7 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 168080 151280 151280 151280 6.489496 3

	Year	1994	1995	1996	1997	1998
Okuma & Howa	Outsource	\$0	\$0	\$0	\$0	\$0
·	Productivity	\$0	\$0	\$0	\$0	\$0
Total		\$0	\$0	\$ 0	\$0	\$0
Cincinnati	Outsource	\$0	\$0	\$0	\$D	\$0
	Productivity	\$36,468	\$36,468	\$36,468	\$36,468	\$36,468
Total		\$36,468	\$36,468	\$36,468	\$36,468	\$36,468
Mazak	Outsource	\$0	\$0	\$0	\$0	\$0
	Productivity	\$150,598	\$150,598	\$150,598	\$150,598	\$150,598
Total		\$150,598	\$150,598	\$150,598	\$150,598	\$150,598

Analysis for Mazak Lathe

Generalized cash flow table

	n									
Item	0	1	2	3	4	5				
		1994	1995	1996	1997	1998				
- Investment	(\$480,000)									
+ Net proceeds from sale						\$158,035				
+(.06) revenue		\$290,159	\$244,799	\$244,799	\$244,799	\$244,799				
-(.06) expenses										
+(.04) Depreciation		\$27,437	\$47,021	\$33,581	\$23,981	\$17,146				
Net Cash Flow	(\$480,000)	\$317,596	\$291,820	\$278,380	\$268,780	\$419,979				
IRR	57%			•						
Present Value @ 12% discount	(\$480,000)	\$283,568	\$232,637	\$198,145	\$170,814	\$238,308				
Net Present Value	\$643,471									

Analysis for Okuma & Howa Lathe

Generalized cash flow table

Item	0	1 .	2	3	. 4	5
		1994	1995	1996	1997	1998
- Investment	(\$375,000)					
+ Net proceeds from sale		· · ·				\$123,465
+(.06) revenue		\$199,800	\$154,440	\$154,440	\$154,440	\$154,440
-(.06) expenses	· .					
+(.04) Depreciation	•	\$21,435	\$36,735	\$26,235	\$18,735	\$13,395
Net Cash Flow	(\$375,000)	\$221,235	\$191,175	\$180,675	\$173,175	\$291,300
IRR	47%				-	
Present Value @ 12% discount	(\$375,000)	\$197,531	\$152,404	\$128,601	\$110,058	\$165,292
Net Present Value	\$378,884		· · · ·			

Analysis for Cincinnati Lathe

Generalized cash flow table

		n				
Item	0	1 1	2	3	4	5
- Investment	(\$438,000)	1994	1995	1996	1997	1998
+ Net proceeds from sale		<u>م</u> الم				\$144,207
+(.06) revenue		\$237,881	\$176,321	\$176,321	\$176,321	\$176,321
-(.06) expenses			•			
+(.04) Depreciation	* . * 	\$25,036	\$42,906	\$30,642	\$21,882	\$15,645
Net Cash Flow	(\$438,000)	\$262,917	\$219,227	\$206,963	\$198,203	\$336,173
IRR	47%					
Present Value @ 12% discount	(\$438,000)	\$234,747	\$174,767	\$147,312	\$125,962	\$190,754
Net Present Value	\$435,541				-	· •

Analysis for Mazak Lathe

Generalized cash flow table

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	n n n					
Item	0	1	2	3	4	5
		1994	1995	1996	1997	1998
- Investment	(\$480,000)					
+ Net proceeds from sale				•		\$158,035
+(.06) revenue		\$90,575	\$90,575	\$90,575	\$90,575	\$90,575
-(.06) expenses					,	
+(.04) Depreciation		\$27,437	\$47,021	\$33,581	\$23,981	\$17,146
Net Cash Flow	(\$480,000)	\$118,012	\$137,596	\$124,156	\$114,556	\$265,755
IRR	15%					
Present Value @ 12% discount	(\$480,000)	\$105,368	\$109,690	\$88,372	\$72,802	\$150,797
Net Present Value	\$47,028					

Analysis for Okuma & Howa Lathe

Generalized cash flow table

		n n				
Item	0	1	2	3	4	5
		1994	1995	1996	1997	1998
- Investment	(\$375,000)					
+ Net proceeds from sale						\$123,465
+(.06) revenue		\$0	\$0	\$0	\$0	\$0
-(.06) expenses						
+(.04) Depreciation		\$21,435	\$36,735	\$26,235	\$18,735	\$13,395
Net Cash Flow	(\$375,000)	\$21,435	\$36,735	\$26,235	\$18,735	\$136,860
IRR	-11%	х.				
Present Value @ 12% discount	(\$375,000)	\$19,139	\$29,285	\$18,674	\$11,907	\$77,658
Net Present Value	(\$218,338)					

Analysis for Cincinnati Lathe

Generalized cash flow table

	n n					
Item	0	1	2	3	4	5
		1994	1995	1996	1997	1998
- Investment	(\$438,000)					
+ Net proceeds from sale		· •				\$144,207
+(.06) revenue		\$21,881	\$21,881	\$21,881	\$21,881	\$21,881
-(.06) expenses						
+(.04) Depreciation		\$25,036	\$42,906	\$30,642	\$21,882	\$15,645
Net Cash Flow	(\$438,000)	\$46,917	\$64,787	\$52,523	\$43,763	\$181,733
IRR	-3%					
Present Value @ 12% discount	(\$438,000)	\$41,890	\$51,648	\$37,385	\$27,812	\$103,120
Net Present Value	(\$176,145)					

Analysis for Mazak Lathe @ 125 hubs per shift

Generalized cash flow table

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Item	0	1	2	3	4	5
		1994	1995	1996	1997	1998
- Investment	(\$480,000)				•	
+ Net proceeds from sale						\$158,035
+(.06) revenue		\$185,399	\$147,599	\$147,599	\$147,599	\$147,599
-(.06) expenses						
+(.04) Depreciation		\$27,437	\$47,021	\$33,581	\$23,981	\$17,146
Net Cash Flow	(\$480,000)	\$212,836	\$194,620	\$181,180	\$171,580	\$322,779
IRR	33%					
Present Value @ 12% discount	(\$480,000)	\$190,032	\$155,150	\$128,960	\$109,042	\$183,154
Net Present Value	\$286,337					

Analysis for Mazak Lathe @ 92 hubs per shift

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Generalized cash flow table

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Item	0	1	2	3	4	5
		1994	1995	1996	1997	1998
- Investment	(\$480,000)					
+ Net proceeds from sale						\$158,035
+(.06) revenue	1	\$95,040	\$57,240	\$57,240	\$57,240	\$57,240
-(.06) expenses						
+(.04) Depreciation		\$27,437	\$47,021	\$33,581	\$23,981	\$17,146
Net Cash Flow	(\$480,000)	\$122,477	\$104,261	\$90,821	\$81,221	\$232,421
IRR	9%					
Present Value @ 12% discount	(\$480,000)	\$109,354	\$83,116	\$64,644	\$51,617	\$131,882
Net Present Value	(\$39,386)	1. J. J.				

Generalized cash flow table	Analysis for Mazak Lathe @ 100 hubs per shift						
				n			
Item	. 0	1	2	3 .	4	5	
		1994	1995	1996	1997	1998	
- Investment	(\$480,000)						
+ Net proceeds from sale						\$158,035	
+(.06) revenue		\$116,921	\$79,121	\$79,121	\$79,121	\$79,121	
-(.06) expenses						4	
+(.04) Depreciation		\$27,437	\$47,021	\$33,581	\$23,981	\$17,146	
Net Cash Flow	(\$480,000)	\$144,358	\$126,142	\$112,702	\$103,102	\$254,301	
IRR	15%			i i na ki si i na sepi i na sepi na se		· · ·	
Present Value @ 12% discount	(\$480,000)	\$128,891	\$100,559	\$80,219	\$65,523	\$144,297	
Net Present Value	\$39,489						

[LATHE2.XLW]CASHFLOW.XLS

EFFECT OF BAD SALES FORCAST ON PRESENT VALUE

	Mazak	Okuma	Cincinnati
80%	47028	-218338	-176145
100%	286337	21749	63943
120%	643471	378884	435541

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