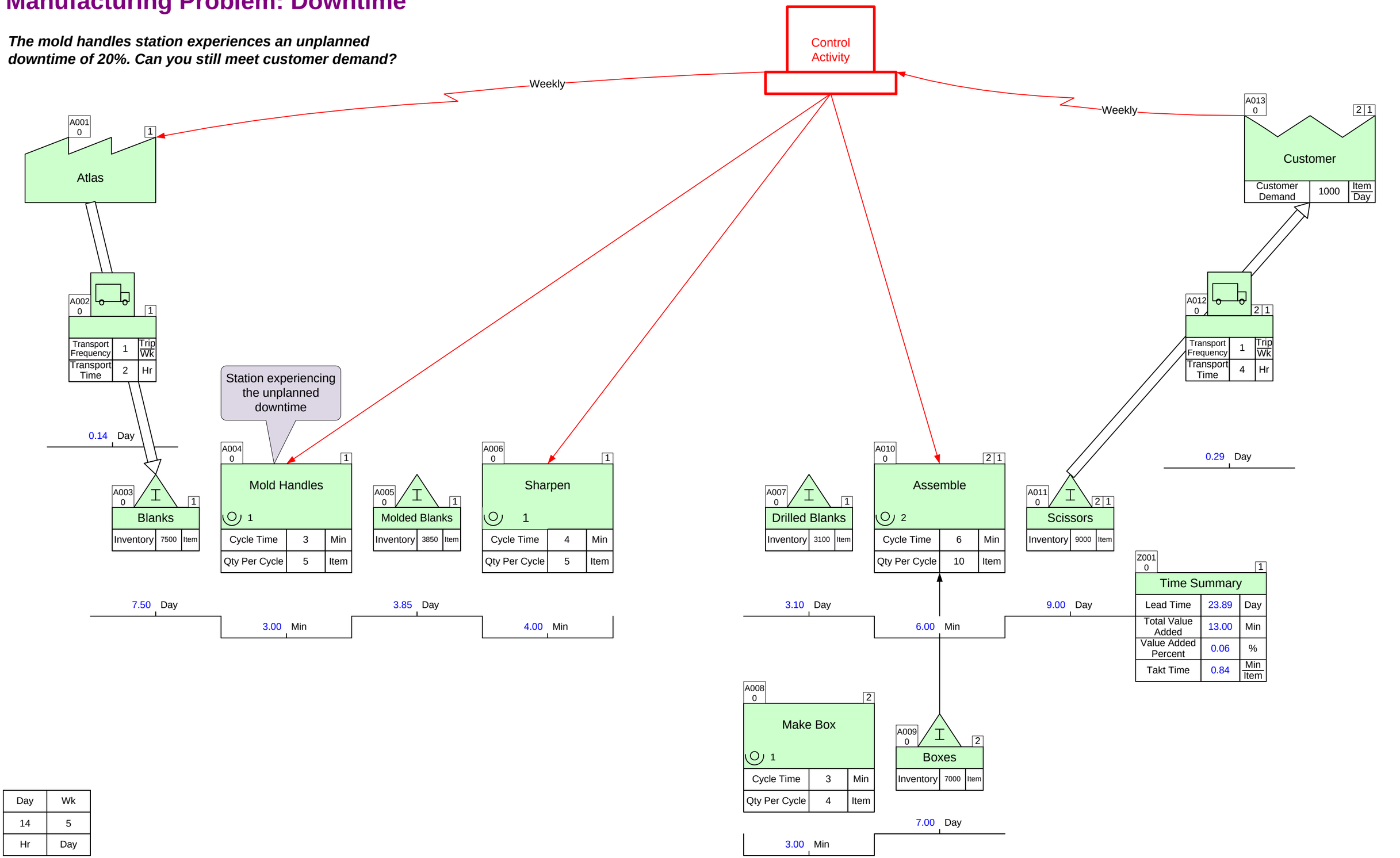
Manufacturing Problem: Downtime

The mold handles station experiences an unplanned downtime of 20%. Can you still meet customer demand?



Day	Wk
14	5
Hr	Day

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Manufacturing Solution: Downtime

The mold handles station experiences an unplanned downtime of 20%. Can you still meet customer demand?

Control Activity

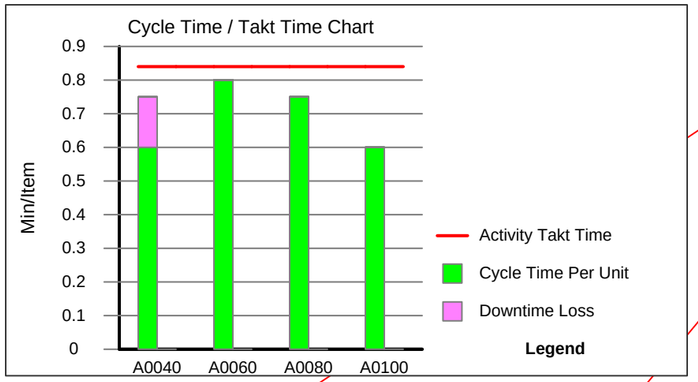
Weekly

Weekly

A001 0 — 1
Atlas

A013 0 — 2 1
Customer

Customer Demand	1000	Item / Day



Answer:

Yes, as shown by the Cycle Time / Takt Time chart.

20% downtime at Mold Handles

Mold Handles — Sharpen — Make Box — Assemble

A002 0 — 1

Transport Frequency	1	Trip / Wk
Transport Time	2	Hr

A012 0 — 2 1

Transport Frequency	1	Trip / Wk
Transport Time	4	Hr

0.14 Day

A003 0 — 1
Blanks

Inventory	7500	Item

A004 0 — 1
Mold Handles
1

Cycle Time	3	Min
Qty Per Cycle	5	Item
Uptime Percent	80	%

A005 0 — 1
Molded Blanks

Inventory	3850	Item

A006 0 — 1
Sharpen
1

Cycle Time	4	Min
Qty Per Cycle	5	Item

7.50 Day — 3.00 Min — 3.85 Day — 4.00 Min

A007 0 — 1
Drilled Blanks

Inventory	3100	Item

A010 0 — 2 1
Assemble
2

Cycle Time	6	Min
Qty Per Cycle	10	Item

A011 0 — 2 1
Scissors

Inventory	9000	Item

0.29 Day

Z001 0 — 1
Time Summary

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	0.84	Min / Item

3.10 Day — 6.00 Min — 9.00 Day

A008 0 — 2
Make Box
1

Cycle Time	3	Min
Qty Per Cycle	4	Item

A009 0 — 2
Boxes

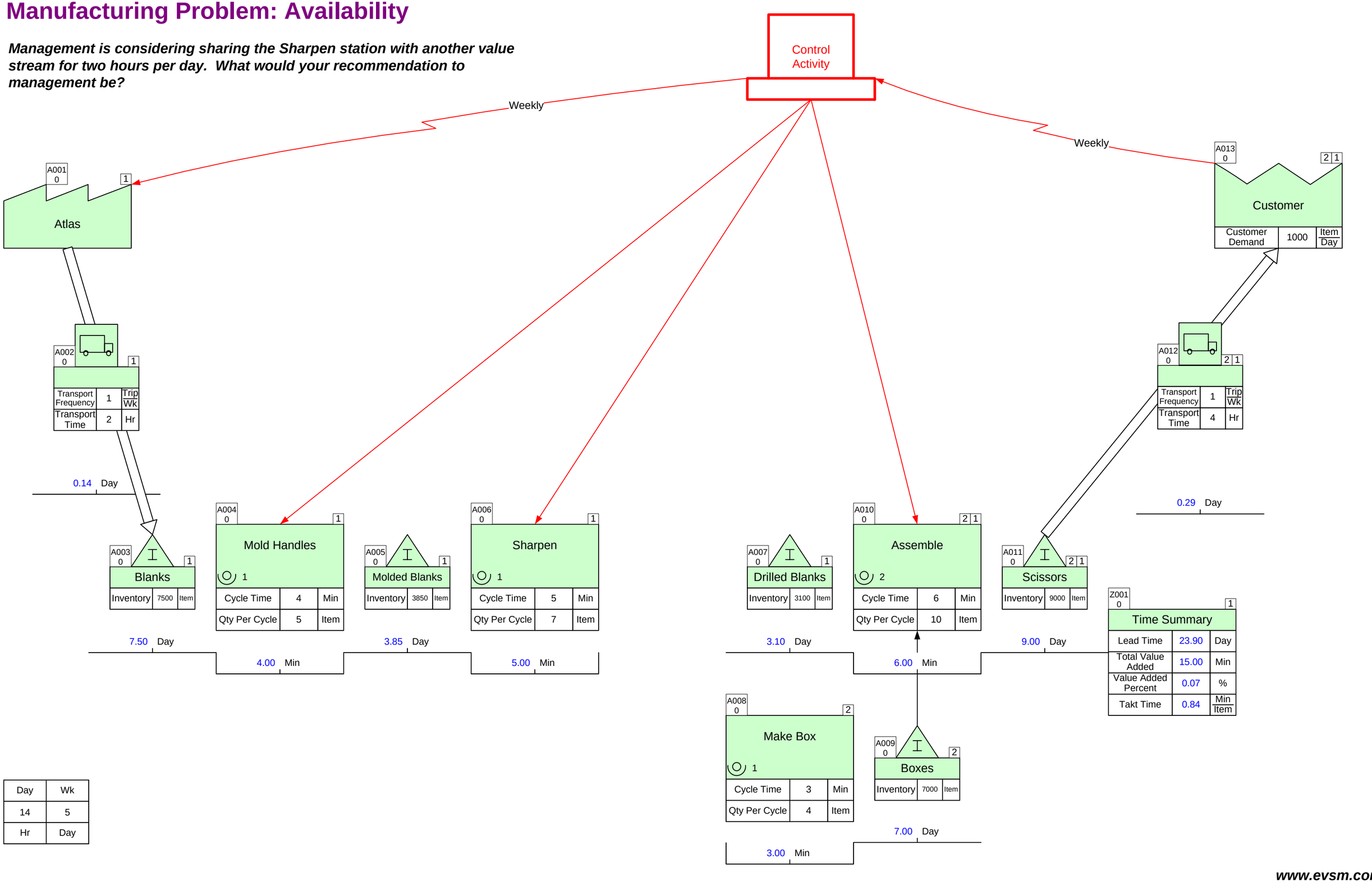
Inventory	7000	Item

7.00 Day — 3.00 Min

Day	Wk
14	5
Hr	Day

Manufacturing Problem: Availability

Management is considering sharing the Sharpen station with another value stream for two hours per day. What would your recommendation to management be?



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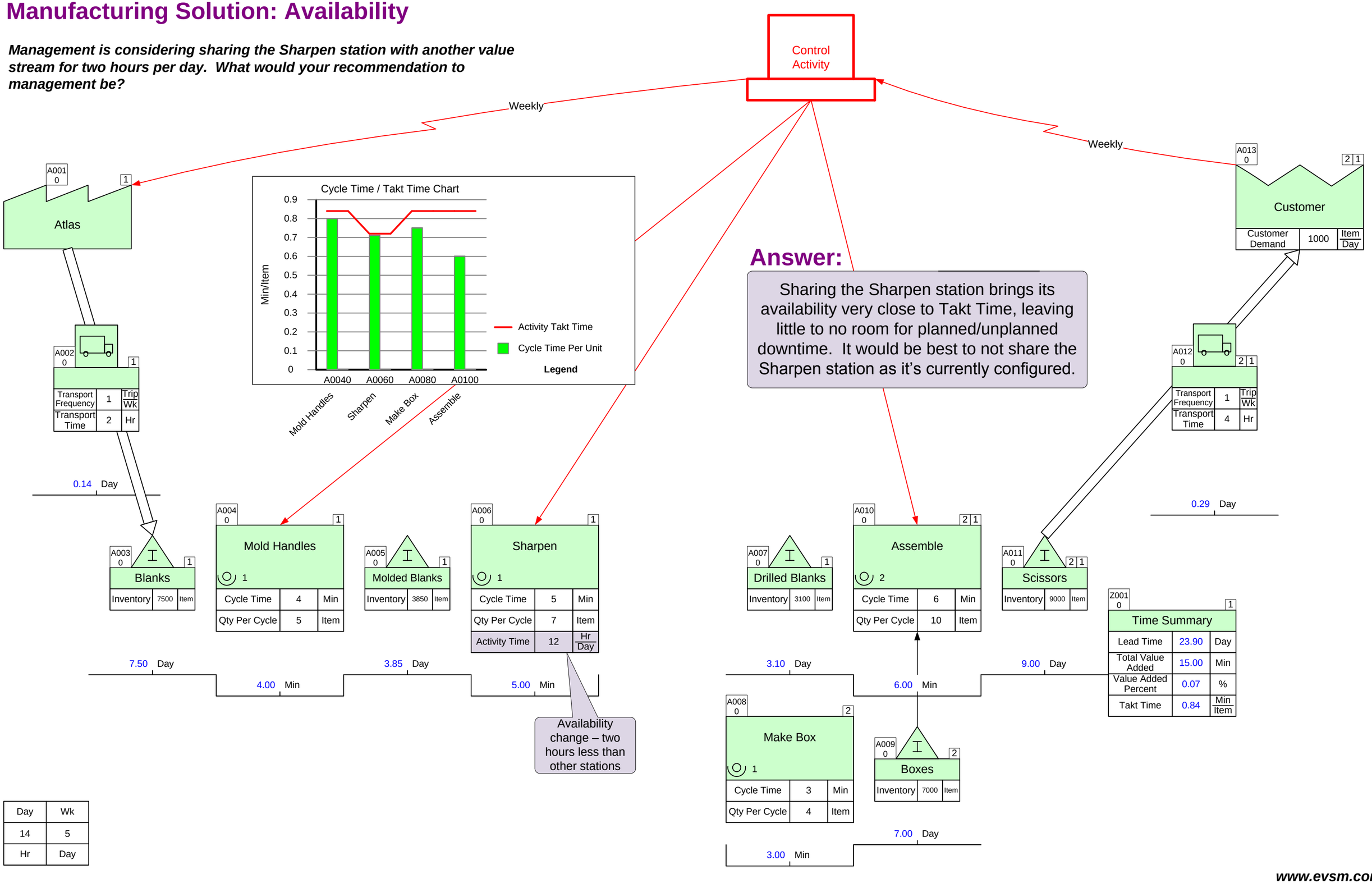
Manufacturing Solution: Availability

Management is considering sharing the Sharpen station with another value stream for two hours per day. What would your recommendation to management be?



Answer:

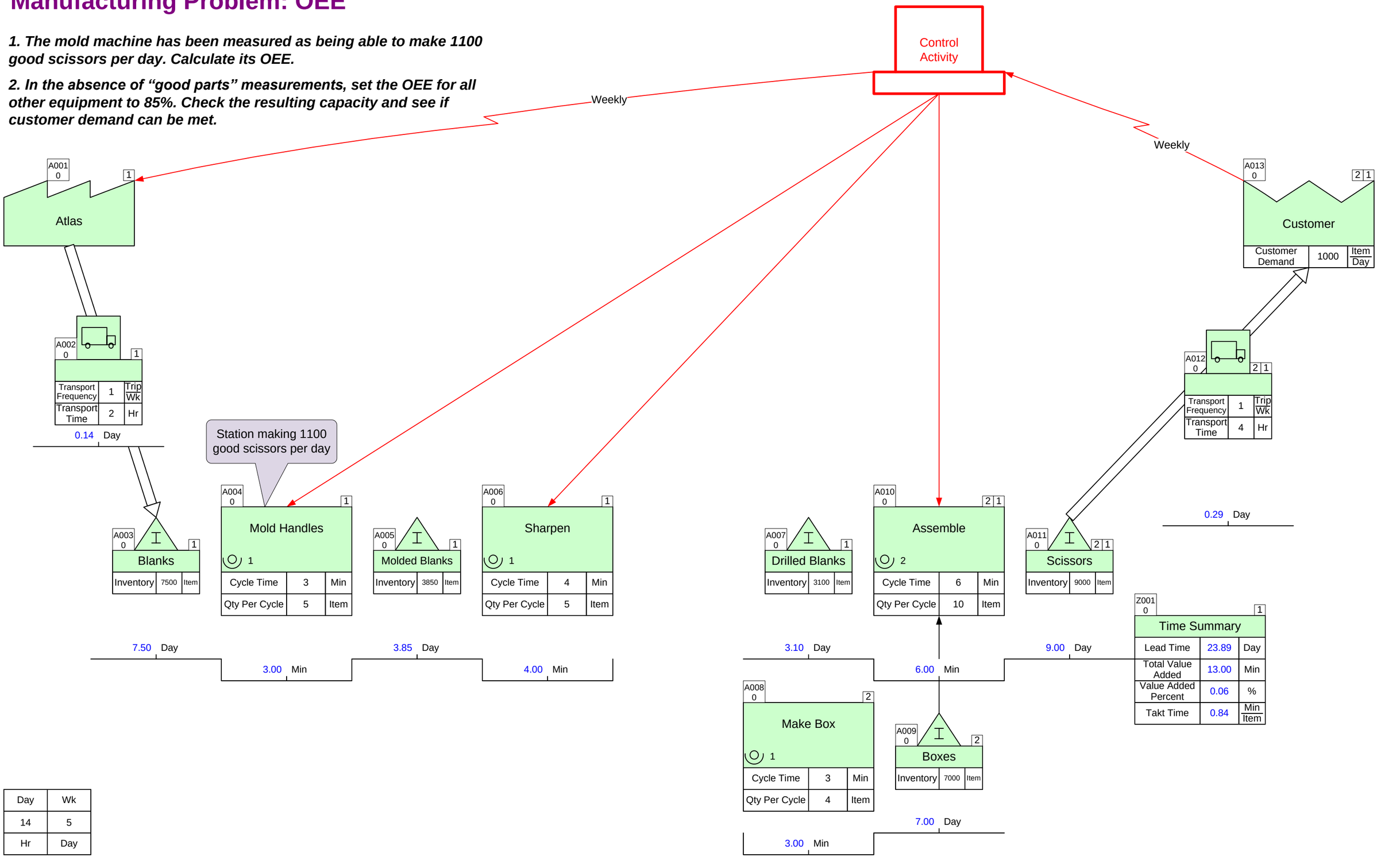
Sharing the Sharpen station brings its availability very close to Takt Time, leaving little to no room for planned/unplanned downtime. It would be best to not share the Sharpen station as it's currently configured.

Day	Wk
14	5
Hr	Day

Manufacturing Problem: OEE

1. The mold machine has been measured as being able to make 1100 good scissors per day. Calculate its OEE.

2. In the absence of "good parts" measurements, set the OEE for all other equipment to 85%. Check the resulting capacity and see if customer demand can be met.



Manufacturing Solution: OEE

1. The mold machine has been measured as being able to make 1100 good scissors per day. Calculate its OEE.

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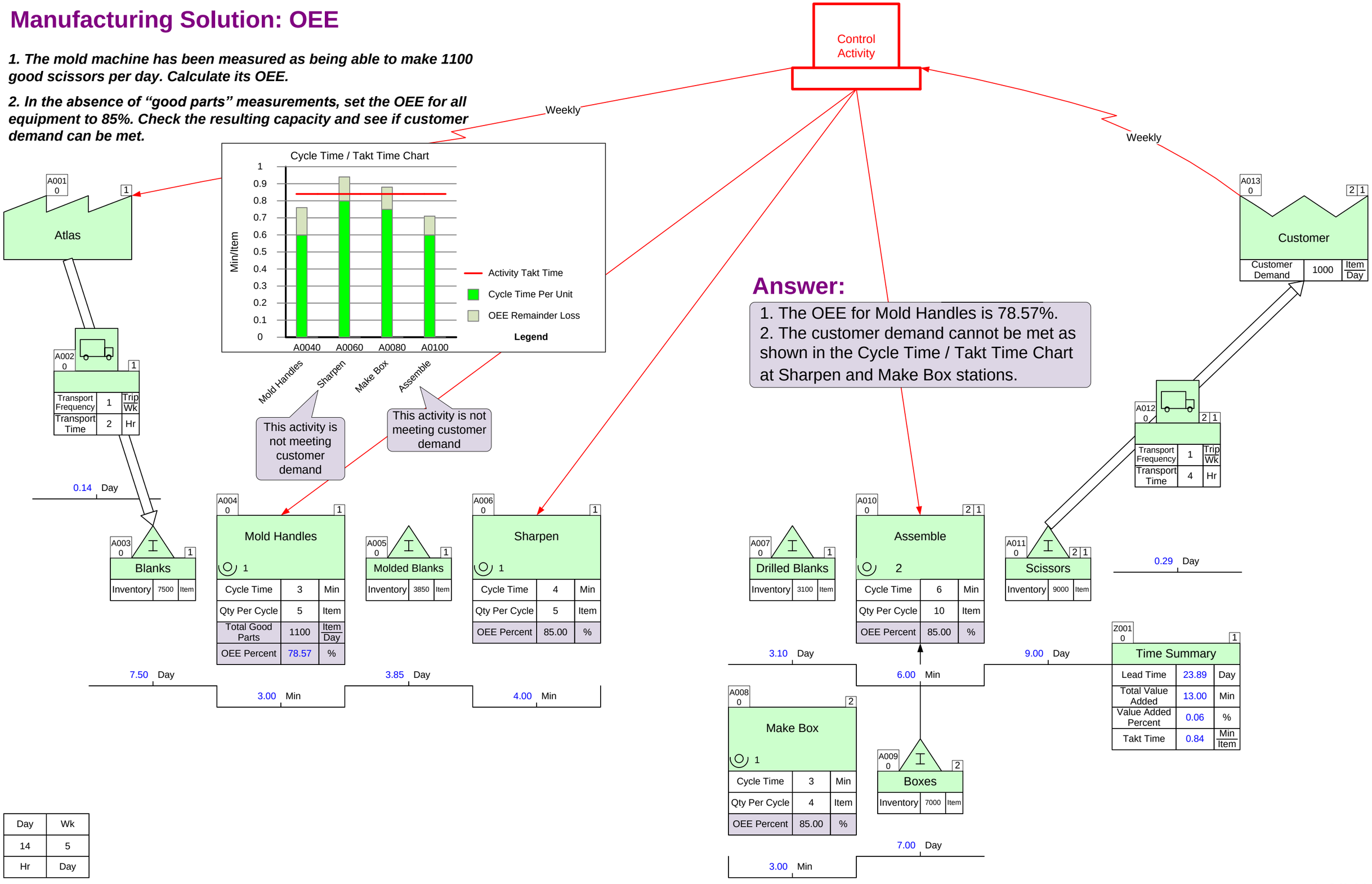


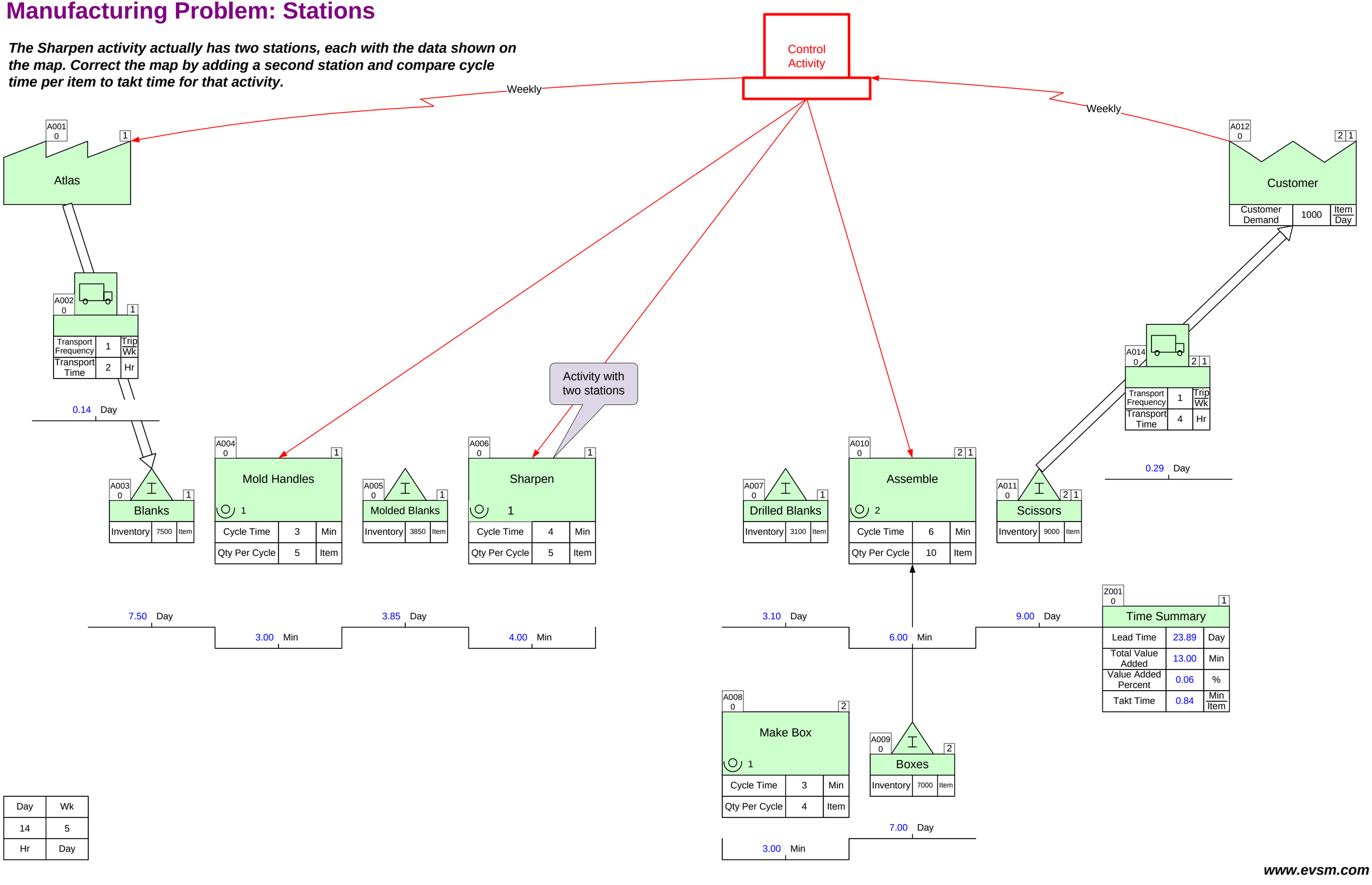
Answer:

1. The OEE for Mold Handles is 78.57%.
2. The customer demand cannot be met as shown in the Cycle Time / Takt Time Chart at Sharpen and Make Box stations.

Day	Wk
14	5
Hr	Day

Manufacturing Problem: Stations

The Sharpen activity actually has two stations, each with the data shown on the map. Correct the map by adding a second station and compare cycle time per item to takt time for that activity.



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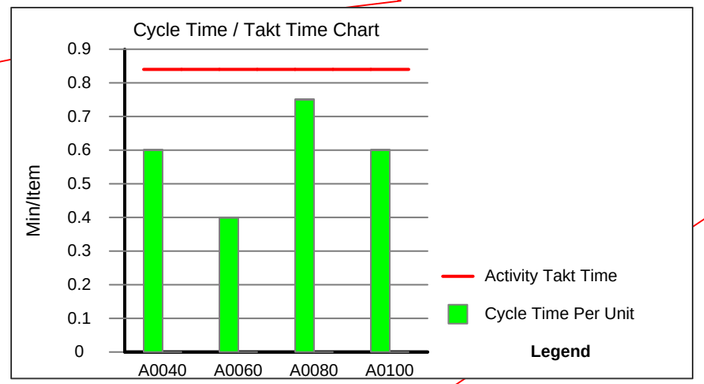
Manufacturing Solution: Stations

The Sharpen activity actually has two stations, each with the data shown on the map. Correct the map and compare cycle time per item to takt time for that activity.

Control Activity

Weekly

Weekly



Mold Handles | Sharpen | Make Box | Assemble

Cycle time per unit has decreased by half

Answer:

The cycle time per unit has decreased as shown on the Cycle Time / Takt Time chart.

A001 0 — Atlas — 1

A002 0 — 1

Transport Frequency	1	Trip / Wk
Transport Time	2	Hr

0.14 Day

A003 0 — Blanks — 1

Inventory	7500	Item

A004 0 — Mold Handles — 1

1

Cycle Time	3	Min
Qty Per Cycle	5	Item

A005 0 — Molded Blanks — 1

Inventory	3850	Item

A006 0 — Sharpen — 1

1

Cycle Time	4	Min
Qty Per Cycle	5	Item
Stations	2	Stn

7.50 Day — 3.00 Min — 3.85 Day — 4.00 Min

A013 0 — Customer — 2 1

Customer Demand	1000	Item / Day

A012 0 — 2 1

Transport Frequency	1	Trip / Wk
Transport Time	4	Hr

0.29 Day

A007 0 — Drilled Blanks — 1

Inventory	3100	Item

A010 0 — Assemble — 2 1

2

Cycle Time	6	Min
Qty Per Cycle	10	Item

A011 0 — Scissors — 2 1

Inventory	9000	Item

3.10 Day — 6.00 Min — 9.00 Day

Z001 0 — Time Summary — 1

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	0.84	Min / Item

A008 0 — Make Box — 2

1

Cycle Time	3	Min
Qty Per Cycle	4	Item

A009 0 — Boxes — 2

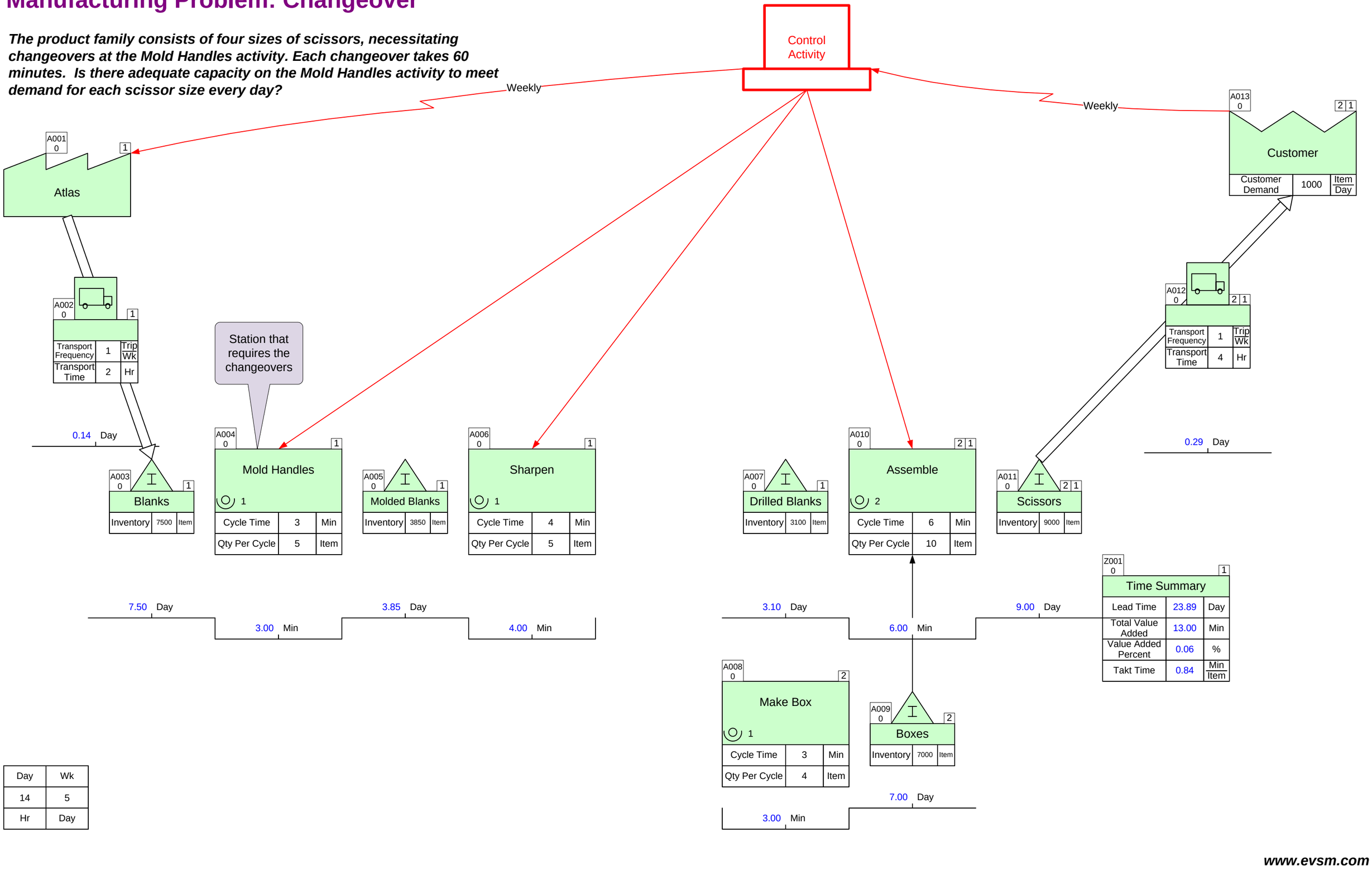
Inventory	7000	Item

7.00 Day — 3.00 Min

Day	Wk
14	5
Hr	Day

Manufacturing Problem: Changeover

The product family consists of four sizes of scissors, necessitating changeovers at the Mold Handles activity. Each changeover takes 60 minutes. Is there adequate capacity on the Mold Handles activity to meet demand for each scissor size every day?



Manufacturing Solution: Changeover

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Control Activity

Weekly

Weekly

A0010 — Atlas — 1

A0020 — Transport Frequency 1 Trip/Wk; Transport Time 2 Hr

0.14 Day

A0030 — Blanks — 1 — Inventory 7500 Item

A0040 — Mold Handles — 1 — 1

Cycle Time	3	Min
Qty Per Cycle	5	Item
Changeovers	4	CO/Day
Time Per Changeover	60	Min/CO

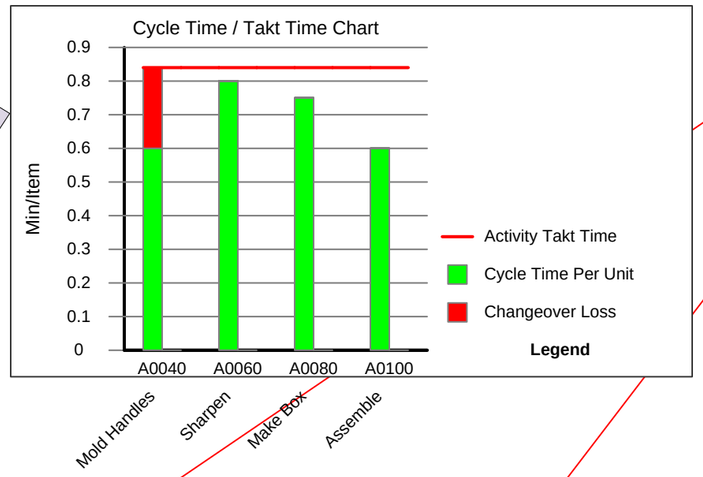
A0050 — Molded Blanks — 1 — Inventory 3850 Item

A0060 — Sharpen — 1 — 1

Cycle Time	4	Min
Qty Per Cycle	5	Item

7.50 Day — 3.00 Min — 3.85 Day — 4.00 Min

Changeover loss for Mold Handles



Answer:

Yes, as shown on the Cycle Time / Takt Time chart.

A0130 — Customer — 2 1 — Customer Demand 1000 Item/Day

A0120 — Transport Frequency 1 Trip/Wk; Transport Time 4 Hr — 2 1

0.29 Day

A0070 — Drilled Blanks — 1 — Inventory 3100 Item

A0100 — Assemble — 2 1 — 2

Cycle Time	6	Min
Qty Per Cycle	10	Item

A0110 — Scissors — 2 1 — Inventory 9000 Item

3.10 Day — 6.00 Min — 9.00 Day

A0080 — Make Box — 2 — 1

Cycle Time	3	Min
Qty Per Cycle	4	Item

A0090 — Boxes — 2 — Inventory 7000 Item

7.00 Day — 3.00 Min

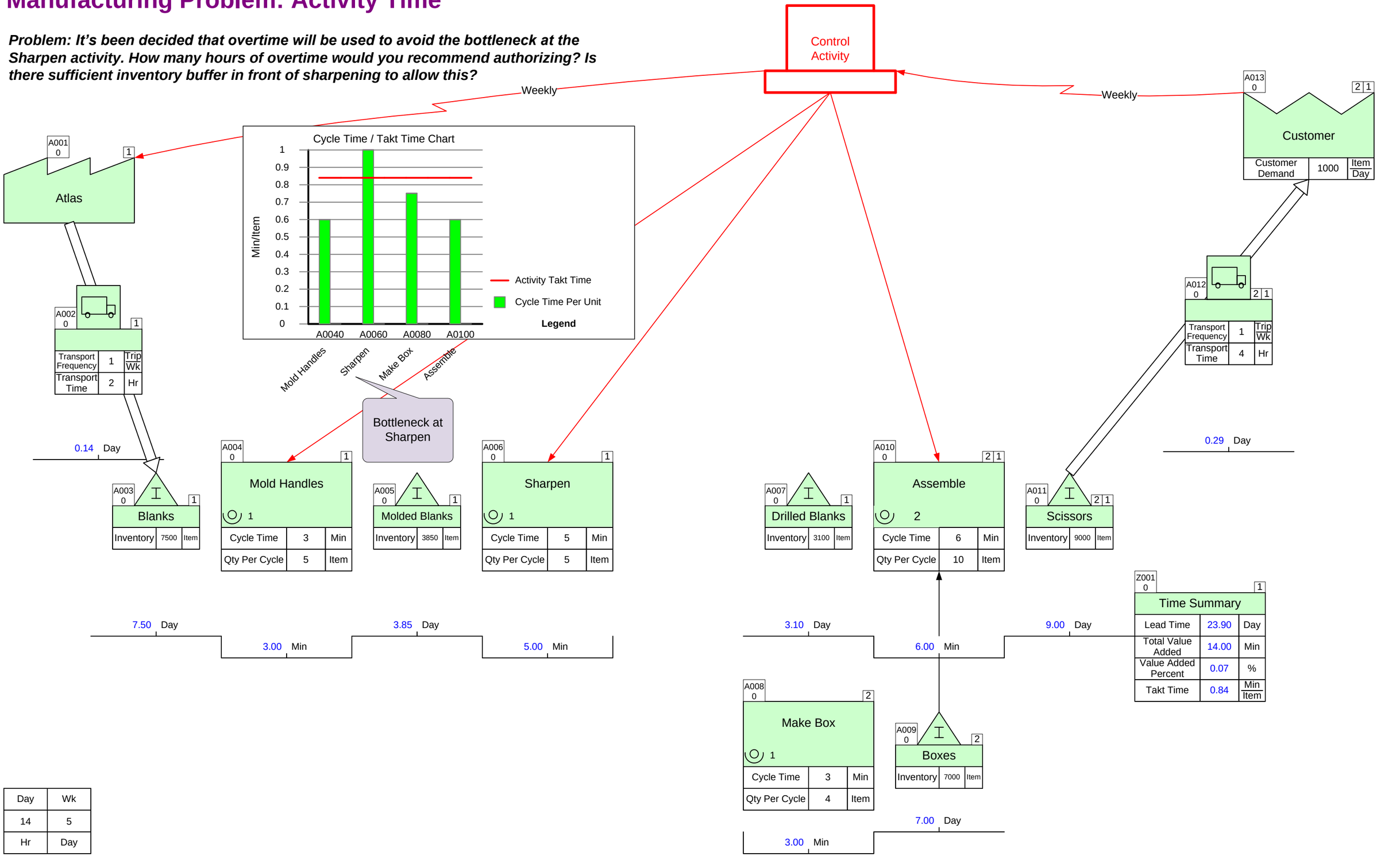
Z0010 — Time Summary — 1

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	0.84	Min/Item

Day	Wk
14	5
Hr	Day

Manufacturing Problem: Activity Time

Problem: It's been decided that overtime will be used to avoid the bottleneck at the Sharpen activity. How many hours of overtime would you recommend authorizing? Is there sufficient inventory buffer in front of sharpening to allow this?



Day	Wk
14	5
Hr	Day

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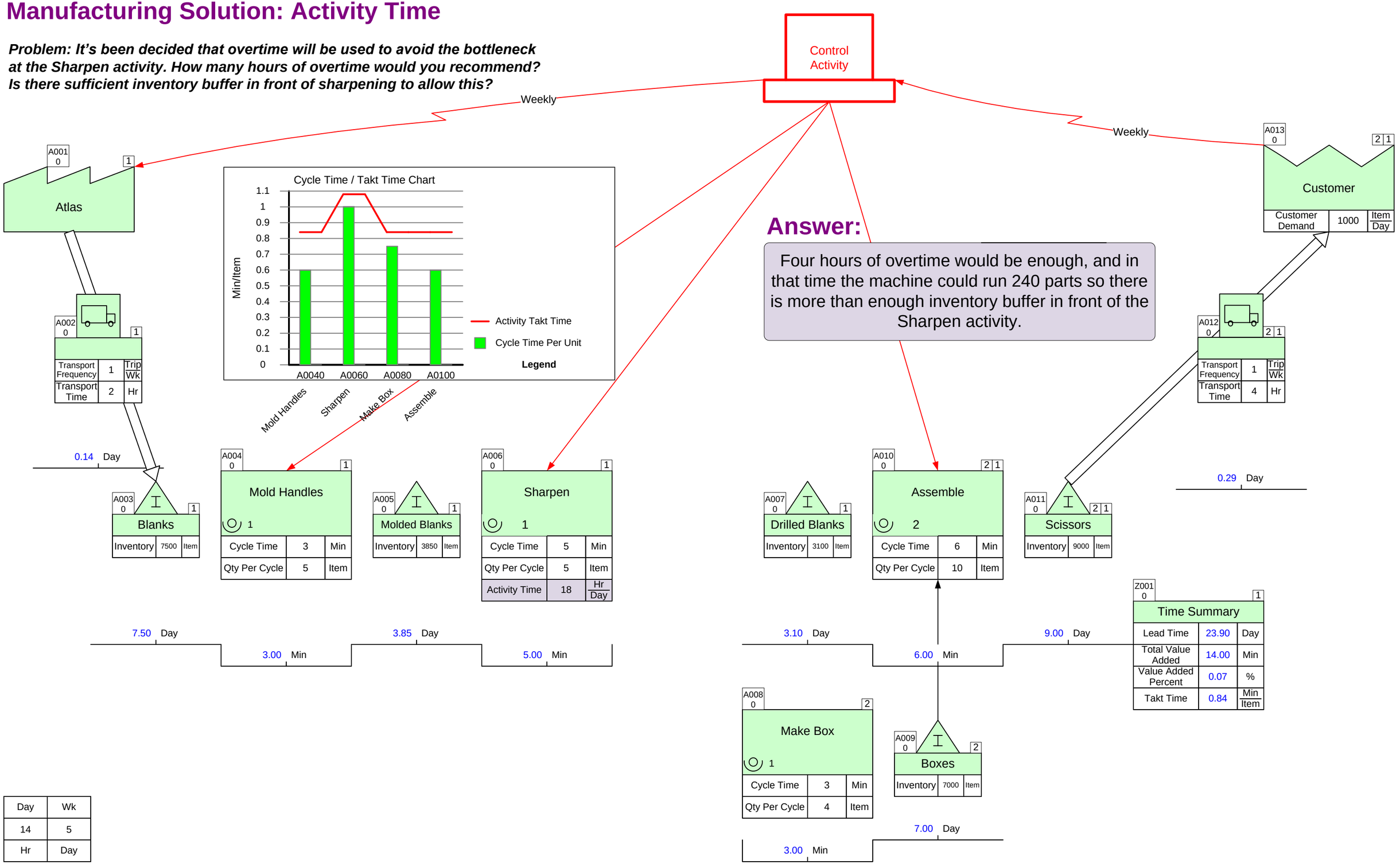
Manufacturing Solution: Activity Time

Problem: It's been decided that overtime will be used to avoid the bottleneck at the Sharpen activity. How many hours of overtime would you recommend? Is there sufficient inventory buffer in front of sharpening to allow this?

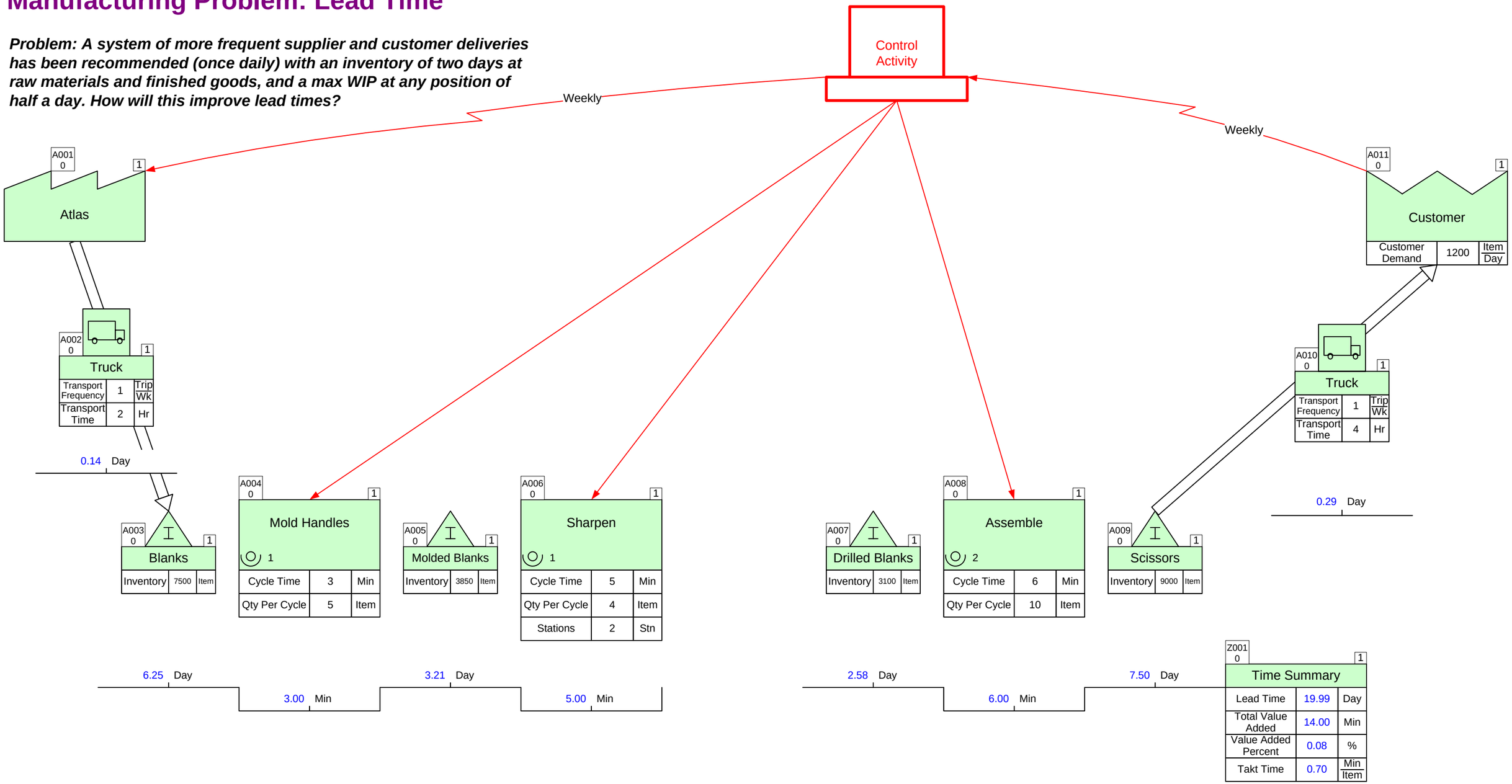


Answer:

Four hours of overtime would be enough, and in that time the machine could run 240 parts so there is more than enough inventory buffer in front of the Sharpen activity.

Manufacturing Problem: Lead Time

Problem: A system of more frequent supplier and customer deliveries has been recommended (once daily) with an inventory of two days at raw materials and finished goods, and a max WIP at any position of half a day. How will this improve lead times?



Day	Wk
14	5
Hr	Day

Manufacturing Solution: Lead Time

Problem: A system of more frequent supplier and customer deliveries has been recommended (once daily) with an inventory of two days at raw materials and finished goods, and a max WIP at any position of half a day. How will this improve lead times?

Control Activity

Weekly

Weekly

A001 0 — 1

Atlas

A002 0 — 1

Truck

Transport Frequency	1	Trip Day
Transport Time	2	Hr

0.14 Day

A003 0 — 1

Blanks

Inventory	2400	Item

A004 0 — 1

Mold Handles

1

Cycle Time	3	Min
Qty Per Cycle	5	Item

A005 0 — 1

Molded Blanks

Inventory	600	Item

A006 0 — 1

Sharpen

1

Cycle Time	5	Min
Qty Per Cycle	4	Item
Stations	2	Stn

2.00 Day

3.00 Min

0.50 Day

5.00 Min

A011 0 — 1

Customer

Customer Demand	1200	Item Day

Answer:

The Lead Time is reduced from twenty days to just above five and a half days.

A010 0 — 1

Truck

Transport Frequency	1	Trip Day
Transport Time	4	Hr

0.29 Day

A007 0 — 1

Drilled Blanks

Inventory	600	Item

A008 0 — 1

Assemble

2

Cycle Time	6	Min
Qty Per Cycle	10	Item

A009 0 — 1

Scissors

Inventory	2400	Item

0.50 Day

6.00 Min

2.00 Day

Z001 0 — 1

Time Summary

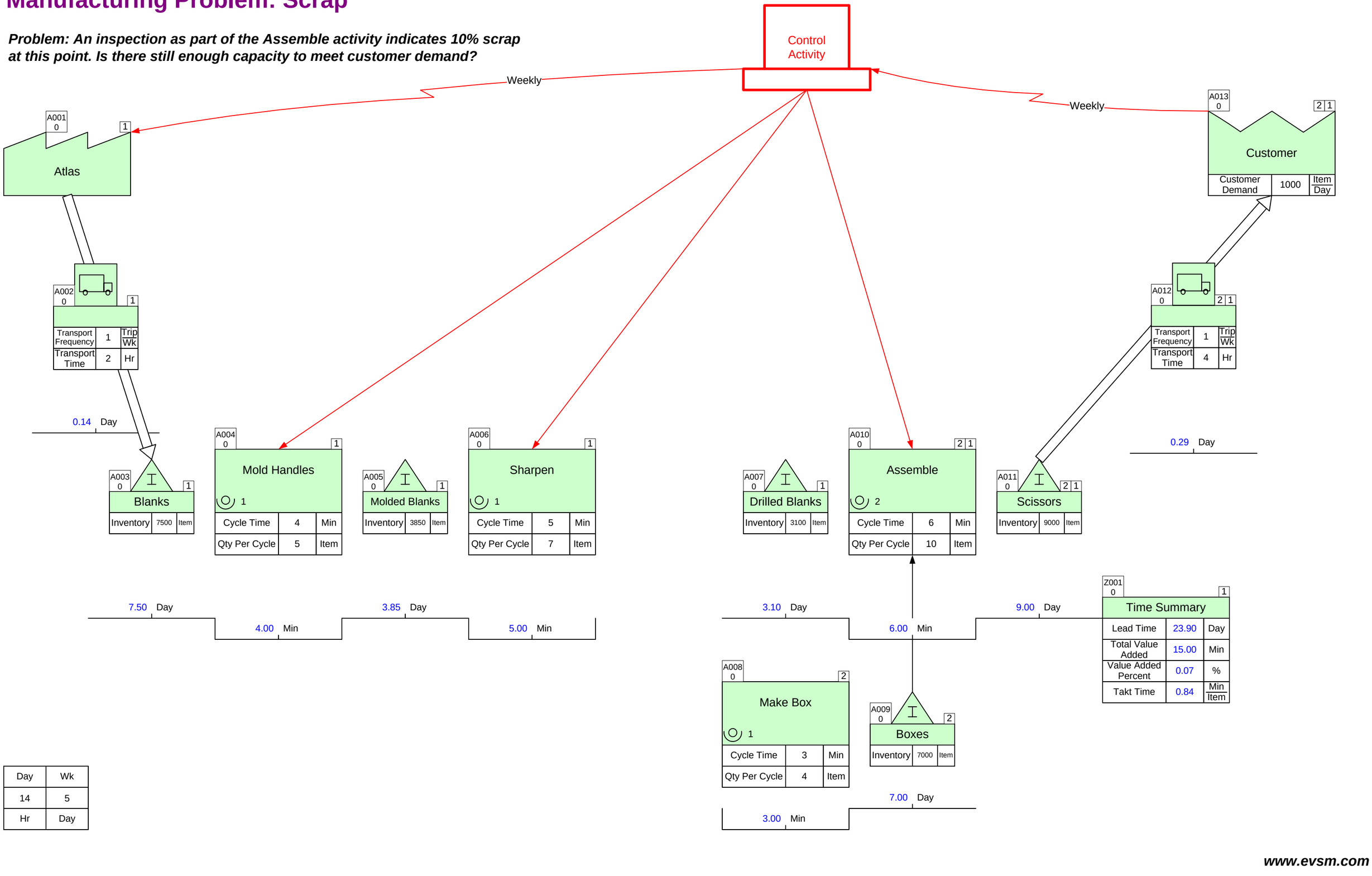
Lead Time	5.45	Day
Total Value Added	14.00	Min
Value Added Percent	0.31	%
Takt Time	0.70	Min / Item

Lead Time value has decreased

Day	Wk
14	5
Hr	Day

Manufacturing Problem: Scrap

Problem: An inspection as part of the Assemble activity indicates 10% scrap at this point. Is there still enough capacity to meet customer demand?



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Manufacturing Solution: Scrap

Problem: An inspection as part of the Assemble activity indicates 10% scrap at this point. Is there still enough capacity to meet customer demand?

Control Activity

Weekly

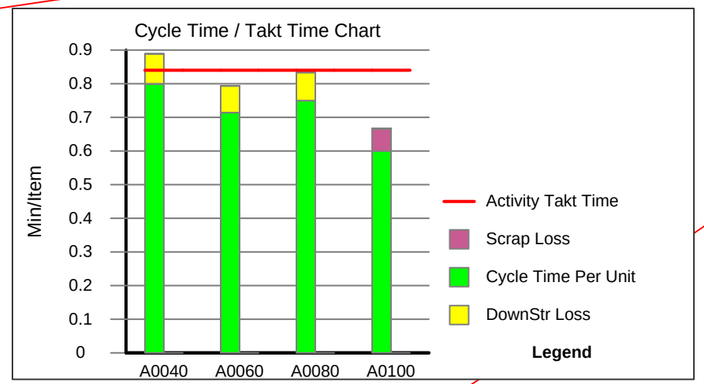
Weekly

A001 0 — 1
Atlas

0.14 Day

A002 0 — 1

Transport Frequency	1	Trip / Wk
Transport Time	2	Hr



A003 0 — 1
Blanks

Inventory	7500	Item

A004 0 — 1
Mold Handles — 1

Cycle Time	4	Min
Qty Per Cycle	5	Item
DownStr Loss	0.09	Min / Item

A005 0 — 1
Molded Blanks

Inventory	3850	Item

A006 0 — 1
Sharpen — 1

Cycle Time	5	Min
Qty Per Cycle	7	Item
DownStr Loss	0.08	Min / Item

7.50 Day — 4.00 Min — 3.85 Day — 5.00 Min

Downstream loss

Day	Wk
14	5
Hr	Day

Answer:

The downstream loss at the Mold Handles activity causes the “Effective Cycle Time” to be above Activity Takt Time. So there is inadequate Capacity.

A013 0 — 2 1
Customer

Customer Demand	1000	Item / Day

A012 0 — 2 1

Transport Frequency	1	Trip / Wk
Transport Time	4	Hr

0.29 Day

A007 0 — 1
Drilled Blanks

Inventory	3100	Item

A010 0 — 2 1
Assemble — 2

Cycle Time	6	Min
Qty Per Cycle	10	Item
DownStr Loss	0.00	Min / Item
Scrap Percent	10	%

A011 0 — 2 1
Scissors

Inventory	9000	Item

3.10 Day — 6.00 Min — 9.00 Day

Z001 0 — 1
Time Summary

Lead Time	23.90	Day
Total Value Added	15.00	Min
Value Added Percent	0.07	%
Takt Time	0.84	Min / Item

A008 0 — 2
Make Box — 1

Cycle Time	3	Min
Qty Per Cycle	4	Item
DownStr Loss	0.08	Min / Item

A009 0 — 2
Boxes

Inventory	7000	Item

7.00 Day — 3.00 Min

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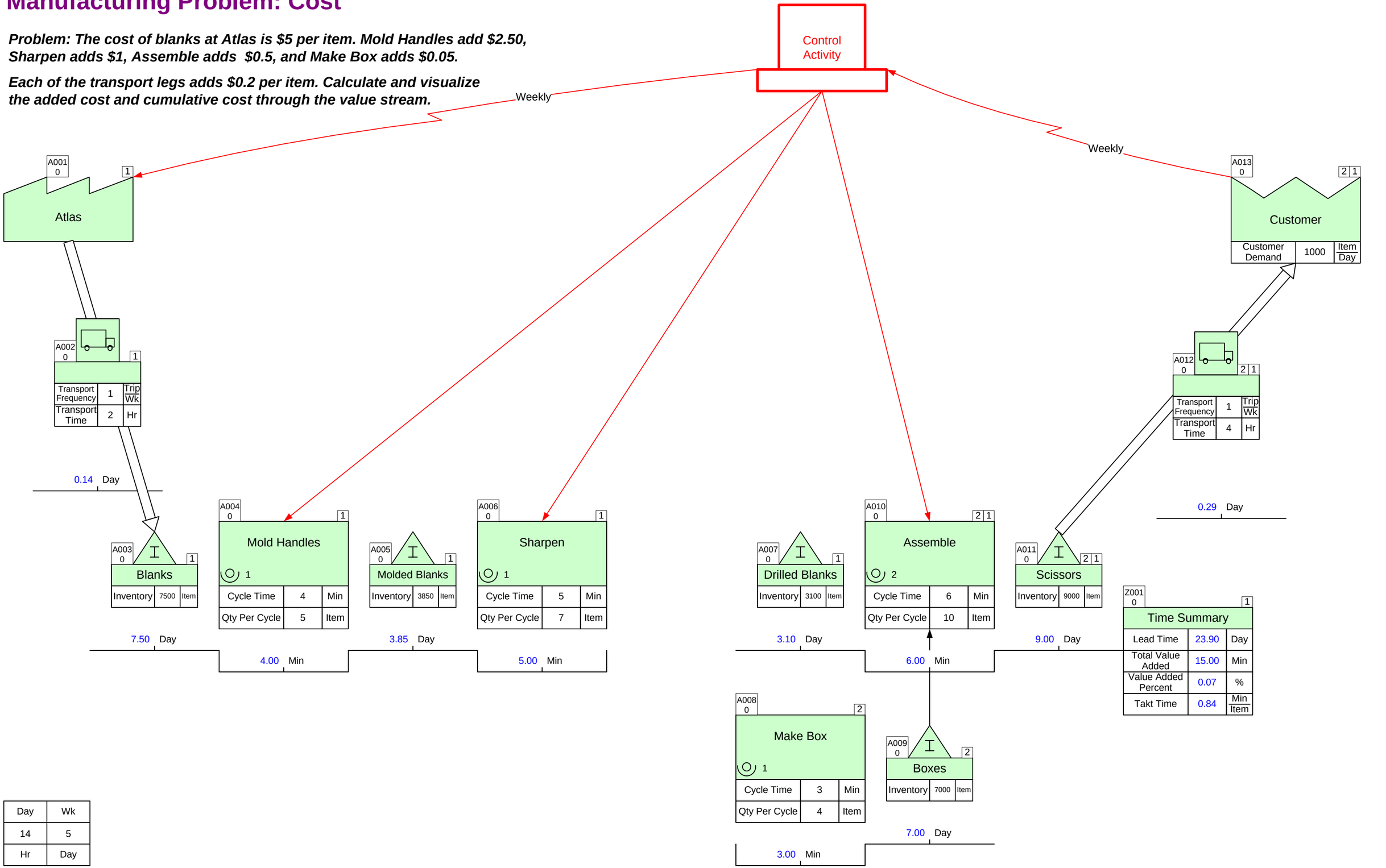
Manufacturing Problem: Cost

Problem: The cost of blanks at Atlas is $5 per item. Mold Handles add $2.50, Sharpen adds $1, Assemble adds $0.5, and Make Box adds $0.05.

Each of the transport legs adds $0.2 per item. Calculate and visualize the added cost and cumulative cost through the value stream.



Day	Wk
14	5
Hr	Day

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Manufacturing Solution: Cost

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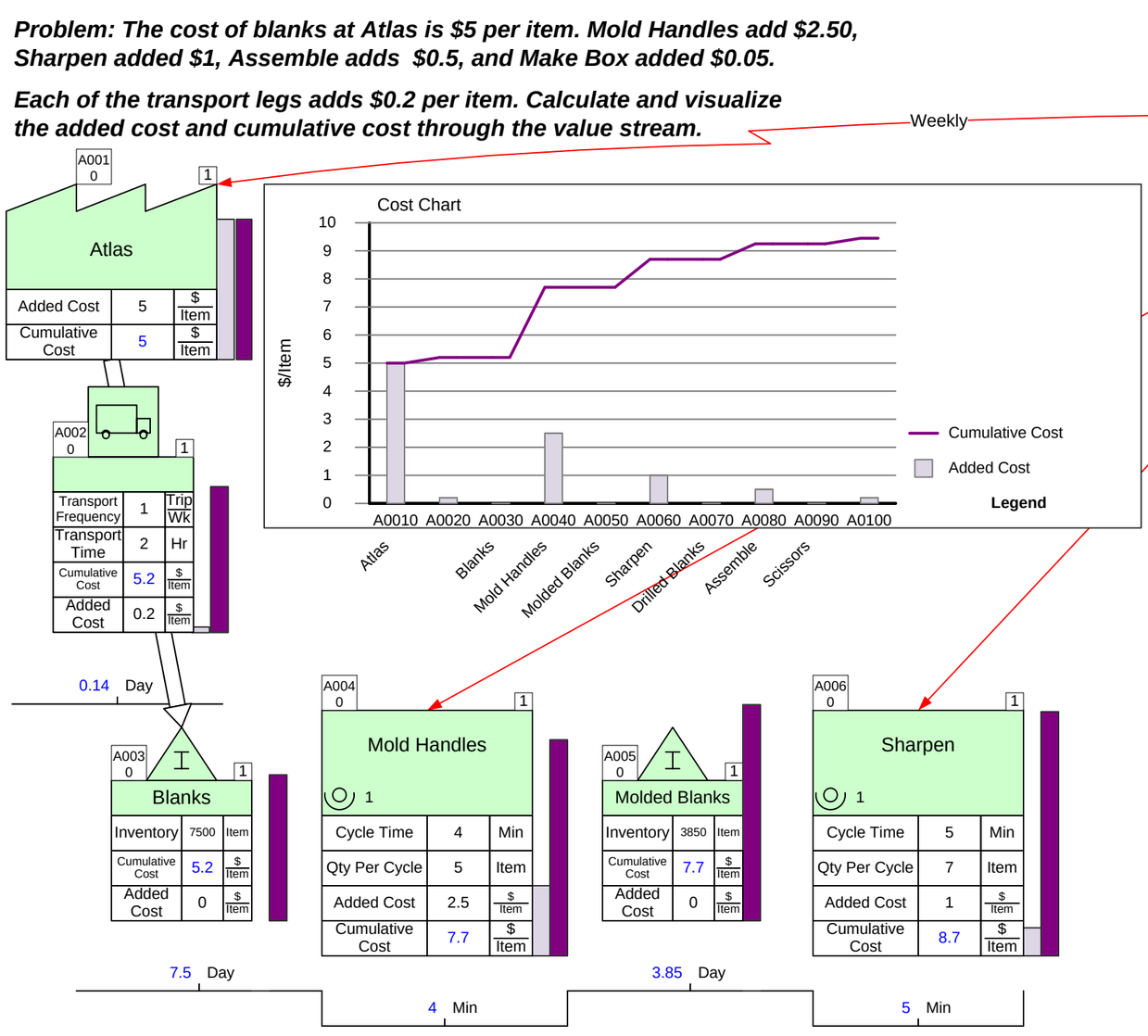

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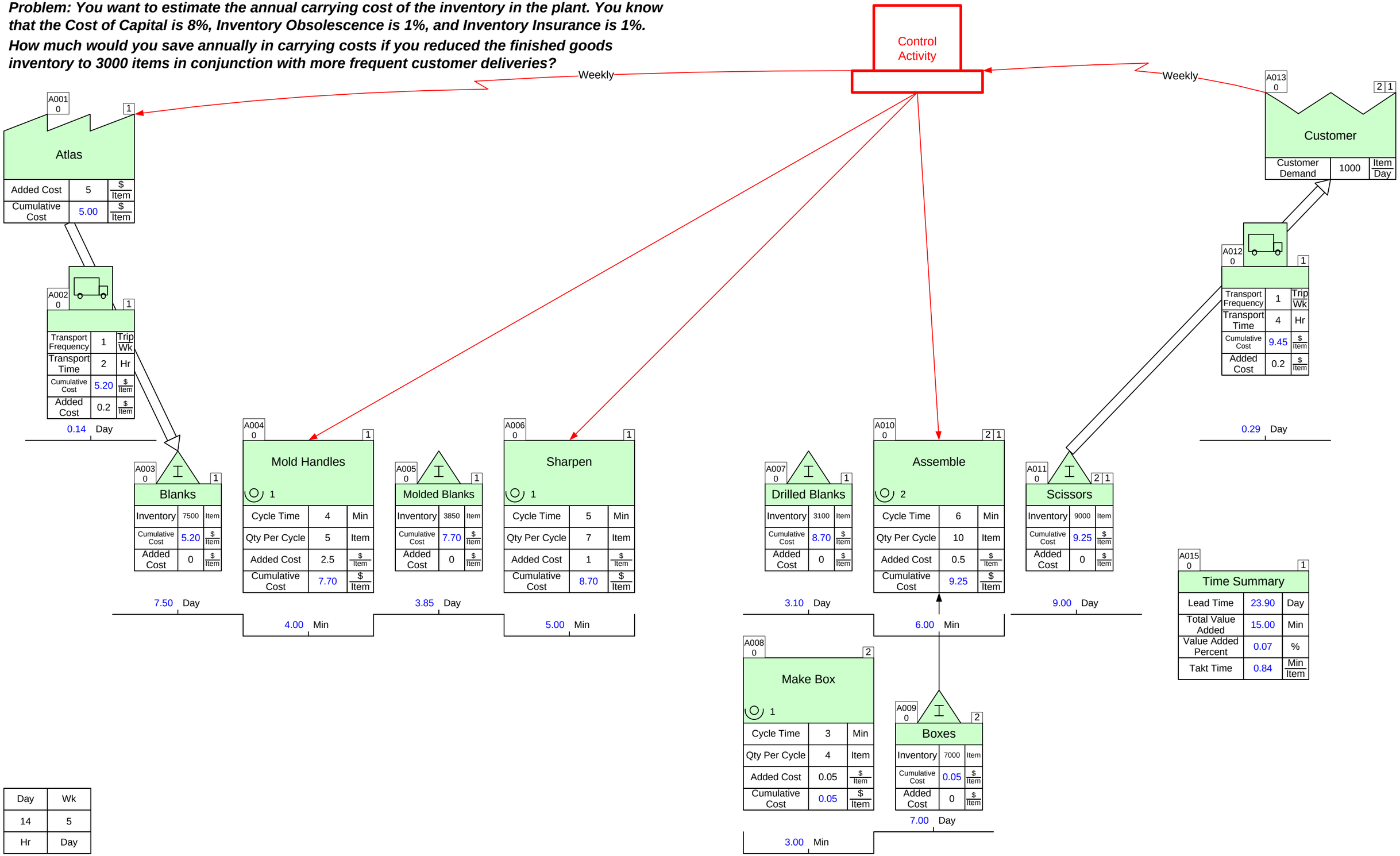
Manufacturing Problem: Annual Carrying Cost

Problem: You want to estimate the annual carrying cost of the inventory in the plant. You know that the Cost of Capital is 8%, Inventory Obsolescence is 1%, and Inventory Insurance is 1%.

How much would you save annually in carrying costs if you reduced the finished goods inventory to 3000 items in conjunction with more frequent customer deliveries?



Day	Wk
14	5
Hr	Day

A015 0 — 1

Time Summary

Lead Time	23.90	Day
Total Value Added	15.00	Min
Value Added Percent	0.07	%
Takt Time	0.84	Min/Item

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Manufacturing Solution: Annual Carrying Cost

Problem: You want to estimate the annual carrying cost of the inventory in the plant. You know that the Cost of Capital is 8%, Inventory Obsolescence is 1%, and Inventory Insurance is 1%.

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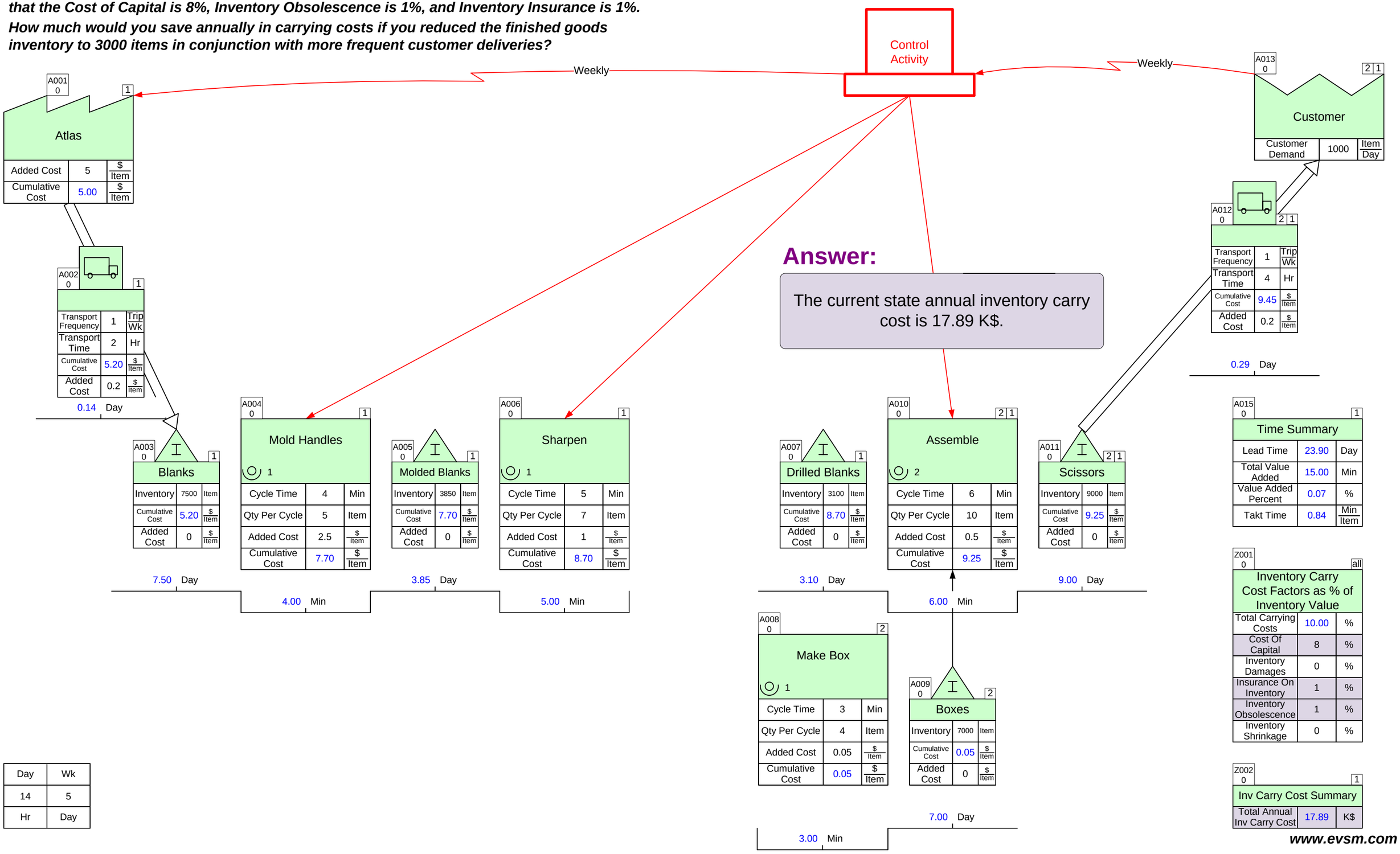

Answer:

The current state annual inventory carry cost is 17.89 K$.

A015 0 — 1

Time Summary

Lead Time	23.90	Day
Total Value Added	15.00	Min
Value Added Percent	0.07	%
Takt Time	0.84	Min/Item

Z001 0 — all

Inventory Carry Cost Factors as % of Inventory Value

Total Carrying Costs	10.00	%
Cost Of Capital	8	%
Inventory Damages	0	%
Insurance On Inventory	1	%
Inventory Obsolescence	1	%
Inventory Shrinkage	0	%

Z002 0 — 1

Inv Carry Cost Summary

Total Annual Inv Carry Cost	17.89	K$

Manufacturing Solution: Annual Carry Cost

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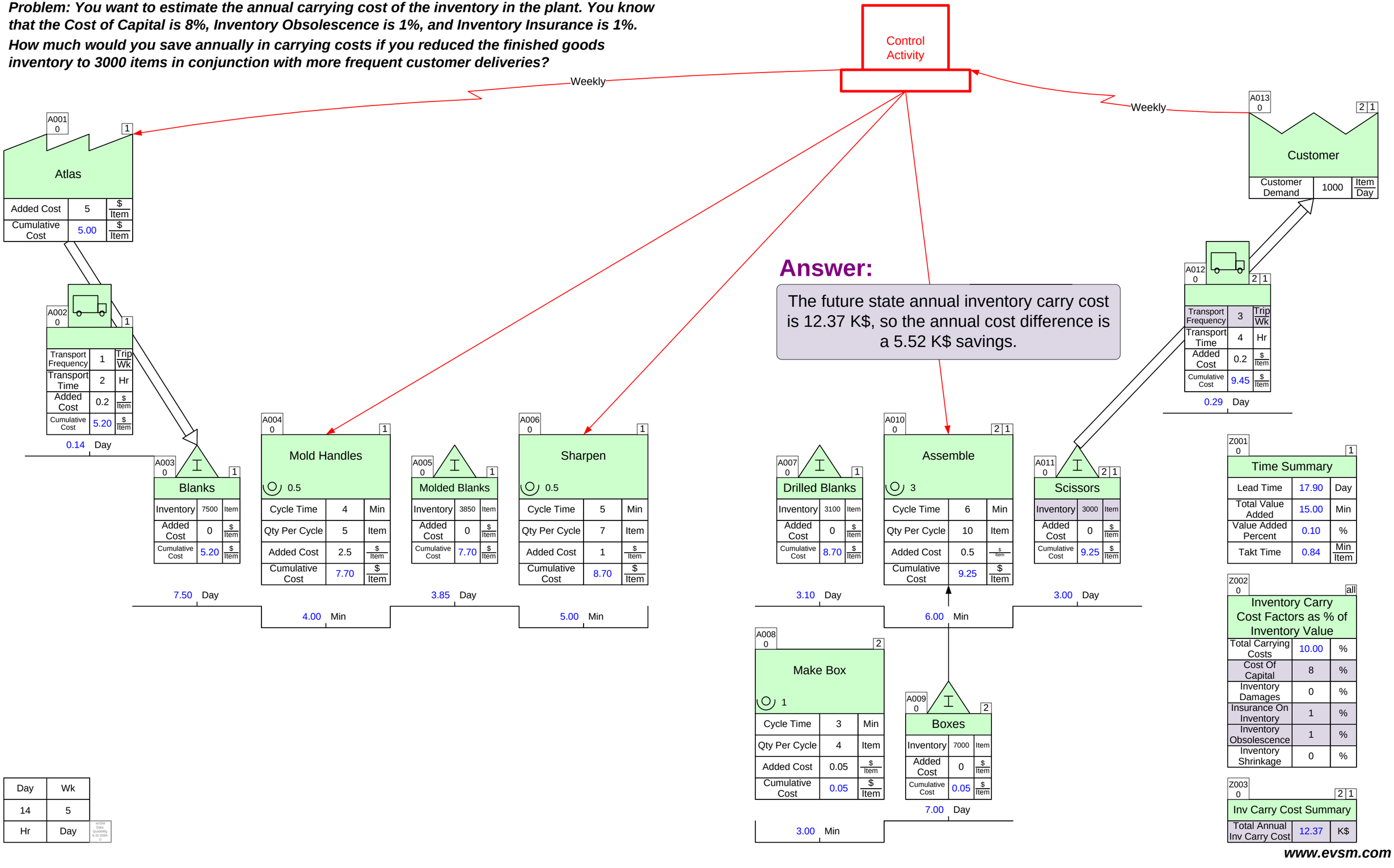

Answer:

The future state annual inventory carry cost is 12.37 K$, so the annual cost difference is a 5.52 K$ savings.

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