Manufacturing Problem: Downtime

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

Control System

Weekly

Weekly

A0010 — Atlas — 1

Activity Lead Time	0	Day

A0020 — 1

Transport Frequency	1	Trip / Week
Transport Time	2	Hr

0.14 Day

A0030 — Blanks — 1

Inventory	7500	Item

A0040 — Mold Handles — 1

1.00

Cycle Time	3	Min
Qty Per Cycle	5	Item
Capacity	1400.00	Item / Day

Station experiencing the unplanned downtime

A0050 — Molded Blanks — 1

Inventory	3850	Item

A0060 — Sharpen — 1

1.00

Cycle Time	4	Min
Qty Per Cycle	5	Item
Capacity	1050.00	Item / Day

7.50 Day — 180.00 Sec — 3.85 Day — 240.00 Sec

A0080 — Make Box — 2

1.00

Cycle Time	3	Min
Qty Per Cycle	4	Item
Capacity	1120.00	Item / Day

A0090 — Boxes — 2

Inventory	7000	Item

7.00 Day — 180.00 Sec

A0070 — Drilled Blanks — 1

Inventory	3100	Item

A0100 — Assemble — #2

2.00

Cycle Time	6	Min
Qty Per Cycle	10	Item
Capacity	1400.00	Item / Day

3.10 Day — 360.00 Sec — 9.00 Day

A0110 — Scissors — #2

Inventory	9000	Item

A0130 — Customer — all

Customer Demand	1000	Item / Day
Share %	100	%
Effective Demand	1000.00	Item / Day

A0120 — #2

Transport Frequency	1	Trip / Week
Transport Time	4	Hr

0.29 Day

Z0010 — Time Summary — 1

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	50.40	Sec / Item
Total Cycle Time	780.00	Sec
Process Time Per Unit	120.00	Sec / Item

Units	Year	Week	Week
	52	70	5
	Week	Hr	day

Manufacturing Solution: Downtime

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

Control System

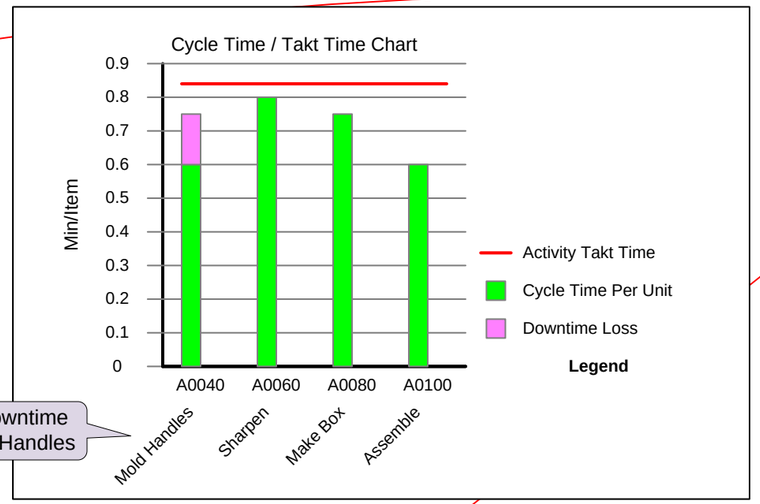
Weekly

Weekly

A0010 | 1

Atlas

Activity Lead Time	0	Day



20% downtime at Mold Handles

A0080 | 2

Make Box

1.00

Cycle Time	3	Min
Qty Per Cycle	4	Item
Capacity	1120.00	Item / Day
Pre OEE Capacity	1120.00	Item / Day
OEE Percent	100.00	%

A0090 | 2

Boxes

Inventory	7000	Item

A0130 | all

Customer

Customer Demand	1000	Item / Day
Share %	100	%
Effective Demand	1000.00	Item / Day

A0020 | 1

Transport Frequency	1	Trip / Week
Transport Time	2	Hr

A0120 | #2

Transport Frequency	1	Trip / Week
Transport Time	4	Hr

0.14 Day

180.00 Sec

7.00 Day

0.29 Day

Answer:

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

A0030 | 1

Blanks

Inventory	7500	Item

A0040 | 1

Mold Handles

1.00

Cycle Time	3	Min
Qty Per Cycle	5	Item
Capacity	1120.00	Item / Day
Pre OEE Capacity	1400.00	Item / Day
OEE Percent	80.00	%
Uptime Percent	80	%

A0050 | 1

Molded Blanks

Inventory	3850	Item

A0060 | 1

Sharpen

1.00

Cycle Time	4	Min
Qty Per Cycle	5	Item
Capacity	1050.00	Item / Day
Pre OEE Capacity	1050.00	Item / Day
OEE Percent	100.00	%

A0070 | 1

Drilled Blanks

Inventory	3100	Item

A0100 | #2

Assemble

2.00

Cycle Time	6	Min
Qty Per Cycle	10	Item
Capacity	1400.00	Item / Day
Pre OEE Capacity	1400.00	Item / Day
OEE Percent	100.00	%

A0110 | #2

Scissors

Inventory	9000	Item

7.50 Day

180.00 Sec

3.85 Day

240.00 Sec

3.10 Day

360.00 Sec

9.00 Day

Z0010 | 1

Time Summary

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	50.40	Sec / Item
Total Cycle Time	780.00	Sec
Process Time Per Unit	120.00	Sec / Item

Units	Year	Week	Week
	52	70	5
	Week	Hr	day

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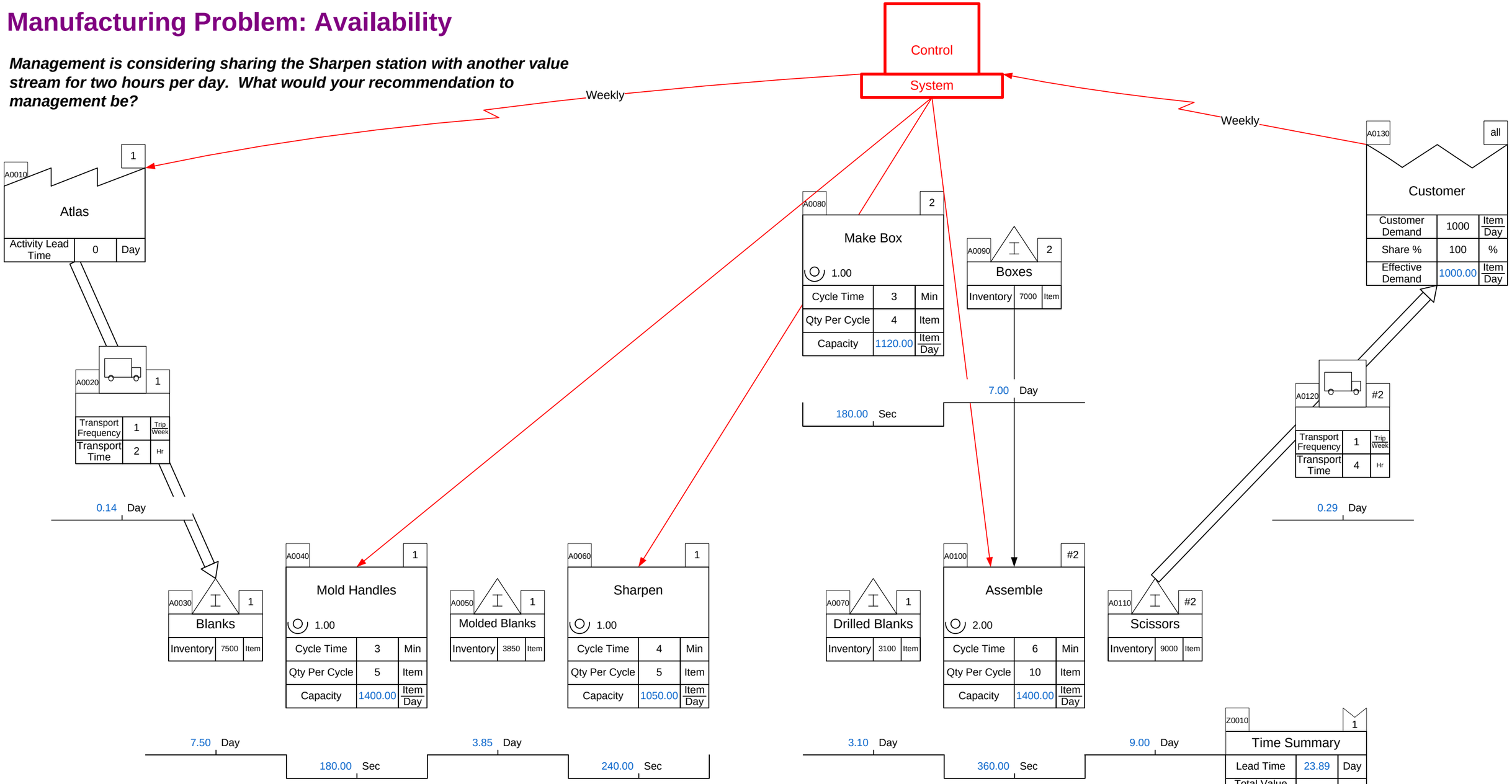
Manufacturing Problem: Availability

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



Units	Year	Week	Week
	52	70	5
	Week	Hr	day

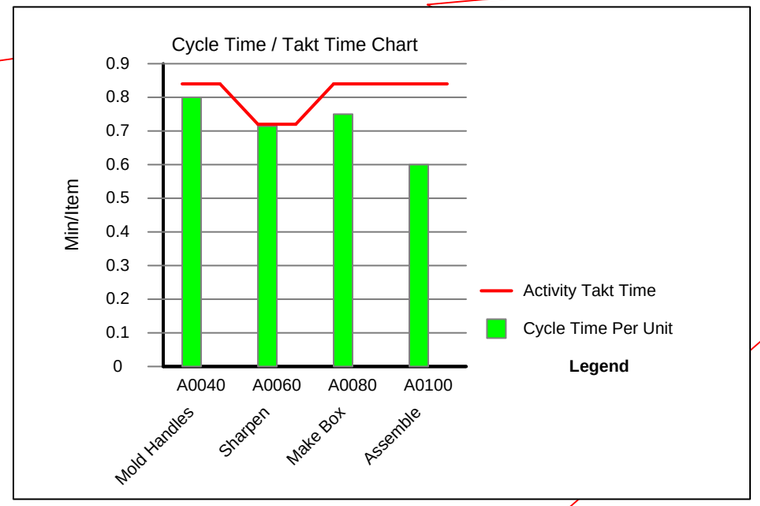
Manufacturing Solution: Availability

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

Control System

Weekly

Weekly



A0010 — 1
Atlas
Activity Lead Time | 0 | Day

A0020 — 1
Transport Frequency | 1 | Trip/Week
Transport Time | 2 | Hr

0.14 Day

A0030 — 1
Blanks
Inventory | 7500 | Item

7.50 Day

240.00 Sec

A0040 — 1
Mold Handles
1.00
Cycle Time | 4 | Min
Qty Per Cycle | 5 | Item
Capacity | 1050.00 | Item/Day

A0050 — 1
Molded Blanks
Inventory | 3850 | Item

3.85 Day

A0060 — 1
Sharpen
1.00
Cycle Time | 5 | Min
Qty Per Cycle | 7 | Item
Capacity | 1008.00 | Item/Day
Activity Time | 12 | Hr/Day

350.00 Sec

Availability change – two hours less than other stations

Units			
	Year	Week	Week
	52	70	5
	Week	Hr	day

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.

A0080 — 2
Make Box
1.00
Cycle Time | 3 | Min
Qty Per Cycle | 4 | Item
Capacity | 1120.00 | Item/Day

180.00 Sec

A0090 — 2
Boxes
Inventory | 7000 | Item

7.00 Day

3.10 Day

360.00 Sec

A0070 — 1
Drilled Blanks
Inventory | 3100 | Item

A0100 — #2
Assemble
2.00
Cycle Time | 6 | Min
Qty Per Cycle | 10 | Item
Capacity | 1400.00 | Item/Day

9.00 Day

A0110 — #2
Scissors
Inventory | 9000 | Item

A0120 — #2
Transport Frequency | 1 | Trip/Week
Transport Time | 4 | Hr

0.29 Day

A0130 — all
Customer
Customer Demand | 1000 | Item/Day
Share % | 100 | %
Effective Demand | 1000.00 | Item/Day

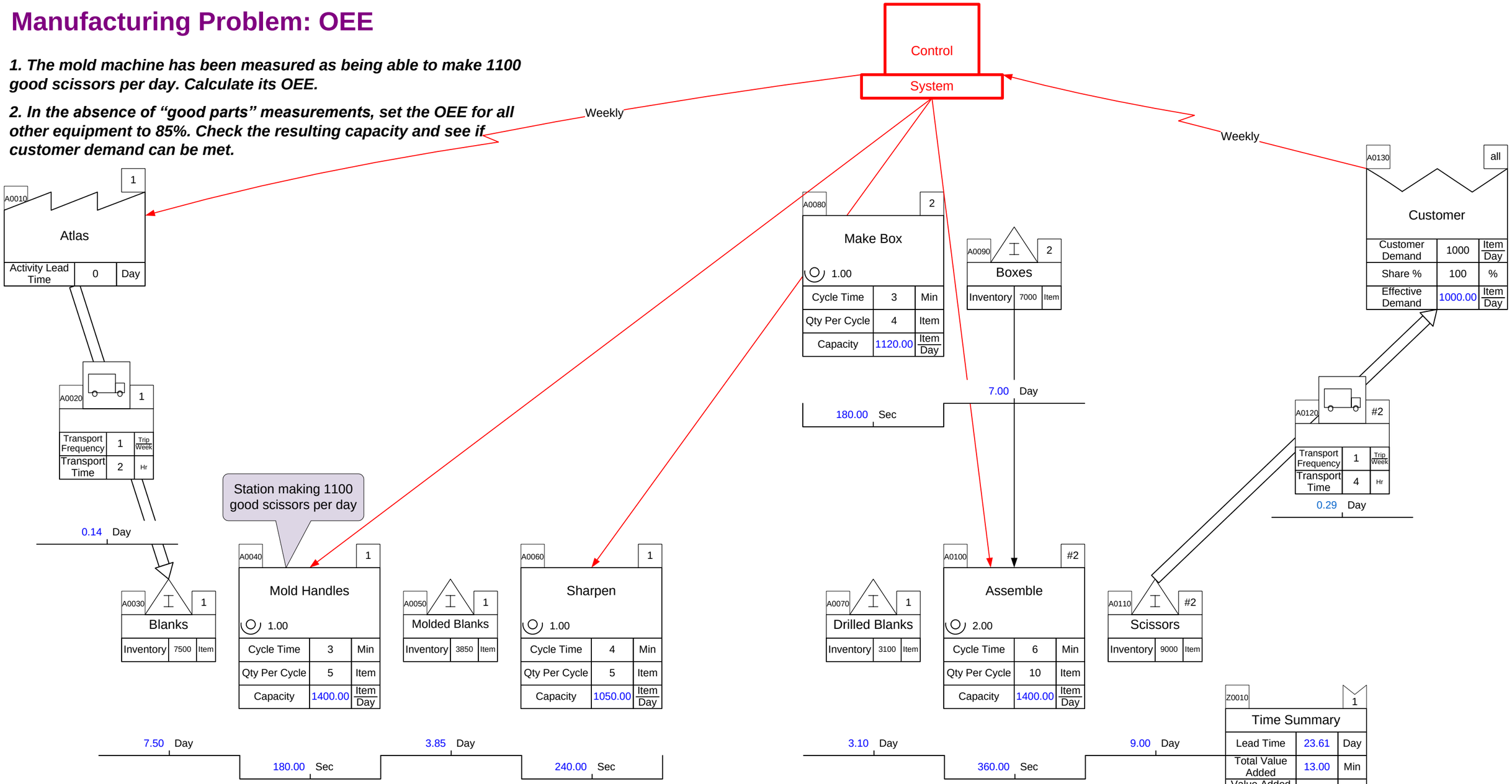
Z0010 — 1
Time Summary

Lead Time	23.90	Day
Total Value Added	15.83	Min
Value Added Percent	0.08	%
Takt Time	50.40	Sec/Item
Total Cycle Time	900.00	Sec
Process Time Per Unit	126.86	Sec/Item

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.

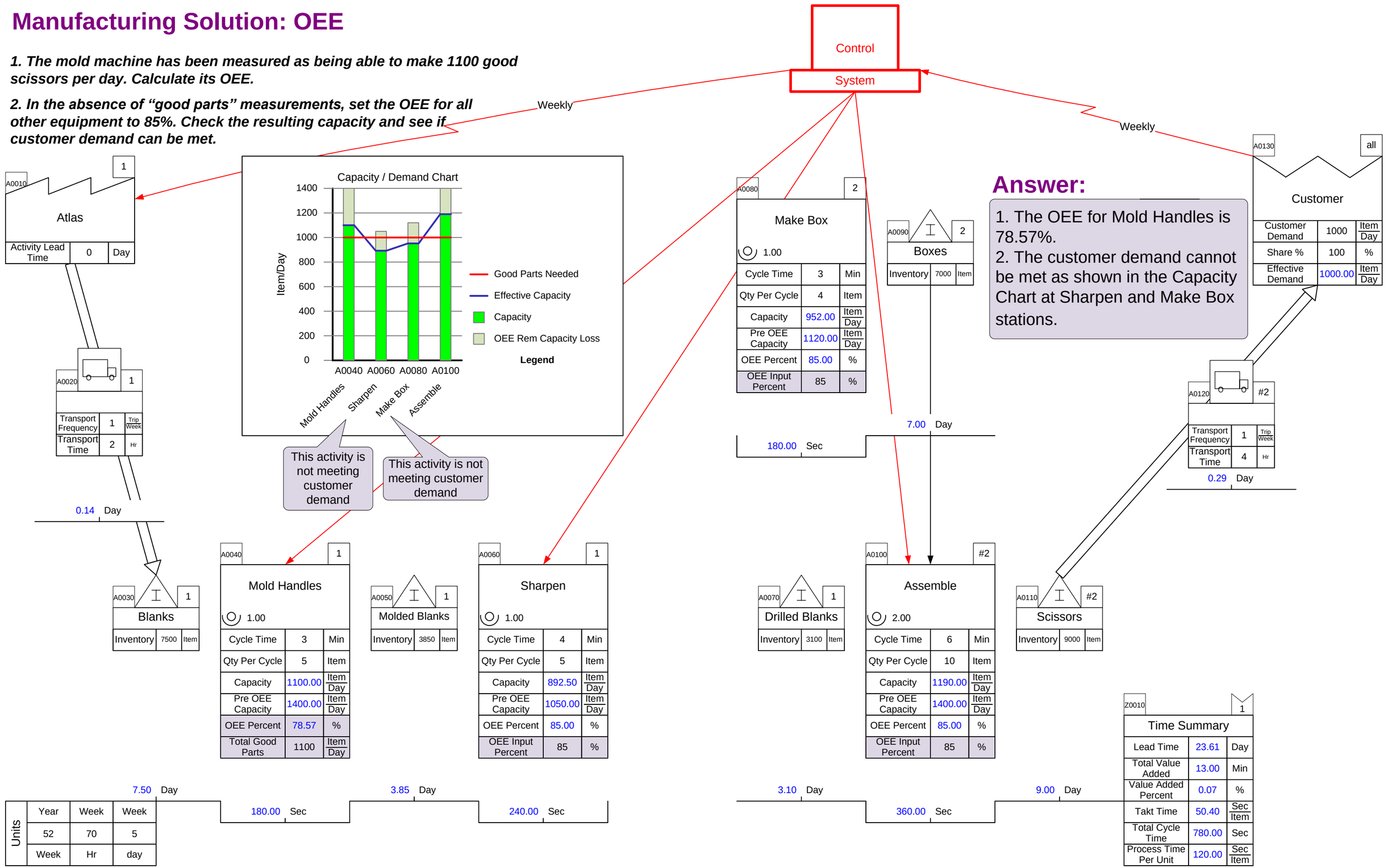


Units	Year	Week	Week
	52	70	5
	Week	Hr	day

Manufacturing Solution: 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.

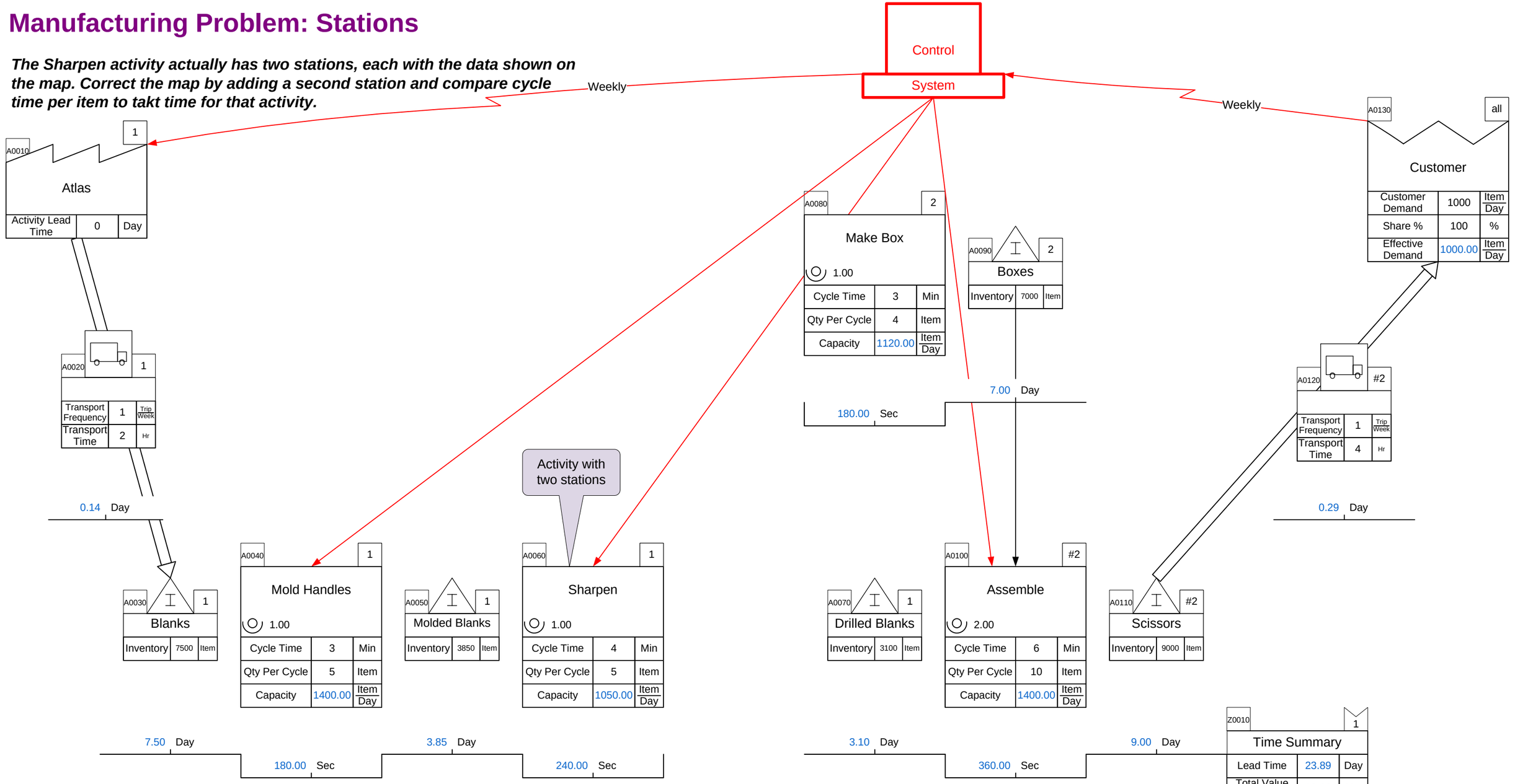


Answer:

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

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.



Units	Year	Week	Week
	52	70	5
	Week	Hr	day

Manufacturing Solution: 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.

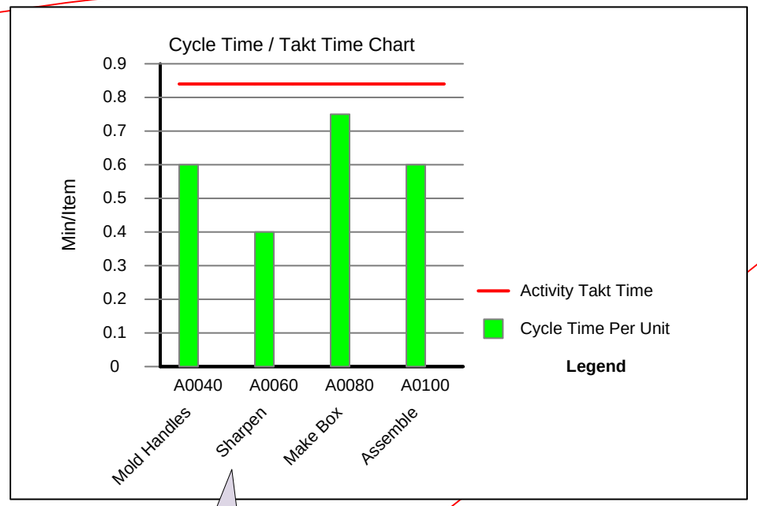
Control System

Weekly

Weekly

Answer:

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



Cycle time per unit has decreased by half

A0010 — 1
Atlas
Activity Lead Time | 0 | Day

A0020 — 1
Transport Frequency | 1 | Trip/Week
Transport Time | 2 | Hr

0.14 Day

A0030 — 1
Blanks
Inventory | 7500 | Item

A0040 — 1
Mold Handles
1.00
Cycle Time | 3 | Min
Qty Per Cycle | 5 | Item
Capacity | 1400.00 | Item/Day

A0050 — 1
Molded Blanks
Inventory | 3850 | Item

A0060 — 1
Sharpen
1.00
Cycle Time | 4 | Min
Qty Per Cycle | 5 | Item
Capacity | 2100.00 | Item/Day
Stations | 2 | Stn

7.50 Day — 180.00 Sec — 3.85 Day — 240.00 Sec

A0080 — 2
Make Box
1.00
Cycle Time | 3 | Min
Qty Per Cycle | 4 | Item
Capacity | 1120.00 | Item/Day

A0090 — 2
Boxes
Inventory | 7000 | Item

7.00 Day — 180.00 Sec

A0070 — 1
Drilled Blanks
Inventory | 3100 | Item

A0100 — #2
Assemble
2.00
Cycle Time | 6 | Min
Qty Per Cycle | 10 | Item
Capacity | 1400.00 | Item/Day

3.10 Day — 360.00 Sec — 9.00 Day

A0110 — #2
Scissors
Inventory | 9000 | Item

A0120 — #2
Transport Frequency | 1 | Trip/Week
Transport Time | 4 | Hr

0.29 Day

A0130 — all
Customer
Customer Demand | 1000 | Item/Day
Share % | 100 | %
Effective Demand | 1000.00 | Item/Day

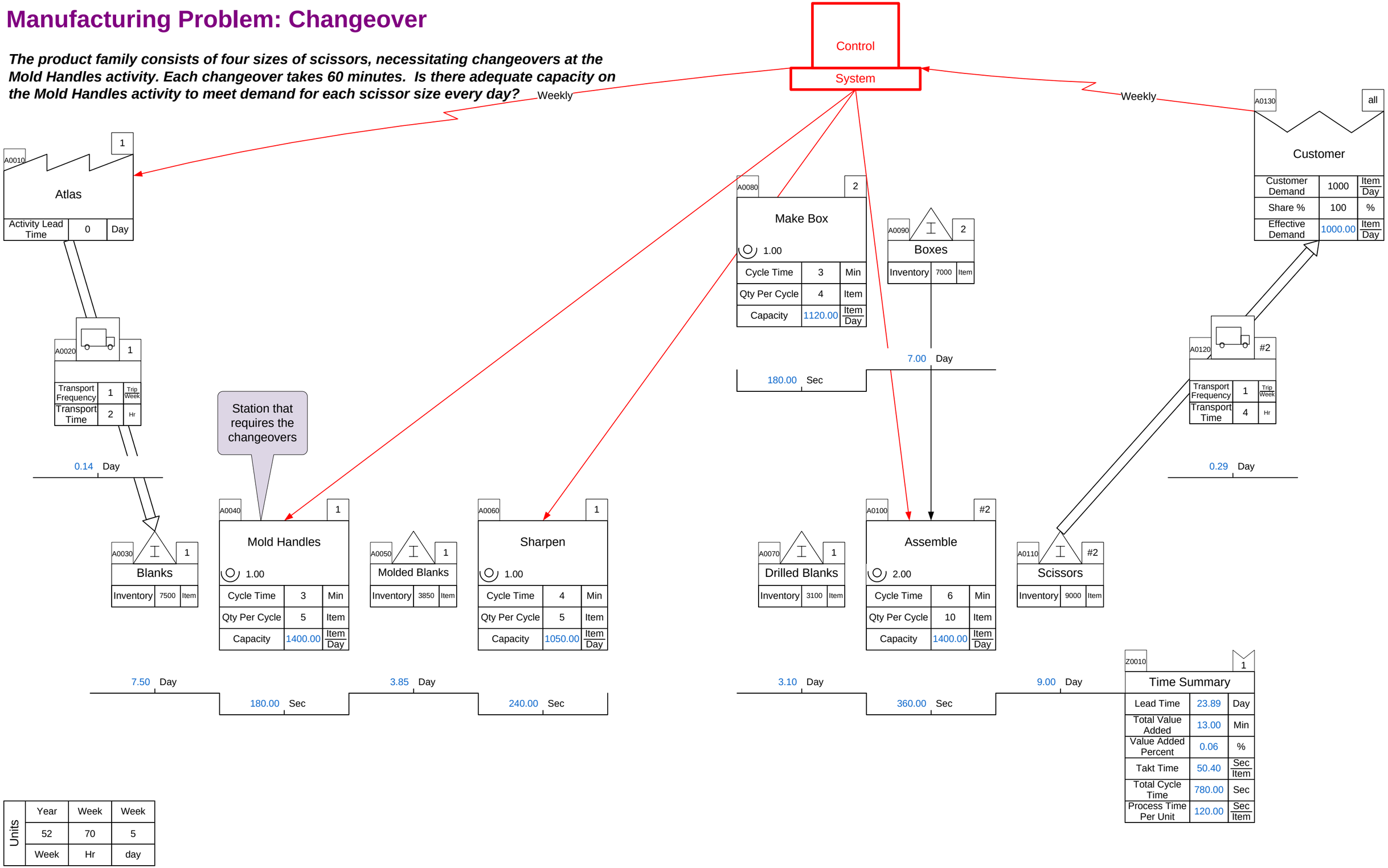
Z0010 — 1
Time Summary

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	50.40	Sec/Item
Total Cycle Time	780.00	Sec
Process Time Per Unit	96.00	Sec/Item

Units	Year	Week	Week
	52	70	5
	Week	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?



Units	Year	Week	Week
	52	70	5
	Week	Hr	day

Manufacturing Solution: Changeover

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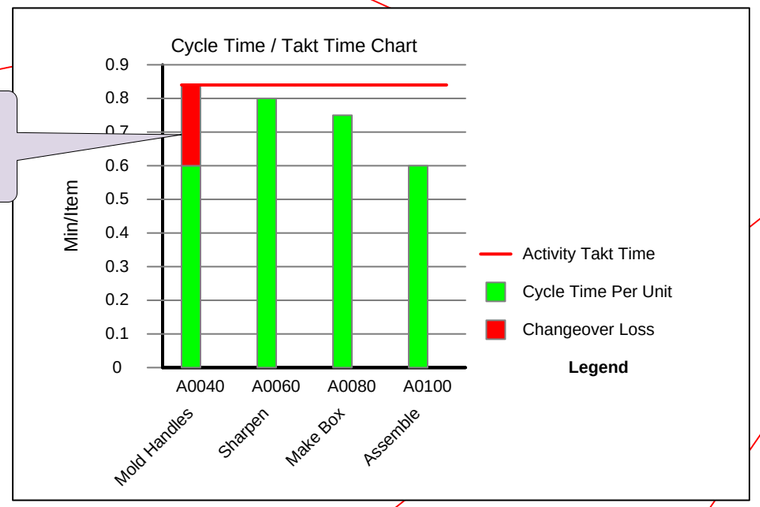


Changeover loss for Mold Handles

Answer:

Just barely, as shown on the Cycle Time / Takt Time chart.

Control System

Weekly

Weekly

A0010 — 1 — Atlas

Activity Lead Time	0	Day

A0020 — 1

Transport Frequency	1	Trip / Week
Transport Time	2	Hr

0.14 Day

A0030 — 1 — Blanks

Inventory	7500	Item

A0040 — 1 — Mold Handles — 1.00

Cycle Time	3	Min
Qty Per Cycle	5	Item
Capacity	1000.00	Item / Day
Pre OEE Capacity	1400.00	Item / Day
OEE Percent	71.43	%
Changeovers	4	CO / Day
Time Per Changeover	60	Min / CO

A0050 — 1 — Molded Blanks

Inventory	3850	Item

A0060 — 1 — Sharpen — 1.00

Cycle Time	4	Min
Qty Per Cycle	5	Item
Capacity	1050.00	Item / Day
Pre OEE Capacity	1050.00	Item / Day
OEE Percent	100.00	%

A0080 — 2 — Make Box — 1.00

Cycle Time	3	Min
Qty Per Cycle	4	Item
Capacity	1120.00	Item / Day
Pre OEE Capacity	1120.00	Item / Day
OEE Percent	100.00	%

A0090 — 2 — Boxes

Inventory	7000	Item

7.00 Day

180.00 Sec

A0070 — 1 — Drilled Blanks

Inventory	3100	Item

A0100 — #2 — Assemble — 2.00

Cycle Time	6	Min
Qty Per Cycle	10	Item
Capacity	1400.00	Item / Day
Pre OEE Capacity	1400.00	Item / Day
OEE Percent	100.00	%

A0110 — #2 — Scissors

Inventory	9000	Item

A0120 — #2

Transport Frequency	1	Trip / Week
Transport Time	4	Hr

0.29 Day

A0130 — all — Customer

Customer Demand	1000	Item / Day
Share %	100	%
Effective Demand	1000.00	Item / Day

Units	Year	Week	Week
	52	70	5
	Week	Hr	day

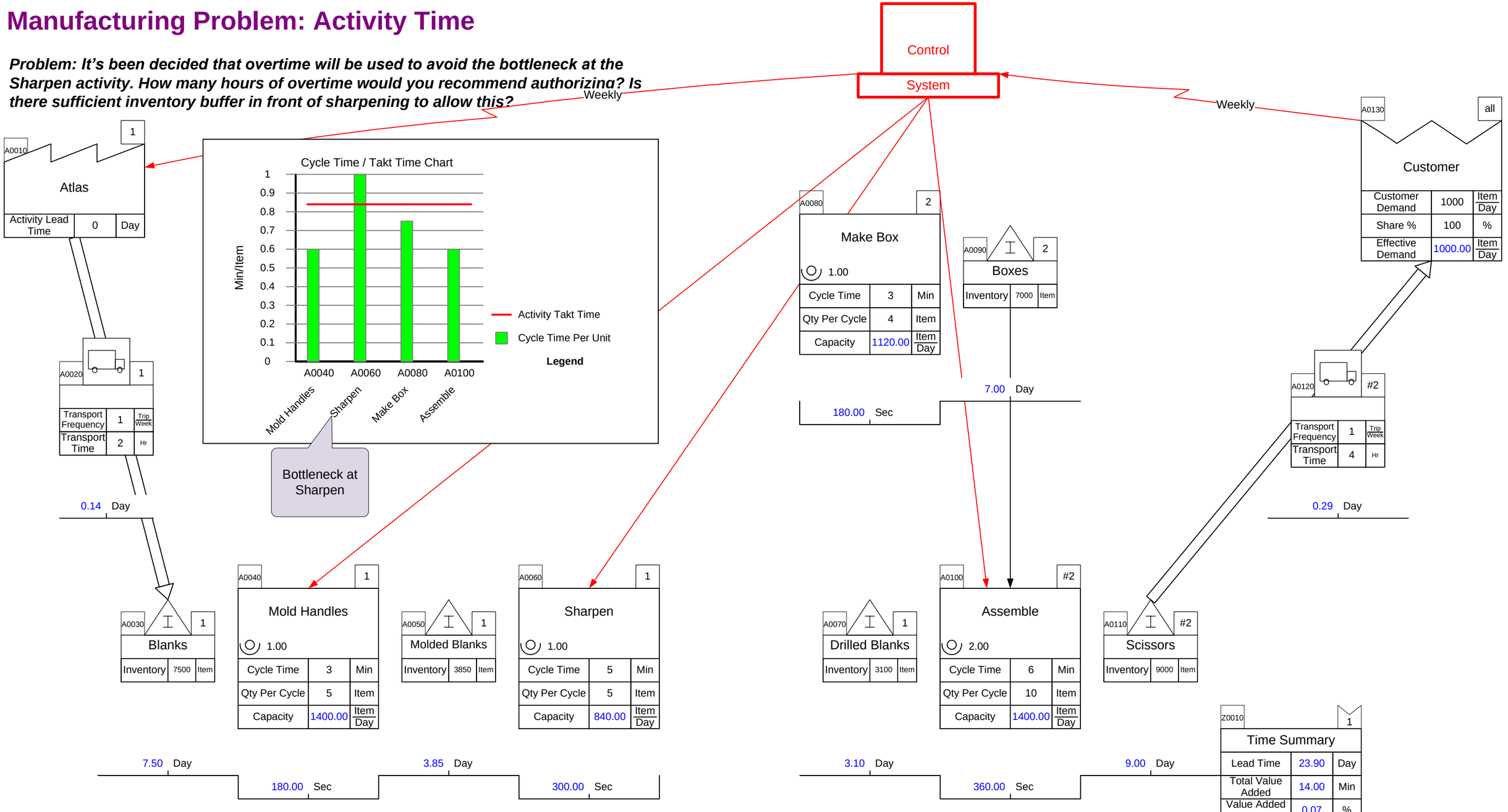
7.50 Day — 180.00 Sec — 3.85 Day — 240.00 Sec — 3.10 Day — 360.00 Sec — 9.00 Day

Z0010 — 1 — Time Summary

Lead Time	23.89	Day
Total Value Added	13.00	Min
Value Added Percent	0.06	%
Takt Time	50.40	Sec / Item
Total Cycle Time	780.00	Sec
Process Time Per Unit	120.00	Sec / Item

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?



Units	Year	Week	Week
	52	70	5
	Week	Hr	day

Manufacturing Solution: Activity Time

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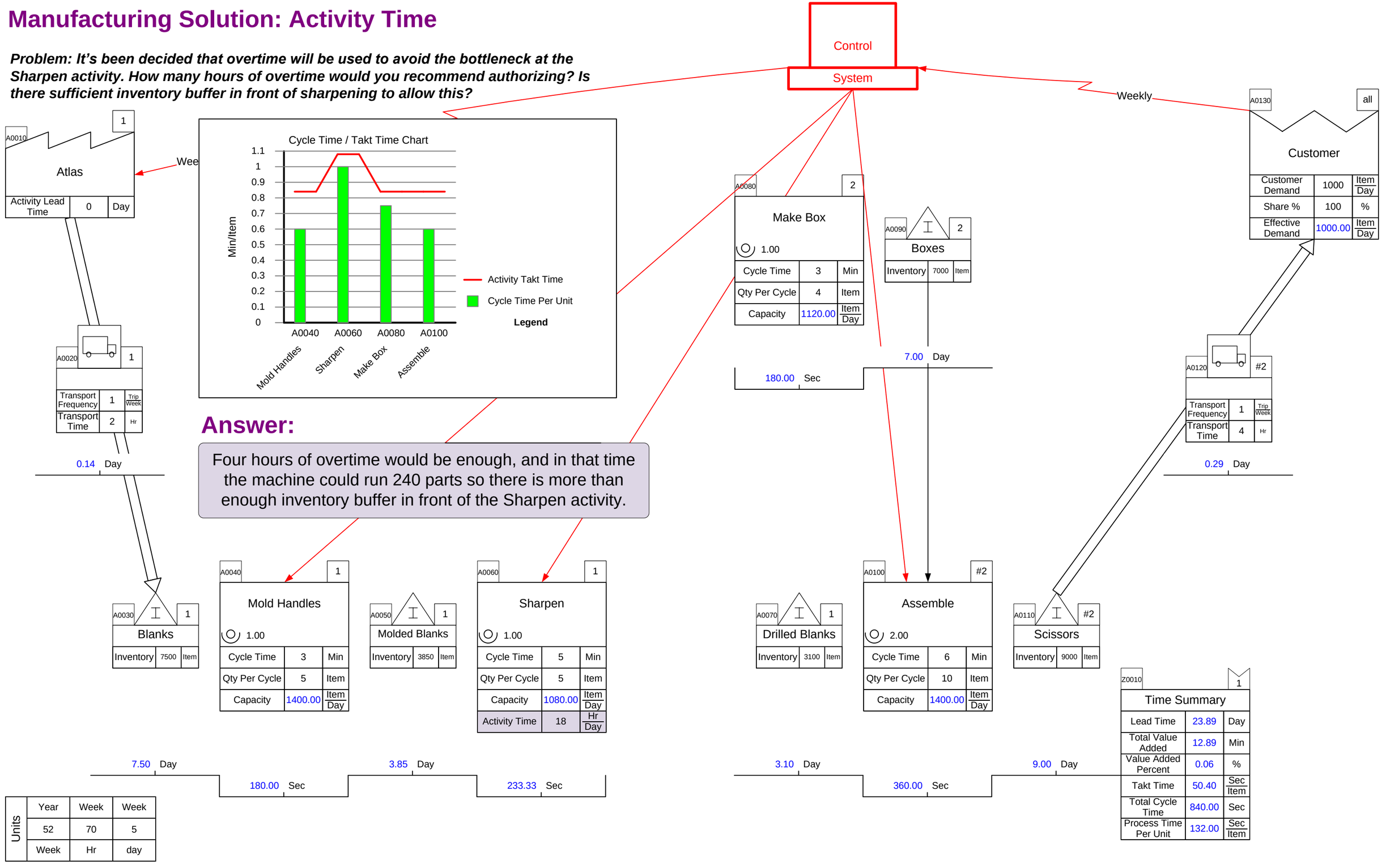
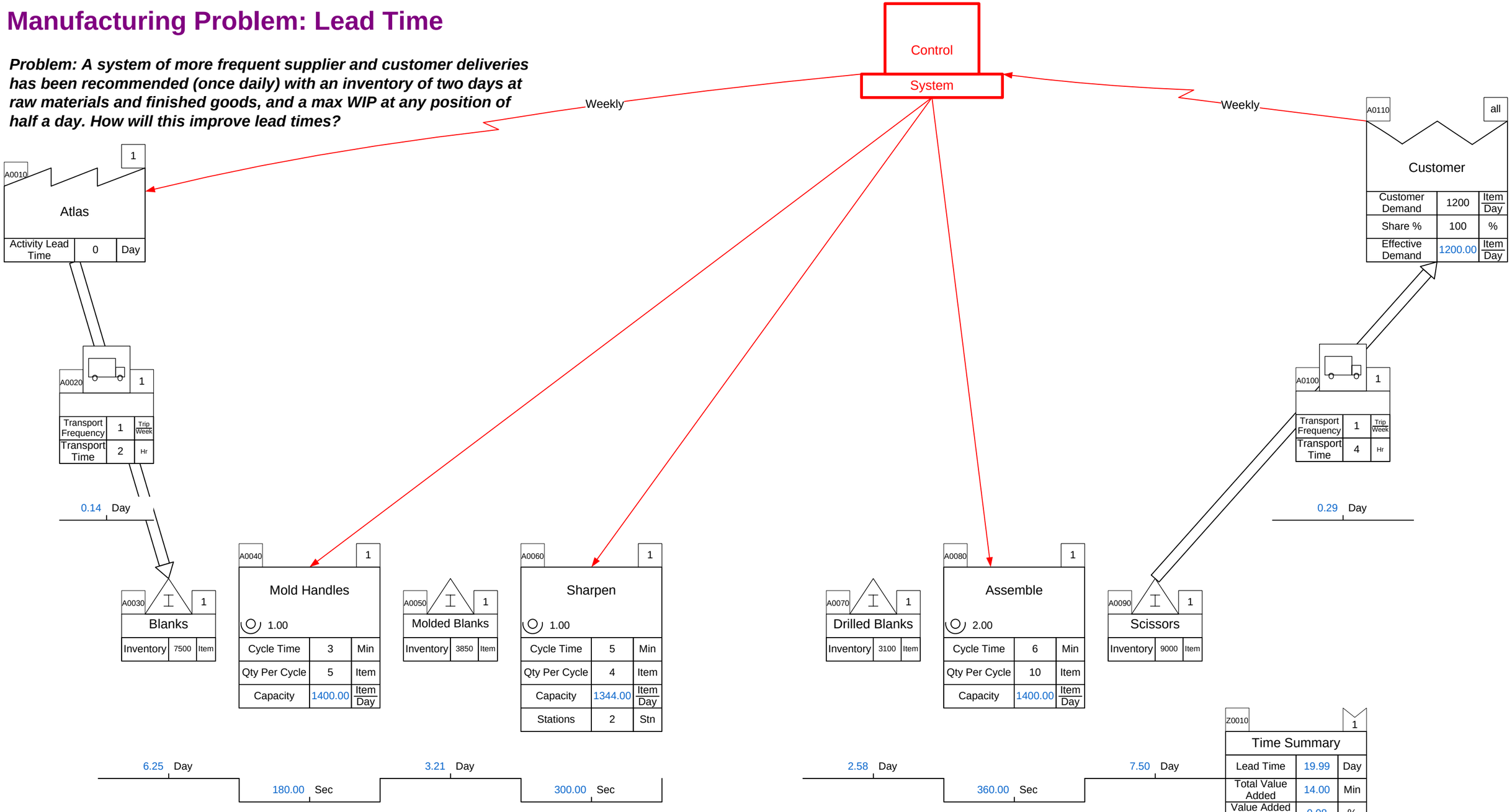


Manufacturing Problem: Lead Time

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?



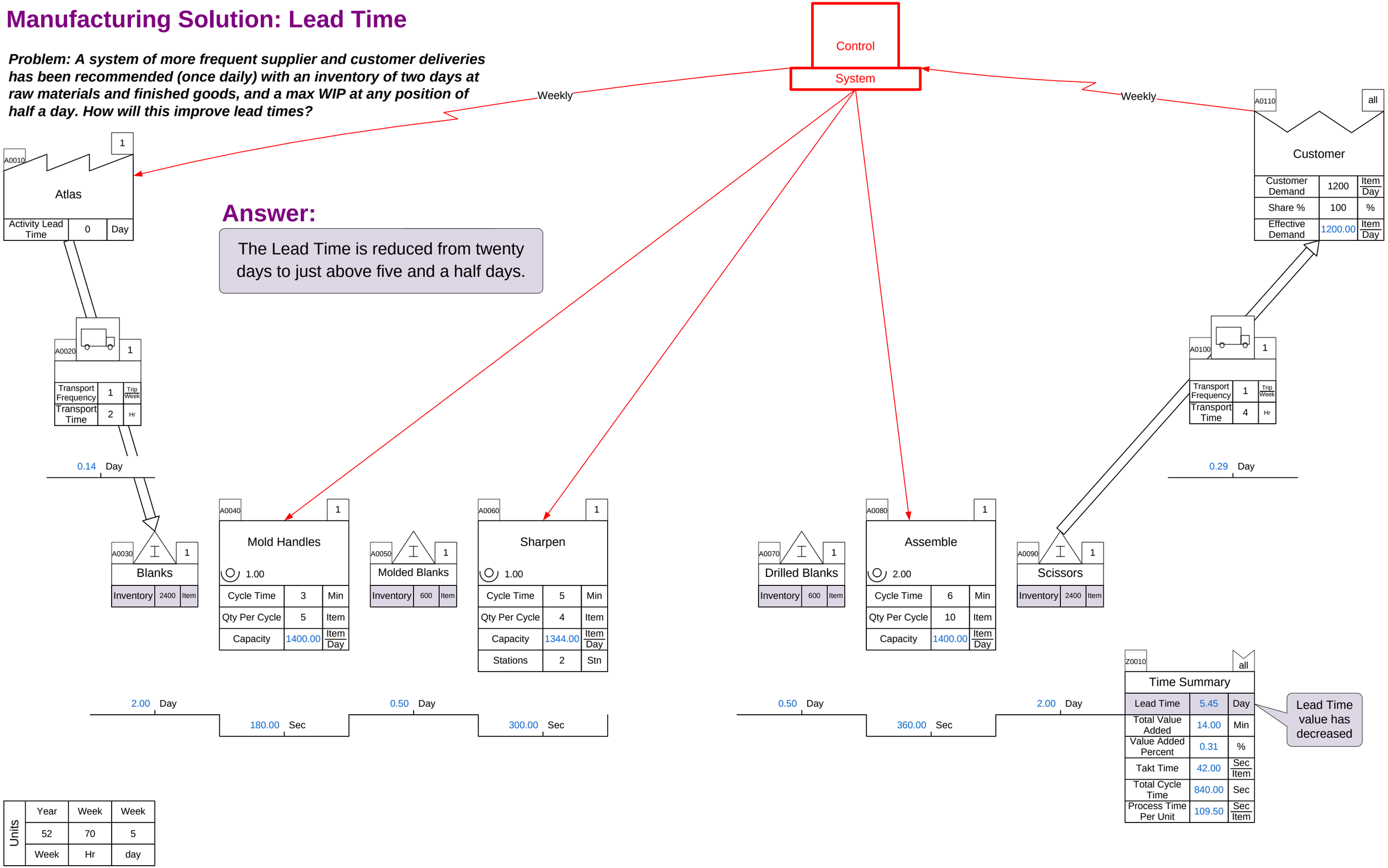
Units	Year	Week	Week
	52	70	5
	Week	Hr	day

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?

Answer:

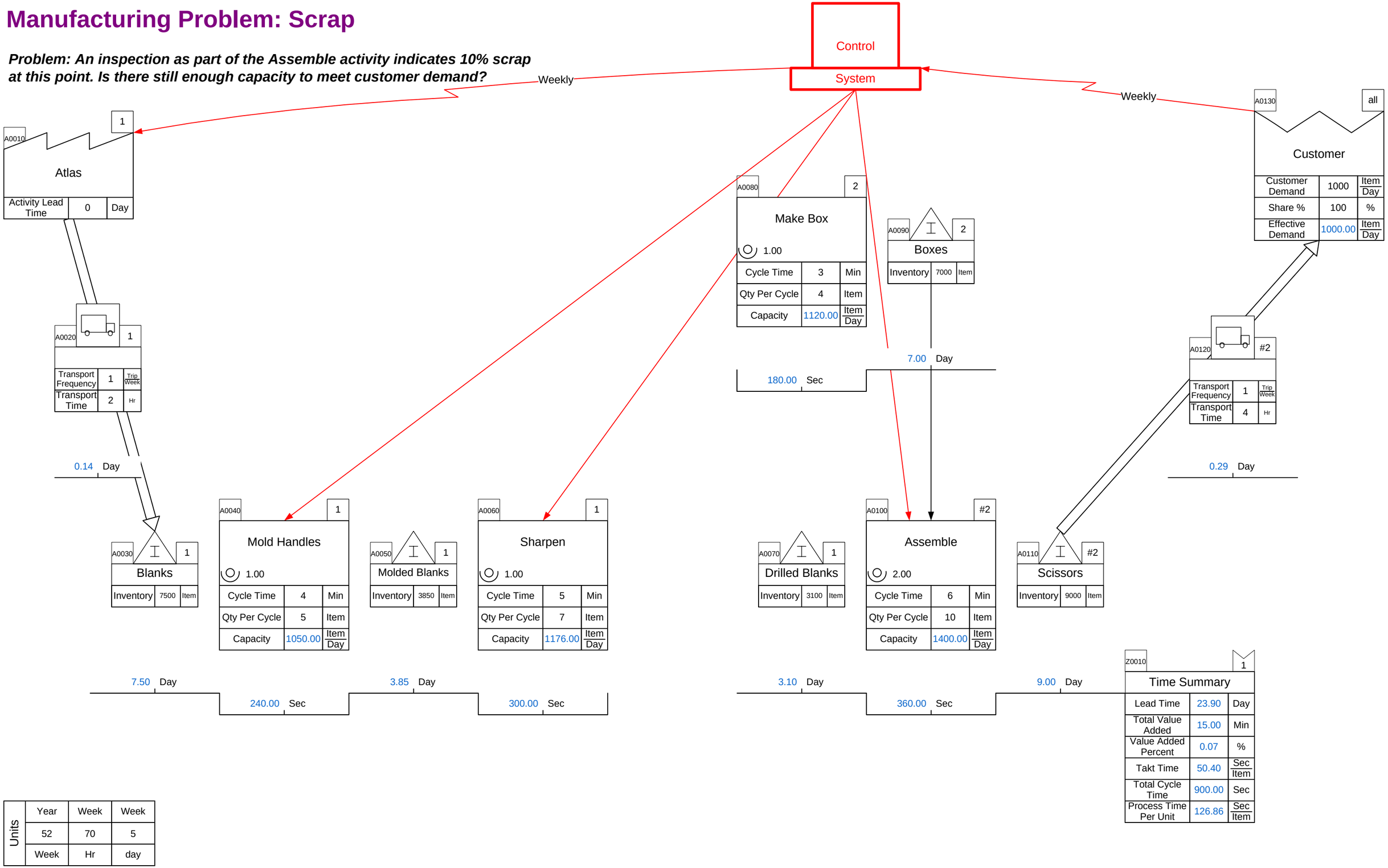
The Lead Time is reduced from twenty days to just above five and a half days.



Units	Year	Week	Week
	52	70	5
	Week	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?



Units	Year	Week	Week
	52	70	5
	Week	Hr	day

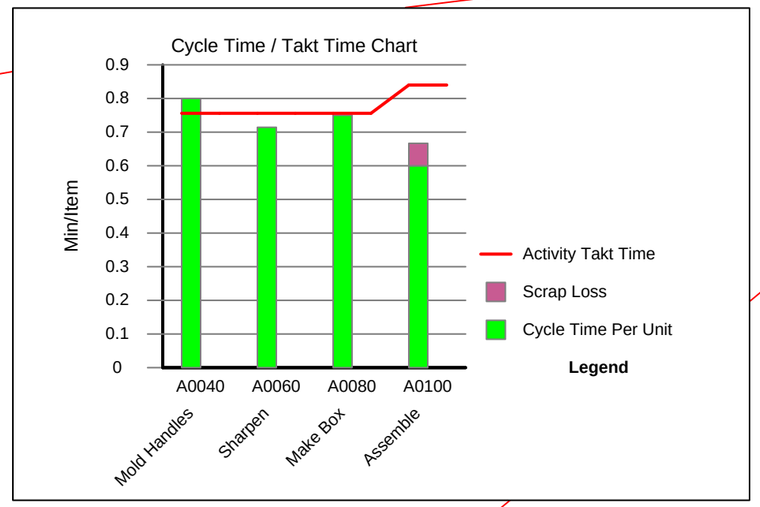
Manufacturing Solution: Scrap

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 System

Weekly

Weekly



Answer:

The Scrap loss at the Mold Handles activity reduces Takt Times upstream such that there is inadequate Capacity.

A0010 — 1
Atlas
Activity Lead Time | 0 | Day

0.14 Day

A0020 — 1
Transport Frequency | 1 | Trip/Week
Transport Time | 2 | Hr

A0030 — 1
Blanks
Inventory | 7500 | Item

A0040 — 1
Mold Handles
1.00

Cycle Time	4	Min
Qty Per Cycle	5	Item
Capacity	1050.00	Item/Day
Pre OEE Capacity	1050.00	Item/Day
OEE Percent	100.00	%
Activity Takt Time	45.36	Sec/Item

240.00 Sec

A0050 — 1
Molded Blanks
Inventory | 3850 | Item

3.85 Day

A0060 — 1
Sharpen
1.00

Cycle Time	5	Min
Qty Per Cycle	7	Item
Capacity	1176.00	Item/Day
Pre OEE Capacity	1176.00	Item/Day
OEE Percent	100.00	%
Activity Takt Time	45.36	Sec/Item

300.00 Sec

Units			
	Year	We	
	52	70	5
	Week	Hr	day

7.50 Day

A0080 — 2
Make Box
1.00

Cycle Time	3	Min
Qty Per Cycle	4	Item
Capacity	1120.00	Item/Day
Pre OEE Capacity	1120.00	Item/Day
OEE Percent	100.00	%
Activity Takt Time	45.36	Sec/Item

180.00 Sec

A0090 — 2
Boxes
Inventory | 7000 | Item

7.00 Day

A0070 — 1
Drilled Blanks
Inventory | 3100 | Item

3.10 Day

A0100 — #2
Assemble
2.00

Cycle Time	6	Min
Qty Per Cycle	10	Item
Capacity	1260.00	Item/Day
Pre OEE Capacity	1400.00	Item/Day
OEE Percent	90.00	%
Activity Takt Time	50.40	Sec/Item
Scrap Percent	10	%

360.00 Sec

A0110 — #2
Scissors
Inventory | 9000 | Item

9.00 Day

A0130 — all
Customer

Customer Demand	1000	Item/Day
Share %	100	%
Effective Demand	1000.00	Item/Day

A0120 — #2
Transport Frequency | 1 | Trip/Week
Transport Time | 4 | Hr

0.29 Day

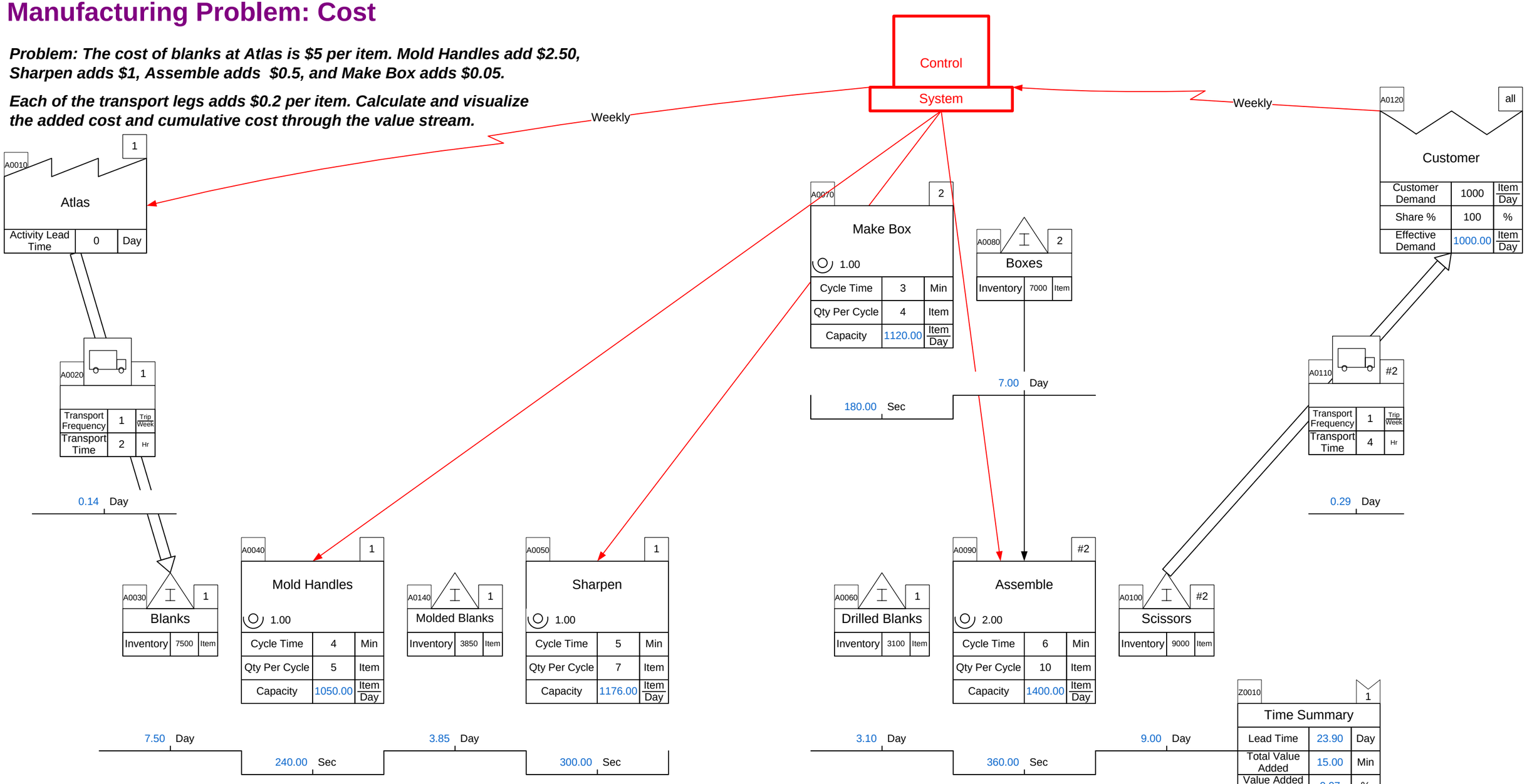
Z0010 — 1
Time Summary

Lead Time	23.90	Day
Total Value Added	15.00	Min
Value Added Percent	0.07	%
Takt Time	50.40	Sec/Item
Total Cycle Time	900.00	Sec
Process Time Per Unit	126.86	Sec/Item

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.



Units	Year	Week	Week
	52	70	5
	Week	Hr	day

Manufacturing Solution: 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.

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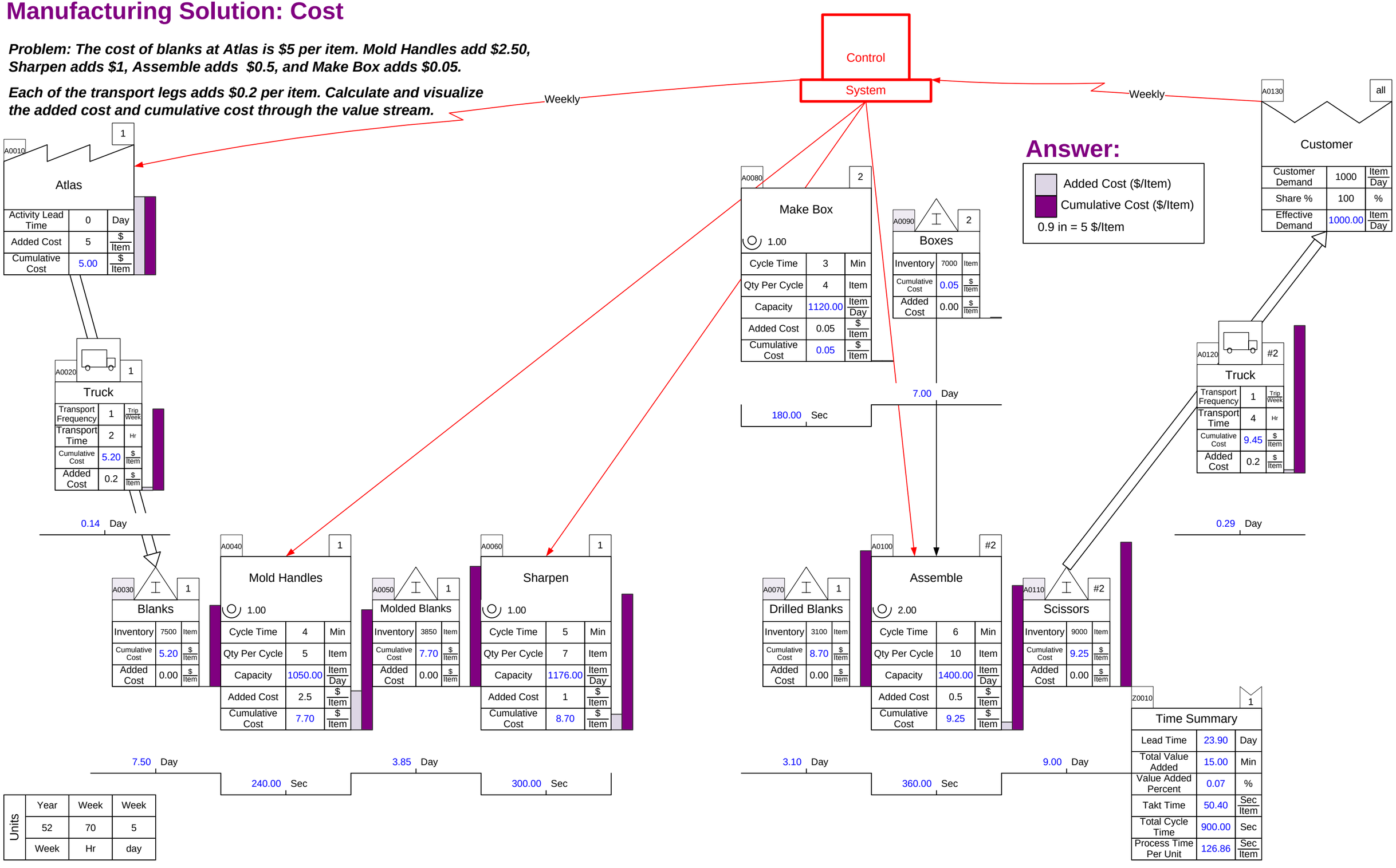
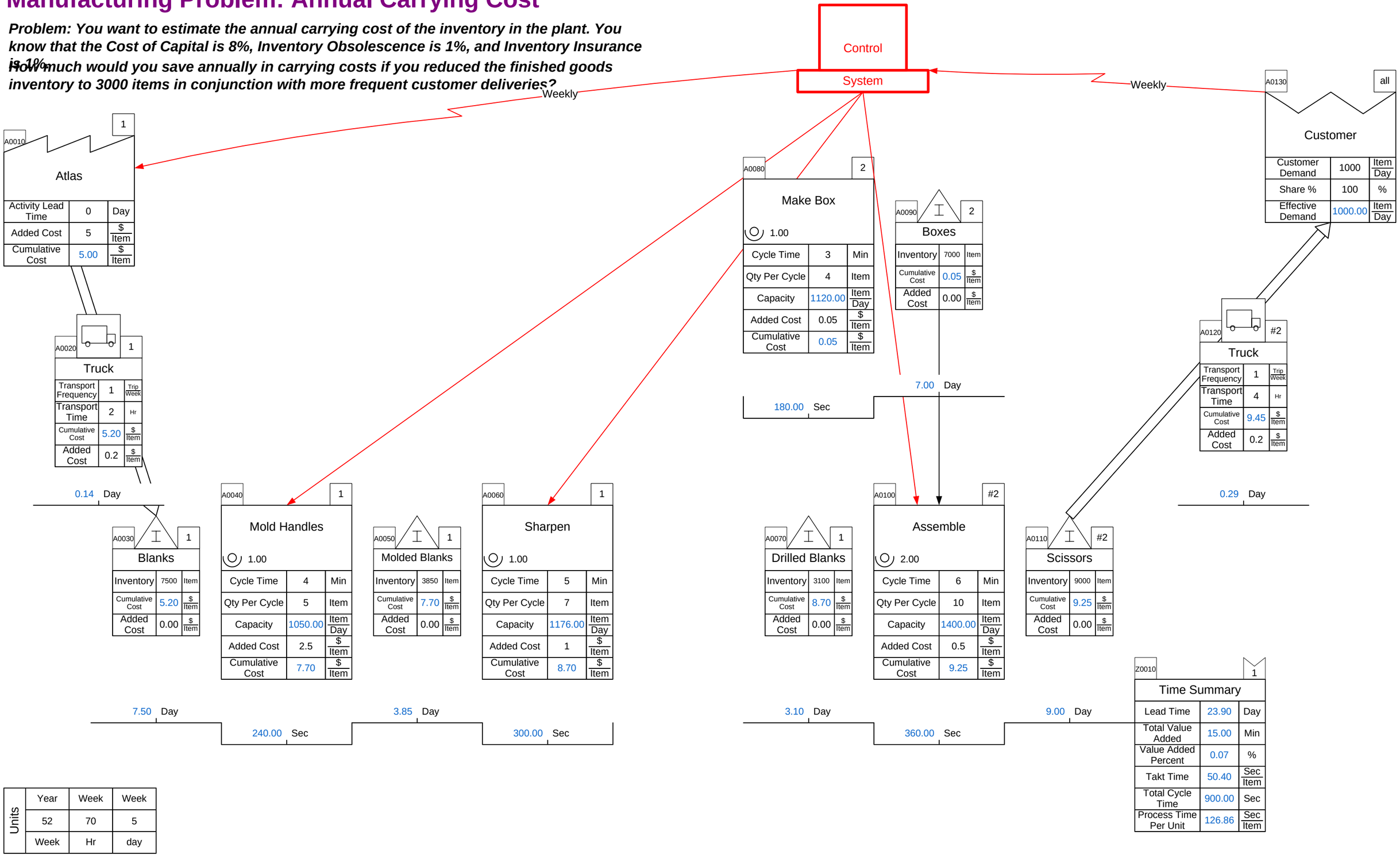


Manufacturing Problem: Annual Carrying Cost

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?



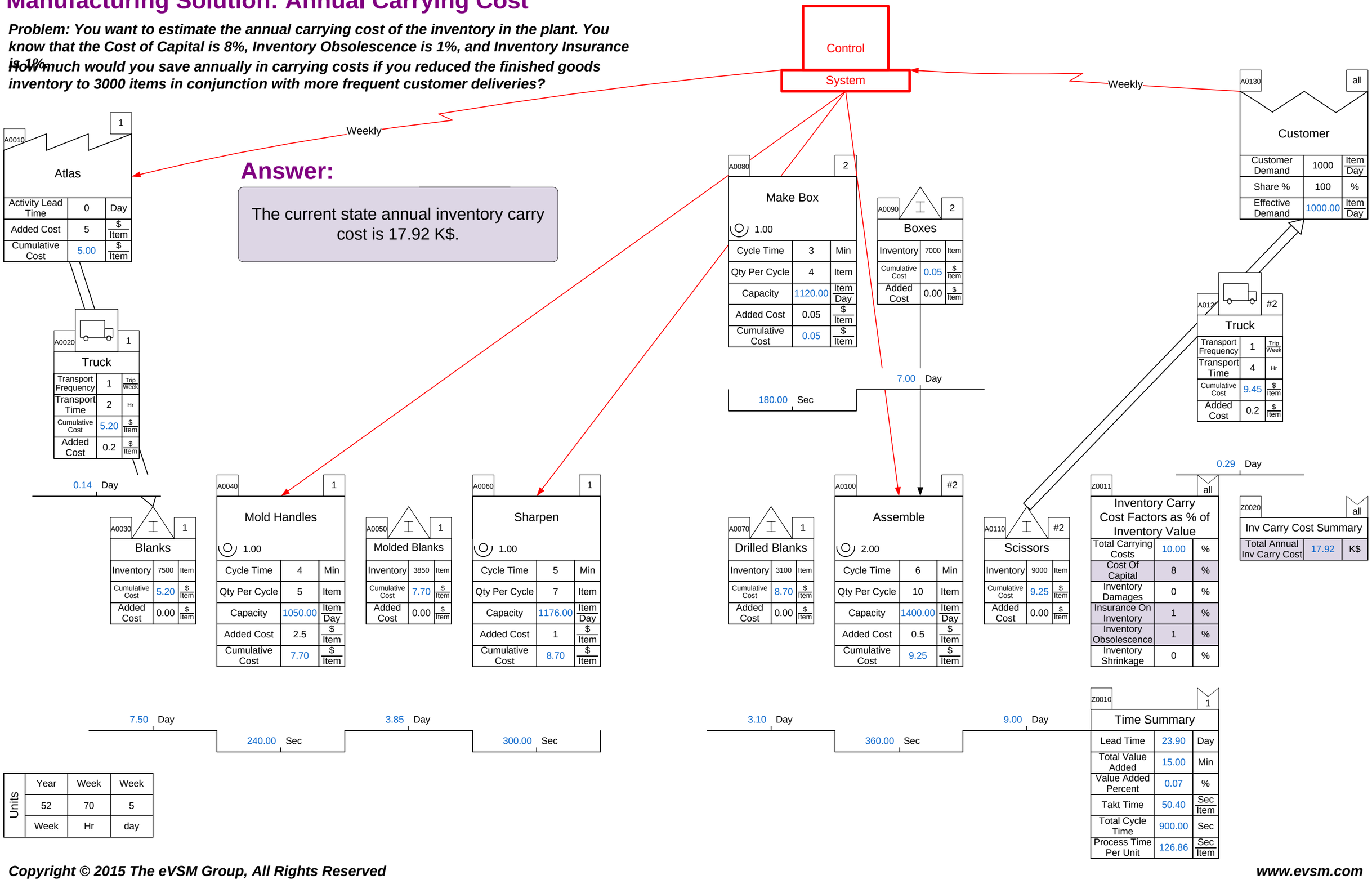
Units	Year	Week	Week
	52	70	5
	Week	Hr	day

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%. 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?

Answer:

The current state annual inventory carry cost is 17.92 K$.



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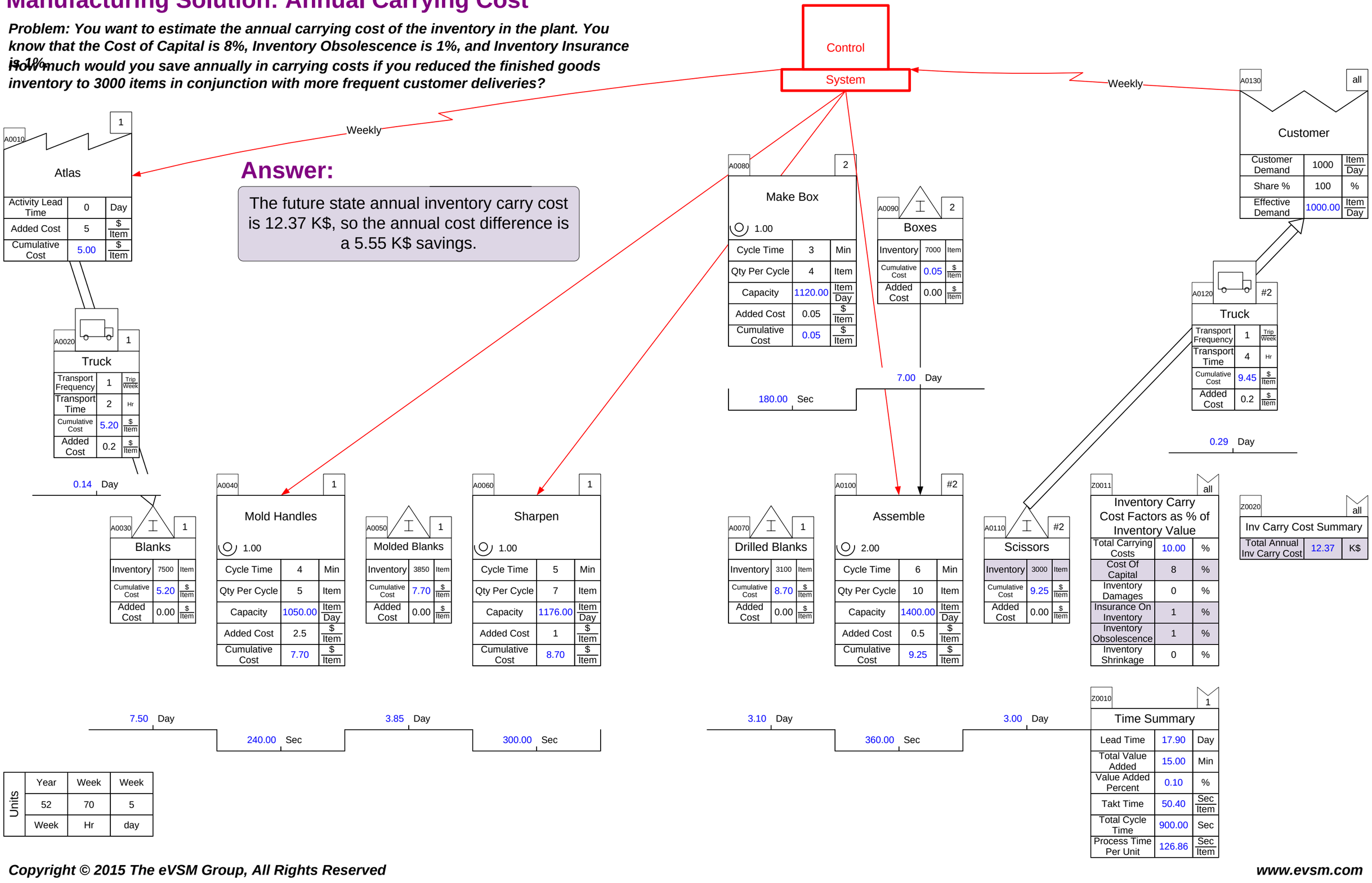
Problem: You want to estimate the annual carrying cost of the inventory in the plant. You know that the Cost of Capital is 8%, Inventory Obsolescence is 1%, and Inventory Insurance is 1%. How much would you save annually in carrying costs if you reduced the finished goods inventory to 3000 items in conjunction with more frequent customer deliveries?

Answer:

The future state annual inventory carry cost is 12.37 K$, so the annual cost difference is a 5.55 K$ savings.



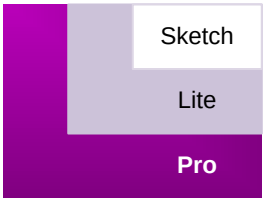
www.evsm.com

Quick Manufacturing Stencil

Easy

Quick Manufacturing is one of eVSM's Quick Stencils and supports plant level mapping of discrete parts and assemblies in industries like automotive, electro-mechanical, and medical equipment. It provides *easy*, *fast,* and *focused* mapping as shown below:

Quick Manufacturing is actually a compatible set of 3 stencils as shown below.



Sketch: Simple sketch shapes, no data blocks

Lite: + data blocks + equations + charts ideal for most maps

Pro: + cost, space, energy concepts that increase map leverage.

Quick stencils are popular because of their capability and also because of the excellent deployment materials available. These include example maps, publications, and learning options.

Fast

4x mapping speed and quantified improvements with a well designed set of icons, variables, macro shapes, equations, and charts.

C/T C/O LT Standard Variables

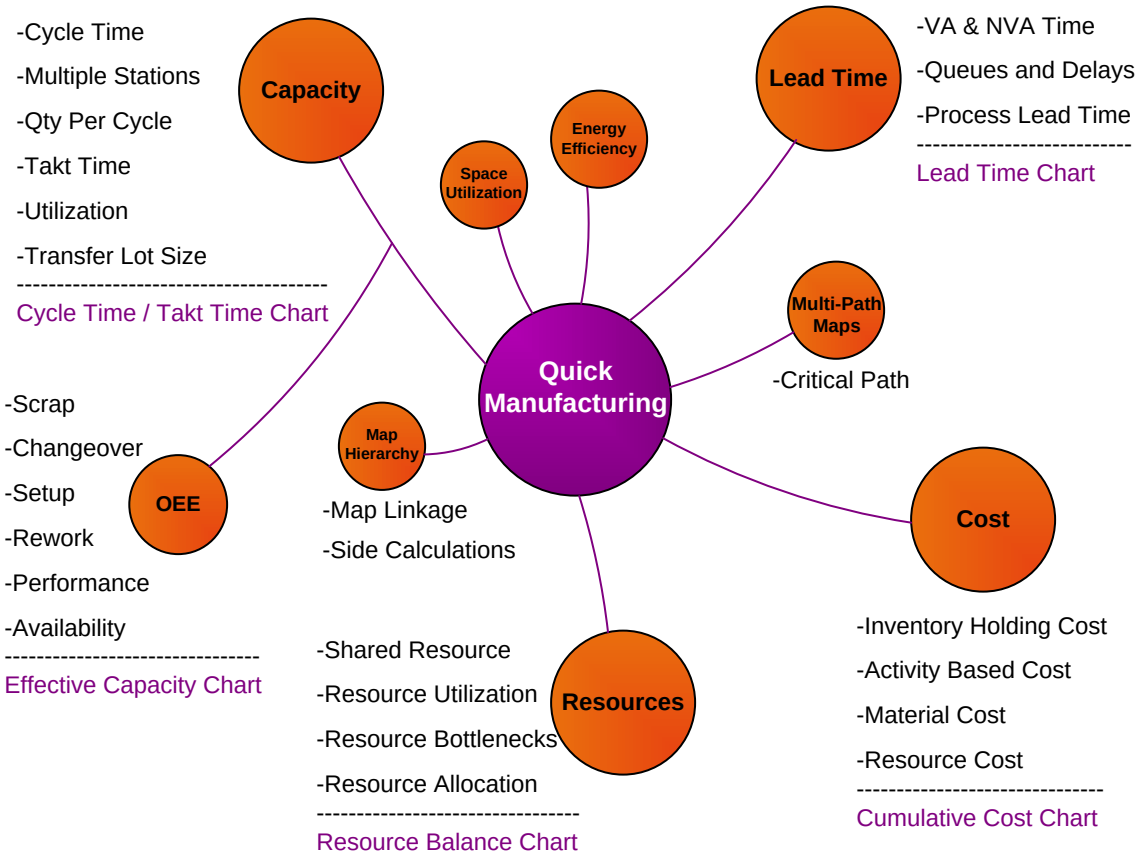
Design Macro Shapes

F(x) Built-in Equations

Built-in Charts

Focused

The technical concepts addressed by the Quick Manufacturing stencil are shown below.



An example map drawn in Quick Mfg is shown overleaf.

eVSM

OEE Measures

Activities comprehend OEE, downtime, scrap, etc

Multi-Lane Maps

Filter charts and summaries by path numbers to handle multi-lane maps

Demand by Customer

Record demand for one or more customers

Wall Map Capture

Capture wall maps easily and quickly using the Sketcher components

Kaizen

Kaizen bursts can be applied, detailed and prioritized towards a future state value stream

Activity Based Cost

Support for cumulative cost calculation

Shared Resources

Shared activities can be modeled by adjusting demand or available time

Lean Metrics

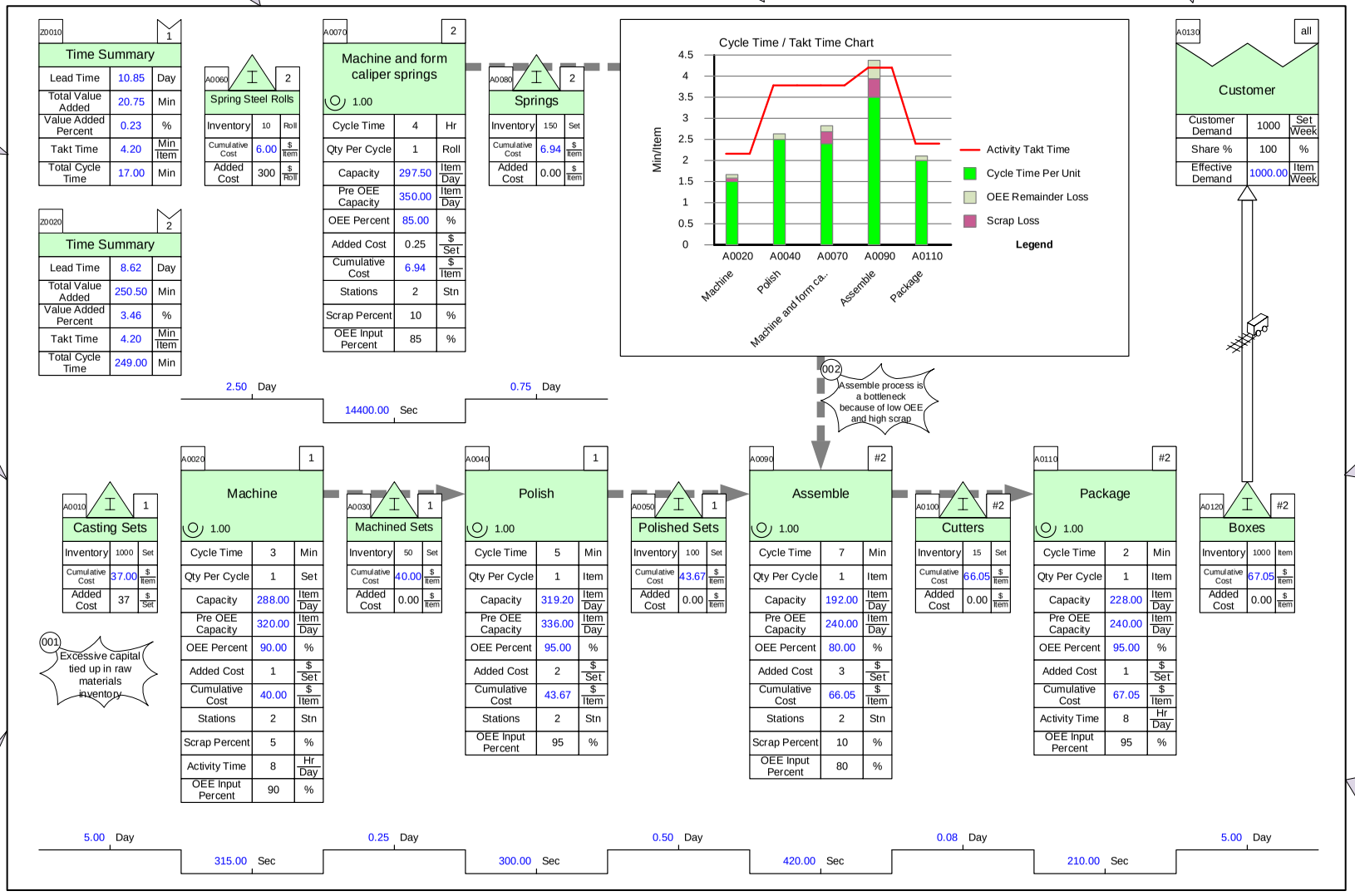
Calculates Lead Time, Takt Time, & VA Times

Timeline

Automatically build and calculate the timeline

Charts

Automatically plot Capacity and Lead Time charts



Quick Manufacturing Example Map with Features