The Manufacturer that lost then found “the Spring in its step”

ASQ LSS Supposium Spring 2009

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The Product

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The Spring Shop Situation

- Just open a 25,000 sq ft warehouse
- Very large lots built, some taking more than a shift to move through each work center
- Shop very congested, the path for a spring was 5000 ft (1 mile)
- Similar operations not grouped
- 5-10 % of manufacturing time looking and transporting
  - Some small lots “MIA” and needed to be started a second time
- Focused on earned hours and machine efficiency classic 1980’s industrial engineering

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The Process

- Shear, flame cut the leaves
- Heat/bend Eyes
- Wrap/Hook
- Center cell
- Prep
- Heat treat
- Final Forming
- Pre-Assembly
- Attach Clips
- Assembly
- Bushing & Paint
- Finding the work

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Charter

Title	Reduce Cycle Time	
Sponsor	VP manufacturing	
Scope	Release the order – to - order complete	
Problem	It takes 21 days on average to make an order of springs. In order meet customer demand a 25,000 sq ft warehouse has been built and large lots are released to manufacturing to meet customer demand by shipping from inventory the warehouse. Inventory has increased 20%	
Object	Reduce the manufacturing cycle time by 75%, and reduce cost by 20% within 6 months.	
Team	Shift supervisors, manufacturing manager, quality manager	

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Method of Attack

- Team of empowered supervisors + 2 well respected direct labor employees
- 1 1/2 day meeting every week for 4 months
- Consultant 4 days per month
- Monthly meeting with exec team
- Clear focus on objective
- The 2 direct labor employees had monthly updates for their peers
- Lean/VSM/Constraint attack

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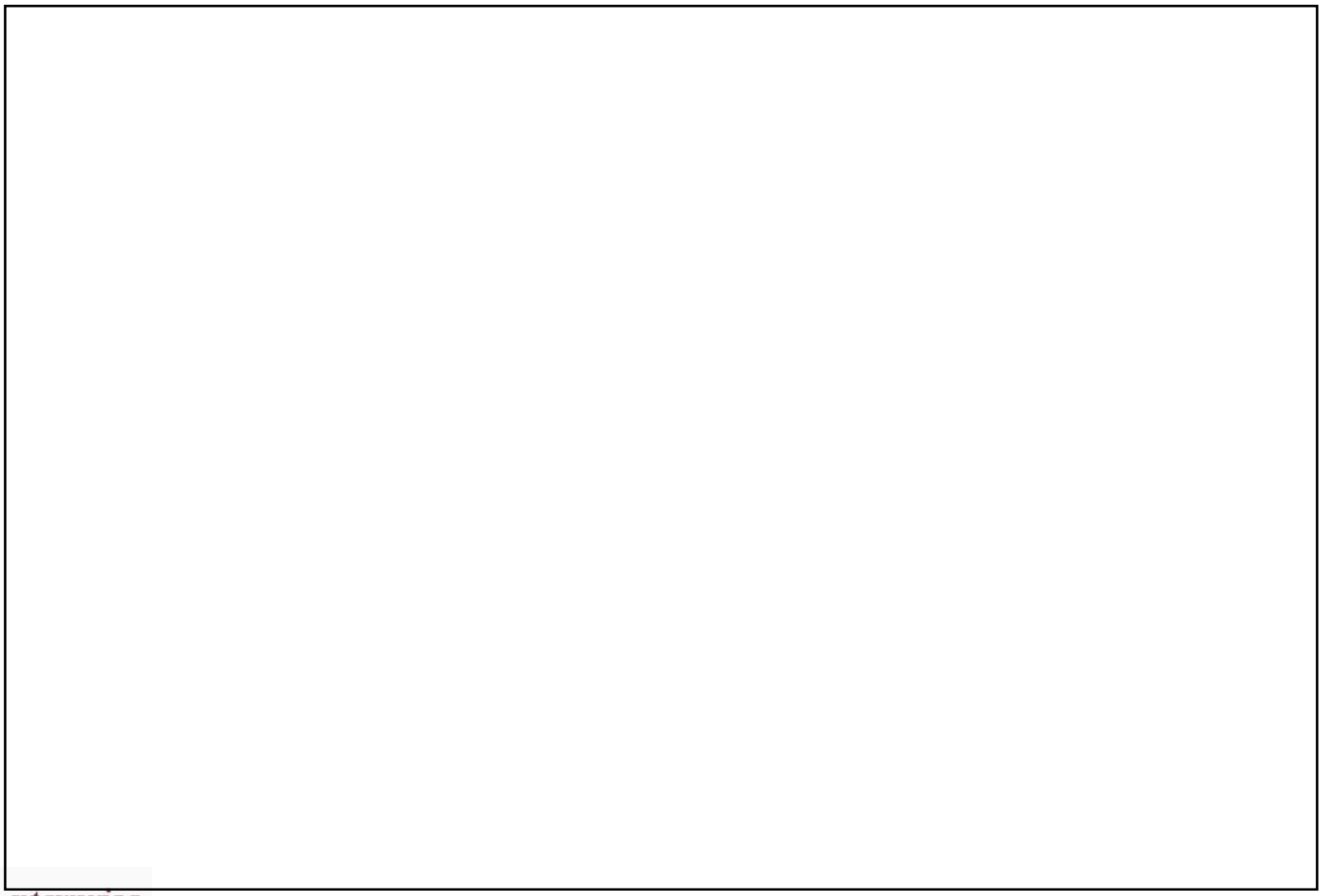
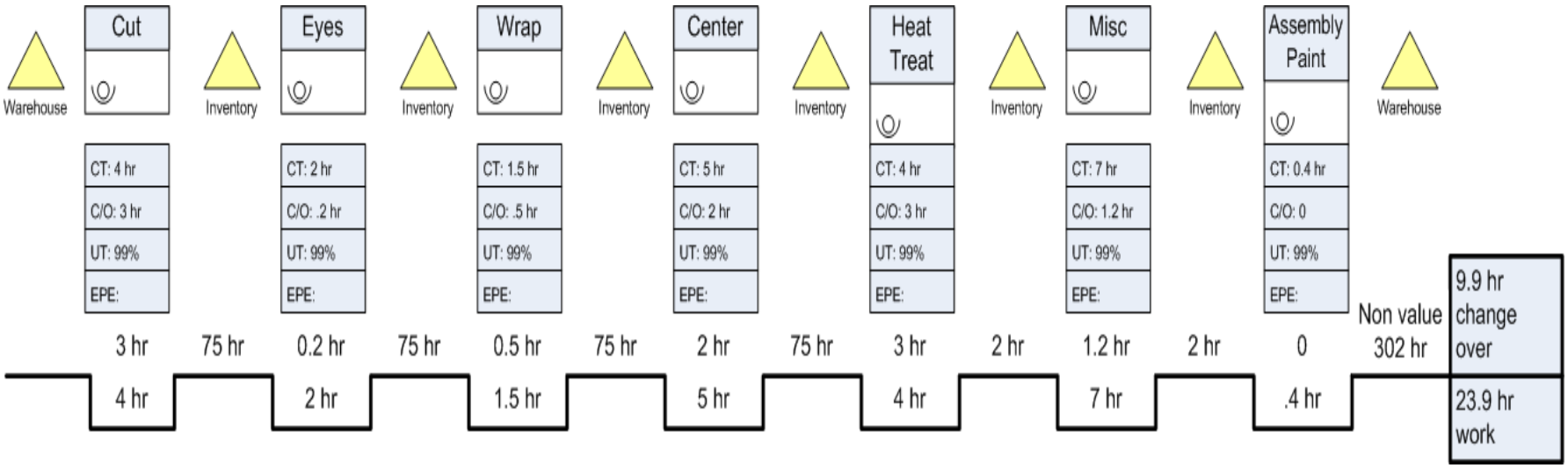
Typical VSM



Spring Shop VSM



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The Math

Typical spring: 90 lbs, 8 leaves, 3 in wide, 0.4 in thick, 50 lot size

	Before		
	Hrs	C/T	C/O
Shear, flame cut the leaves	7	4	3
Heat/bend Eyes	2.2	2	0.2
Wrap/Hook	2	1.5	0.5
Center cell	7	5	2
Heat treat	7	4	3
Pre-Assembly	5.6	5	0.6
Attach Clips	2.6	2	0.6
Assembly	0.4	0.4	0

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What does this tell us?

- It takes 336 hrs(21 days x 16 hrs) to do 24 hrs work PCE= 7% effective
- There is 312 hrs of work not being worked on:
  - Being damaged
  - Getting lost
  - Cluttering up the shop
    - They had just bought 100 new stackable skids to hold the extra WIP at $200 each = $20,000
- The set up (change over) times were approx 30% of the real work time
- Although the Typical lot represented the average spring order on the shop orders as large as 250 springs were released on a weekly basses
- Constraint was heat treating

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Changes

- Control lot size to 50 springs maximum
- 2 - 10 hr shifts per day
- 3 extra days used for expedited orders with overtime employees, worked well except during “Buck season”
- Only released orders to manufacturing the amount that went through the constraint (heat treat) on previous shift
- Previously orders in manufacturing went through the process as a spring, many leaves only needed to be cut and hole punched, now leaves were released approximately, and met up at heat treat
- Modeled production system in Excel, and still use Excel

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Changes

- Smaller WIP areas in-front of each work area
- Work “Cells” of next functions put together so 2-3 tasks on the leaf could be done with only picking it up once
- The cell were based on the strength of the machine i.e. heavy duty shears with the 20 Ton press
- Set up times were reduced using preset jigs instead of universal jigs needing adjustments and first piece measurement
- Shift specific staging area in front of heat treat

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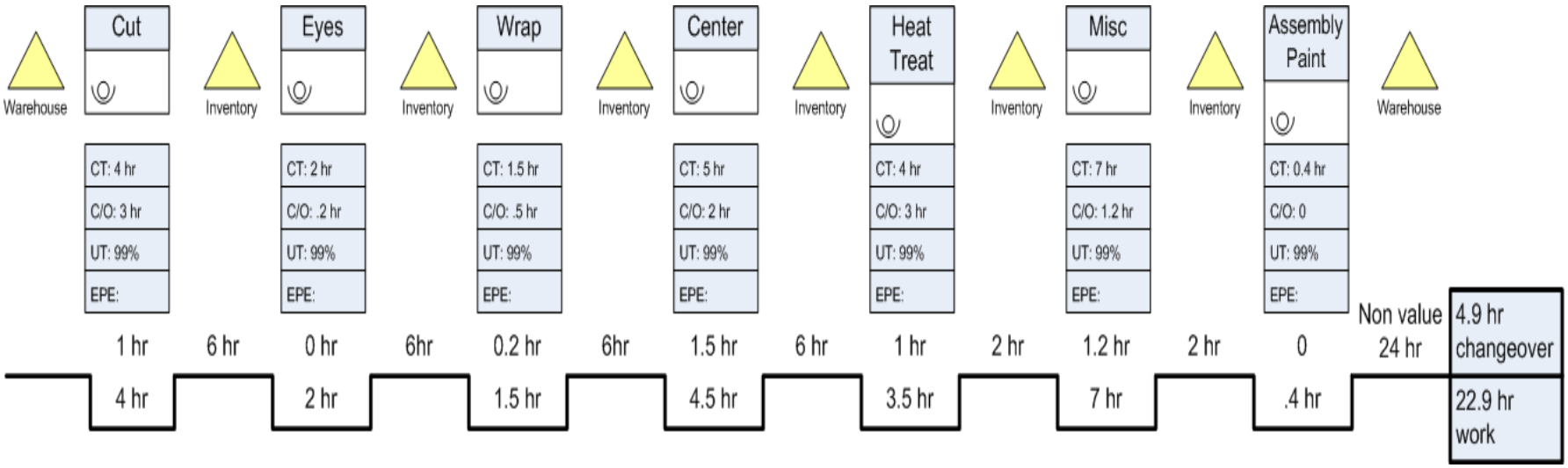
After Spring Shop



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The Math again

Typical spring: 90 lbs, 8 leaves, 3 in wide, 0.4 in thick, 50 lot size

	Hrs	After C/T	C/O
Shear, flame cut the leaves	5	4	1
Heat/bend Eyes	2	2	0
Wrap/Hook	1.7	1.5	0.2
Center cell	6	4.5	1.5
Heat treat	4.5	3.5	1
Pre-Assembly	5.6	5	0.6
Attach Clips	2.6	2	0.6
Assembly	0.4	0.4	

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Results

- 5 day cycle time allowing
  - Reduced need for finished goods $500,000 down to $100,000 within a year
  - Happy employees 4 day week
  - 30% improvement in customer satisfaction driven by on time delivery
- 23% Productivity improvement
  - old 330,000 lbs of steel/week
  - new 400,000 lbs steel/week with in a month
- 50 spring lot size
- Beat it's competition, is most successful spring manufacturer in N.A. (a Berkshire Hathaway company)

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Success Criteria

- Executive support, monthly meetings with tough questions
- A burning issue, this a “Buffet” company that needed improvement or…….
- Champion in the organization (quality manager)
- 2 front line employees on the team
- Supervisors on team
- Pilot, pilot, pilot, involving the some of the people that needed convincing
- Time to think things through, PFMEA
- Modeled the new system in Excel,

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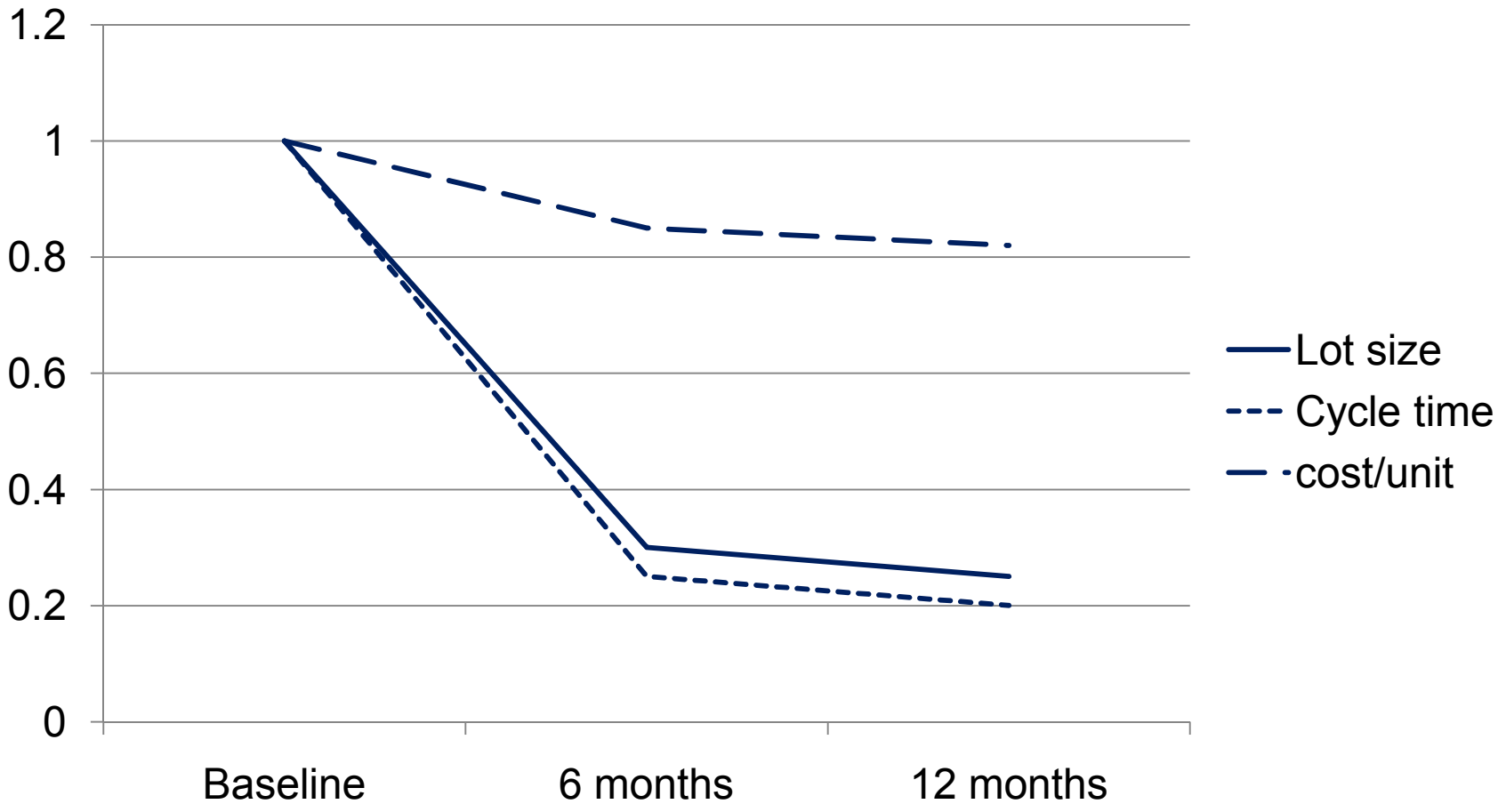
Lets look at the data



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