8 Tools to Over Manage the Bottleneck

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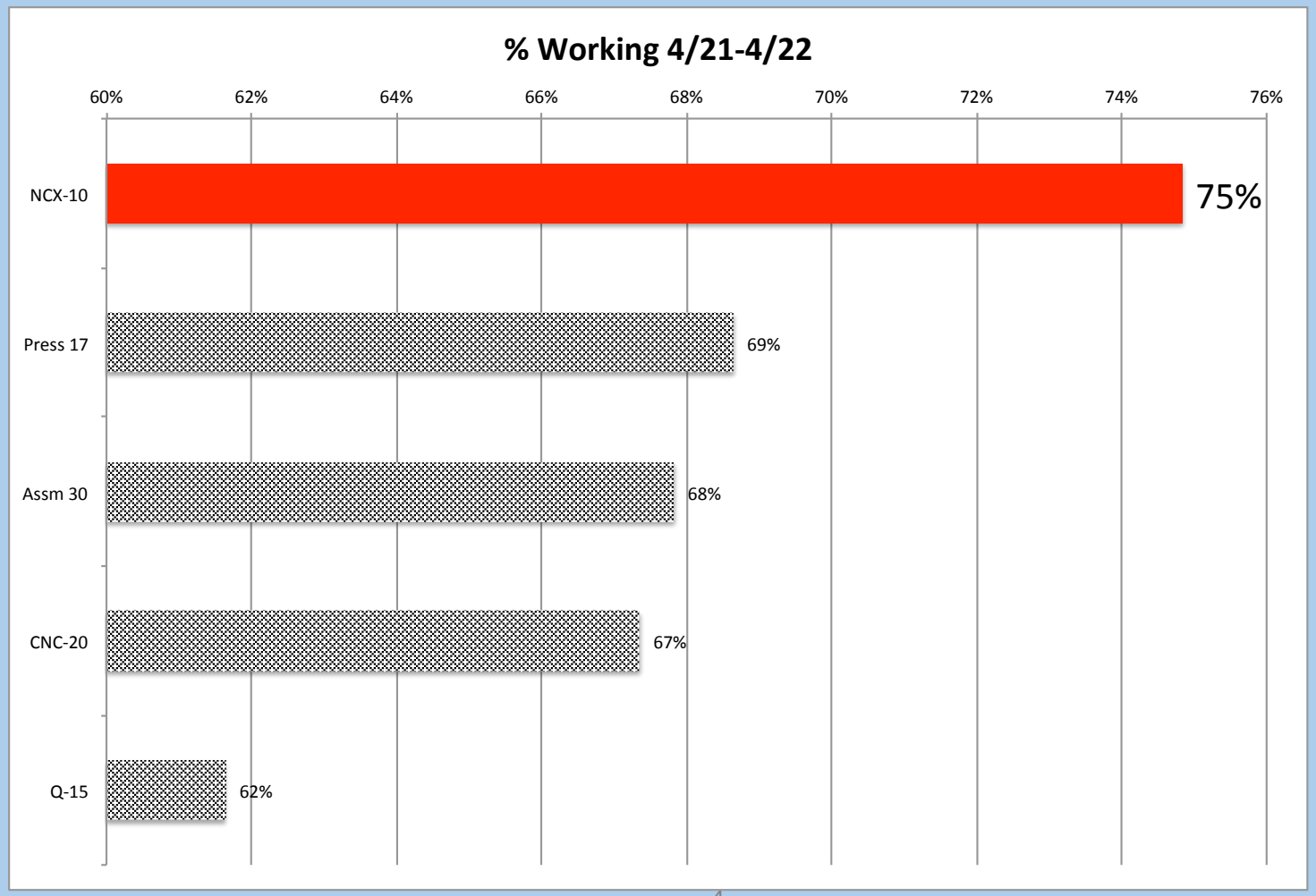
Current Situation

- Improve the throughput of auto suppliers whose poor performance threatens the production of profitable vehicles
- We are paid by the auto company, not the supplier
- We need to be quick and stick to the facts, and avoid adding another opinion to the mix
- Create focus on the bottleneck – Over manage this area, under manage the others
- Strong History of Success
- This is, to a degree, a negative result of successfully implementing the Throughput Improvement Process (based on TOC) in the production and design of assembly plants

Where's the Bottleneck?

- As in The Goal, the bottleneck is the work station that has the biggest pile of work in front of it along with a very small pile of work after it (often 0)
- The bottleneck is the busiest work station in a complex closed loop system
  - Always has something to work on, always has some place to put it
- The tools we use ensure the bottleneck has not moved

Where's the Bottleneck?



Prework

- Understand the Gap between actual supplier throughput and what is being demanded
- Plant tour -- Problem assessment
  - Determine if we can find the Bottleneck by observation
  - Other basic questions:
    - Do they understand what a Bottleneck is?
    - Where are the buffers?
    - How do they schedule?
    - How do they set priorities?
- Identify the key policy makers – usually not management

Strategy / Tactics

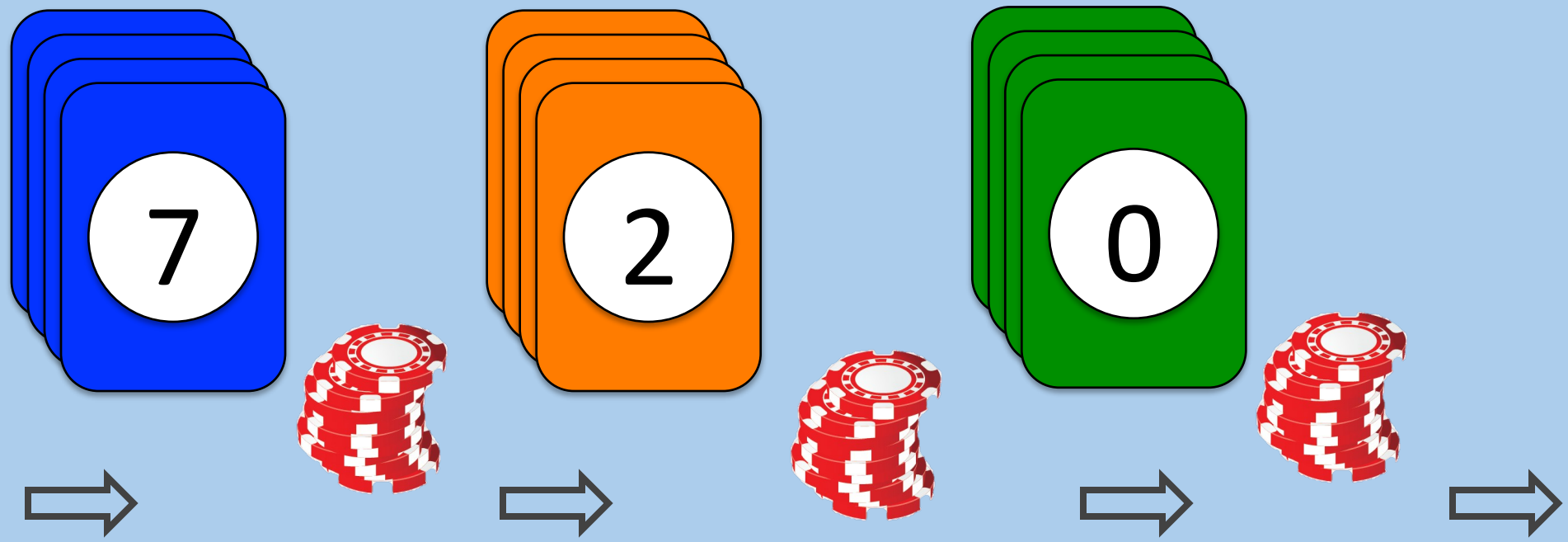
- Understand our purpose, why we are here, when we will leave
- Focus on over managing the one bottleneck, under managing all the non-bottlenecks.
  - Like all companies, they lack time, money and head count
- Need for speed
- Concentrate on the problems occurring because of a lack of a logical, fact-based process
- Move from guessing/opinions to a logical, fact based process on ONE workstation

8 Tools

1. TOC 101 Course
2. Production White Boards at the Bottleneck
3. Web Cam Data Collection
4. Throughput Accounting
5. Basic Time Studies
6. Color Coded Buffer Management
7. Cycle Time Build plans
8. Game Simulators

TOC 101 Course

- 1-2 day course focused on finding the bottleneck and understanding variation



TOC 101 Course

- Relate the game to the target line
- Have them understand how blocking and starving can cause the bottleneck to become idle
- Compare the game bottleneck to the actual bottleneck
- Demonstrate how positive variation does not make up for negative variation

Production Whiteboard

NCX-10

1 or less

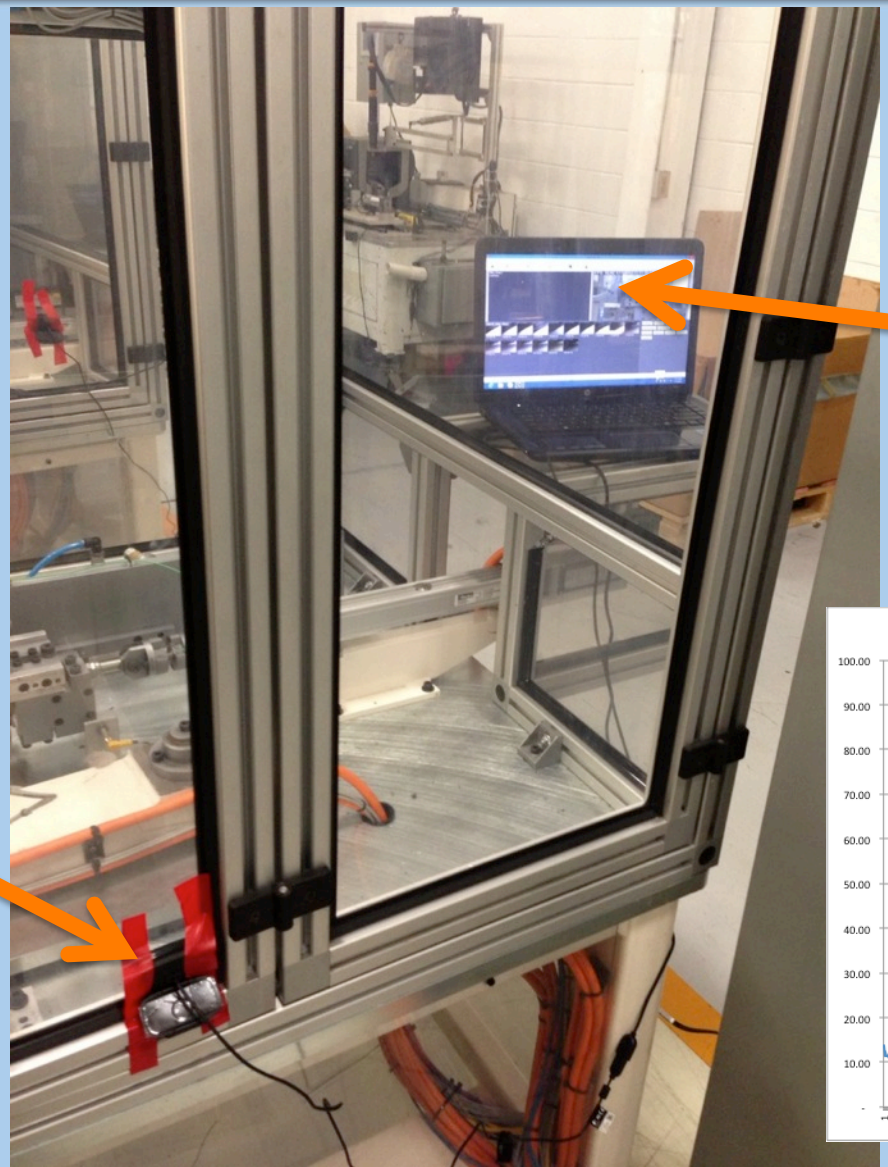
LL
#47 60 Hrs
#48 60 Hrs

HOURS START	HOURS END	ATTAINMENT TARGET	ATTAINMENT ACTUAL	QC SCRAP QTY	OEE %	LOST TIME OPPORTUNITIES / DOWNTIME EXPLANATION BY HOUR
10:00 PM	11:00 PM	—	—	—		Down Clamp issue, bent boss pin down all night
11:00 PM	12:00 AM	60	—	—		
12:00 AM	1:00 AM	60	—	—		
1:00 AM	2:00 AM	60	—	—		
2:00 AM	3:00 AM	60	—	—		
3:00 AM	4:00 AM	60	—	—		
4:00 AM	5:00 AM	60	—	—		
5:00 AM	6:00 AM	60	—	—		
6:00 AM	7:00 AM	60	0		0	Shut press down wait material
7:00 AM	8:00 AM	60	20	13	33%	Press restart due to wait material
8:00 AM	9:00 AM	60	52	7	87%	Display, 1 start up
9:00 AM	10:00 AM	60	65	1	108	
10:00 AM	11:00 AM	60	30	27	50%	Engineer Trial 25 pcs
11:00 AM	12:00 AM	60	60	1	100%	
12:00 AM	1:00 PM	60	64	1	106%	
1:00 PM	2:00 PM	60	58		97%	
2:00 AM	3:00 PM	60	51	17	85%	Start up Kipley
3:00 AM	4:00 PM	60	3	9	0%	Maintance Clamp issue
4:00 PM	5:00 PM	60	—	—	0%	Maintance Clamp issue Started @ 5pm
5:00 PM	6:00 PM	60	—	—	0%	Maintance Clamp issue
6:00 PM	7:00 PM	60	28	24	47%	Startup: Flowlines
7:00 PM	8:00 PM	60	41	21	68%	Flow Time
8:00 PM	9:00 PM	60	41	13	68%	Flow Time
9:00 PM	10:00 PM	60	19	4	31%	Press Down Clamp Call Maint.
10:00 PM	11:00 PM					
3RD SHIFT TOTAL						
2ND SHIFT TOTAL						
1ST SHIFT TOTAL						

Production Whiteboard

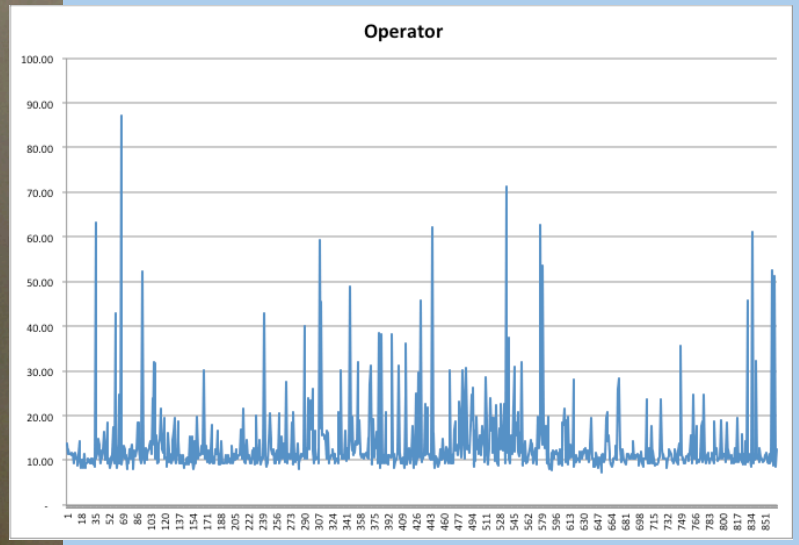
- Quick
  - Walk in the door with a template
  - Go to the office supply store and get a whiteboard
    - Use double sided tape to attach the board to a machine, column, or use a presentation easel.
  - Or, plot the template out at FedEx and post next to machine
  - Done only at the bottleneck
- Fact Based
  - Reviewing this several times a day will begin to generate insight that will lead to solutions.
  - Understand variability, targets vs. actual performance

Web Cam Data Collection



Inexpensive Data Collection Computer

Temporary Webcam



Web Cam Data Collection

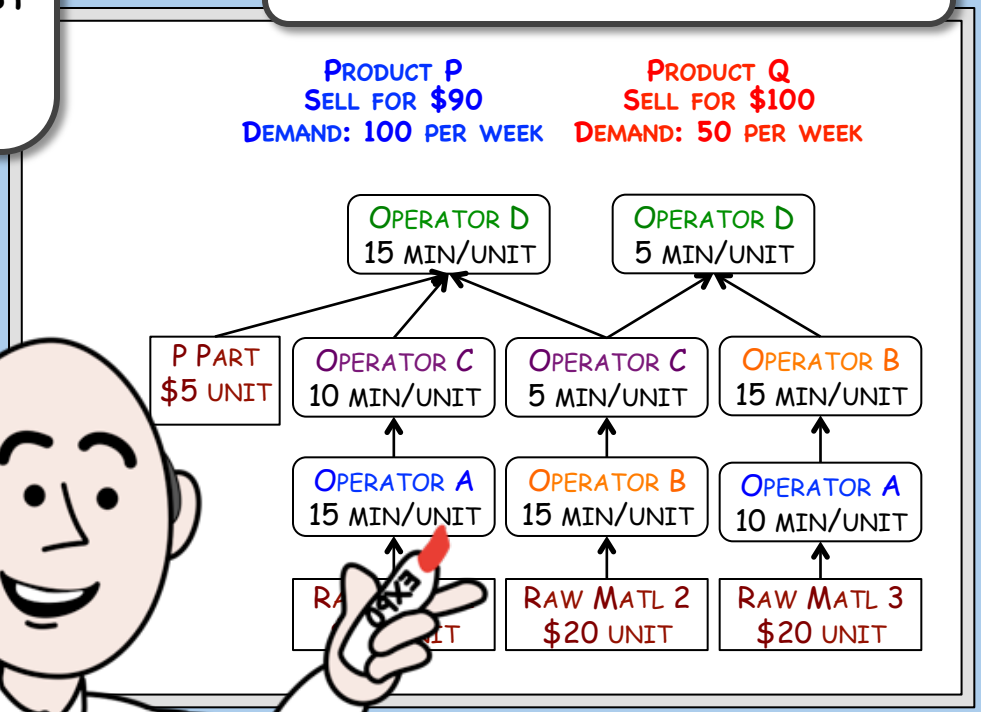
- Quick
  - Tape a web cam to something that has a good view of the machine
  - Set up the motion detection to see a clean view of the machine cycling with no other motion being apparent
  - Export data to an Excel file
  - Done only on the bottleneck
- Fact Based
  - Data and Graphs make it apparent what is really happening vs. the opinion of what is happening

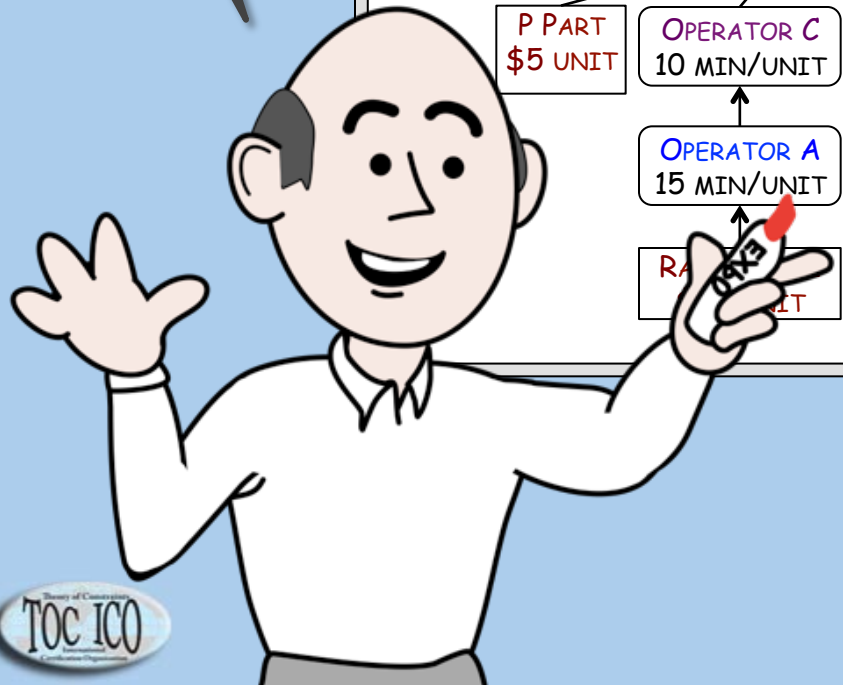
Throughput Accounting

What does the Bottleneck **REALLY** cost us in Lost Profit?

What can we do to **RECOVER** that kind of loss?

Some of these solutions may be considered Waste in the short term, so let's call it **PROFITABLE** Waste!





Net Profit = Revenue - Costs
Revenue = Selling Price x Units Sold*
Throughput $ = (SP - RM) x T*)

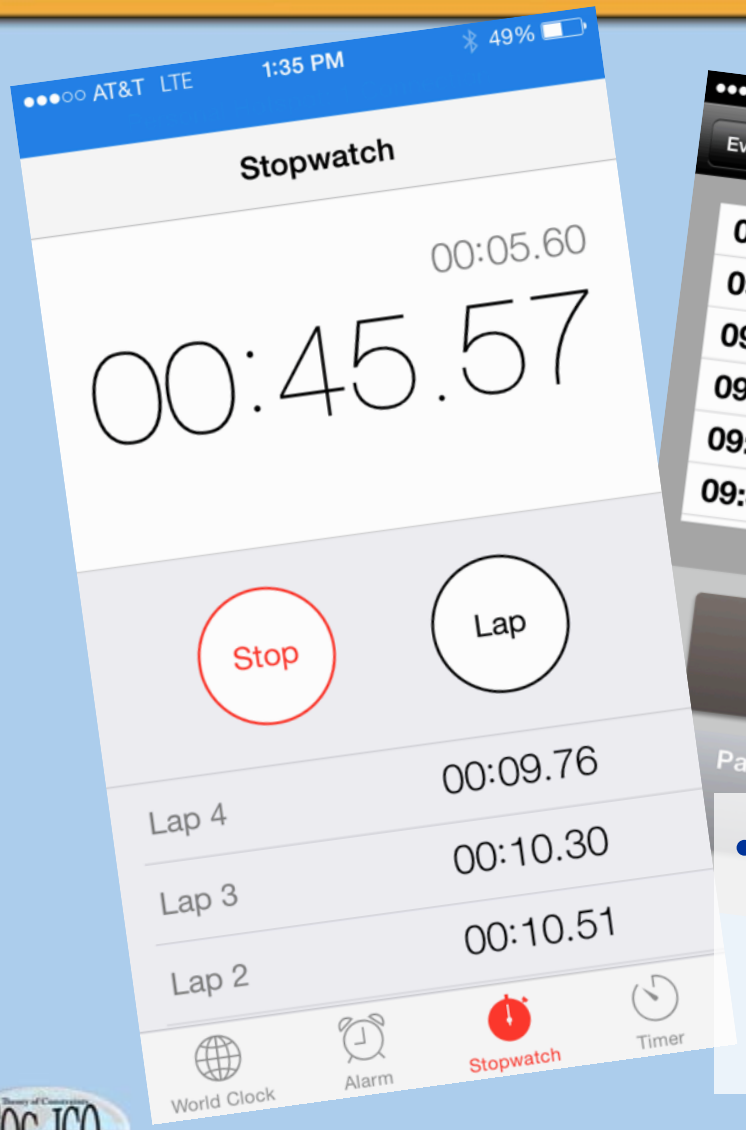
* - Units must be in Demand. Anything over Demand is Inventory

- Selling Price is SP
- Units Sold = T (for Throughput)
- RM = Raw Material or Variable Cost – those costs that vary with throughput.
- T$ = Throughput Dollars

Throughput Accounting

- Quick
  - Something that can be explained in 20 minutes or less
  - They have made poor decisions simply because they were not using the right formula for today's business environment
  - Manufacturing is considered a cost center
- Fact Based
  - Even getting "close enough" data helps to give insight on why the current problem exists

Basic Time Studies

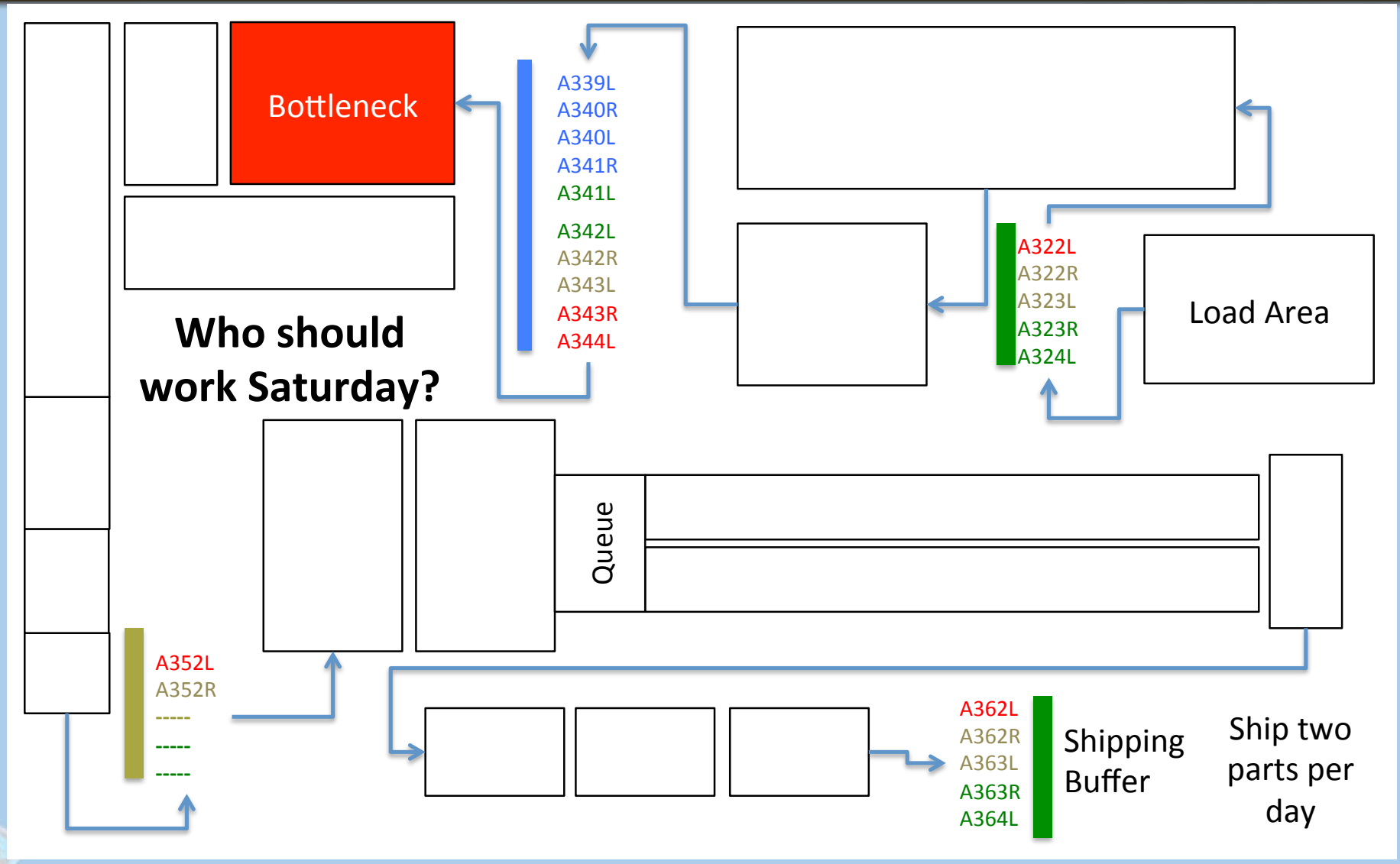


- **Quick**
  - A stop watch is already on your phone
  - Some simple apps to collect reasons

Basic Time Studies

- Fact Based
  - What the target is as compared to what is actually occurring
  - The basic 100% OEE capacity may not be enough to supply customer demand
  - Did they design the system correctly to handle both the minimum and maximum demand requirements?
  - Does the operator follow the standardized work, or is it different every cycle?
  - Did the cost accounting (vs. Throughput Accounting) equation contribution to these decisions?

Color Coded Buffer Status



Color Coded Buffer Status

- Quick
  - Look at the buffers before and after the bottleneck
    - Easy to count and record levels
  - Use canned Excel spreadsheet formulas for colors
  - Easy to explain levels
- Fact Based
  - Understanding these numbers helps the plant make fact based decisions on the non-bottlenecks supplying the bottleneck
    - Overtime
    - Expedited transportation

Build Plans

Press

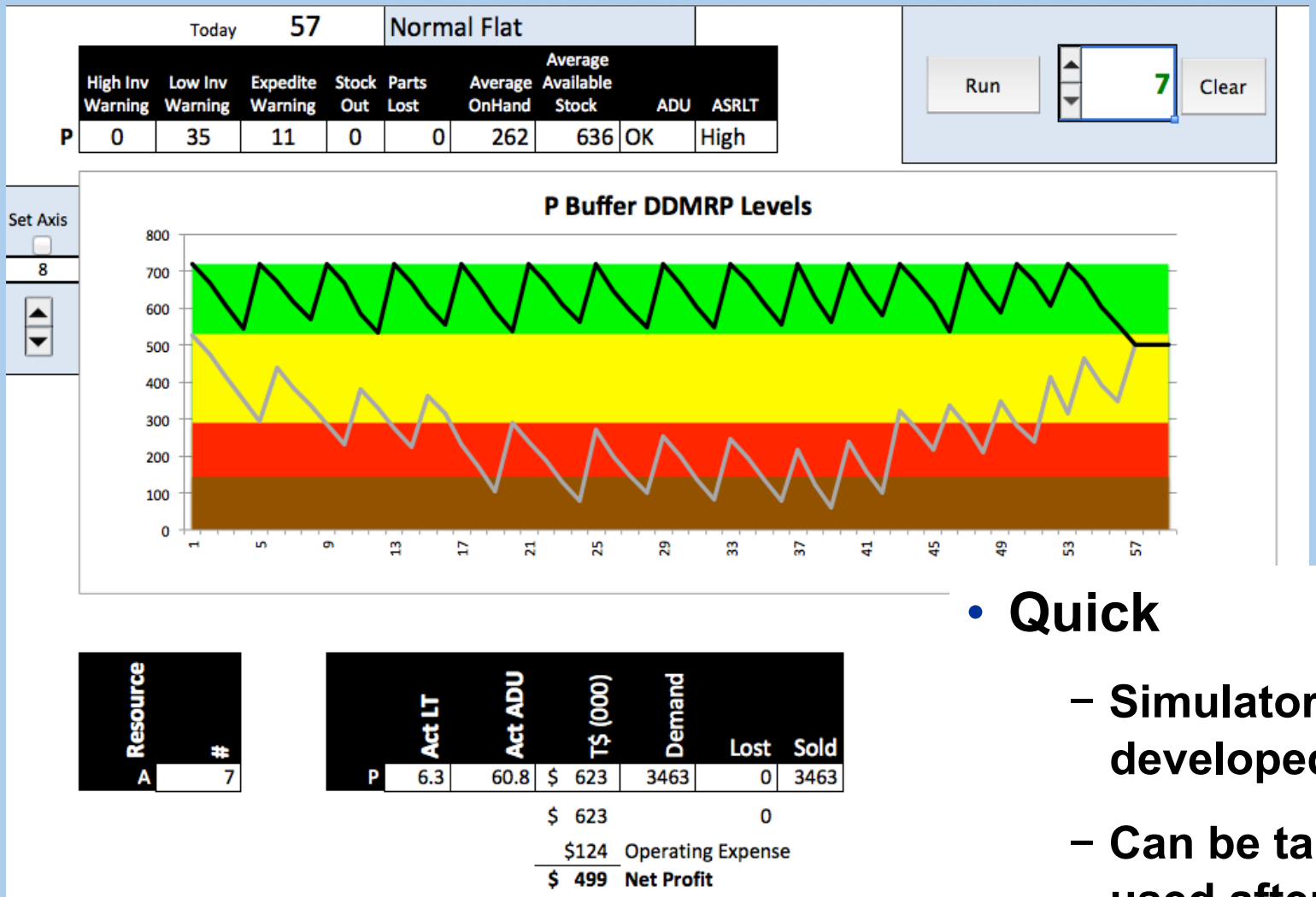
	Avail Stock	TOR	TOY	TOG	Priority (Lower is Worse)	Order?	Order Size (cntr)	Order Size (pcs)	Press
100	770	611	1425	1832	42%	Order	28	1092	B
102	1850	521	1215	1562	118%	Stop	0	0	
103	503	735	1715	2205	23%	Expedite	44	1716	A
104	2000	800	1866	2399	83%		11	429	

- Quick
  - After collecting cycle time data and buffer status
  - Uses TOC formulas to create work order size

Build Plans

- Fact Based
  - Project what the buffer status will be after a work order is complete
  - Used by consultant to valid scheduling decisions
  - Determine if a run has to be stopped to keep all products flowing
  - Help plant to determine client's priority for the plant as a whole

Game Simulators



- **Quick**
  - **Simulators are already developed and ready to go**
  - **Can be taken by clients and used after you are gone**

Game Simulators

- **Fact Based**
  - Can use the “formulas” of their current method and compare it to results after using the new formulas
  - Can modify to look very close to their own situation
  - Offers ability to safely master these tools

Summary

- Our Clients have to understand how bottlenecks and variability impact their bottom line
- These bottlenecks have to be “over managed” because of limited time and resources
- Tools used must be:
  - Quick
  - Fact Based
  - Simple & Visible