

MATCOM



Working Smarter

Putting Best Practices to Work:
Transforming Logistics Capability
into Readiness at the Marine Corps
Maintenance Centers

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CAN DO!



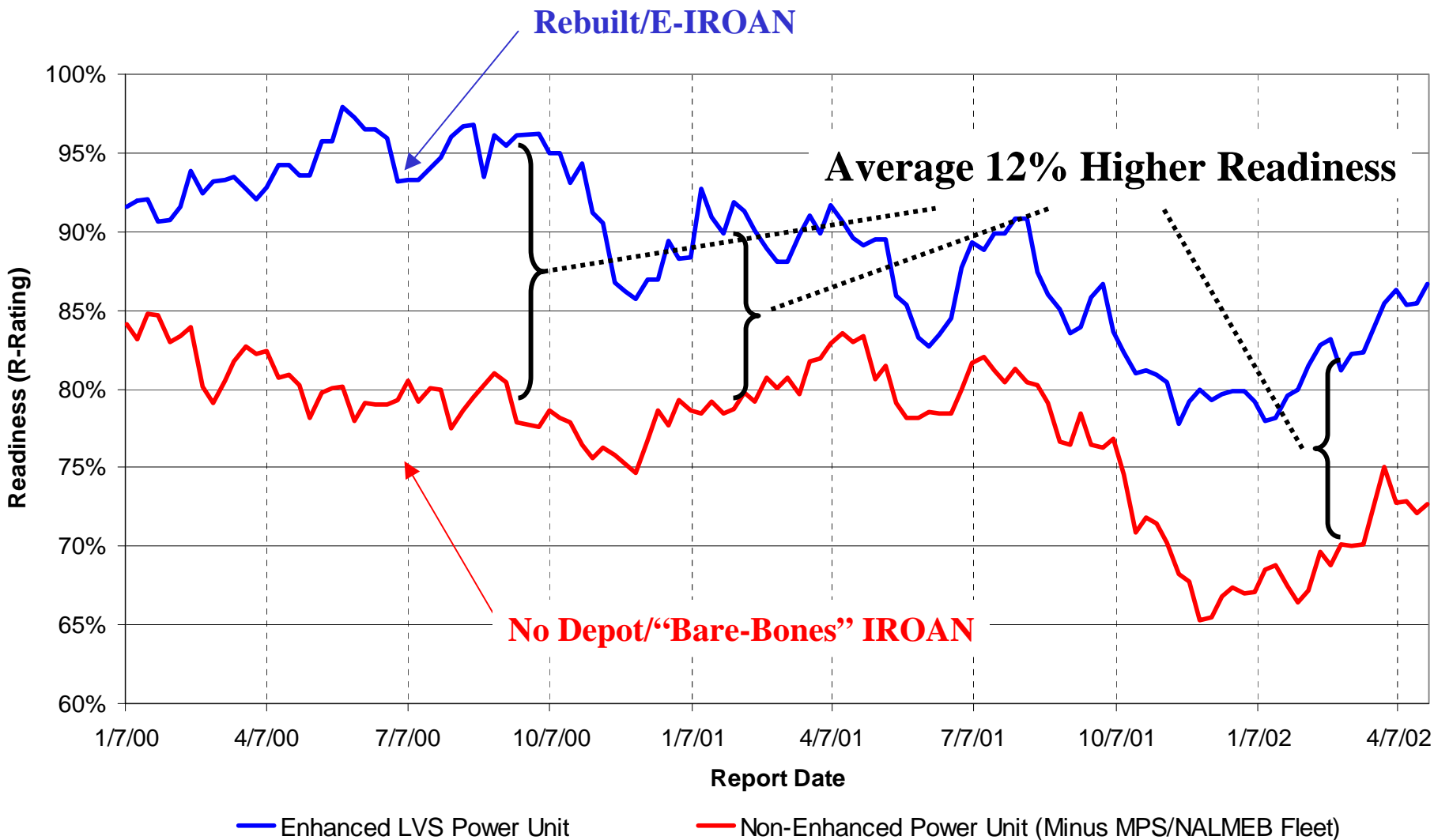
The Problem

- Example: MK-48 Power Unit
 - Fielded in '85
 - Planned SLEP—never happened
 - Wearing Out
 - Of about 1700 fielded, only 330 have been rebuilt or through enhanced IROAN





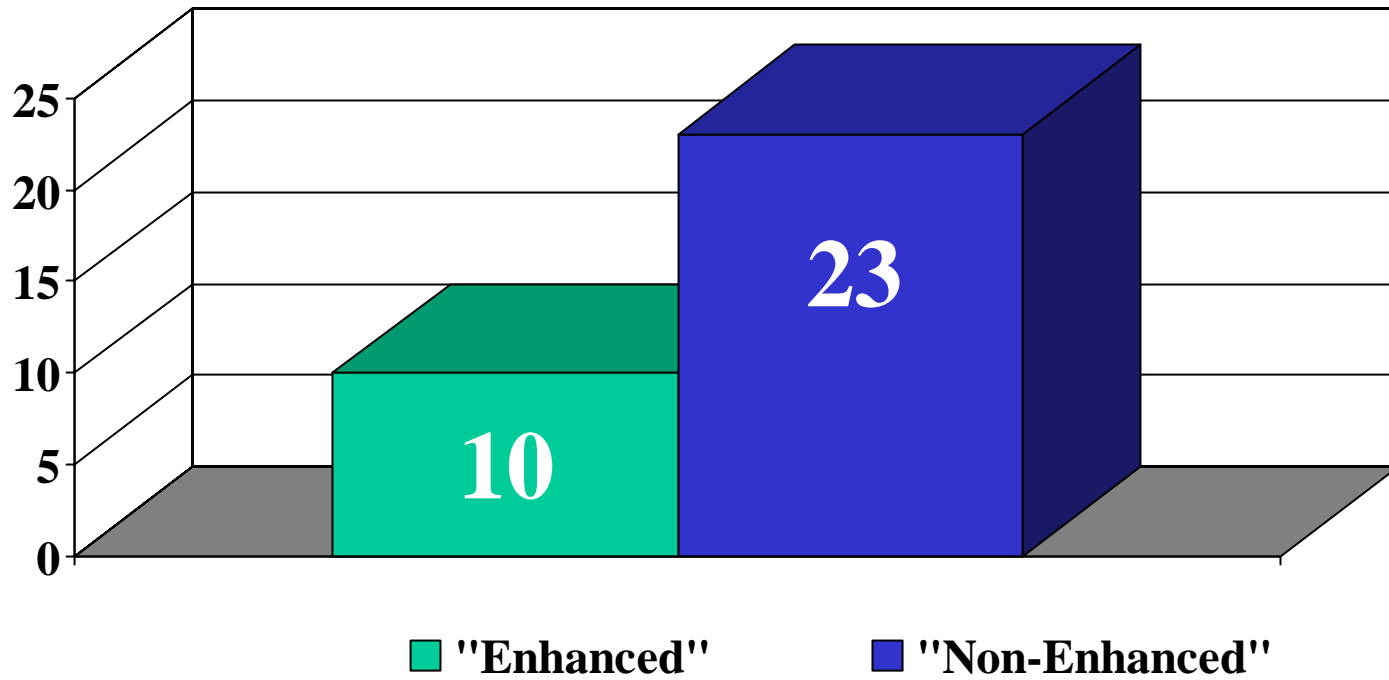
The Depot Contribution





And...

Average Annual OpFor Hours in Maintenance per Vehicle





But...

- Rebuild too expensive
- E-IROAN not cheap either...
- Production—(ahem)—sluggish

The Challenge

- Increase Throughput and make schedule without increasing Operating Expenses or sacrificing quality





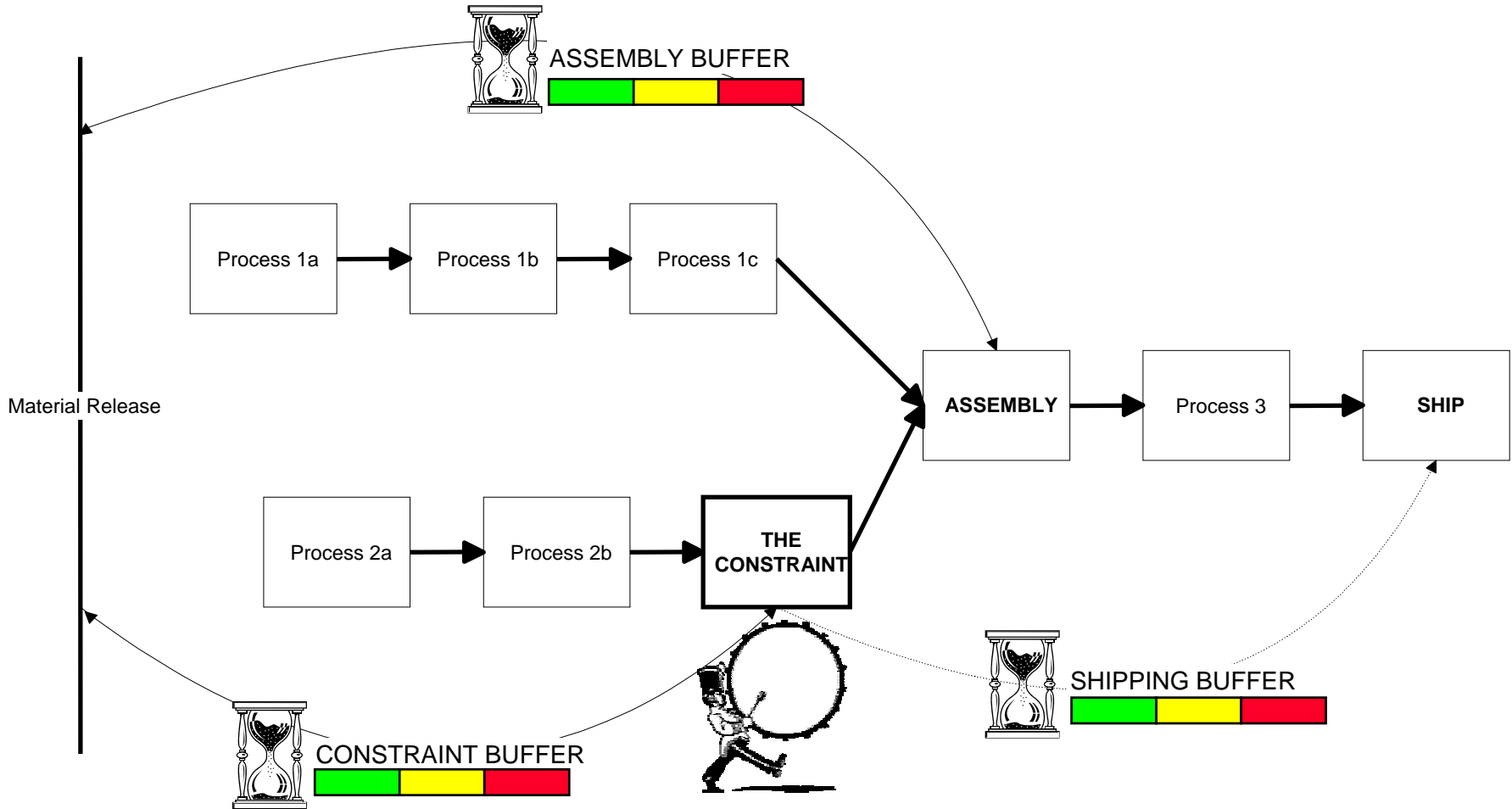
Theory of Constraints

****Five Focusing Steps****

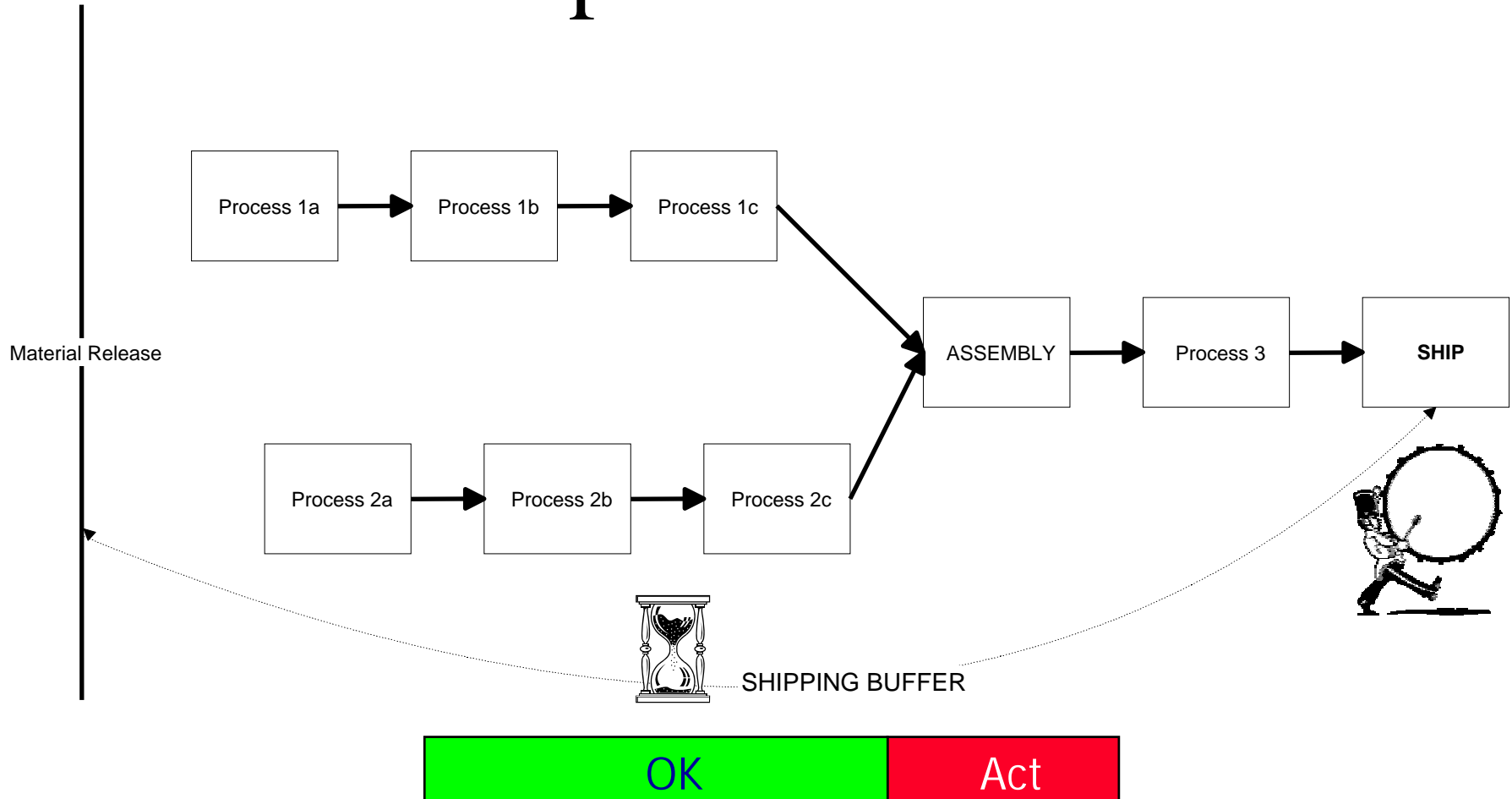
1. Identify the Constraint
2. Exploit the Constraint
3. Subordinate everything else to the Constraint
4. Elevate the Constraint
5. Go back to step one (Avoid Inertia)



Drum-Buffer-Rope



Simplified DBR





Production vs. Project

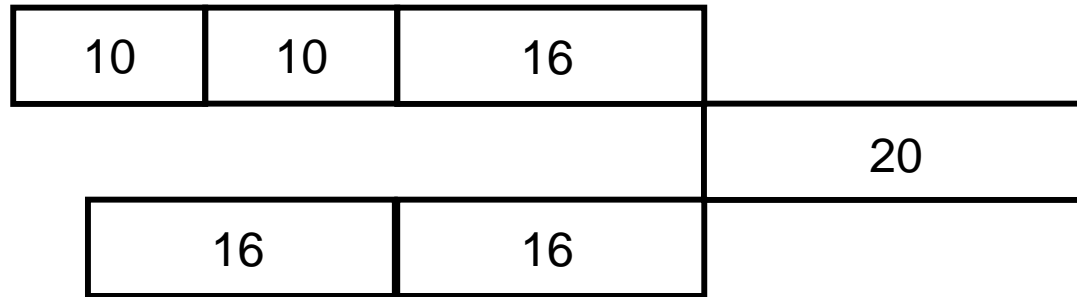
- Production:
 - Lots of queue time relative to touch time
 - Usually waiting for something to start
 - Usually decrease RCT by *reducing time in queue*
- Project:
 - Little queue time relative to touch time
 - Usually waiting for something to finish
 - Decrease RCT by *removing safety time* built into individual tasks



Critical Chain Solution

- Use safety time for the whole project, not individual tasks
- Reduce WIP
- Don't batch inductions
- Stop multi-tasking
- Buffer Management

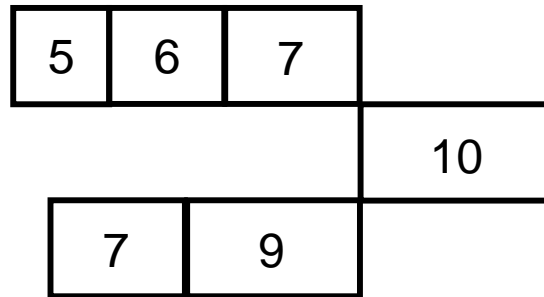
Tasks



- Step 1: Tasks arranged in chronological order

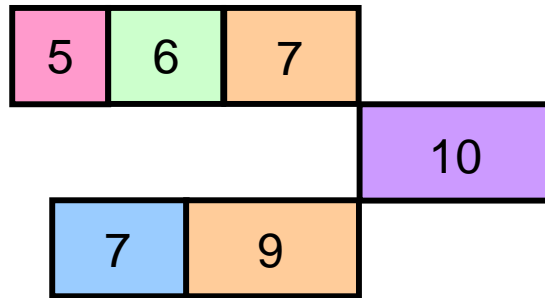


Remove Safety Time



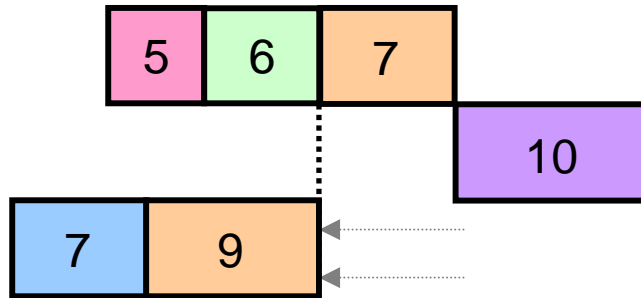
- Step 2: Safety time removed from individual tasks.

Resource Assignments



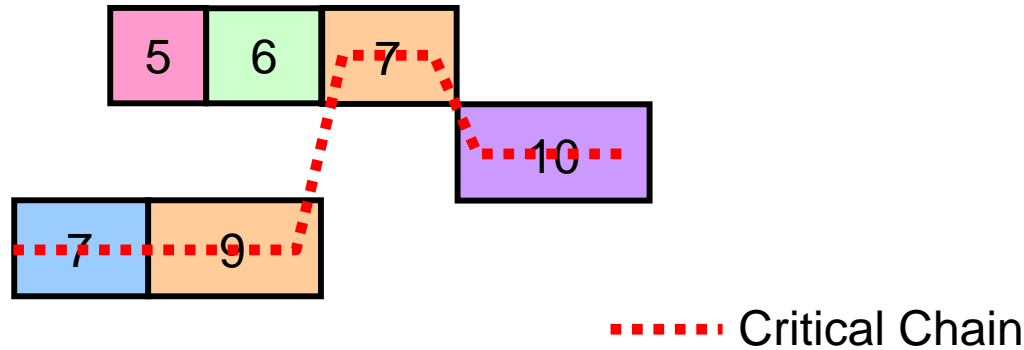
- Step 3: Resources are assigned to each task

Resource Sync



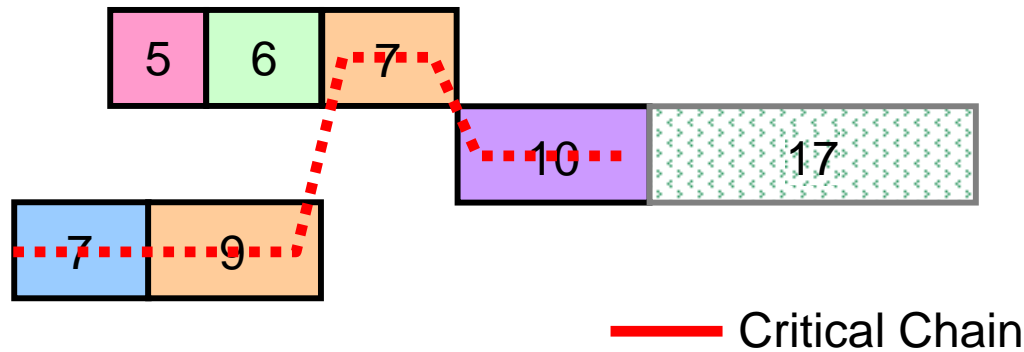
- Step 4: Resource demands are de-conflicted

Critical Chain



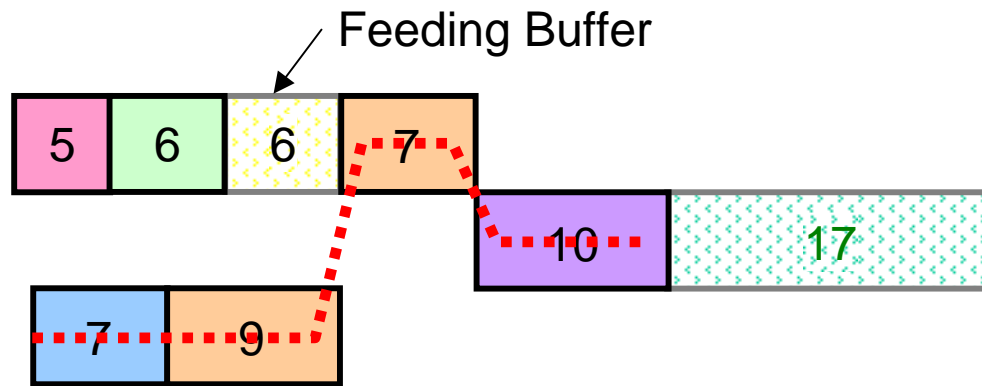
- Step 5: Critical Chain is identified

Project Buffer



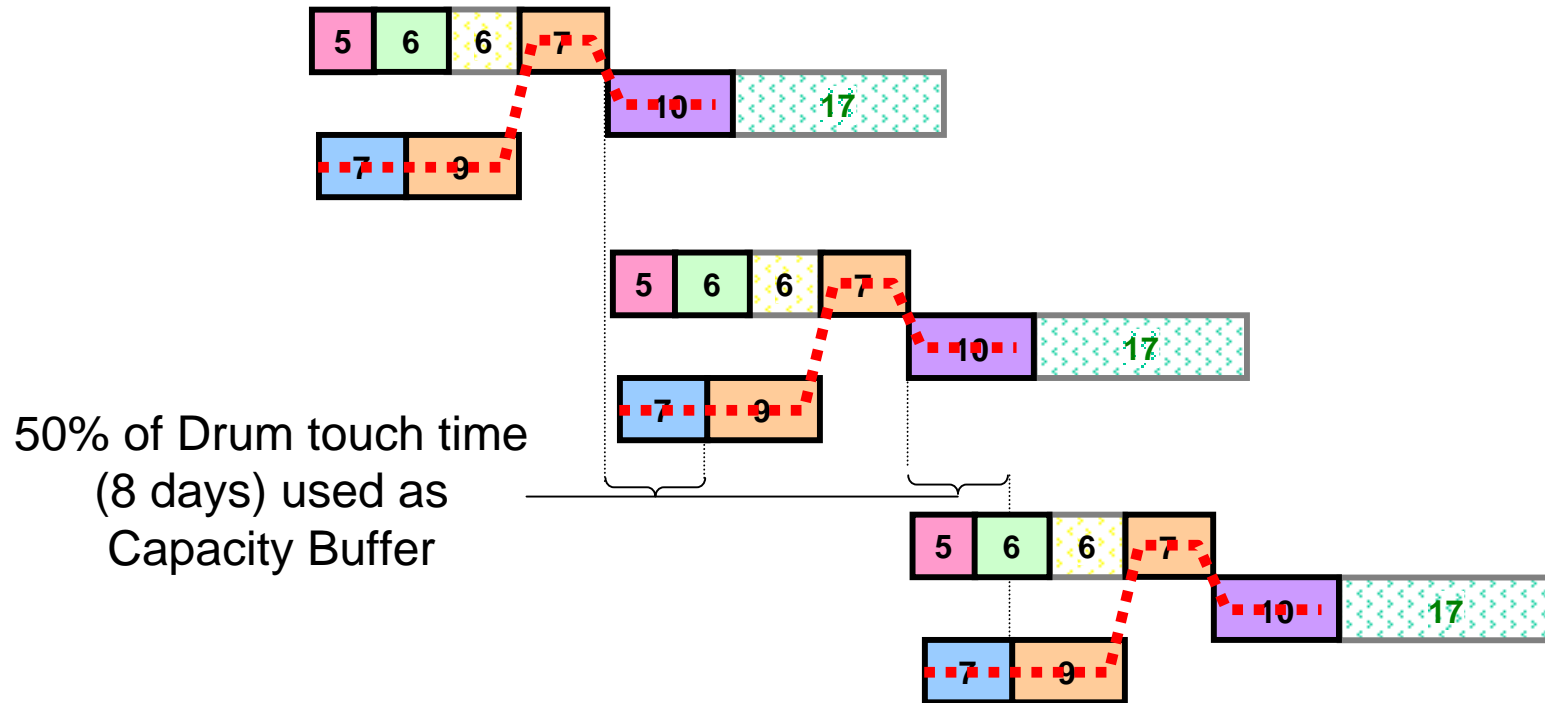
- Step 6: Project Buffer added—50% of critical chain touch time, rule of thumb

Feeding Buffers



- Step 7: Feeding Buffers are placed between Critical Chain and non-Critical Chain activities

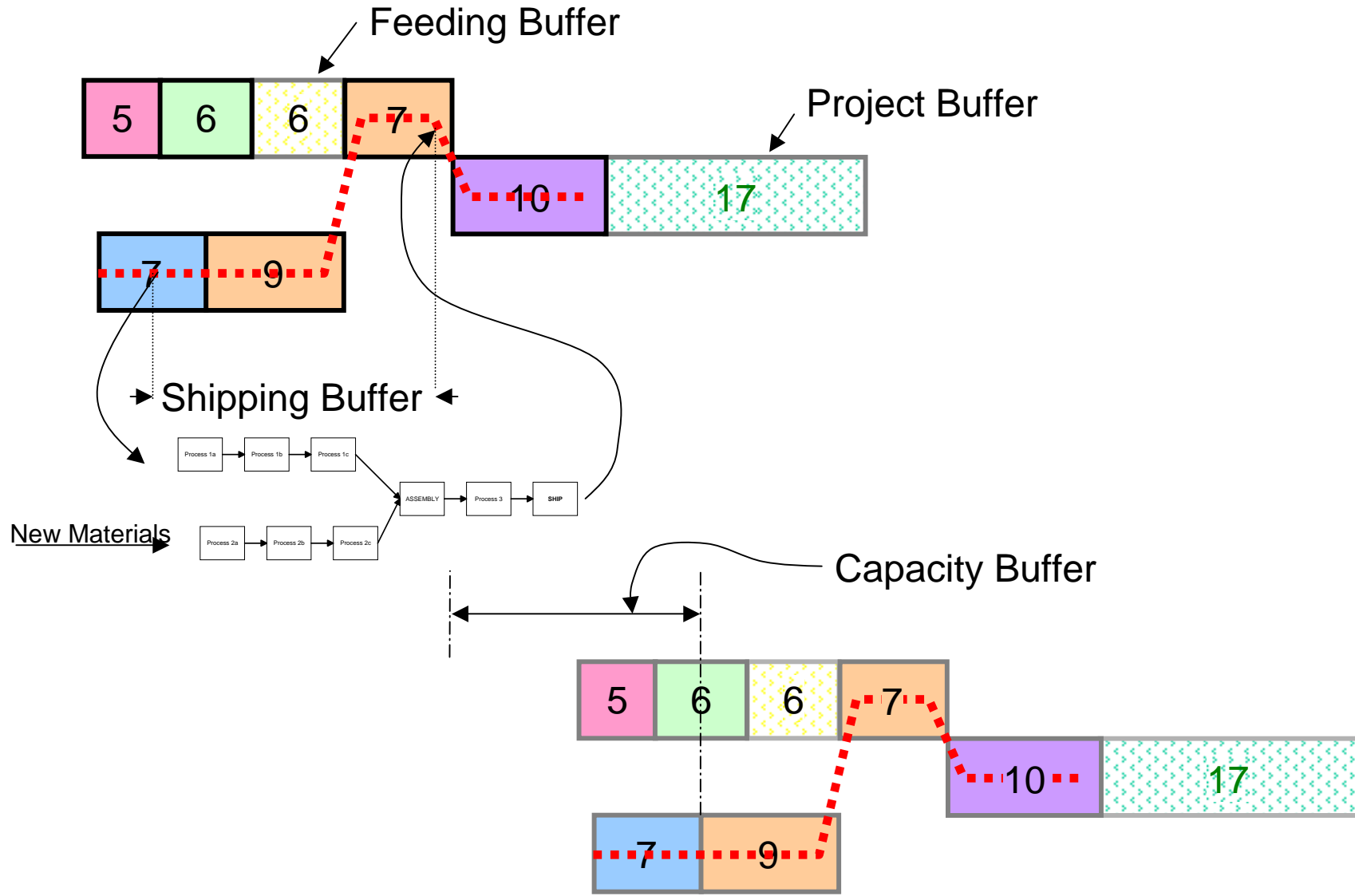
Capacity Buffers



- “Drum resource” used to determine Capacity Buffer between projects



Critical Chain + SDBR





Production Management =
(**A**)(Schedule) + (pull system)

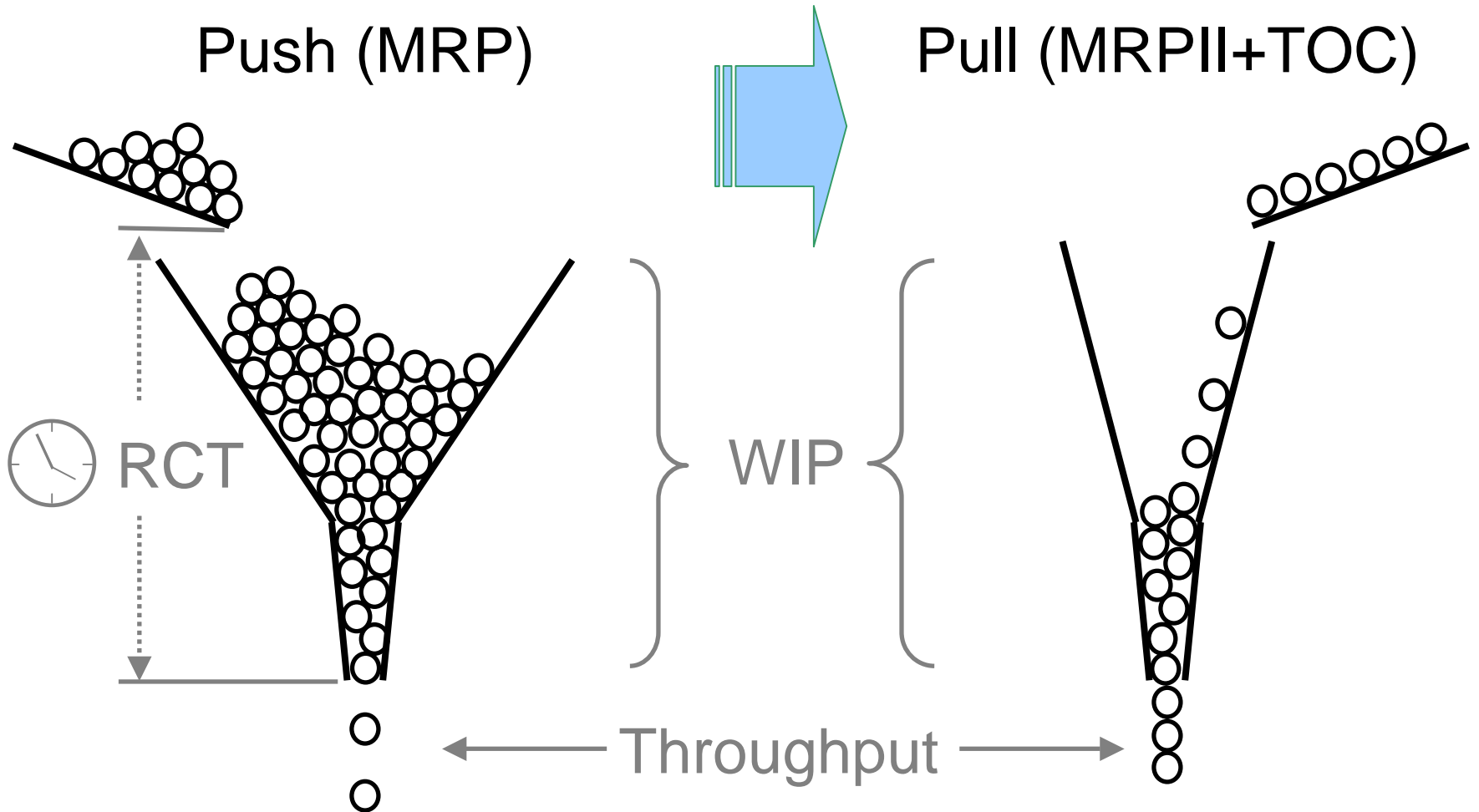
- Critical Chain project management
- Simplified Drum-Buffer-Rope production
- Theory of Constraints “thinking”
- MRPII “engine”



Implications for MRP

- Create Critical Chain in usual way
- Modify item masters, routers and BOMs to reflect the new lead times, routes and BOM indentures
- Create Project Level Work Order and route using the CC schedule
- Run MRP to time phase materials and create a dispatch list and shop orders with CC priorities
- Create “Immediate Action” report for SDBR and “Project Buffer Status” report for CC to manage by buffers

Result



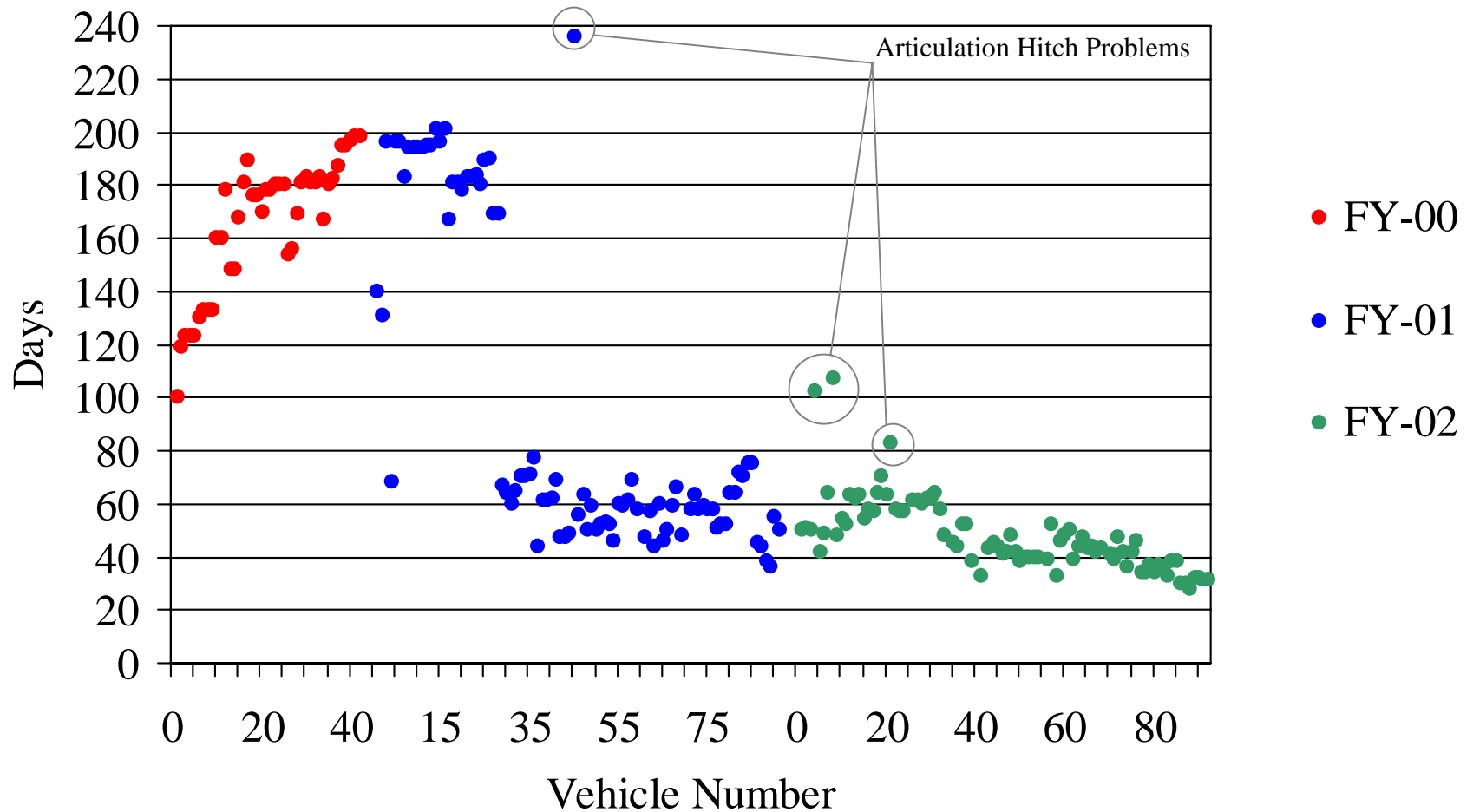


Maintenance Center Albany



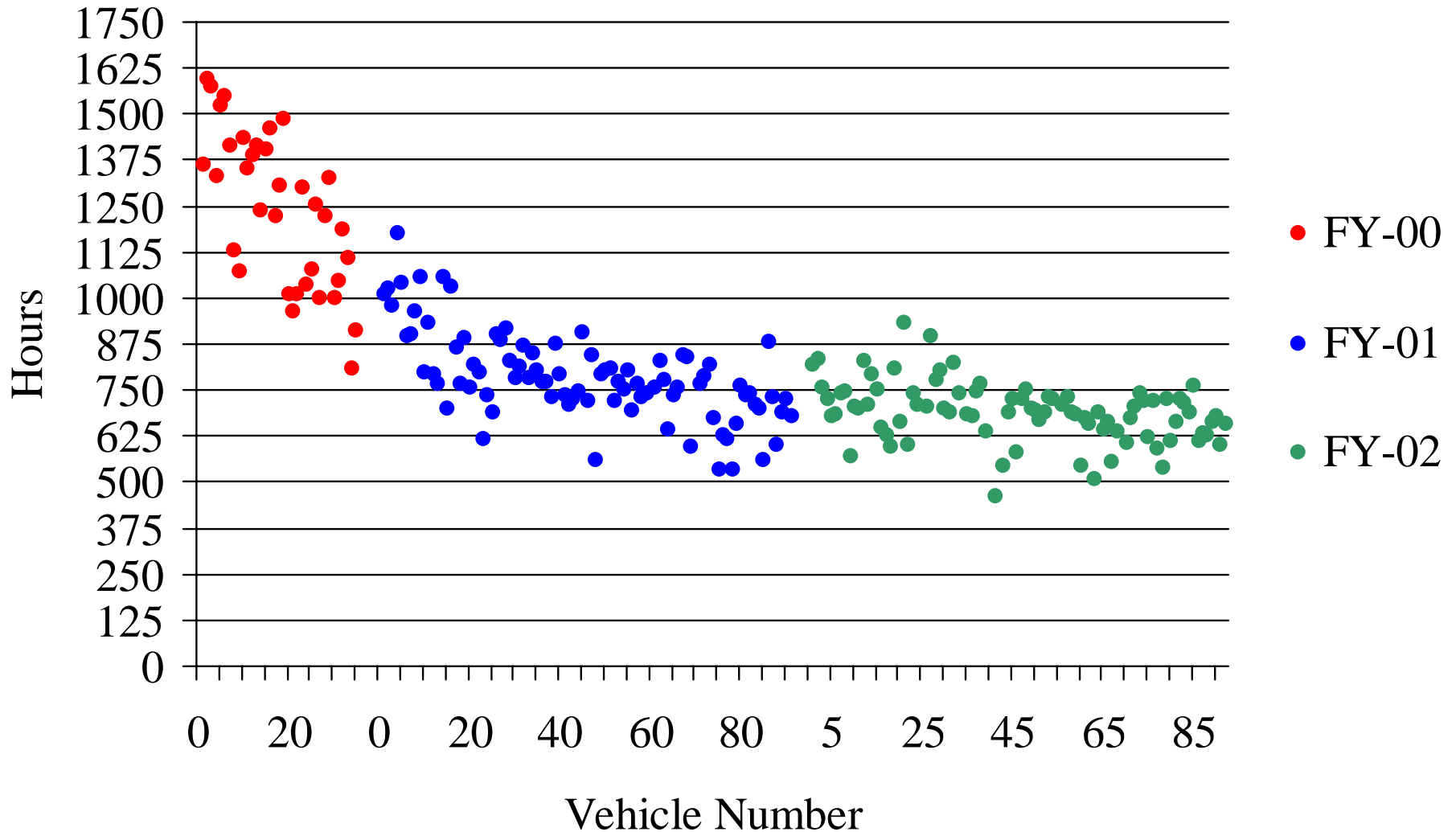


Repair Cycle Time



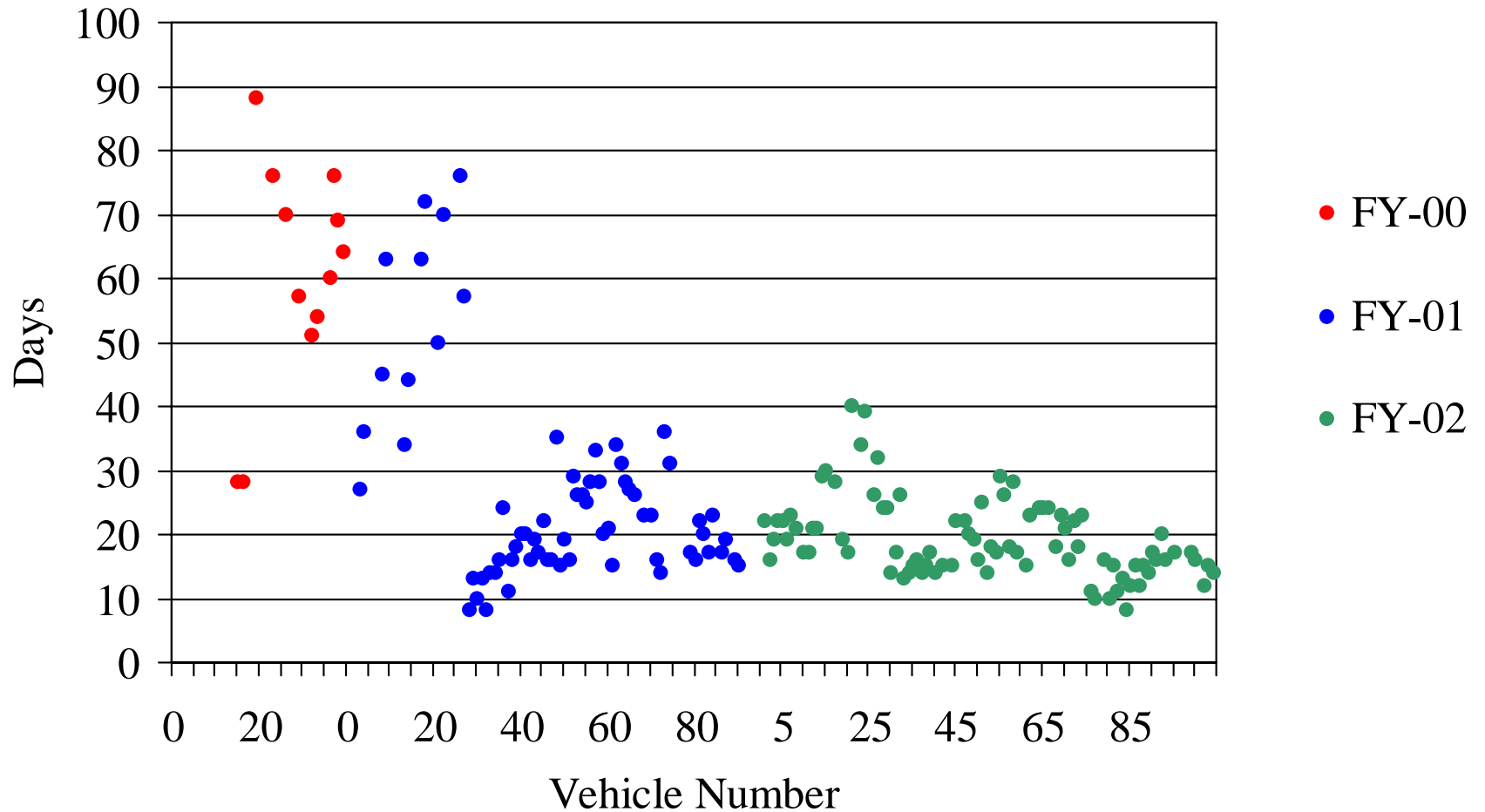


Labor Hours



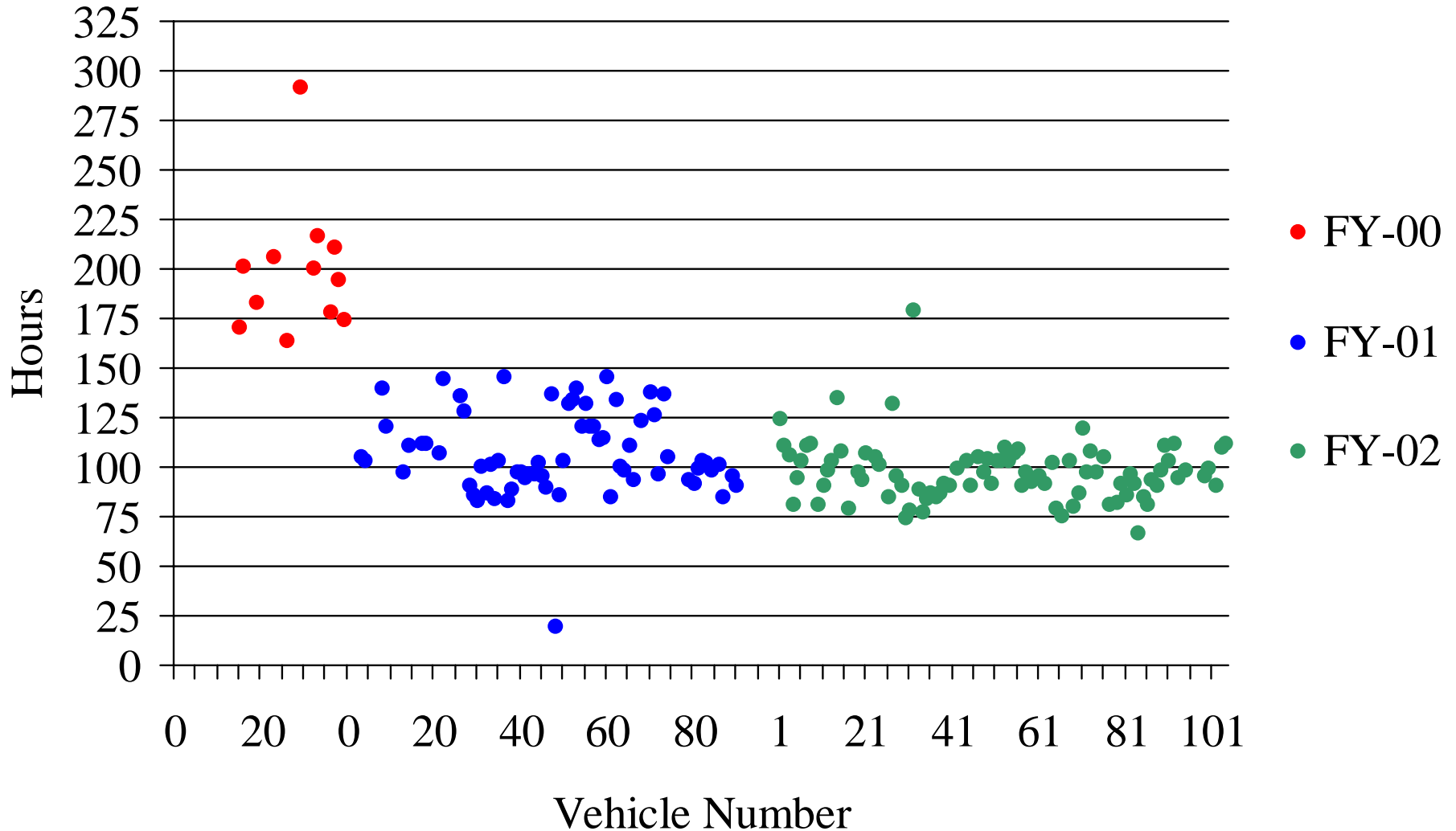


Engine RCT





Engine Labor Hours





Lean Thinking 6S Concept

- **Sort:** Get rid of what's not needed. Be ruthless.
- **Straighten:** Organize what belongs (Parts and Materials).
- **Scrub:** Clean everything (Equipment, Floors, and Walls).
- **Standardize:** Assign tasks. How will you keep your shop clean and organized and who will do it?
- **Safety:** + **ALWAYS put safety first!** +
- **Sustain:** Audit shops. Create checklist.



Cable Shop—Before





Cable Shop—After





Body Shop—Before





Body Shop—After





MK-48 Readiness Contribution

“What-If” 2000

- 6 per month per depot
- 167 days/vehicle
- \$152K /vehicle

“General, for \$137M we could raise readiness 12%, but it will take 19 years”

“What-If” 2003

- 19 per month per depot
- 51 days/vehicle
- \$120K /vehicle

“General, for \$108M we could raise readiness 12%, in 2 years”



And Not Just MK-48s...

Production Line	Before	Critical Chain	Actual
MK48	167	53	48
LAV	180-240	92-102	111-167
MK14 Trailer	56	23	34
MK15 Trailer	229	69	95
MK16 Trailer	126	22	38
MK17 Trailer	269	49	
M931 5-ton	113	48	70
M936 Wrecker	278	63	*
M970 Refueler	282	82	
M149A2 Water Trailer	No data	18	39
M88 Tank Retriever	213	159	146
AAV – P & C Variants	66**	66***	

* No current production line.

** AAV hull repair and assembly after receipt of hull from UDLP.

*** The AAV critical chain has been established to cover the work performed after the hull has been modified by UDLP.



WIP Reduction

Production Line	Before	TOC Target	Actual
MK48	55	35	39
LAV	13	7	7
MK14 Trailer	8	3	3
MK15 Trailer	2	2	1
MK16 Trailer	2	2	1
MK17 Trailer	3	2	1
M931 5-ton	5	4	4
M936 Wrecker	6	0	0*
M970 Refueler	8	6	13**
M149A2 Water Trailer	17	7	7
M88 Tank Retriever	5	3	3
AAV – P Variant	5	4	4
AAV – C Variant	22	9	9

*Production line completed.

**Awaiting one part to complete; received 23 Aug 02.

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to be continued...

Questions?

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