

Operational Excellence Case Study



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In the past few years Kenny has led two organizations to ISO 9001:2000 registration and three organizations to ISO/TS 16949:2002 registration. Of these 5 organizations, Total Electronics went on to become one of seven National Finalists for the American Association for Manufacturing Excellence (AME) award in October of 2005. Master of Business Administration, MBA from Anderson University, a Master of Arts in Education, MAE from Ball State University, and a Bachelor of Science, BS from Purdue University.



SMS Technologies, Inc.

2009 Supplier Excellence Alliance
Supply Chain Innovation Winner

And

2010 Supplier Excellence Alliance
Operational Excellence Winner
Workforce Development Finalist



SMS Technologies, Inc.

- ❑ Employees - 100 in San Diego
- ❑ Low volume / high mix EMS - Electronic Manufacturing Services including Design, Layout, Rapid Proto-Typing, DFM & DFT, RF Technology, Supply Chain Management
- ❑ AS9100, ISO/TS 16949, ISO 9001 & 13485
- ❑ Aerospace & Military Customers:



SIGNAL ENGINEERING, INC.

THALES



Results of USAF Implementation

Productivity	up 83%
On Time Delivery	100% to SEI
Zero Defects	0 PPM to USAF
Customer Satisfaction	up 33%
Inventory turns	up from 7 to over 10
“BEST TEAM”	Great Execution!
DEBT-FREE & RECORD PROFIT	

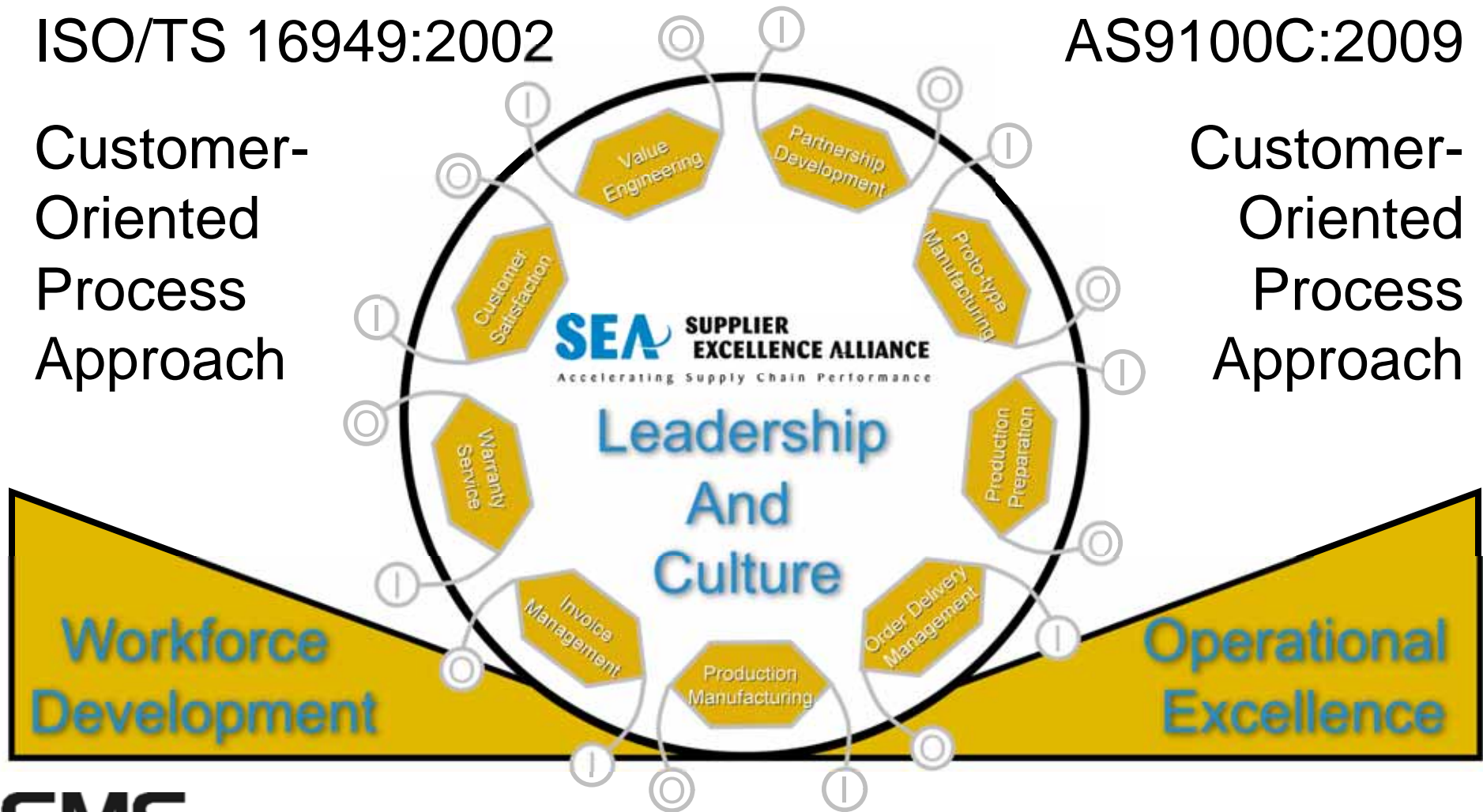
Customer-Focused Process Approach

ISO/TS 16949:2002

Customer-Oriented
Process
Approach

AS9100C:2009

Customer-Oriented
Process
Approach

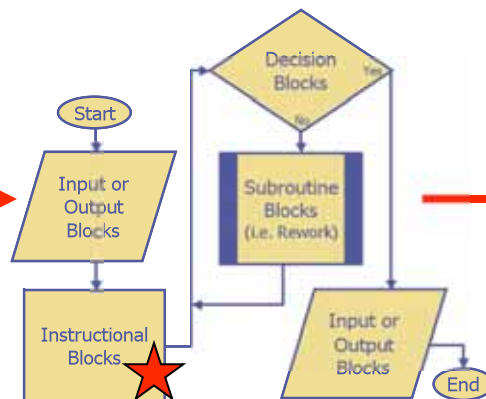


Build Quality In With APQP (Advanced Product Quality Planning)

Customer Requirements

Special / Key Product Characteristics (★)

Process Flow Diagram



Process Failure Mode Effects Analysis

Potential Failure Mode and Effects Analysis (Process FMEA)														
Item		Process Responsibility			FMEA Number									
Key Date		Key Date			Page		of							
Model Year(s)/Model(s)		Model Year(s)/Model(s)			Prepared by		FMEA Date (Eng)							
Core Team														
Process Function/Requirement	Potential Failure Mode	Potential Effect(s) of Failure	S	O	C	Potential Cause(s)/Mechanism(s) of Failure	Control Process Controls	Current Process Controls	Recommended Action(s)	Responsibility & Target Completion Date	ACTION RESULTS			
			1	2	3		Prevention	Detection			1	2	3	4

Control Plan

Product		Rev. Control		Rev. Control		Rev. Control		Rev. Control		Rev. Control		Rev. Control		Rev. Control	
Part Number/Last Change Level		Rev. Date		Customer Engineering Approval Date (if Req'd)		Customer Quality Approval Date (if Req'd)		Customer Approval Date (if Req'd)		Customer Approval Date (if Req'd)		Customer Approval Date (if Req'd)		Customer Approval Date (if Req'd)	
Part Name/Description		Supplier/Plant		Supplier/Plant		Supplier/Plant		Supplier/Plant		Supplier/Plant		Supplier/Plant		Supplier/Plant	
Supplier		Supplier Code		Supplier Code		Supplier Code		Supplier Code		Supplier Code		Supplier Code		Supplier Code	
Part Number		Part Name		Part Name		Part Name		Part Name		Part Name		Part Name		Part Name	
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Work Instruction

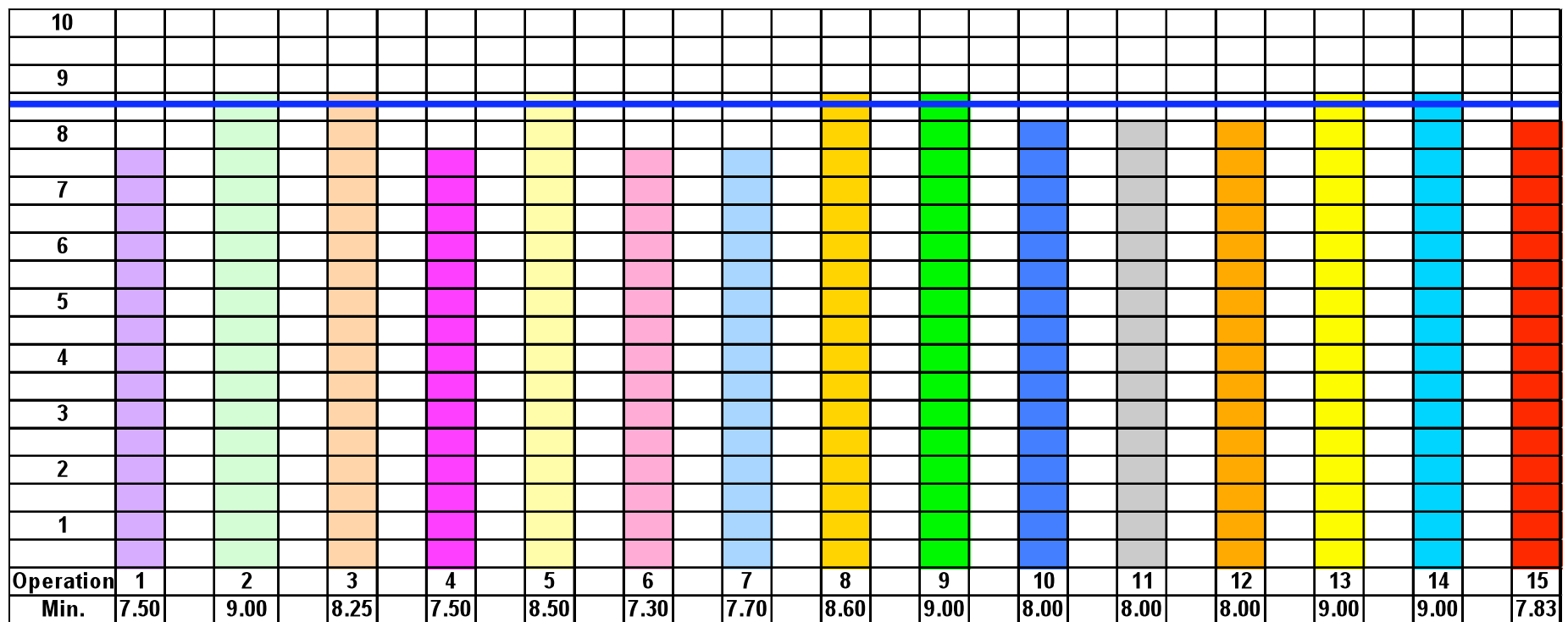


Qualification



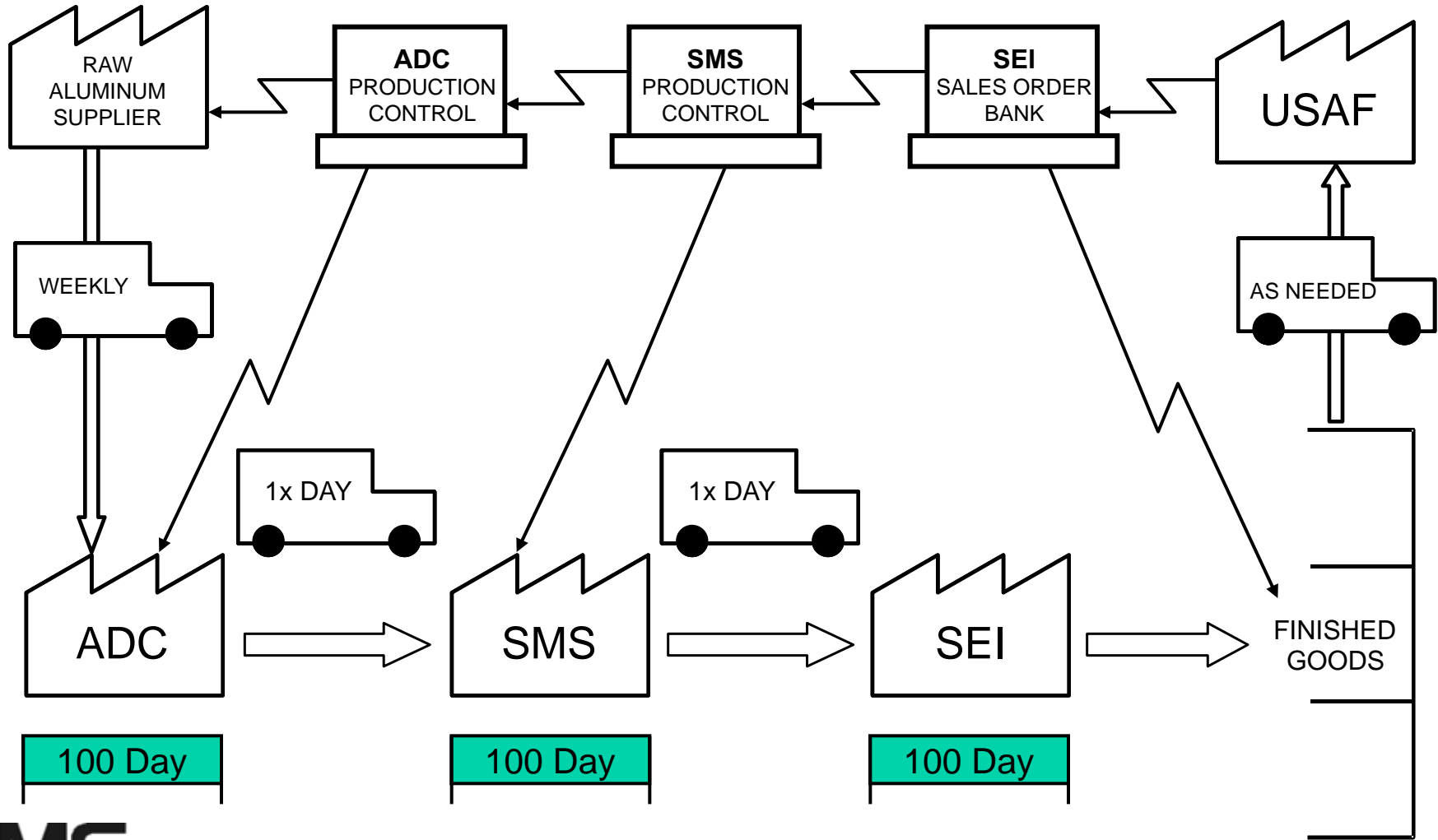
Launch Lean With 3P

Production Preparation Process



Note: Each color represents a different operator's work cycle

VSM From Raw Material to USAF



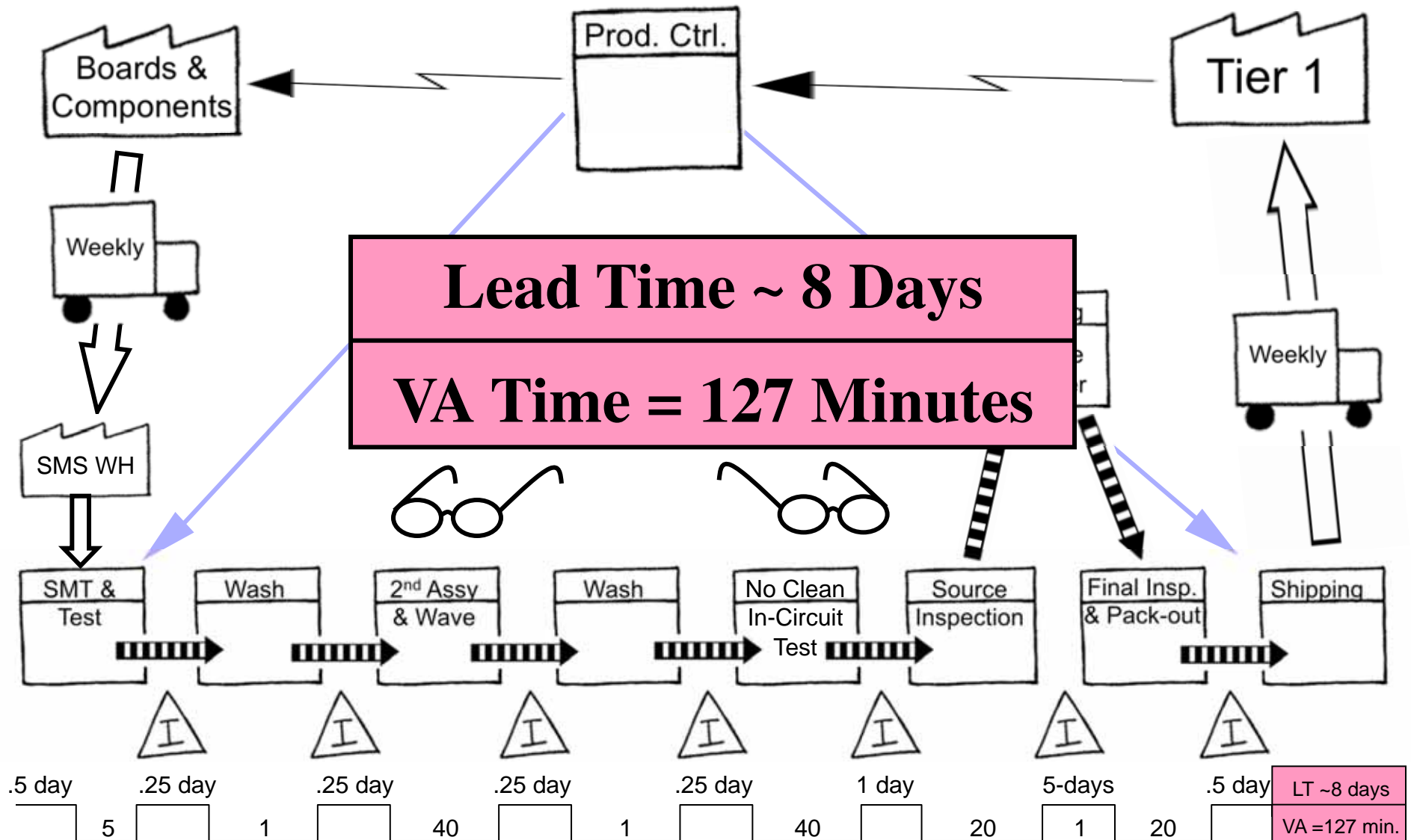
Results of NSA Implementation

Productivity	up 93%
On Time Delivery	93% to 99%
Defect Performance	1 Defective Unit to NSA
Customer Satisfaction	Nominated for OE Award
Inventory turns	Up from 7 to over 10
“Right Strategic Partner”	Great Execution!
Completed IDIQ early after lagging by 1200 units	

Trouble In The Beginning

- ❑ NSA business was acquired by SMS in 2007
 - ❑ Volume was 260 sets (13-PCBAs) per month
- ❑ Many of the key components were obsolete
- ❑ Consigned material was furnished sporadically by our Tier 1 customer
- ❑ Low incoming yield from a key directed-source resulted in quality problems throughout
- ❑ Material handling costs were left out of the quote
- ❑ **SMS was losing >175% of the quoted margin**

The 1st SMS Current State Map



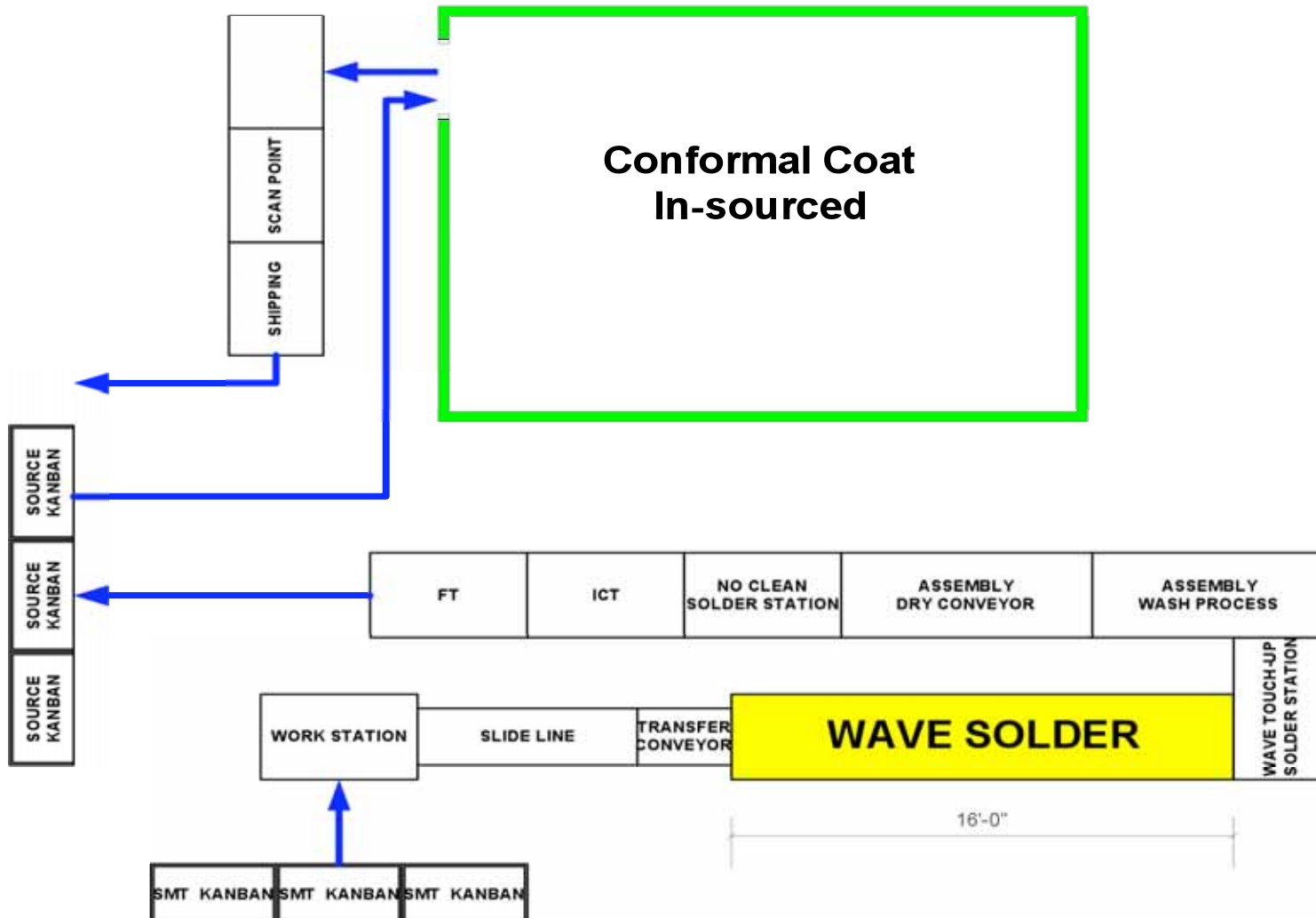
The NSA Customer-Focused Team

- ❑ Program Manager
- ❑ Manufacturing / Quality Engineer
- ❑ Test Engineer
- ❑ Value-Stream Manager
- ❑ Production Planner
- ❑ Procurement Specialist
- ❑ Cell Leads

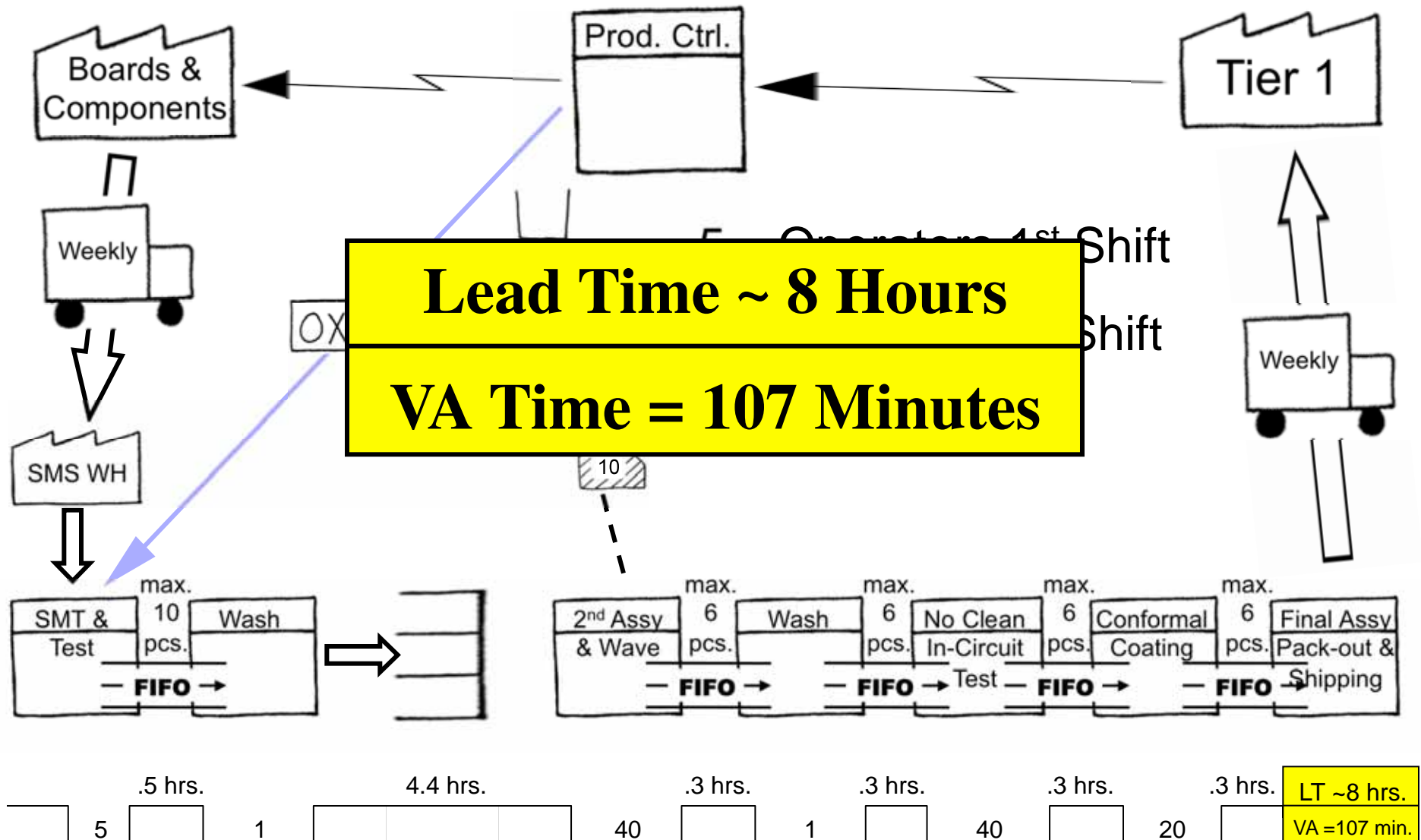
The Turn-A-Round Begins

- ❑ Our customer agreed to let SMS manage the supply chain including obsolete components
- ❑ SMS qualified a second source to provide key flex cables & helped them improve the process
 - ❑ Quality improved significantly throughout the entire value-stream as a result (98.4% SMS)
- ❑ The SMS Customer-Focused Team conducted a Kaizen event to develop a mixed-model cell around the wave soldering process
 - ❑ The Team built every PCBA every week

The NSA Cell Lay-out



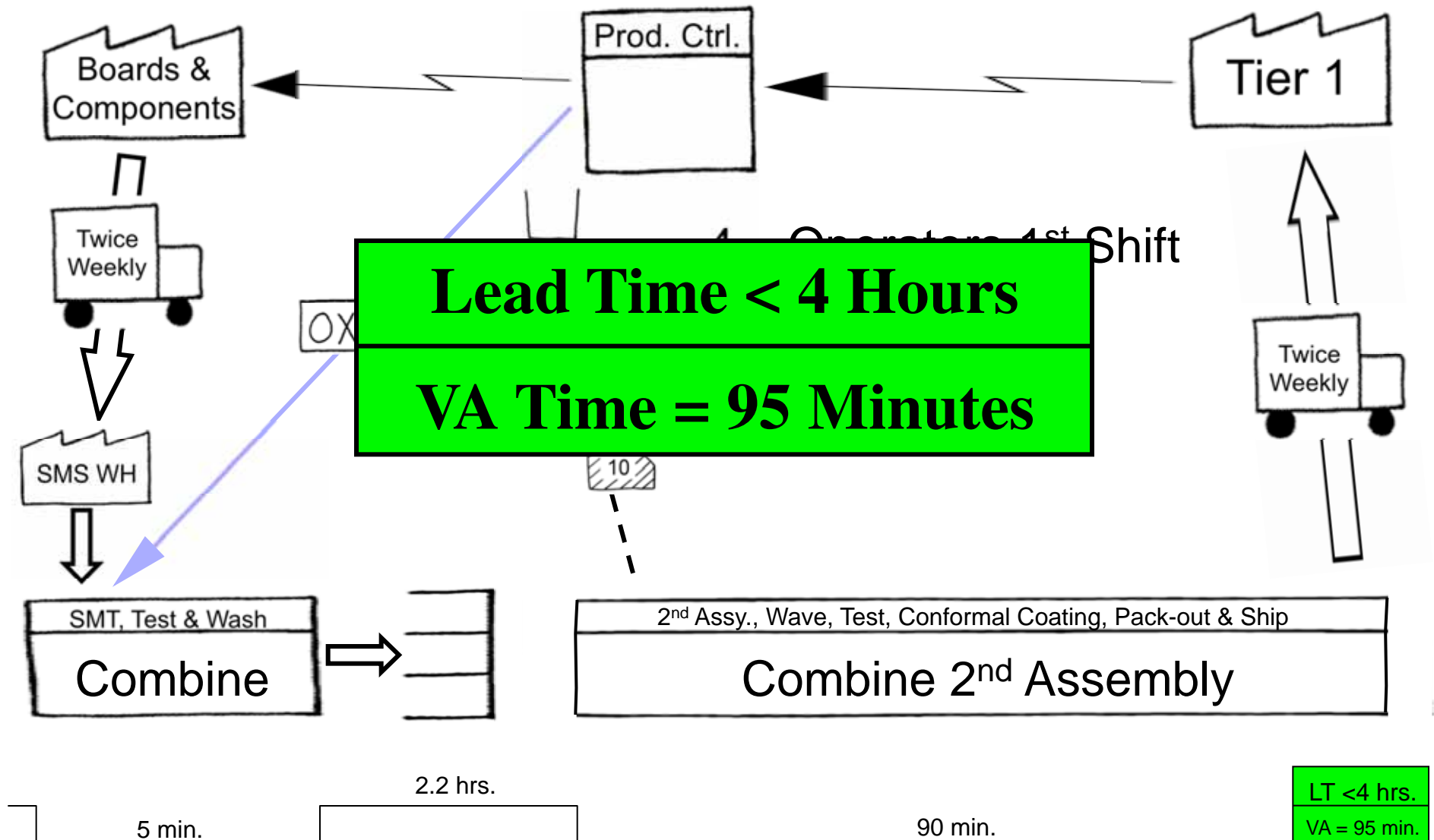
The New SMS Current State Map



LIFE, Quality & Margin Improves

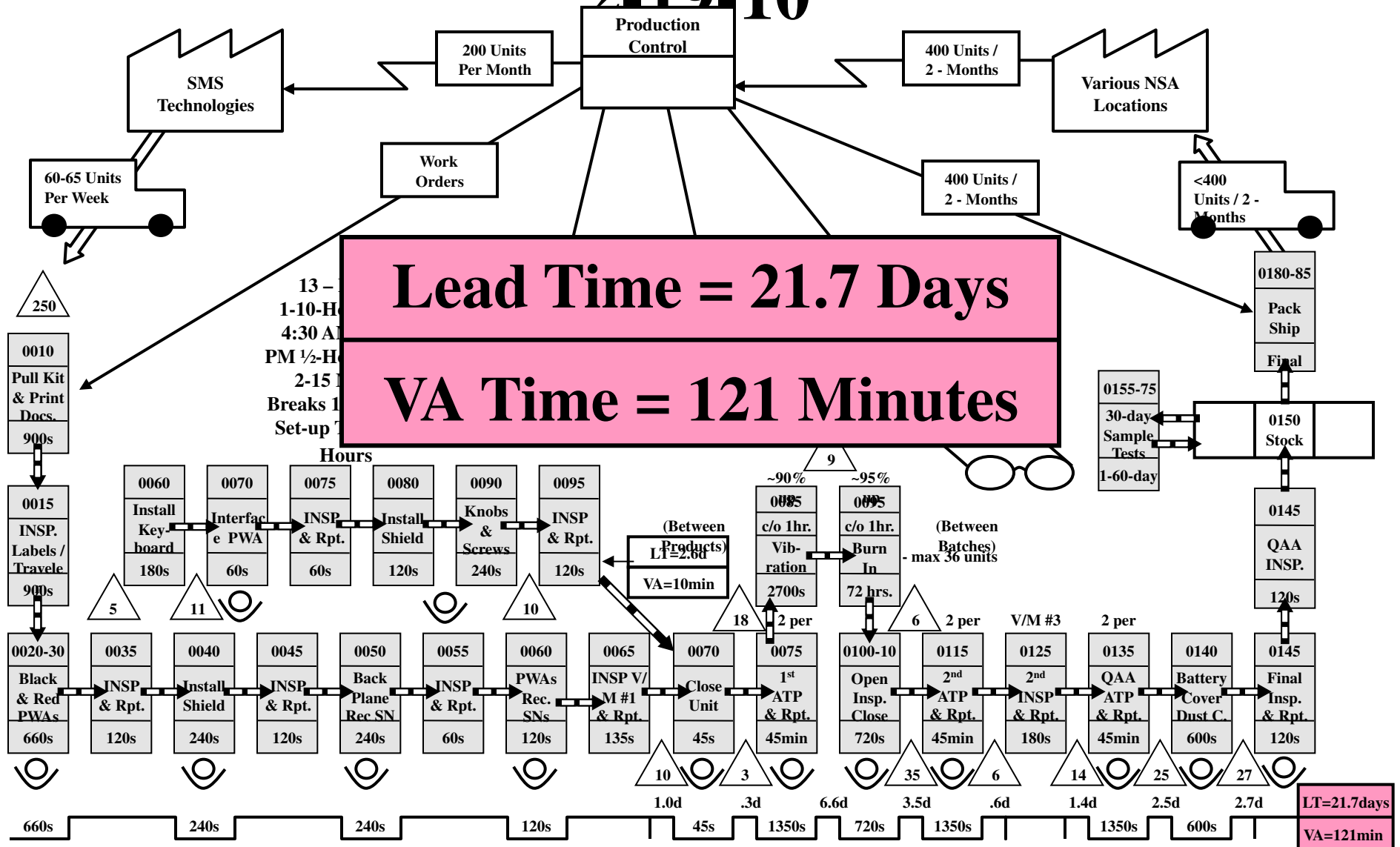
IMPROVEMENT MEASURES	INITIAL Measure	CURRENT Measure	PERCENT Improvement	
LEADTIME Total Cycle Time (Hours)	64 Hours (8 Shifts)	8 Hours (1 Shift)	87.5%	↓
INVENTORY (Number of PCBAs)	1308 Units	160 Units	87.8%	↓
FLOORSPACE (Sq Ft &/or Linear Ft)	976 Sq Ft 1068 Lin. Ft	337 Sq Ft 630 Lin. Ft	65.5% 69.5%	↓
EFFECTIVENESS (PCBAs / Person / Shift)	148 Units / 11 People = 14	160 Units / 6 People = 26.7	90.7%	↑
QUALITY (PPM)	17,709 PPM	926 PPM	94.8%	↓
Margin Vs. Quoted (Percentage %)	-175%	54%	83.3%	↑

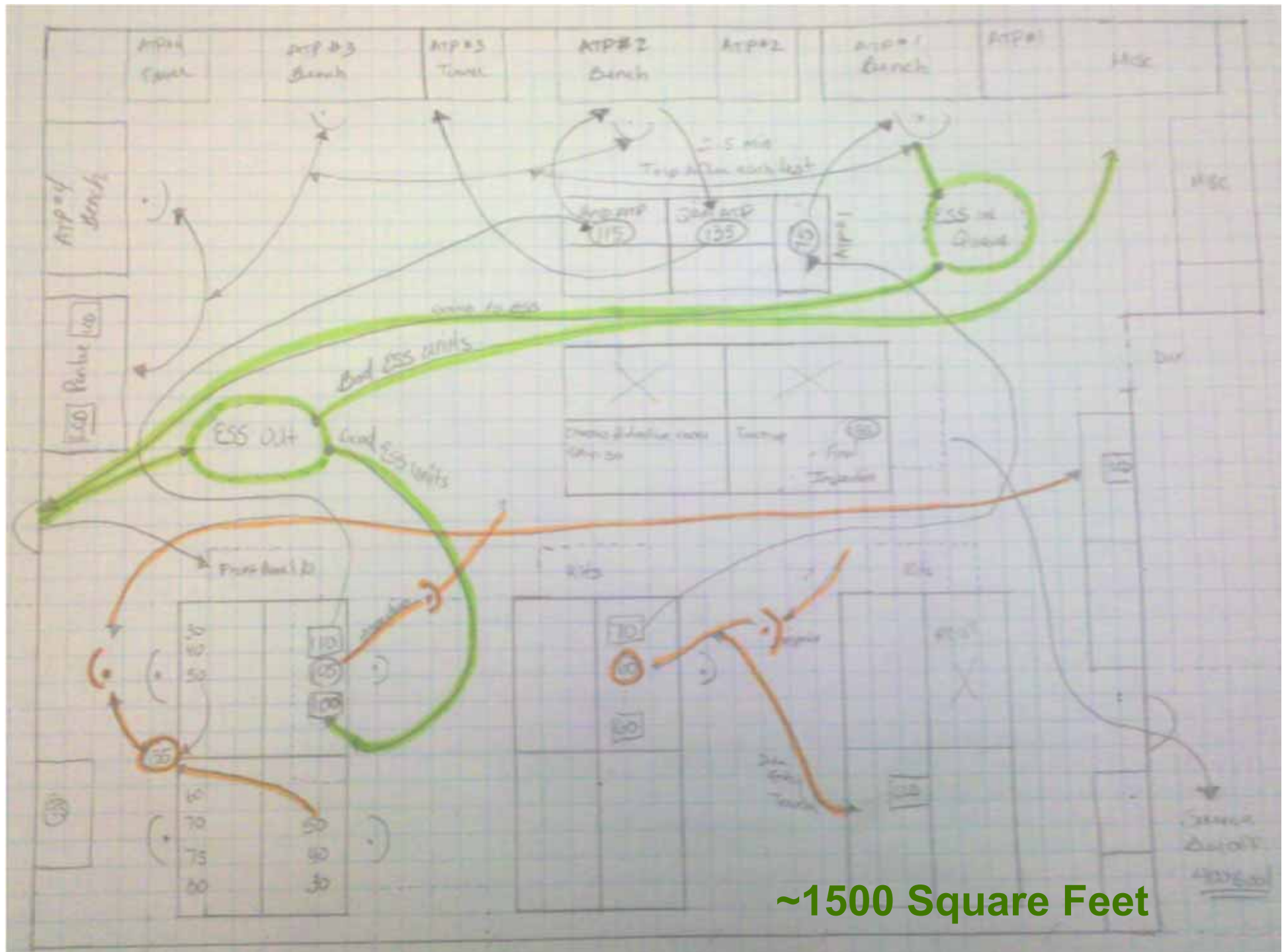
The New SMS Future State Map



NSA Current-State Value Stream Map

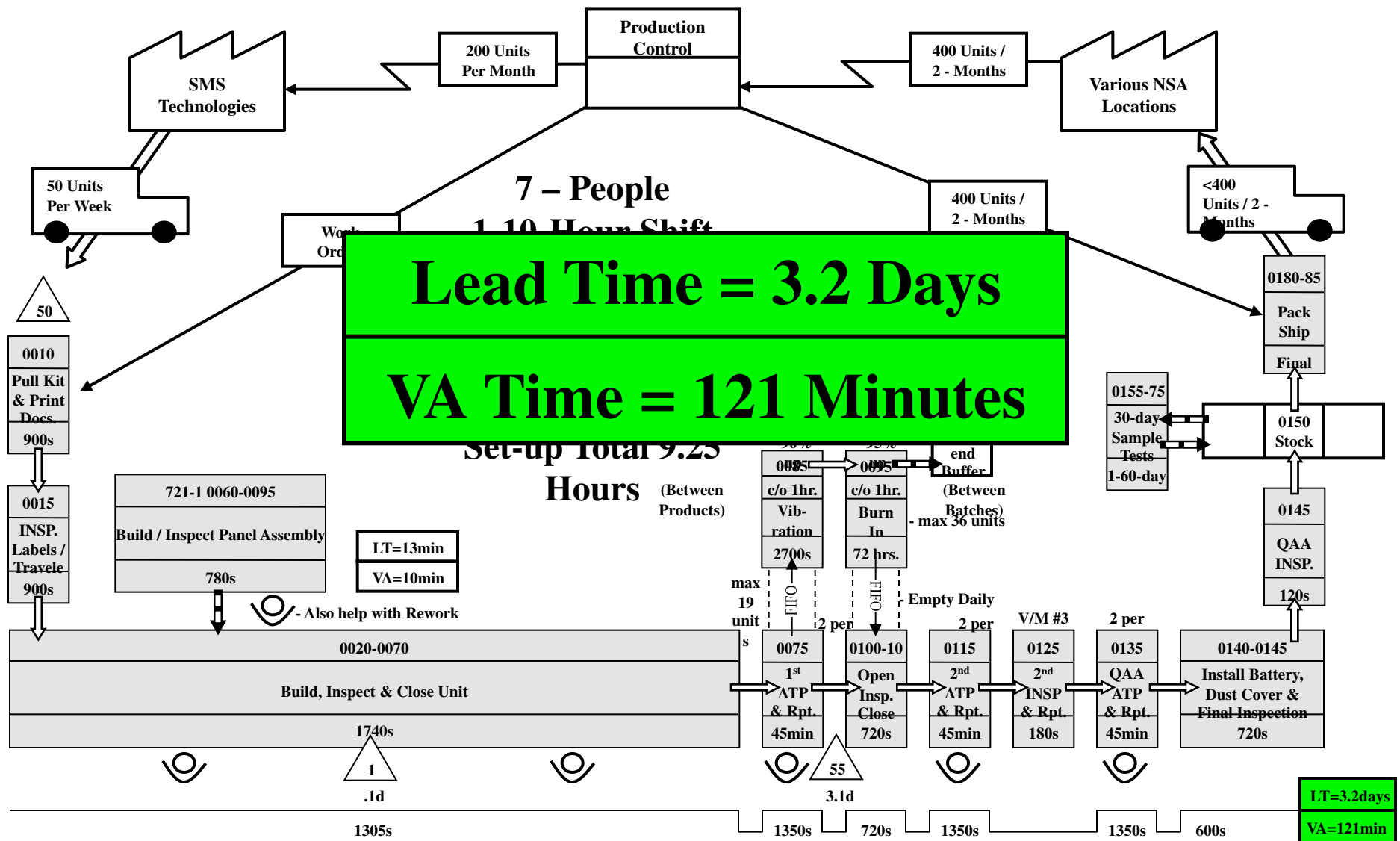
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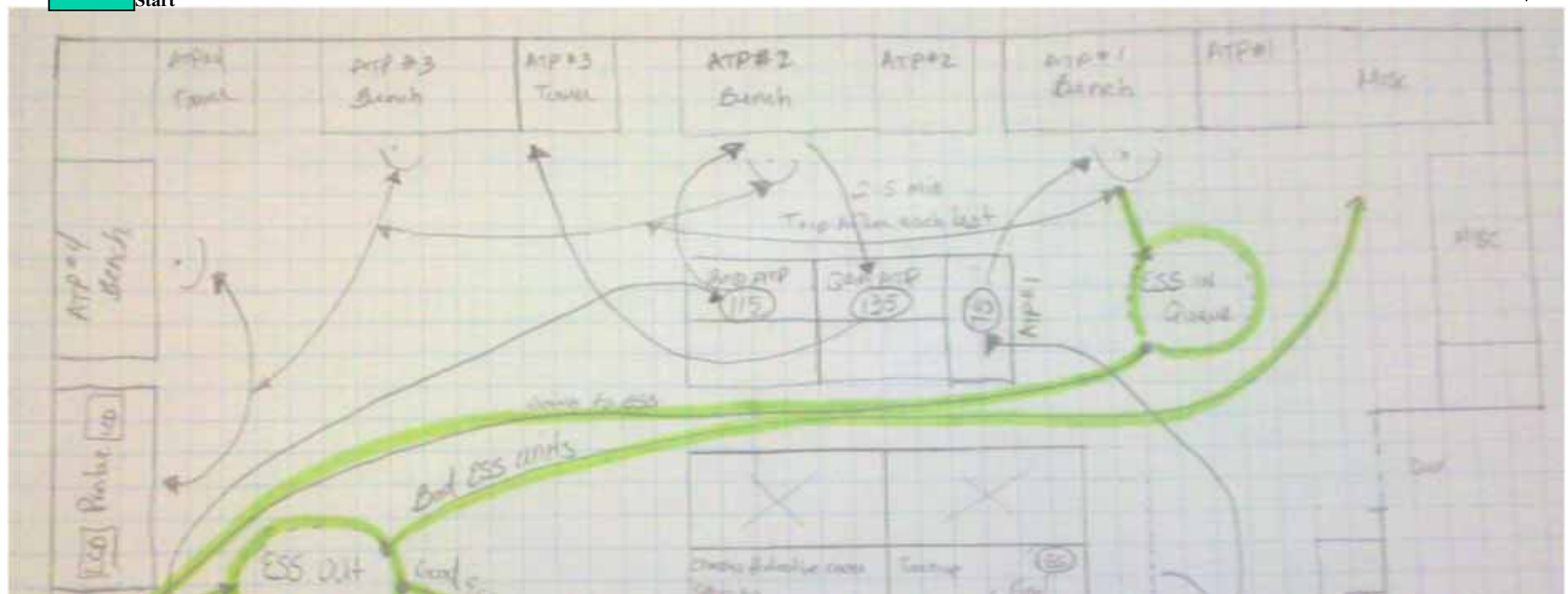
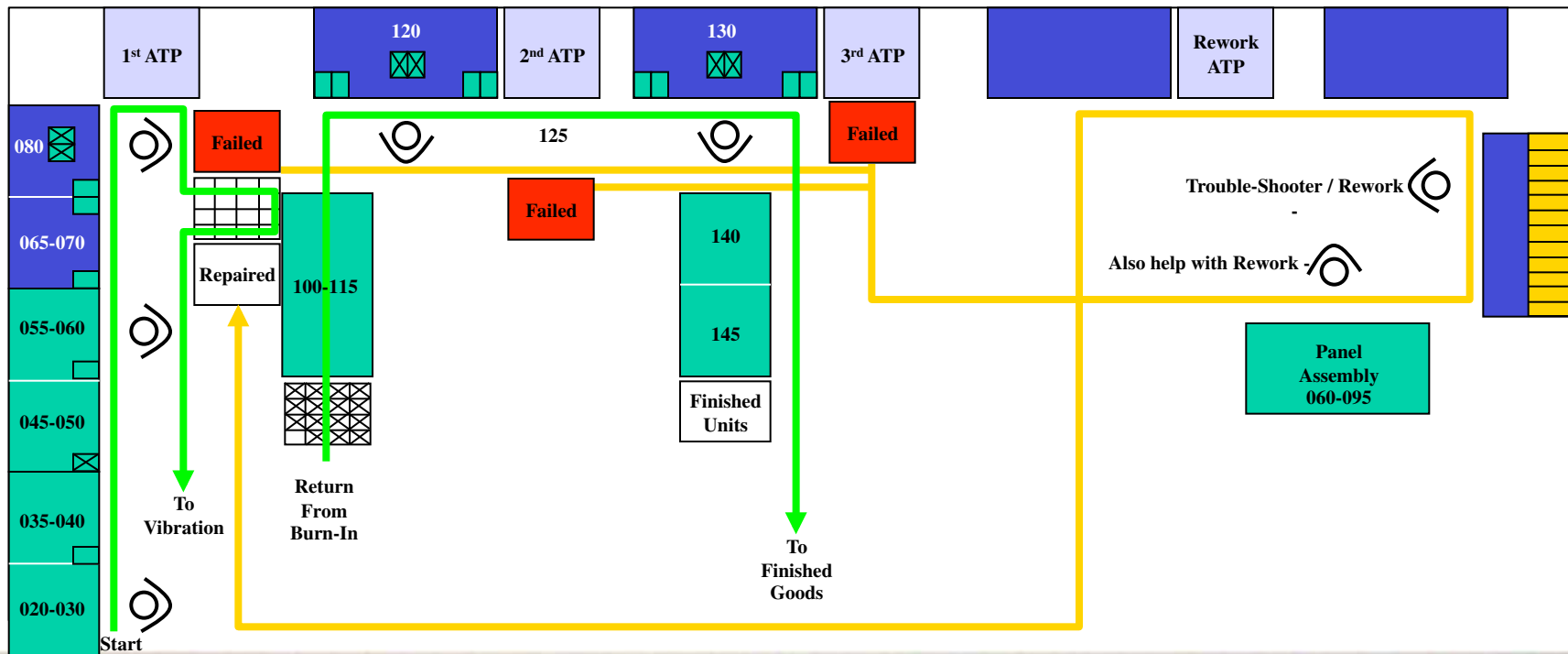




~1500 Square Feet

NSA Future-State Value Stream Map 2-26-10





Projected **LIFE** Improvements

IMPROVEMENT MEASURES	INITIAL Measure	PROJECTED Improvement	ACTUAL Improvement
LEADTIME Total Cycle Time (Hours)	21.7 Days	3.2 Days	4.6 Days
INVENTORY (Number of PCBAs)	215 Units	56 Units	70 Units
FLOORSPACE (Square Feet)	1500 Sq Ft	810 Sq Ft	890 Sq Ft
EFFECTIVENESS (PCBAs / Person / Shift)	346 / 2 Months = .79	18.5 Units / 7 People = 2.6	15.75 Units / 9 People = 1.8

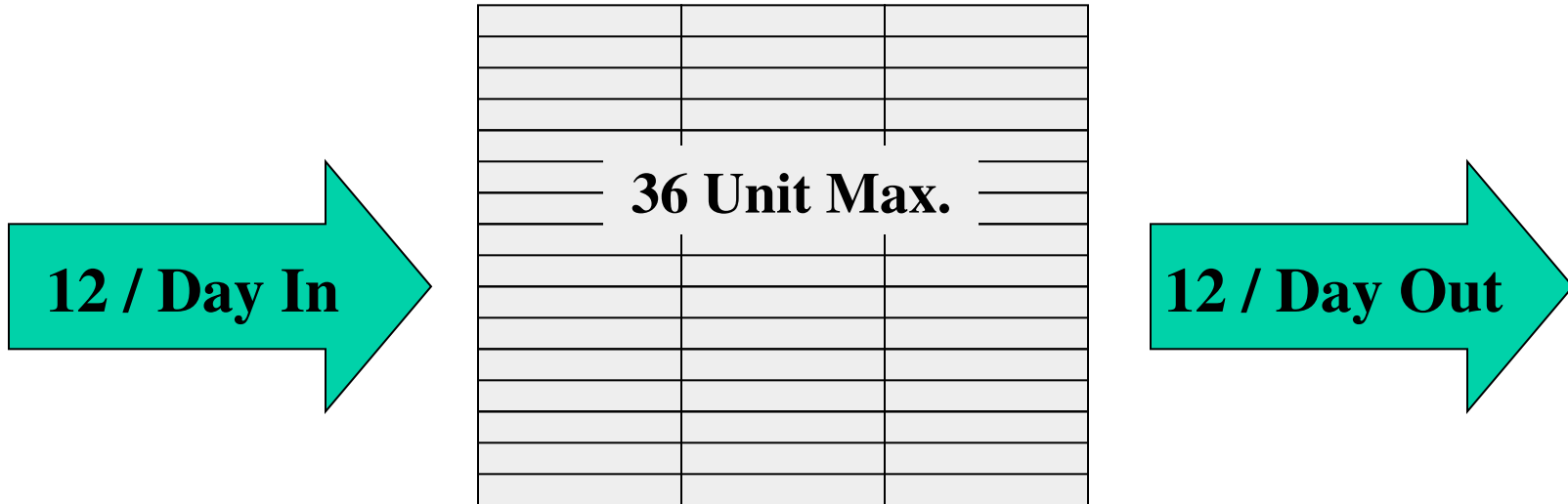
Actual **LIFE** Improvements

IMPROVEMENT MEASURES	INITIAL Measure	CURRENT Measure	PERCENT Improvement	
LEADTIME Total Cycle Time (Hours)	21.7 Days	4.6 Days	79%	↓
INVENTORY (Number of PCBAs)	215 Units	70 Units	67%	↓
FLOORSPACE (Square Feet)	1500 Sq Ft	890 Sq Ft	41%	↓
EFFECTIVENESS (Units / Person / Shift)	346 / 2 Months = .79	15.75 Units / 9 People = 1.8	122%	↑

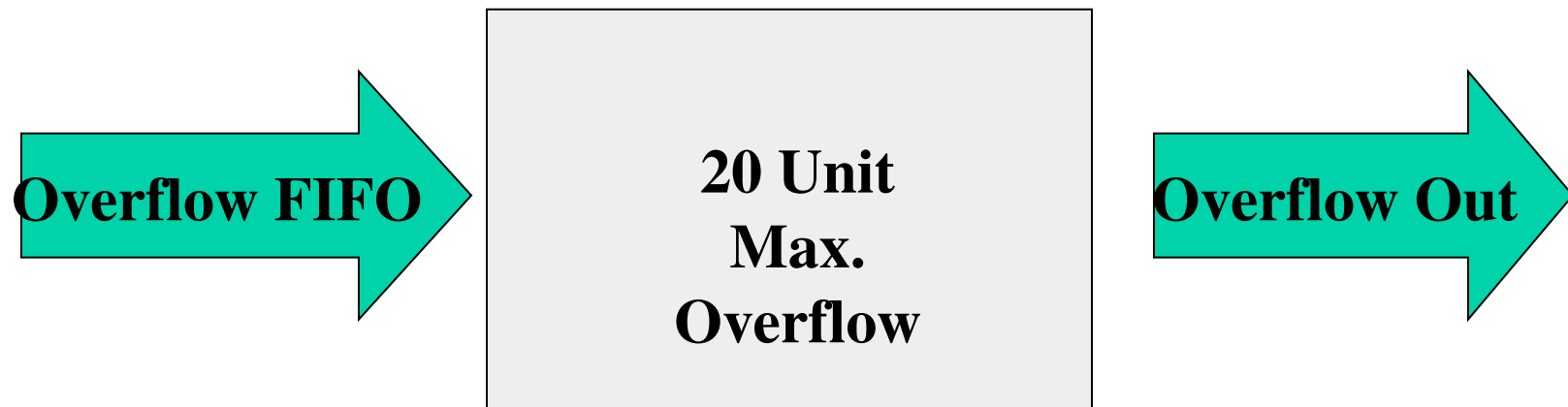
Pitfalls to Improvement

- ❑ The power of a disciplined lean culture should not be underestimated
- ❑ Workforce development is also a critical component of a successful lean transformation
- ❑ Independent inspection requirements forced us to continuously move operators from station to station
- ❑ The customer shut down SMS operations for 4 weeks after the event to use up excess inventory
- ❑ The assembly process lacked enough burn-in capacity to keep pace with the projected rate
 - ❑ The burn-in chamber is a monument

Bottlenecks / Constraints



Maximum 84 Unit Throughput in 7 Days (24/7)



Potential Future Improvements

- ❑ Combine inspections steps
- ❑ Combine functional test operations
- ❑ Pack-out at the end of the cell
- ❑ Locate all assembly & test in one place
- ❑ Ship to NSA every month vs. 2 months
- ❑ Add more visual controls
- ❑ Develop returnable shipping kanbans
- ❑ Make milk-runs twice a week

Daily, Weekly & Monthly Output (For 10 & 12-hour Shifts)

<u>Shifts</u>	<u>Days</u>	<u>Hours</u>	<u>Units / Day</u>	<u>Units / Week</u>	<u>Units / Month</u>
1	5 (M-F)	10	18.5	92.5	320
2	5 (M-F)	10	37	185	640
1	6 (M-W&R-F)	10	18.5	111	481
1	6 (M-W&R-F)	12	22	132	572



Lessons Learned

- ❑ The significance of lean culture and workforce development on the ease of implementation
- ❑ The power of the SEA Roadmap
- ❑ Removing the blinders and “learning to see”
- ❑ Having faith when it is not easy to see the way
- ❑ Supply chain partners can team-up to turn a losing proposition into a sustaining asset
- ❑ Operational Excellence is multiplied many times over when it is applied to the entire value stream

VSM From Raw Material to NSA

