

FS Operating System

Process Control

Lean/Six Sigma Methodology & FSPT Journey

12-12-18



FS Precision Tech Co., LLC

- FS Precision Tech manufactures precision investment castings for Aerospace, Defense, Automotive, and General Industry applications.
- Specialists in the manufacture of titanium investment castings.
- An independent subsidiary of Fusheng Precision Company (Taipei) since 2004.
- Globally recognized quality certifications and customer process approvals, known for:

Responsive Service & Collaboration
Accredited Quality
Process Control
Global Reach



Quick Facts

- Facility: 60,000 ft² (5574 m²)
- Los Angeles, CA; minutes from Port of Long Beach
- ~120 employees
- Aerospace & Defense Quality Accreditation
- Lockheed Martin, BAE Systems Approvals
- ITAR Registered
- Recognized Industry Innovators

Investment Casting Markets



Aerospace & Defense

- Structural aircraft & missile components, Weapons systems & Military Firearms



Turbomachinery

- Titanium Turbocharger Components for Automotive and Aerospace industries



Commercial & General Industry

- Energy, Subsea, Industrial instruments & tools, Firearms



In 2013 FSPT was looking to improve its predictability and profitability.

The solution?

The solution: 5 Steps

1. Goal Deployment Process – Strategic Tool
2. Functional Groups Integration – Define Roles/Responsibilities
3. Visual Factory Development - Daily Management Tool
4. Communication Flowdown Process – Accountability Tool
5. Training/Certification Process – Create CI Leaders

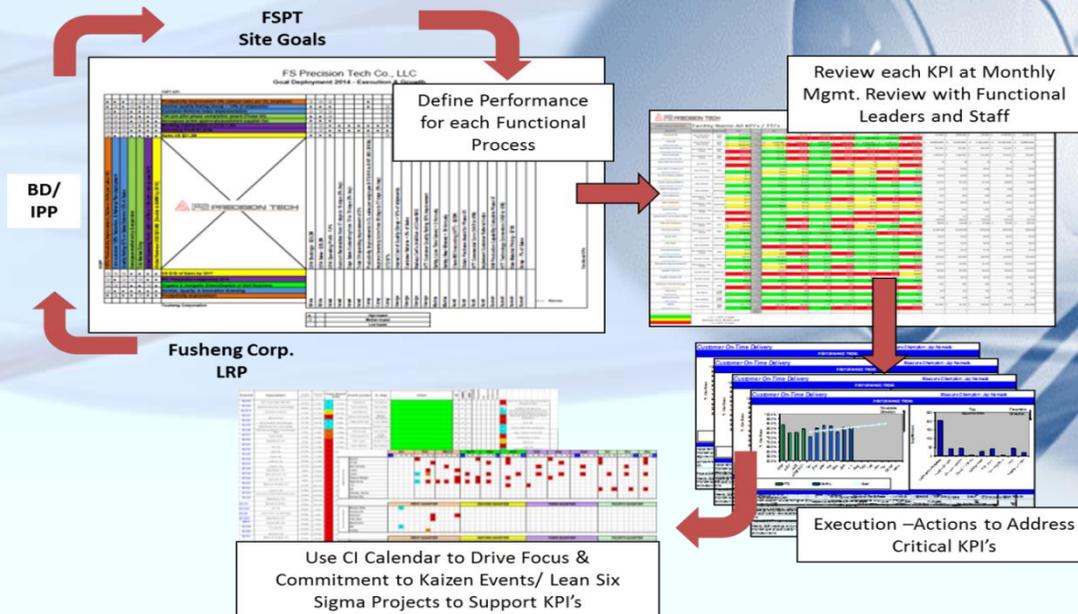
Achieve a Continuous Improvement **Culture** utilizing Lean/Six Sigma Methodology & Tools

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Lean/Six Sigma Goal Deployment

1. Goal Deployment

- X-Matrix Development (Linkage)
 - ✓ FUSHENG Co. LRP
 - ✓ Business Development/IPP
 - ✓ FS Precision Tech
 - ✓ Functional Groups



Vision

Our Vision is to be recognized by our target customers as the leader in quality service and support for technically advanced titanium castings.

Mission

Deliver Quantifiable Customer Value Through Creative Casting Solutions And Supplier Service.

Guiding Principles

1. Treat everyone with dignity, respect, and professionalism.
2. Empower our employees to be creative solutions providers.
3. Make decisions which create value for all stakeholders.
4. Only make commitments that you will keep.
5. Provide extraordinary service by anticipating and responding to customer needs.

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Lean/Six Sigma Integration

2. Functional Groups Integration

- Define Strategy/Roles & Responsibility

- ✓ Sr. Leadership
- ✓ Engineering
- ✓ Operations
- ✓ Quality
- ✓ Customer Service
- ✓ Human Resources
- ✓ Accounting/Finance
- ✓ Information Technology
- ✓ Continuous Improvement
- ✓ Sales & Marketing



STRATEGIC CONTEXT

The Continuous Improvement Department Strategy is to become a business partner with all facility departments to ensuring Lean/Six Sigma processes, practices and training are in place to provide guidance and achieve a Continuous Improvement environment, meet customer requirements and facility objectives.

Continuous Improvement Dep. – Strategy/Roles & Responsibility

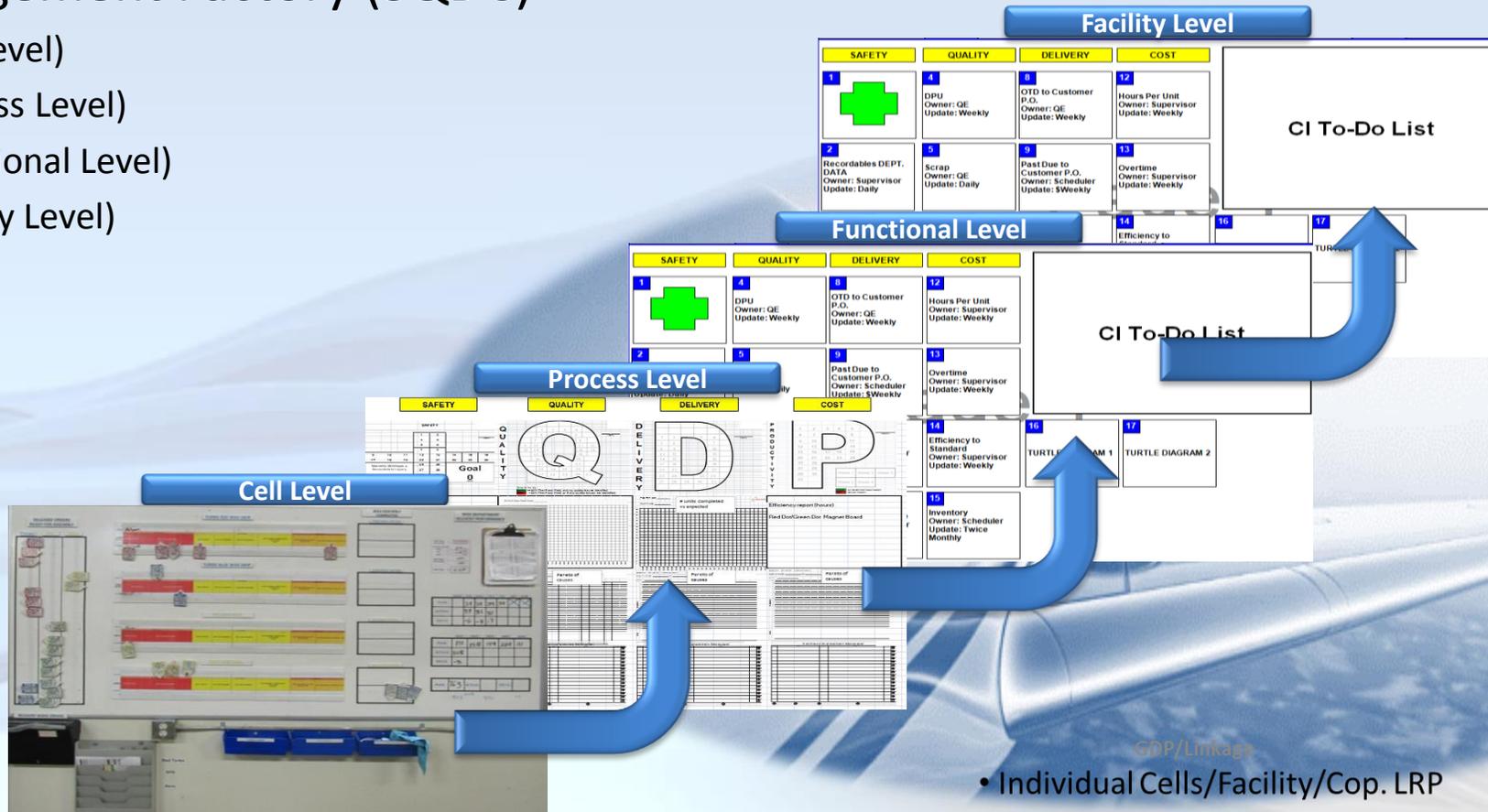
1. Develop & provide Lean / Six Sigma Training
2. Facilitate Lean / Six Sigma Kaizen events and projects
3. Facilitate development of a standardize visual management factory
4. Advocate continuous improvement for the business
5. Partner with Functional leaders to provide CI guidance based on customer requirements
6. 5S - Develop Program, Deploy & ensure training is provided
7. Deliver facility cost out objectives
8. Develop Continuous Improvement leaders within the facility
9. Work with individual teams to create repeatable processes and eliminate waste
10. Track and measure gains and benefits realized from Lean/Six Sigma Activities

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Lean/Six Sigma Visual Management

3. Visual Management Factory (SQDC)

- Tier #1 (Cell Level)
- Tier #2 (Process Level)
- Tier #3 (Functional Level)
- Tier #4 (Facility Level)



GDP/Linkage
• Individual Cells/Facility/Cop. LRP

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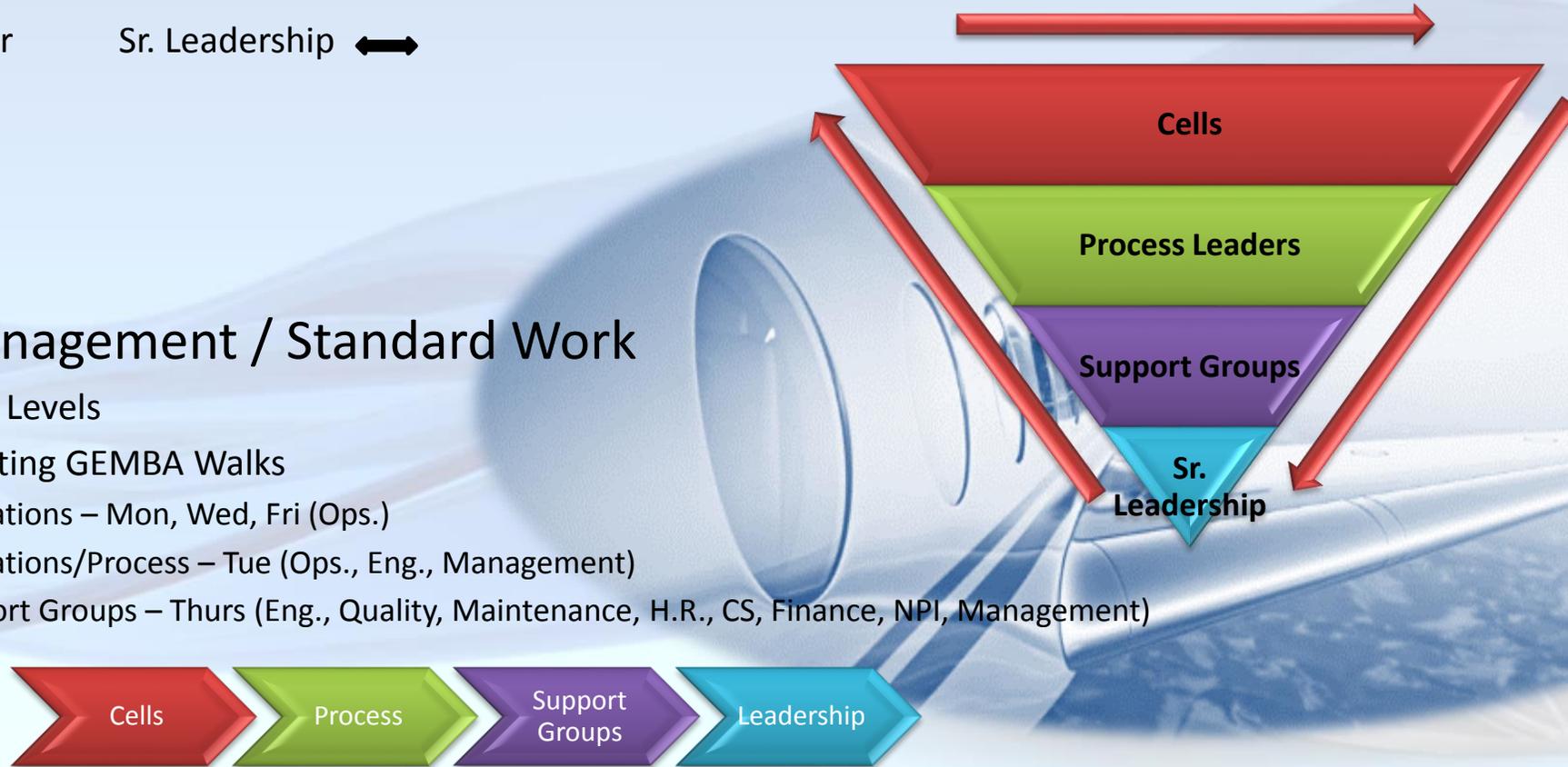
Lean/Six Sigma Communication

4. Building Accountability & Communication Flowdown

- Data Driven
- Shop Floor Sr. Leadership ↔

- Visual Management / Standard Work

- At All Tier Levels
- Incorporating GEMBA Walks
 - Operations – Mon, Wed, Fri (Ops.)
 - Operations/Process – Tue (Ops., Eng., Management)
 - Support Groups – Thurs (Eng., Quality, Maintenance, H.R., CS, Finance, NPI, Management)



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Lean/Six Sigma Training & Certification

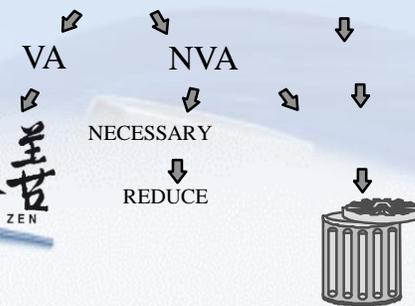
5. Training/Certification Process Development

- Leadership Training
- Direct Labor & Support Groups Training
- Development Of Lean / Six Sigma Leaders
 - ✓ Lean - Waste Elimination (Focused on TPS)
 - ✓ Six Sigma - Reduction Of Process Variation (Utilizing DMAIC Process)

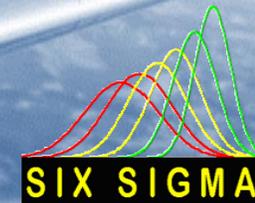


Waste Elimination

Normal v.s. Abnormal



Variation Reduction

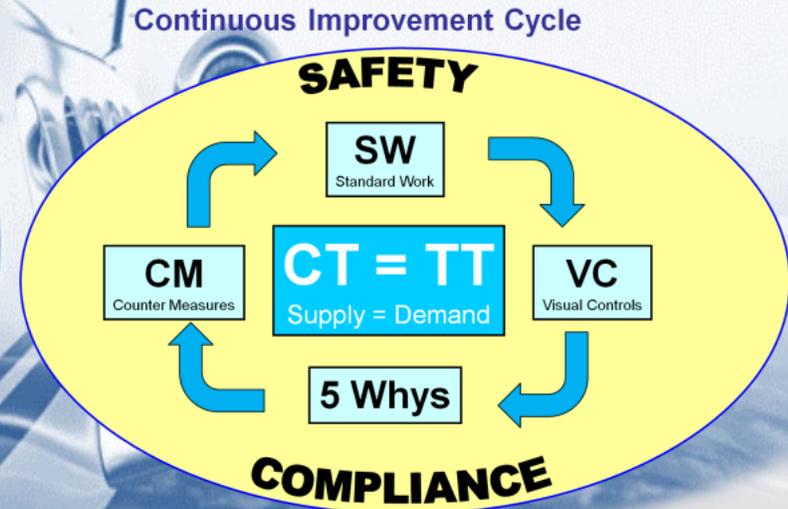
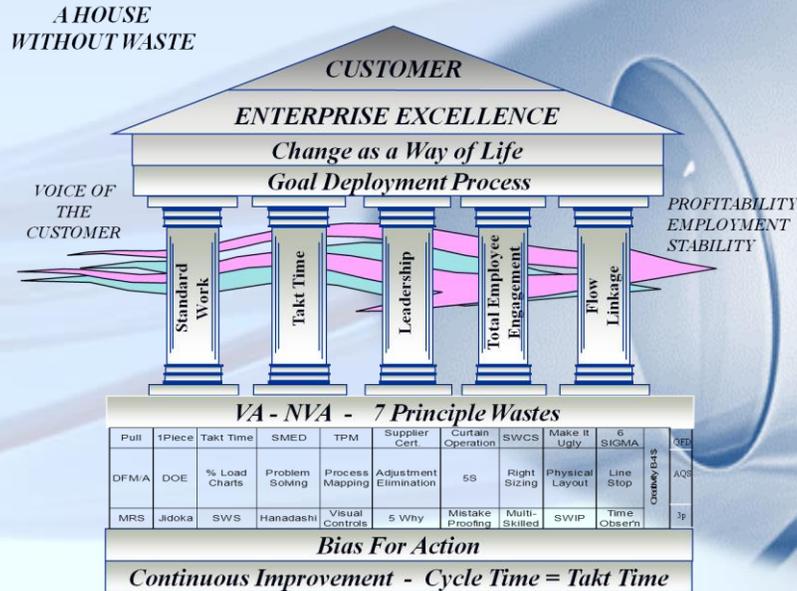


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Lean/Six Sigma Continuous Improvement Culture

6. Development of a Continuous Improvement Culture

- Culture Focused On
 - ✓ Customer Satisfaction
 - ✓ Problem Solving
 - ✓ Continuous Improvement



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Lean/Six Sigma Implementation



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Lean/Six Sigma Goal Deployment

1. Develop The Vision For The Future

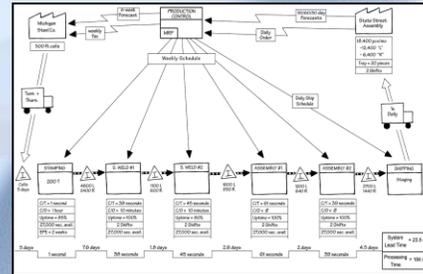
- Current State VSM vs. Future State VSM
- Alignment to FS Goal Deployment (GDP)

- Current manufacturing/process flow representative of the facility value stream, displaying:

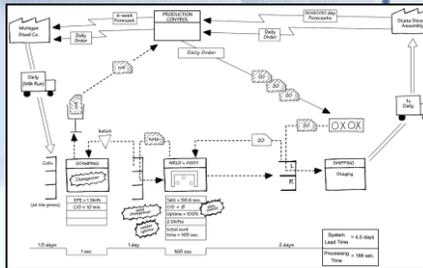
- Inventory
- Cycle Time
- Queue Time
- Lead Time



CURRENT STATE VALUE STREAM MAP

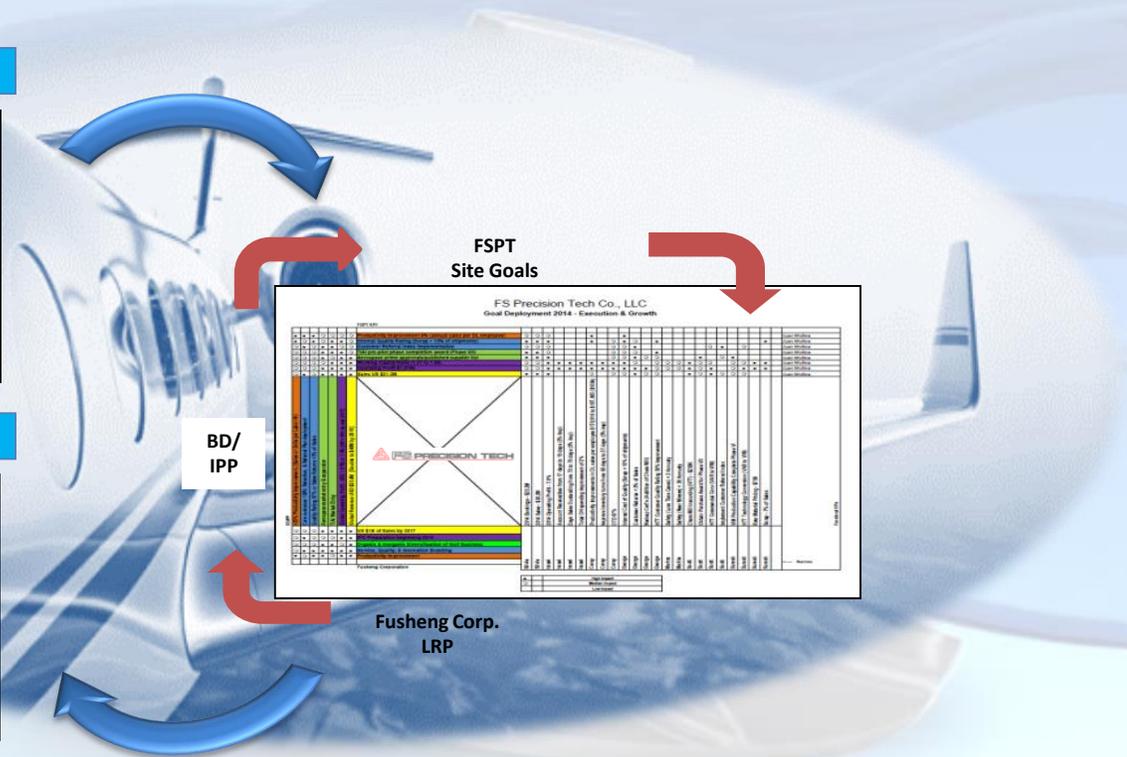


FUTURE STATE VALUE STREAM MAP



- Future manufacturing/process flow representative of the facility value stream improvements in:

- Inventory
- Cycle Time
- Queue Time
- Lead time



BD/
IPP

FSPT Site Goals

FS Precision Tech Co., LLC
Goal Deployment 2014 - Expansion & Growth

Area	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Revenue
Profit
Customer Satisfaction
Operational Efficiency
Employee Engagement
Quality Improvement
Environmental Stewardship
Community Impact

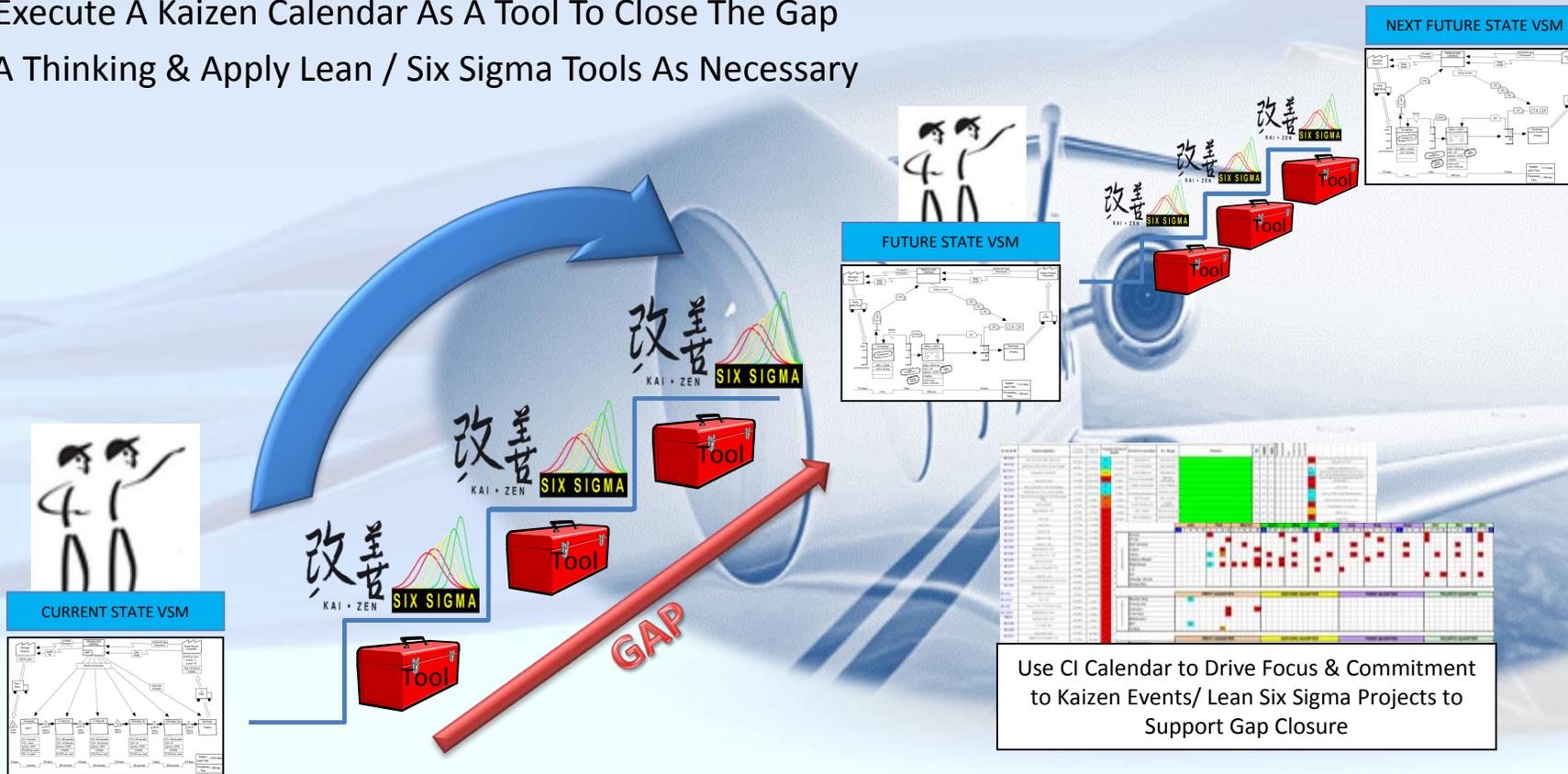
Fusheng Corp.
LRP

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Lean/Six Sigma Strategy

2. Develop A Gap Closure Strategy

- Define The Gap Between The Vision and The Current State
- Develop & Execute A Kaizen Calendar As A Tool To Close The Gap
- Utilize PDCA Thinking & Apply Lean / Six Sigma Tools As Necessary



Basic Lean Six Sigma Training

Focus of Lean/Six Sigma

SIX SIGMA
VARIATION REDUCTION



LEAN MANUFACTURING
WASTE ELIMINATION



SIX SIGMA

GOAL : Improve Process Performance Through Process Control and Reduction of Process Variation "DEFECTS"

Focus : Bias For Analysis

Method : DMAIC, Control Chart, MSA, Process Capability, Process Control Plan

Defect Prevention

LEAN

GOAL : Improve Process Performance Through "WASTE" Elimination & Cycle Time Reduction

Focus : Bias For Action

Method : TPS, Kaizen, VSM, 5S, TPM, Kanban, Standardize Work

Speed, Flow

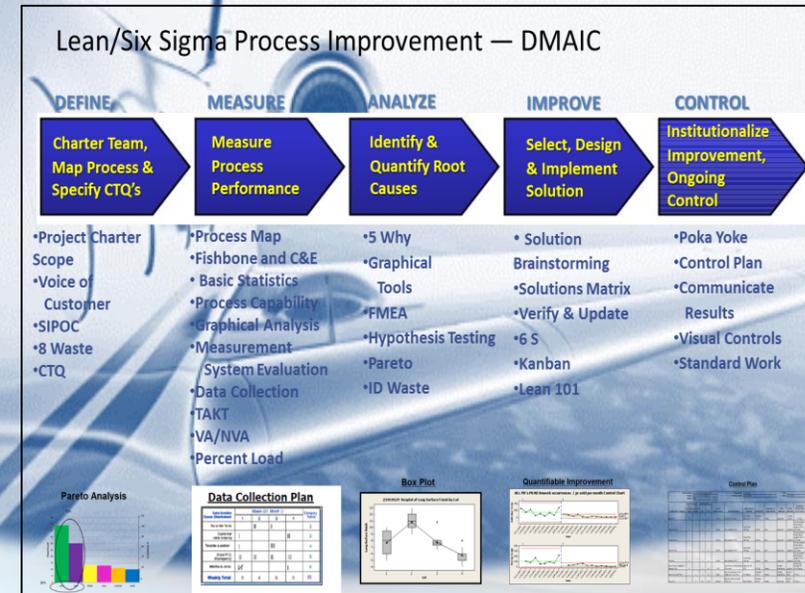
Less Defects & Less Waste Means Process Improvement!!

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Lean/Six Sigma Roadmaps

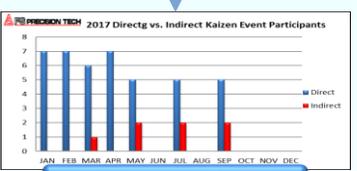
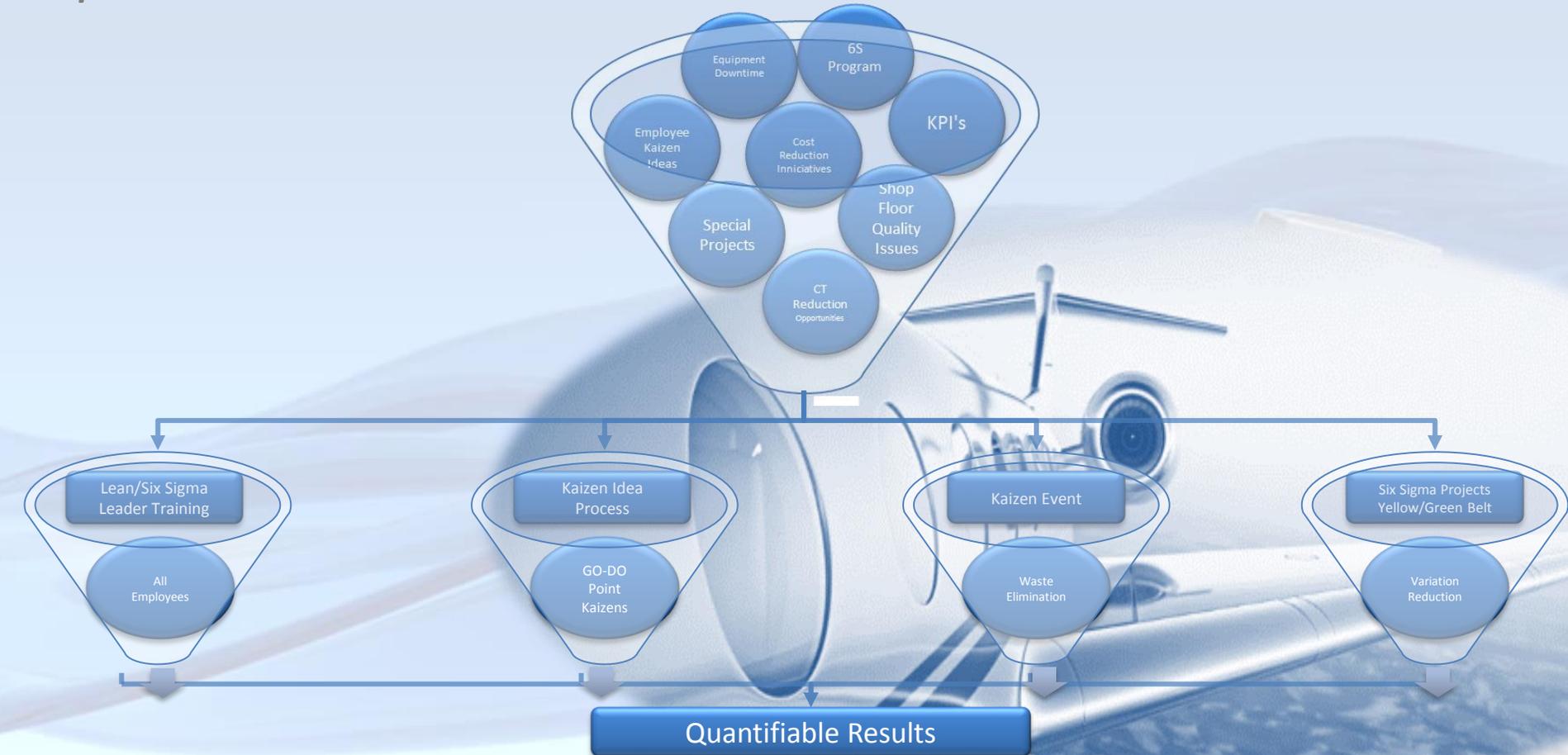
3. Lean / Six Sigma Process Development (Standard Work)

- Utilize The Lean Manufacturing Roadmap
 - ✓ Waste Elimination (Utilizing TPS)
- Utilize The Six Sigma Roadmap
 - ✓ Reduction Of Process Variation (Utilizing DMAIC Process)

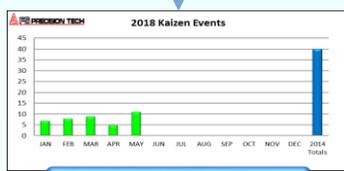


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Lean/Six Sigma Operational Excellence



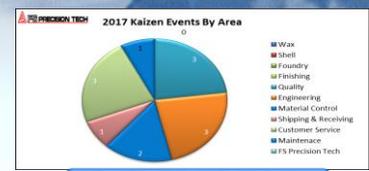
Kaizen Participants/Leaders



of Kaizen Events



Kaizen Events by Type



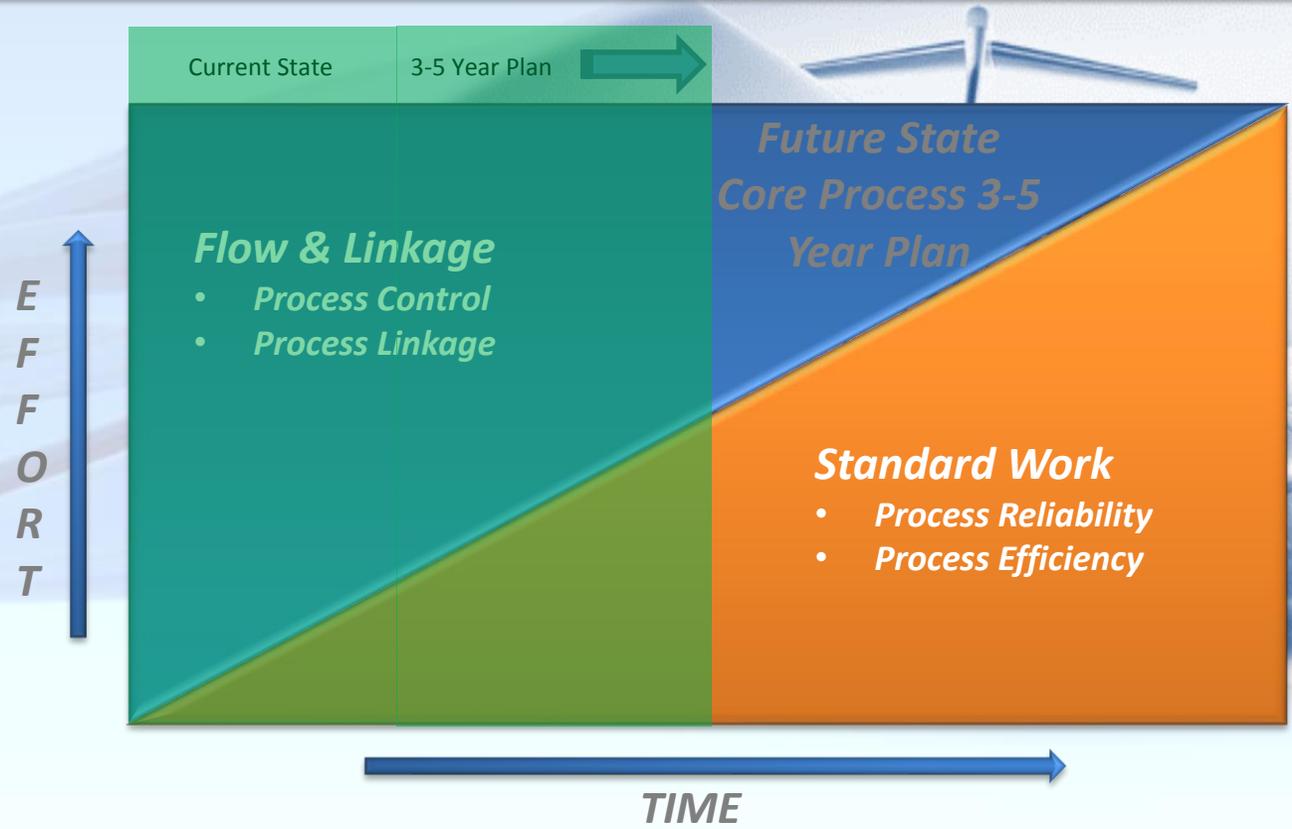
Kaizen Events by Area



Kaizen Events Improvements/Savings

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Future State Core Process 3-5 Year Plan (Operational Excellence Focus)



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6S Process



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Lean/Six Sigma 6S Process

1. 6S Program Development

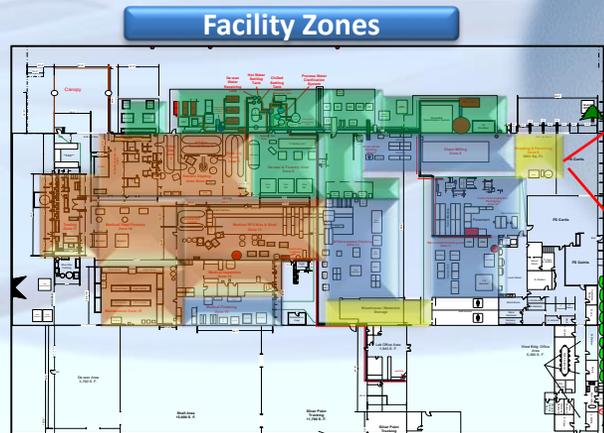
- Core Team selection
- Facility Zone Definitions
- Zone Owners Identification & Accountability Definition
- Assessor / Auditor Identification
- Roles & Responsibility / Procedure Development
- Development of Rewards & Recognitions



"Continuous Improvement Leads On To... Operational Excellence"

6S is the starting point for ALL improvement activities!

English	Literal Translation
S afety	Step 1: Be Safe
S ort	Step 2: Clearing Up
S traighten	Step 3: Organizing
S hine	Step 4: Cleaned
S tandardize	Step 5: Standardizing
S ustain	Step 6: Training & Discipline



Audit Area #	grid	Area Description	owner	Process Owner	Person	Person
1	A12	Parking Lot	Paul Murrey	Paul Murrey	Miguel Padgett	Bryan Garcia
2	A1	HR Process Line	Bob Lene	Bob Lene	Bryan Garcia	Bryan Garcia
3	A1	Manufacturing	Paul Murrey	Paul Murrey	John Zady	John Zady
4	A2	10 B1	Offices and Cor.	42,42,41	Martin Bergant	Shatella Clark
5	A1	17 B2	Carson Lineup	54,53	Robert Evans	Evans Frank
6	B1	C 18 B7	Warehouse	40,31	Bob Lene	Bryan Garcia
7	B2	A 19 B3	Aluminum Cabinet	35	Barney Henderson	Johnny Henderson
8	B2	A 20 B3	737 Levac	35	Cory Williams	Feng Shipheth
9	B2	M 21 B3	Wings and Balance	35	Barney Henderson	Robert Castillo
10	B2	C 22 C1	Falcon	113,113	Richard Young	Line Oil
11	B3	C 23 B2	Univer offices and tool cbrs	55,53,53	Scott Henderson	Bill Leomey
12	B3	M 24 C2	Machone Shop	120,120	Bob Lene	Bryan Garcia
13	B2	M 25 C2	Tooling	124,124	Paul Murrey	Bill Smith
14	B2	M 26 B2	737-FAJ	11,76,76	Cory Williams	Jerry Lopez
15	B3	A 27 C3	Bel	118,118	Manolona Tark	Manolona Tark
16	B3	M 28 C3	NC room	120,120	Bob Lene	Bryan Garcia
17	B3	M 29 C3	Rigid Barrier Assembly	120,120	Cory Williams	Jesse Garcia
18	B3	M 30 C1	Paint Booth	142,142	Bob Lene	Alan Garcia
19	B3	M 31 C3	Apache Dust Box	142,142	Bob Lene	Robert Castillo
20	B3	M 32 C3	Shipping and Receiving	142,142	Denny Miranda	Diego Miranda
21	B3	M 33 C3		142,142	Denny Miranda	Diego Miranda



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FSPT Lean/Six Sigma Journey



In 2013 FSPT was looking to improve its predictability and profitability.

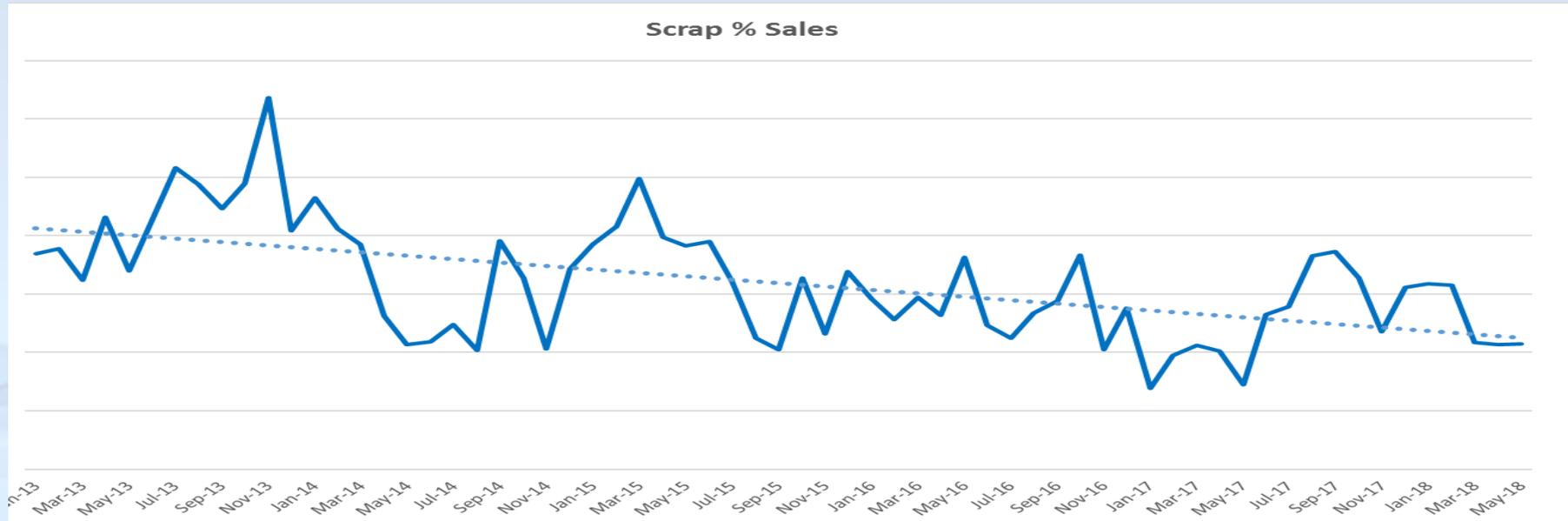
The solution?



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FSPT Lean/Six Sigma Journey

Scrap

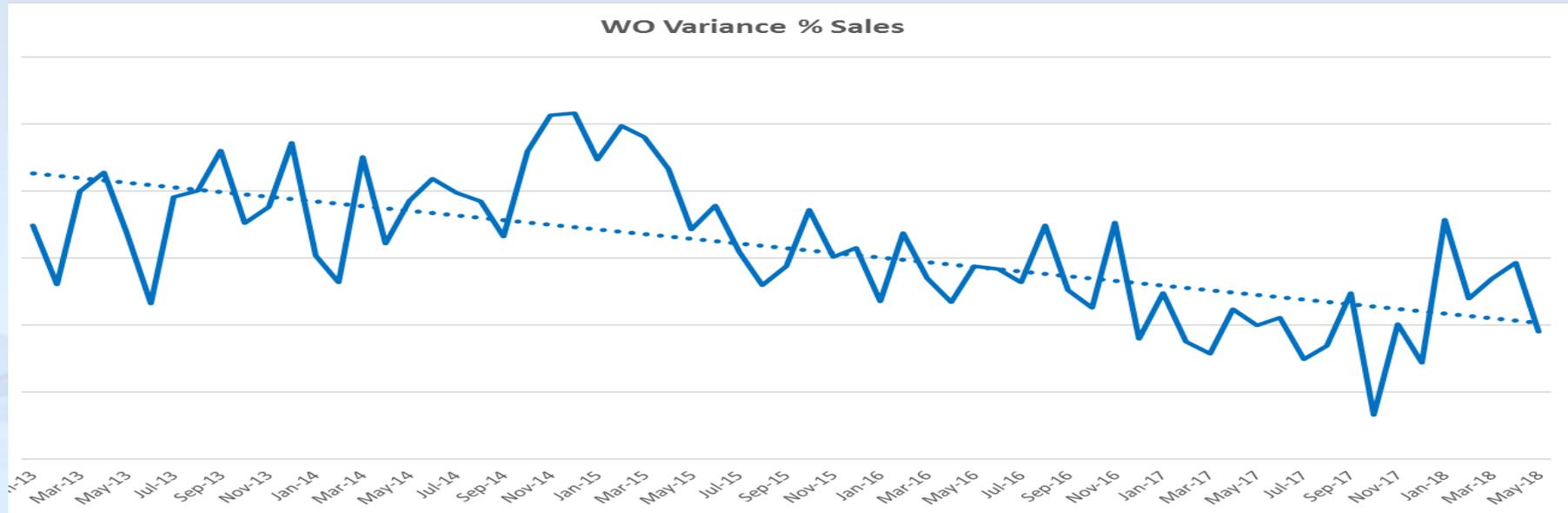


- **4 Year Scrap % of Sales:** Scrap has been improved X% since 2014.
- Scrap improvement attributed to application of Six Sigma tools in Engineering & Manufacturing for continuous improvement with quantitative results:
 - Detailed control planning for critical processes
 - Run chart data, capability analysis, and failure analysis techniques
- Increase in scrap starting July is a result of special cause variation.

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FSPT Lean/Six Sigma Journey

Work Order Variance

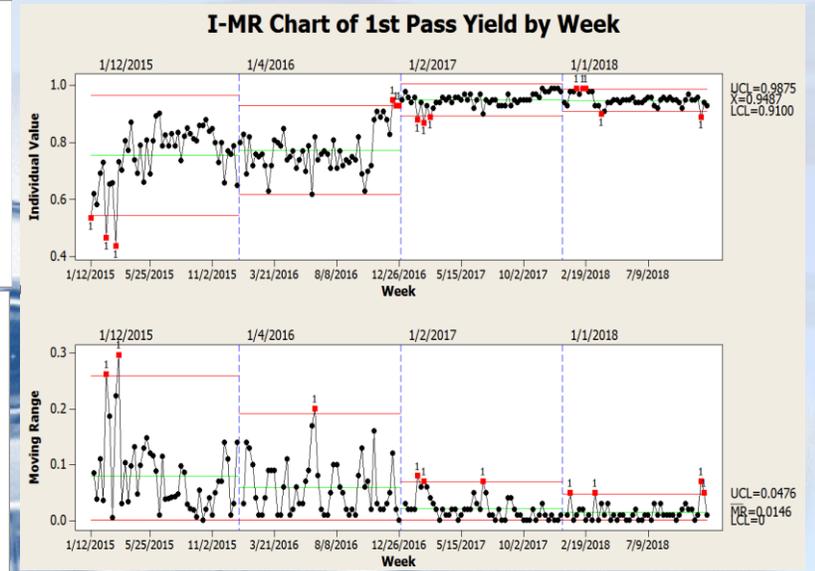
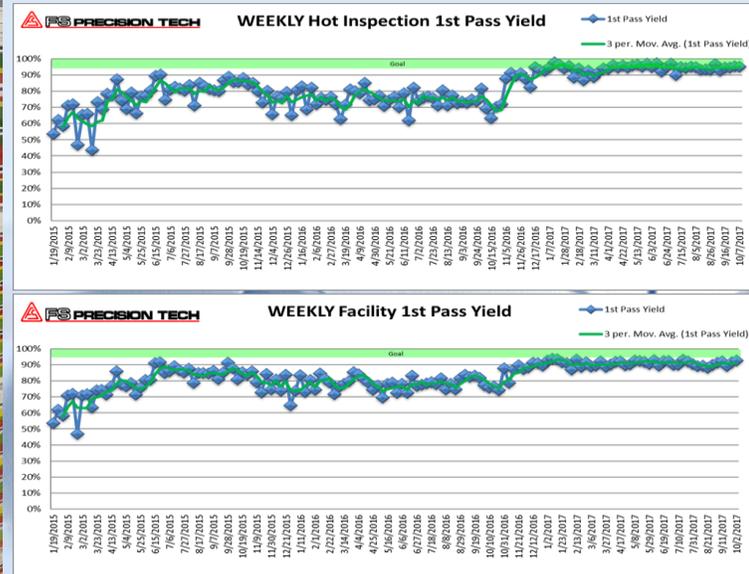


- **3 Year Work Order % of Sales:** Variance reduction has improved from a high of 8% of sales in 2015 to near breakeven levels in 2017.
- Continuous improvement techniques have generated favorable variances including:
 - Implementation of Standard Work & Flow and Linkage
 - Cellular Manufacturing
 - Lean/Six Sigma DMAIC Projects
- More work is needed to mitigate variation based on product mix, such as product relaunches.

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FSPT Lean/Six Sigma Journey

Manufacturing Process Control



Facility FPY: A shift to continuous improvement culture has shaped behavior towards process control and capability driving FPY to highest levels in company history. Much work remains to become capable.

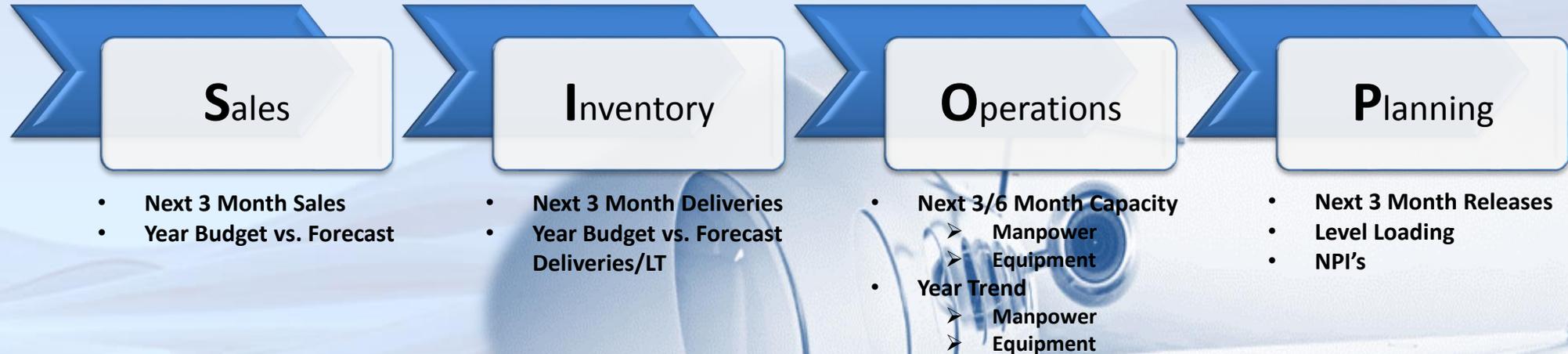
Hot Inspection FPY: FPY as critical inspection points assists FSPT in identifying special cause variation that will alert staff of to create action to identify root causes. Much work remains with training personnel on use of lean principles.

Process Control Plans: Identifies Key Process Inputs, how to control them, how to react to “Out of Control” situations, and how to prevent them from re-occurring.

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FSPT Lean/Six Sigma Journey

Business Process Control (SIOP)



SIOP Process: Monthly critical business process for FSPT, allowing us to predict, react & control cost due to sales fluctuation, manpower, equipment and Inventory requirements. This process is key prior to the actual manufacturing and new product development process.

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FSPT Lean/Six Sigma Journey

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