



Paperless Implementation as an Enabler for Efficient MRO Operations

Neal Reagor,
Director Planning and Commercial Services - EAMS



AGENDA

1 EAMS' History

- About EAMS
- Delivery Trends
- Process Flow & Paperwork
- No Real Time Data or Status

2 What & How We Changed

- Embraer P3E
- Digital Non Routines
- Task Card Process Flow
- Digital Status and Milestones

3 What We Gained

- Daily Production Status Report
- Task Card Life Cycle
- Reporting
- On Time Performance

About EAMS

2002

First Embraer
MRO for
Commercial
Aircraft in the
United States



2006

Hangar 2
Built for the EJets
(E170 – E195)



2012

Hangar 3
Operations
replaces the
Paint area



2013

Hangar 4
Temporary
additional hangar
and shop space



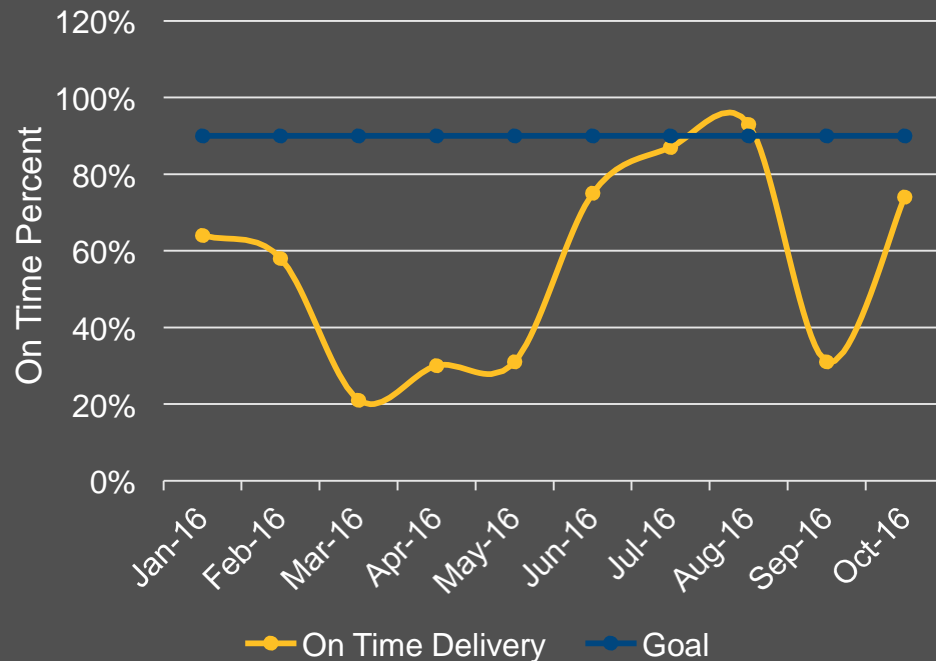
Embraer Aircraft Maintenance Services Inc., a wholly-owned subsidiary of Embraer since 2002. EAMS provides Aircraft and Component Maintenance as well as factory authorized training on the E-jet. EAMS has 11 aircraft maintenance bays and over 400 maintenance technicians.

Where We Were

2014 – 2016

- Struggling Delivery Performance
- 3000+ Pieces of Paper per Heavy Check
- No Real Time Visibility of Aircraft Workflow
- Lack of Data to Make Informed Decisions

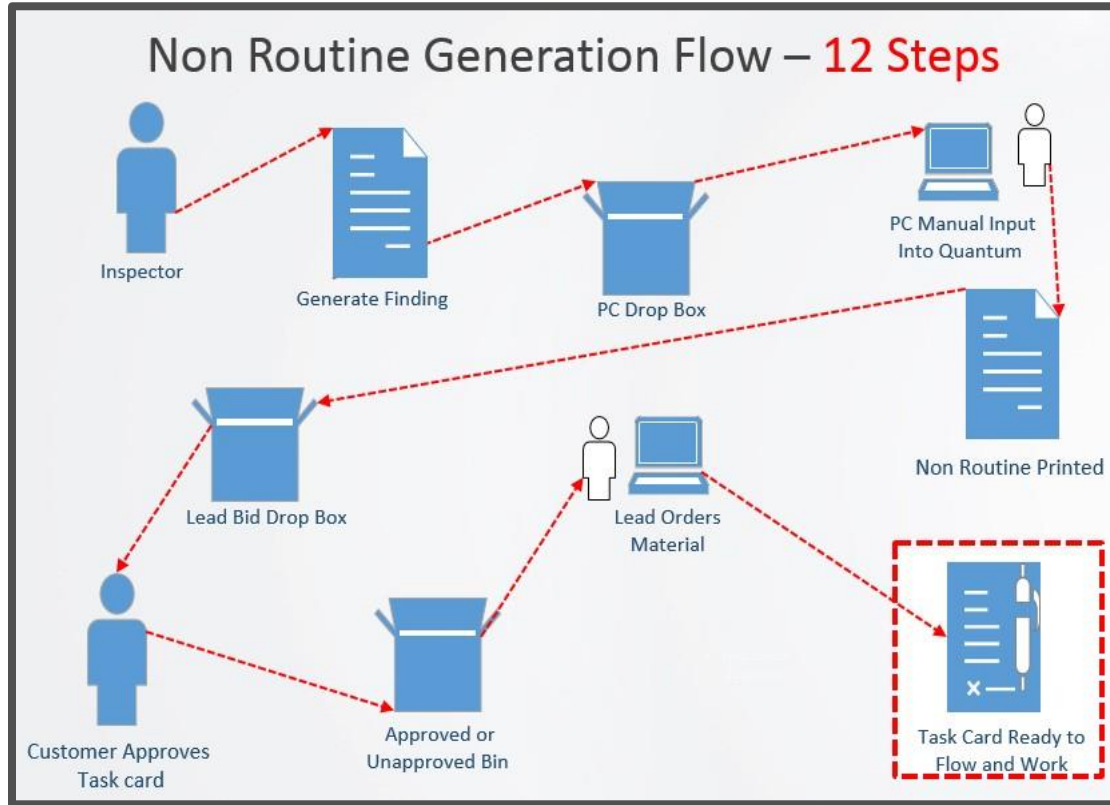
On Time Delivery Performance



[illegible][illegible]

Stamps, Signatures, Dates, all Handwritten on Paper.

Where We Were



Paperwork movements to multiple locations at EAMS = Lost Paperwork



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Maintenance Services**

Where We Were



Each bay would have a board of nearly 500 panels that would have to be opened and closed during the check. They were listed alpha numerically as opposed to location.



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Where We Were

No Real Time Data

- No Live Status of Aircraft Progression
- No Real Time Task Completion Data
- No Standardized Aircraft Flow
- Aircraft Check's Status was Manually Populated

C12

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What & How EAMS Changed



2014 - Process
Improvement / Preparation

2015 – Automation /
Implementation

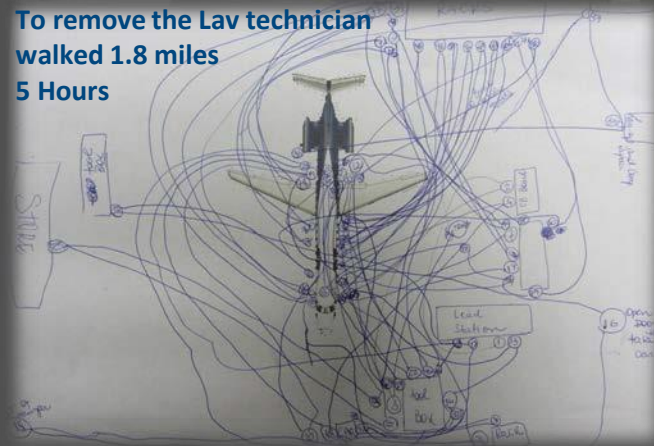
2016 / Future –
Standardized / Optimize

How & What We Changed

Embraer P3E Steps

- Analyze Processes
- Identify Issues
- Define a Strategy
- Complete Kaizens
- Implementation
- Optimize New Process

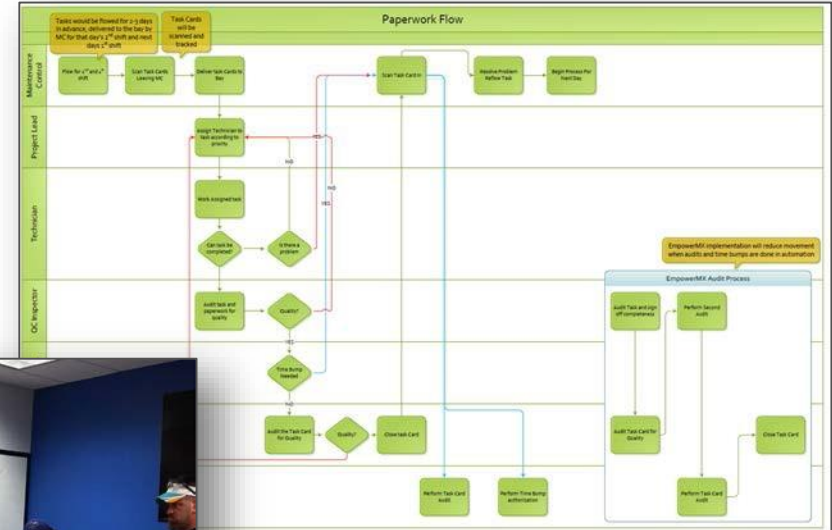
To remove the Lav technician
walked 1.8 miles
5 Hours



How and What We Changed

Understand The Current Process

- Map Processes
- Bring in the whole team
- No Idea is a bad Idea



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How and What We Changed

Paperless Non Routine Findings

- Legibility
- Date and Time Stamped Entries
- Reduced Paperwork on Floor
- Electronic Signatures
- Digital Notes

This image shows a physical paper form for a maintenance task. It contains handwritten text, including dates like '16/FEB/15', and signatures. The form is cluttered with various fields and checkboxes, some of which are filled out by hand.



EAMS Non-Routine Task Card						00048	Tallied
Ship: N190JB	Station: BNA	Check Type: E-Jet Basic 5 Check	Date: 16/Feb/15	W/O: H4520	Task Card No: 4016:E190-12-13-1 1-612-801-LH/001	Task Card Type: NR	
DISCREPANCY DETAILS							
ATA: 72-00 - ENGINE		Zone: 400 - Powerplant and Pylon		Work Area: Engine LH		Estimated Hours: 441-A/C MAINT : 3:00 Total : 3:00	
Originated By: 4 - Inspector, Hector 16/Feb/15		Discrepancy Description: #1 Engine Driven Pump found damaged at attaching flange.				SDR	
EVALUATION							
No. 1.	Authorized By 3 - Lead, Lenny 16/Feb/15	Authorized Repair Remove and replace #1 EDP			Customer Approval 6 - Rep, Joe 16/Feb/15		
Required Authorization(s):							
FINAL CORRECTIVE ACTION							
Approval Level RII	Accomplished By 2 - Licensed, Jack 16/Feb/15	Inspected By 4 - Inspector, Hector 16/Feb/15	Final Corrective Action Complete: Installed New Engine Driven Pump, Ref EMM 12-34-56				
TASKS							
No.	Approval Level	Task Description	Corrective Action	Accomplished By:	Inspected By:		
WORK IN PROGRESS							
No.	Approval Level	Accomplished By	Inspected By	Description			
1	RII	2 - Licensed, Jack 16/Feb/15	4 - Inspector, Hector 16/Feb/15	WIP: Removed #1 Engine Driven Pump, Ref EMM 12-34-56			
2	RII	2 - Licensed, Jack 16/Feb/15	4 - Inspector, Hector 16/Feb/15	Complete: Installed New Engine Driven Pump, Ref EMM 12-34-56			
PARTS							
P/N ON	P/N OFF	S/N ON	S/N OFF	Description		PO#	
12345-01		1002	1001	Engine Driven Pump		123456	
Audited By							
1st Audit: 5 - PC, Perry 16/Feb/15							
2nd Audit: 4 - Inspector, Hector 16/Feb/15							
Tally: 6 - Rep, Joe 16/Feb/15							
Records Audit: 9 - Records, Rhonda 16/Feb/15							

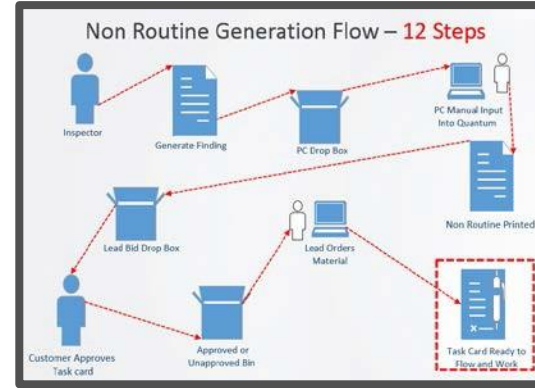


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How and What We Changed

Control of Task Cards

- Visible Task Card Movement
- Online Customer Approvals
- Increased Accountability
- Quicker Time into Work



How and What We Changed

Pre Shift Work Assignments

- Work Ready for Technicians Pre-Shift
- Grouped into Executable Packages
- Flowed by Project Manager to Crew to Tech



Assign Users

Select Crew: [H201-DAYS] [v]

Assignment: [Assign] [Unassign]

Assigned task cards

Artacho, Hermes	<input type="checkbox"/>
Day Off, Not Scheduled	<input type="checkbox"/>
Bogle, William	<input checked="" type="checkbox"/>
Duggin, Calvin	<input type="checkbox"/>
Frazier, John	<input type="checkbox"/>
Humphrey, Shawn	<input type="checkbox"/>
McEachern, Edward	<input type="checkbox"/>
Not Scheduled	<input type="checkbox"/>
Thresh, Christopher	<input type="checkbox"/>
Tschida, Mark	<input type="checkbox"/>
Tsegay, Tesfu	<input type="checkbox"/>

No assigned task cards

Hill, Janita	<input type="checkbox"/>
McFarland, Christopher	<input type="checkbox"/>
Day Off, Not Scheduled	<input type="checkbox"/>
Peach, Troy	<input type="checkbox"/>
Day Off, Not Scheduled	<input type="checkbox"/>
Pearce, David	<input type="checkbox"/>
Day Off, Not Scheduled	<input type="checkbox"/>
Williams, Raymond	<input type="checkbox"/>

Task Card Search | **Group Task Card Search**

Task Card Search

Task Cards Only Assigned to [H201 DAYS]

Start Day Task Card Info

No Matches Found

Task Cards Assigned to Users in [H201-DAYS]

Select	Start Day	Task Card Info
<input type="checkbox"/>	1 (Day 1, Shift 1)	4056:170-71-00-00-001-2/012 **00545** [RH Eng O/B TR FWD mount bolt float bushing corroded]
<input checked="" type="checkbox"/>	Priority: B	441 - N/R Engine/Pylon #2
<input type="checkbox"/>	1 (Day 1, Shift 1)	4057:170-71-00-00-001-1/006 **00544** [LH eng O/B TR fwd mount bolt float bushing corroded]
<input type="checkbox"/>	Priority: B	441 - N/R Engine/Pylon #1
<input checked="" type="checkbox"/>	1 (Day 1, Shift 1)	5043:170EO-57-20-0029/001 **00446** [Remove 2 each hydraulic lines as necessary for EO -170EO-57-20-0029 LH WING reinstall when complete.]
<input type="checkbox"/>	Priority: B	441 - N/R Wing LH
<input checked="" type="checkbox"/>	1 (Day 1, Shift 1)	5010:170EO-57-20-0030/001 **00447** [Remove 2 each hydraulic lines as necessary for EO -170EO-57-20-0030 RH WING Reinstalled after complete.]
<input type="checkbox"/>	Priority: B	441 - N/R Wing RH

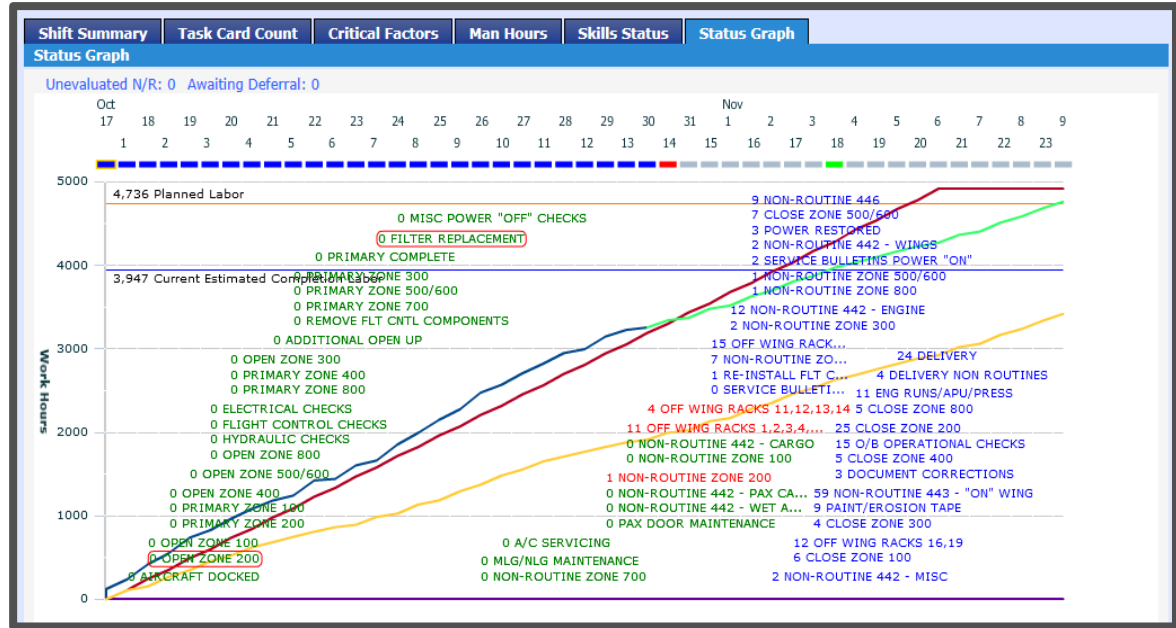


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How and What We Changed

Real Time Data and Maintenance Flow

- Live Aircraft Status
- Major and Minor Check Milestones
- Planned vs Actual Labor Trends
- Critical Factors Viewable by Customer
- Real Time Task Progress
- Factual Data



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What We Gained

“Most of the world will make decisions by either guessing or using their gut. They will be either lucky or wrong.”

- Suhail Doshi, CEO, Mixpanel

Data to Make Informed Decisions

Real Time Data

- Check Card and Labor Hour Progress
- Overdue Milestones and Tasks
- Quality Indicators – Reopened, Rejected, and Voided Task Cards
- Non Routine Evaluation Status
- Real Time Budget Progress
- Planned vs Actual Labor Production



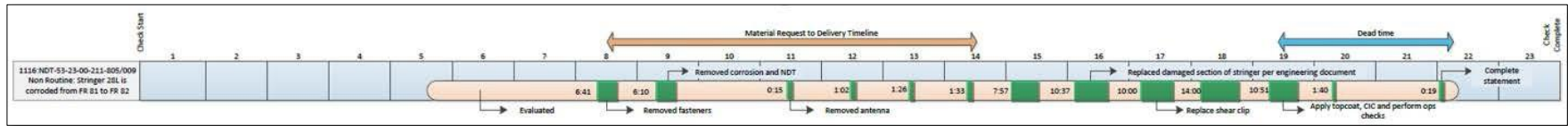
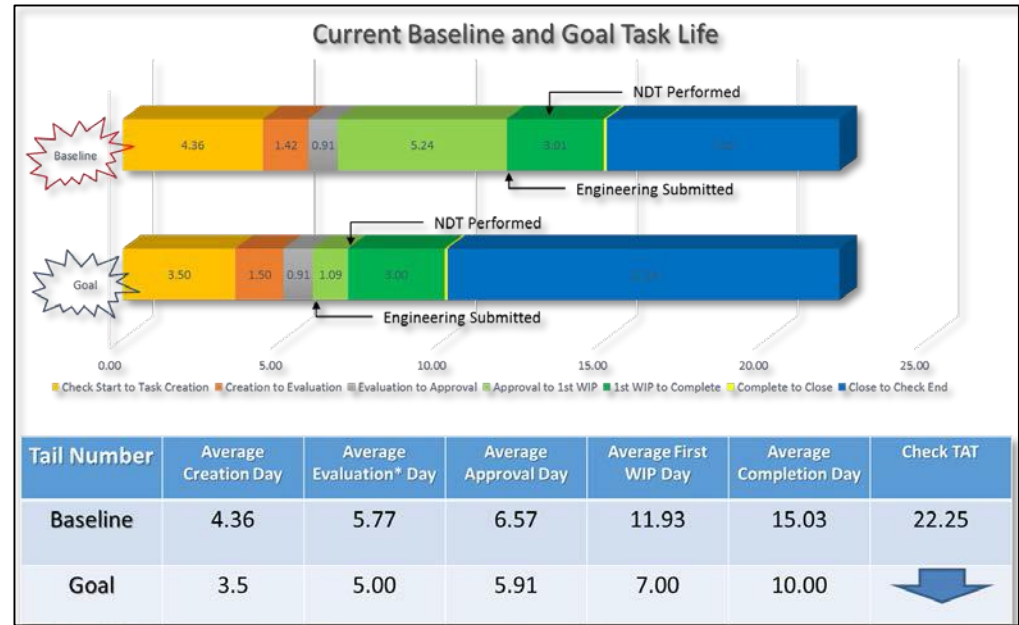
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Labor Plan:

Data to Make Informed Decisions

Task Card Life Cycle Analysis

- Data to Improve the Execution of Task Cards
- Identify Bottlenecks
- Increase Mechanic Hands On Time
- Decrease Overall Check Turn Time One Task at a Time



Data to Make Informed Decisions

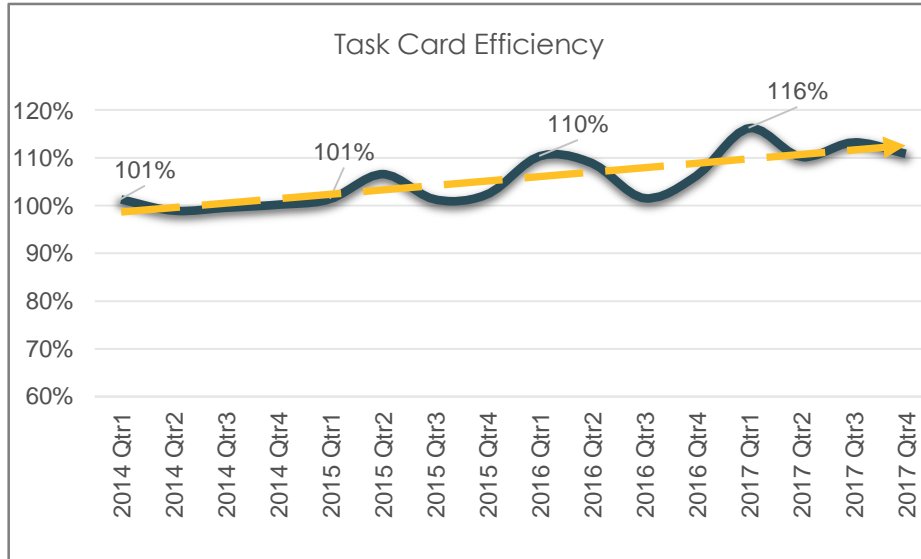
Instant Reporting

- Available to All Departments Based on Needs
- Other Example of Data Trends
 - Rework Trends
 - Work Stoppages
 - Incorrectly Classified Findings
 - Audit and Tally Data
 - Support Shop Resource Utilization

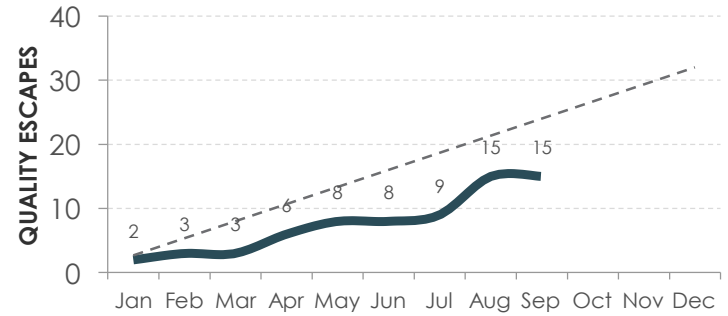
Search Results				Create Ad Hoc Report
Report Name	Report Description	Report Area	Predefined	
109 ELR	For control tower measurements	Core Task Card	No	
109 INTERIORS 443 REPORT 2	MATERIAL PROBLEMS	Core Material	No	
109 INTERIORS 443 REPORT 4	MILESTONE REPORT	Milestone Reporting Area	No	
109 INTERIORS 443 REPORT 5	BUDGET NUMBERS	Core Task Card	No	
109 INTERIORS 443 REPORT 7	AC ON SITE	Core Bill of Work/ Work Order	No	
109 OMIT - Task Card Missing quantum Seq	Work order specific - Task Card Missing quantum Seq EXCLUDING 109 rack items	Core Task Card	No	
109 RACK ONLY - Task Card Missing quantum Seq	ALL work orders - Task Card Missing quantum Seq ONLY FOR 109 rack items	Core Task Card	No	
442 Kaizen WIP Data	for kaizen results tracking	Core Task Card WIPS	No	
AEROTEAMS PAYROLL	AEROTEAMS PAYROLL LABOR HOURS	Production Labor	No	
AVIONICS 444 REPORT 1	USER ACCOUNT INFO	User Info	No	
AVIONICS 444 REPORT 2	MATERIAL PROBLEMS	Core Material	No	
AVIONICS 444 REPORT 4	MILESTONE REPORT	Milestone Reporting Area	No	
AVIONICS 444 REPORT 5	BUDGET NUMBERS	Core Task Card	No	
AVIONICS 444 REPORT 7	AC ON SITE	Core Bill of Work/ Work Order	No	
Active Rework / Warranty	Reports rework task card types for all open work orders	Core Task Card	No	
Applied Hours By Month	Applied Hours Transfer	Production Labor	No	
Area Group Report	Report to detail employee to assigned location	User Info	No	
Audit 2 Report	Audits	Core Task Card	No	
Commercial Invoice Report	Reports A/C Completed and Ready for Invoice	Core Bill of Work/ Work Order	No	
Commercial Work Order Data Report	W/O Data Set	Core Bill of Work/ Work Order	No	
Compass All Run	Pulls quantum and Empower sequence numbers	Core Task Card	No	
Compass NR Over 25 Hours	Pulls info for Compass tally	Core Task Card	No	

Results

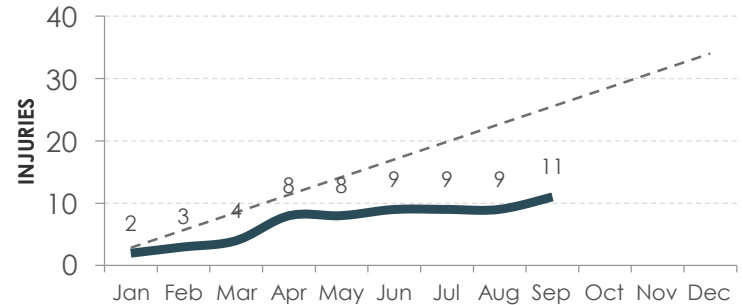
Paperless operations increases technician Efficiency, which enables increases in Quality and Employee Safety.



YTD: QUALITY ESCAPES VS PREVIOUS BASELINE



YTD: OSHA RECORDABLE INJURIES VS PREVIOUS BASELINE

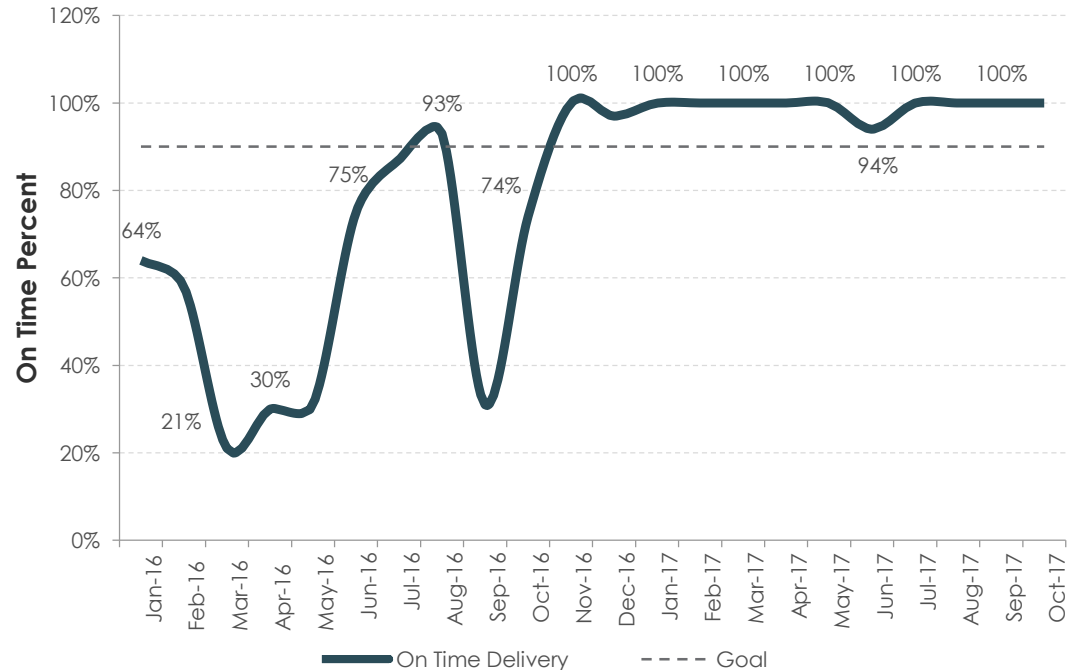


Results

Going Paperless Summary

- Increase Data
 - The ability to make quick and accurate business decisions based on factual, real time data.
- Better, More Defined Process
 - Process inside the system will be defined with little to no work arounds.
- Increased Accountability
 - The defined process will point out new and previously unknown bottlenecks.

EAMS – On Time Delivery Performance





Neal Reagor,
Nreagor@Embraer.com