



# Paperless Implementation as an Enabler for Efficient MRO Operations

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Director Planning and Commercial Services - EAMS



# AGENDA

#### **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





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.

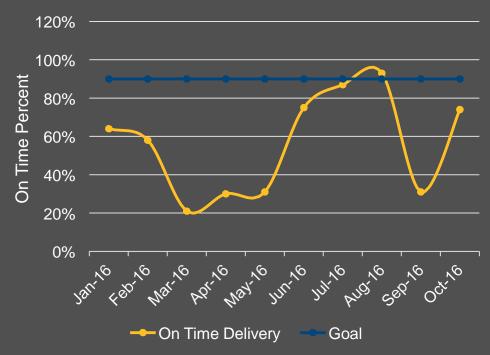


#### Where We Were

#### 2014 - 2016

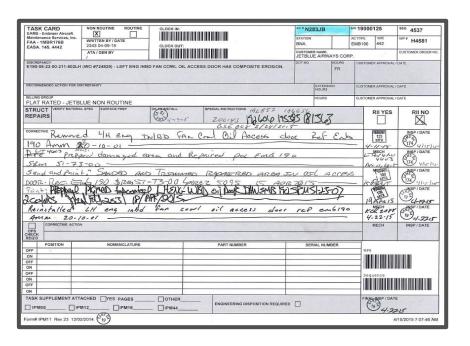
- Struggling Delivery Performance
- 3000+ Pieces of Paper per Heavy Check
- No Real Time Visibility of Aircraft Workflow
- Lack of Data to Make Informed Decisions

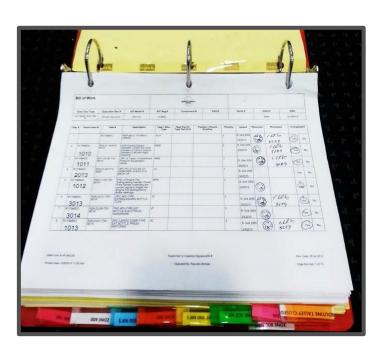






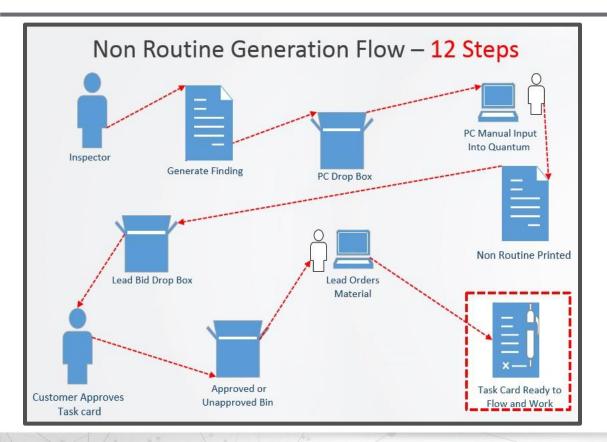
#### Where We Were





Stamps, Signatures, Dates, all Handwritten on Paper.





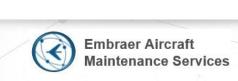
Paperwork movements to multiple locations at EAMS = Lost Paperwork

#### Where We Were





Large Amounts of paperwork in the Hangars



#### 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.



#### 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

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, Ja	c	D	F	G
Aircraft Tail/WP Number:		H4866		3
Start Date	TAT	Finish Date	Today's Date/Time	Quantum Data Last Updated
	24.00	3/1/16 7:00 AM		
2/6/16 7:00 AM	24.00	3/1/16 /:00 AWI	10/31/17 11:02 AM	3/4/16 2:06 PM
Flow	1	2	4	5
Skill	2/6/2016	2/7/2016	2/9/2016	2/10/2016
441	188	241	108	180
442	21	37	57	131
443	3	3	20	29
444	54	4		2
491				
710 711	89	290	287	33 185
Flow	356	575	472	560
	350			
Cards Closed Per Day		127	130	167
Schedule MP Hide UnHide	Saturday	Sunday	Tuesday	Wednesday
441	124	94	138	148
442	0	0	30	86
443 444	0	0	0	0
491	0	0	10	0
711	20	50	40	30
Scheduled Hours	144	144	218	264
Actual Applied Hide UnHide	2/6/2016	2/7/2016	2/9/2016	2/10/2016
441-A/C MAINT	103	69	123	162
442-SHEET METAL		10	55	94
443-INTERIORS 444-AVIONICS INSTALL		9	9	23
491-PAINT HANGAR		•	<b>3</b>	10
711-QA INSPECTION	34	59	59	48
Actual Applied	137	147	246	337
Flow Issues				Master Billing Group Data
Flow Errors	441	Billings	Est Hours	Actual Hours
Cards Started Early	241	Main Routine	3747.55	2667.23
Cards That Should Be Closed	0	Main Non Routine	2054.18	1586.71
Blown Time	1156	Secondary Routine	0	0
441 Cards "IN WORK"	0	Secondary Non Routine	0.5	0.31
Cards with "PARTS ISSUES"	0	Customer Requested Item	84.25	77.52
442 In Work Cards	41	Service Bulletin	1214.3	931.46
442 III WORK Cards	41			
		EAMS Warranty	0.5	4.24
Rotable Parts Discre	pancies	EAMS Non Billable Time	49	702.74



# 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

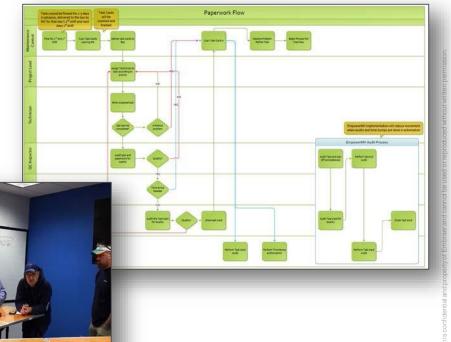


#### **How and What We Changed**

#### **Understand The Current Process**

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





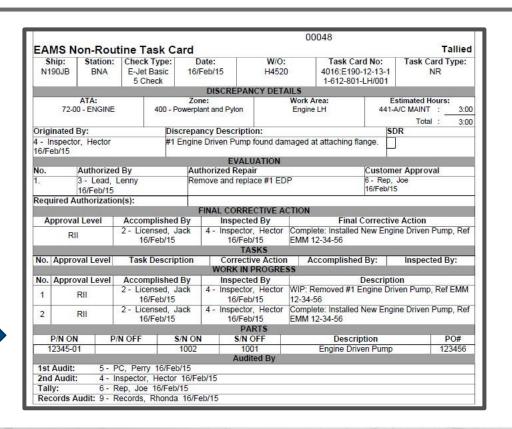


#### **How and What We Changed**

#### Paperless Non Routine Findings

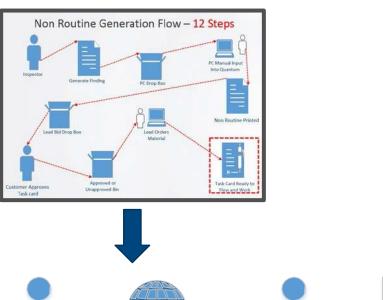
- Legibility
- Date and Time Stamped Entries
- Reduced Paperwork on Floor
- Electronic Signatures
- Digital Notes







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



Card



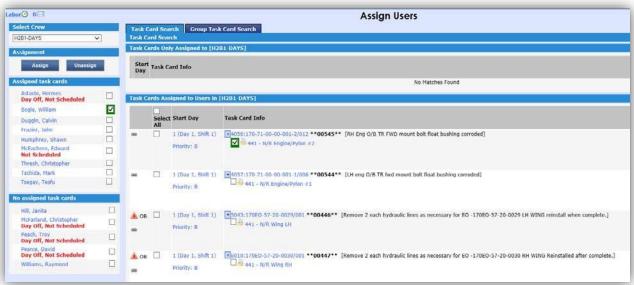


#### **How and What We Changed**

#### Pre Shift Work Assignments

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



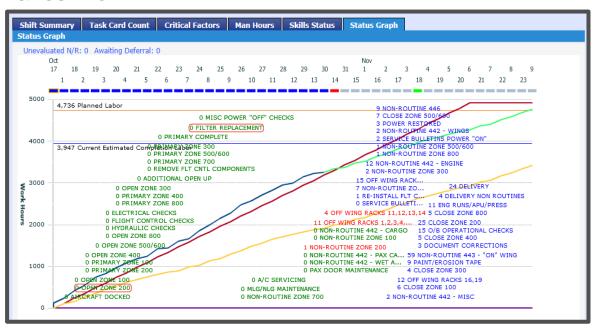




#### **How and What We Changed**

#### 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





#### 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



#### 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





#### As Is: Automated Reporting

#### → Approve Overtime

- -> Closed Task Card Labor
- → Day Labor

Labor

- -> Estimated Labor Requirements
- -> Labor Hours by Group
- → Labor by Skill
- → Man Hour Report
- → Overtime
- → Schedule Labor
- ⇒ Shift Labor
- → Unaccounted Labor
- → User Activity
- → WO Labor Audit

#### **Task Card**

- → Aircraft Awareness
- -> Evaluation Summary
- → Major Repairs
- → NR Creation
- → Shop Task Cards
- → Task Card Count Report
- -> Task Card Details
- → Task Card Labor
- → Task Card Milestones
- -> Task Card Start Davs
- → Task Card Zones
- → Task Cards Over-Estimate
- → Voided Task Cards
- -> Work History

#### Work Order

- → Base Maintenance Status Report
- → CASS
- -> Critical Factors Report
- → DBT Status
- → Dashboards
- -> Engineering Forms
- -> Estimated Hours by Crew
- ⇒ Labor Forecast
- → Milestone
- → N/A NRs
- → Post Check
- -> Post Check Work
- -> Production Control Status Report
- ⇒ Settlements
- → Station Guides
- → Status Report Legacy
- -> Status Report New
- → Structural Defects
- → WO Aggregates
- → WO Performance
- -> WO Performance By Skill
- -> WO Process Status

			Task Cards Over Estimate	e Repor	t				
Seu	arch Criteria			-					
	Task Card	Status Categor	v: ® path ⊕Closed ⊕opes				Set Deta	set Load Get	and the
	Took Com	d Trees Calmon	x Obod/Stouthe Thorstodies 1	Task Cards L	aned i	. ****	of Creeding		
			E deleta Vini Ame			er ole			•
					2700	o Per Pe		PRINT PA	-
	Inches ta	sk cards with	N hs Threshold		RESER	a rier ri	ger (22 - F	Search In	coeff
-	orch Hentelle								
	AY Task Card	Serial Number	~ * Description	-	- Est Hes	A. W. Act	^* Percent	~ * Yarsance	Details
	1997 Z191-001- U/003	00164	bround air conditioning connection duct disbonding from attachment bracket.		3.50	7.40	212.6	-5.92	Ovtolo
0	9009 BACK/967	00366	Rack-Right Heat exchanger duct to exchanger forward e composit detrage and had seal.	dge has	0.50	2.20	440.0	1.76	Detali
	2153:53-23-006- 0161-0/002	00110	RM window seal at Pris2/83 torri ueder clamp		1.50	2.60	173.0	-1-10	Details
	6018 Z510 00L-	00200	BUT, WING ## SLAT OVE WEATHER SEAS TORN		2.00	3,02	151.0	14.00	Cetalia
	9009-RACK/919	60289	PNI 4295R has elongated fastner hole.		2.50	3.38	134.0	-0.65	Details
	2077-25-21-10-801- 0/008	00033	Passanger seat IB armrest hinge broken at 30		1.50	2.25	150.0	-0.116	Details
	Tica E300-001-	00030	IH #1 passenger window is created.		2.00	2.68	129,0	-0.63	Detain
	4018-71-08-10-801- LH/915	00050	D(Engine has Hultiple Chevron Seals (Turkey Feathers) : Demaged	that are	12.05	12.49	134.6	17.48	Details
	2006 FWD GALLEY	00520	Corrosion - FR35 corroded, under floor support bracket.) Y = -1118, Z = +490.	K = 4711,	1,90	2.30	122.0	0.42	Details

Average Allowed Will Types 1-bit Rose 3 Check Current Time Princip Car E Dirth 1 Whiching Shifts (5)							WO Start Date/Start Francis (NISC 2013) 55-96 2 Florant Aveled (NISC 2017 Planned Delivery) 00726-2017 Sevined Delivery)								
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1.2	0.00	9.79	9.59	6.79	5.00	- EAD	0.00		0.00			0.00	0.00	3.79	2.3
1 6	0.00	3.70	0.00	1.00	6.00	3.44	0.00					3,05	8.00	1.02	(43)
- 1	0.00	- E 80	0.00	0.79	0.00	10 £ 600	0.30					0.00	90.00	0.70	- 4
4 . 4	0.00	1 00	9,00	1.01	9.00	10 6 08	0.00	0.59	0.00		0.00	3,00	9.00	+90	143
	0.00	72.00	4:00	+42	0.00		0.90	:-0.79				0.00	9.66	4.75	4.3
10.40	0.04	1.8	6,00	CHI MAD	3,66	SS 8,00	0.00	4.50				3,399	8.66	171.03	- 4
	0.64	1,21	0,00		6.00		0.00	1.75				8.00	0.00	0.72	- 4
	0.00	120	0.00	1.01	0.00		0.70	1.00	0.00		3.86	1,00	0.00	0.00	- 1
		333					0.00								- 31
	0.00	- 22	8.59	1,617	5.00	10.00	0.00				2.51	0.00	0.00	0.04	- 23
	0.00	231	5.00	4.60	1.00	5.21	0.00				2.22	1,05	0.05	2.66	7.1
10.00	0.00	3.76	0.00	4.79	8.00	6.00	0.00					0.00	0.00	0.79	153
	0.00	5.00	5.00	1-85	6.00	141	0.50				9.30	1.02	6.65	0.06	- 13
1 2	0.00	0.3.34	0.00	4.76	5.00	2.45	0.00				9.50	0.00	0.00	10.76	1.0
	0.00	2.00	0.00	4.00	0.00	0.14	0.00	1.0	0.00		5.99	1.00	11.00	1.60	1.1
	0.00	3.50	0.00	0.59	9.00	2.40	0.00		0.00	244	2.50	11.00	- 0.00	10.75	- 4.1
4 1	0.68	100	0.09	1,00	6.00	17.14	0.00	2.49	0.01		3.00	1.00	0.66	1.01	1.0
2.	0.00	0.30	0.55	D. 10.04	95.00		0.56		0.8	17,44	3.56	6.00	0.00	0.73	4.3
11.30	0.00	9,00	6.00	1,00	8.00		0.00		0.00			1,00	0.00	1.07	14.2
1	6.00	3.75	4-58		0.40		0.50				5.84	U.08	0.00	ATY	1.6.2
12.5	0.00	3.30	0.00	17/140	0,00	1.00	0.70	1.00	9,00		0.60	1/00	90.0	179.04	(4)
	0.00	175	9.66	V 9.75	9.00		9.00	175	0.00			9.00	0.00	0.75	198
3.1	0.00	2.75	0.00	1.00	8.00		0.00	Y 43				0.00	9.60	100	- 13
	0.00	12	0.50	100	5.00		0.00	1.70	0.00		5.50	0,00	0.66	3.01	- 21
14	0.00	1.79	0.54	8.75	1.00		0.00	101	0.00			0.00	0.00	11.75	2.7
- 1	0.00	100	0.00	1.00	5.00		0.00	1.60			1.50	1.00	0.00	0.00	- 1
14.4	0.00		0.00	10.75	0.00		0.00					0.00	0.00	0.70	20
102	8.00	100	8.00	1.60	5.00		0.00	1.60	9.80		2.00	1.00	0.00	1.00	- 6
14.	0.00	12.60	0.00	0.55	6.00		0.00		9.00		0.00	0.00	0.00	0.79	- 2
	0.01	1.00	0.00	1,00	5.00	4.51	0.00	0.61			0.88	1.00	0.06	1.00	0.7
7.2			-10	-/-			4.40								- 3.5

Evaluation Summary:

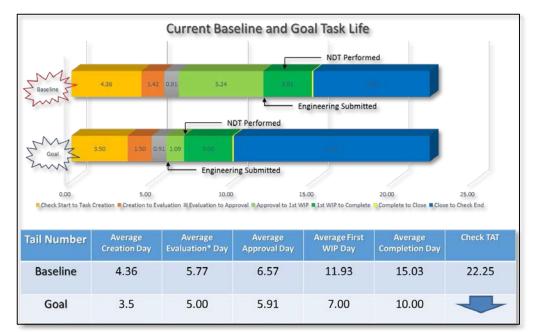
And more...

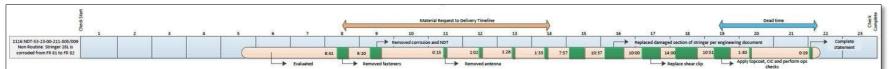
Evaluation Summary							
rch Criteria							
luation Summary							
^▼ Evaluated By	^ ▼ Task Cards Evaluated	^▼Est Hrs	^ ✓ Act Hrs	Percent	Details		
Amason, Kyle	41	173.50	16.40	9%	Show Details		
Blair, James	55	359.46	124.45	35%	Show Details		
Deleon, Fernando	102	320.50	8.03	3%	Show Details		
Freeze, Milton	2	53.00	18.48	35%	Show Details		
Gray, Scott	69	348.35	229.22	66%	Show Details		
Hudson, Charles	52	137.10	36.87	27%	Show Details		
Lumbruno, Constantino	25	62.64	19.07	30%	Show Details		
Martinez, Edmundo	3	2.30	1.15	50%	Show Details		
Mayes, Malcolm	43	143.22	55.77	39%	Show Details		
Onermaa, Eric	54	119.95	72.75	61%	Show Details		
Raiker, Joseph	7	25.40	14.07	55%	Show Details		
Roth, Justin	49	172.08	102.87	60%	Show Details		
Rowson, Jeff	7	17.36	11.67	67%	Show Details		
Rue, Mike	8	26.48	18.12	68%	Show Details		
Smith, Glenn	1	2.50	0.00	0%	Show Details		
Total	518	1963.84	728.90	37%			



#### 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







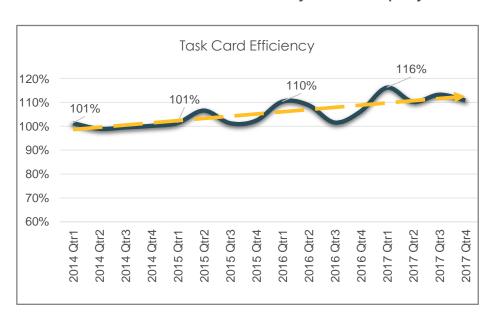
# Data to Make Informed Decisions

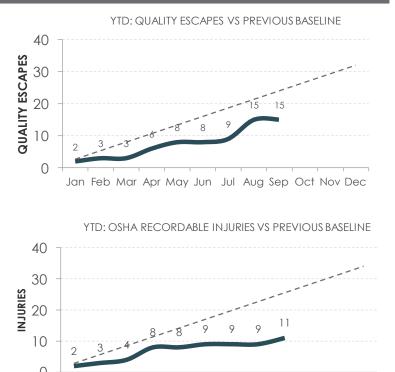
#### **Instant Reporting**

- 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

	Manage Ad Hoc Reports			
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	v 🚅 🗎 🗊 🥥 🛅
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	▼ ₫ 🗎 👨 📵 🛅







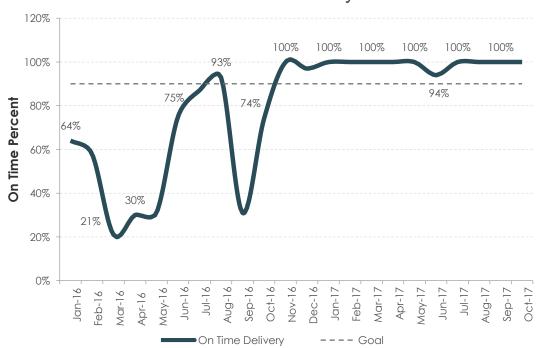
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



#### 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







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