

MOOG

Aircraft Group

Our DDMRP Journey

October 2018



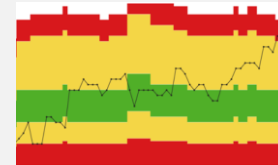
Agenda



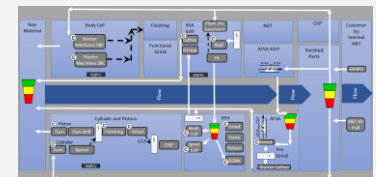
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DDMRP Journey
June 2017...



DDMRP Results



Next Steps



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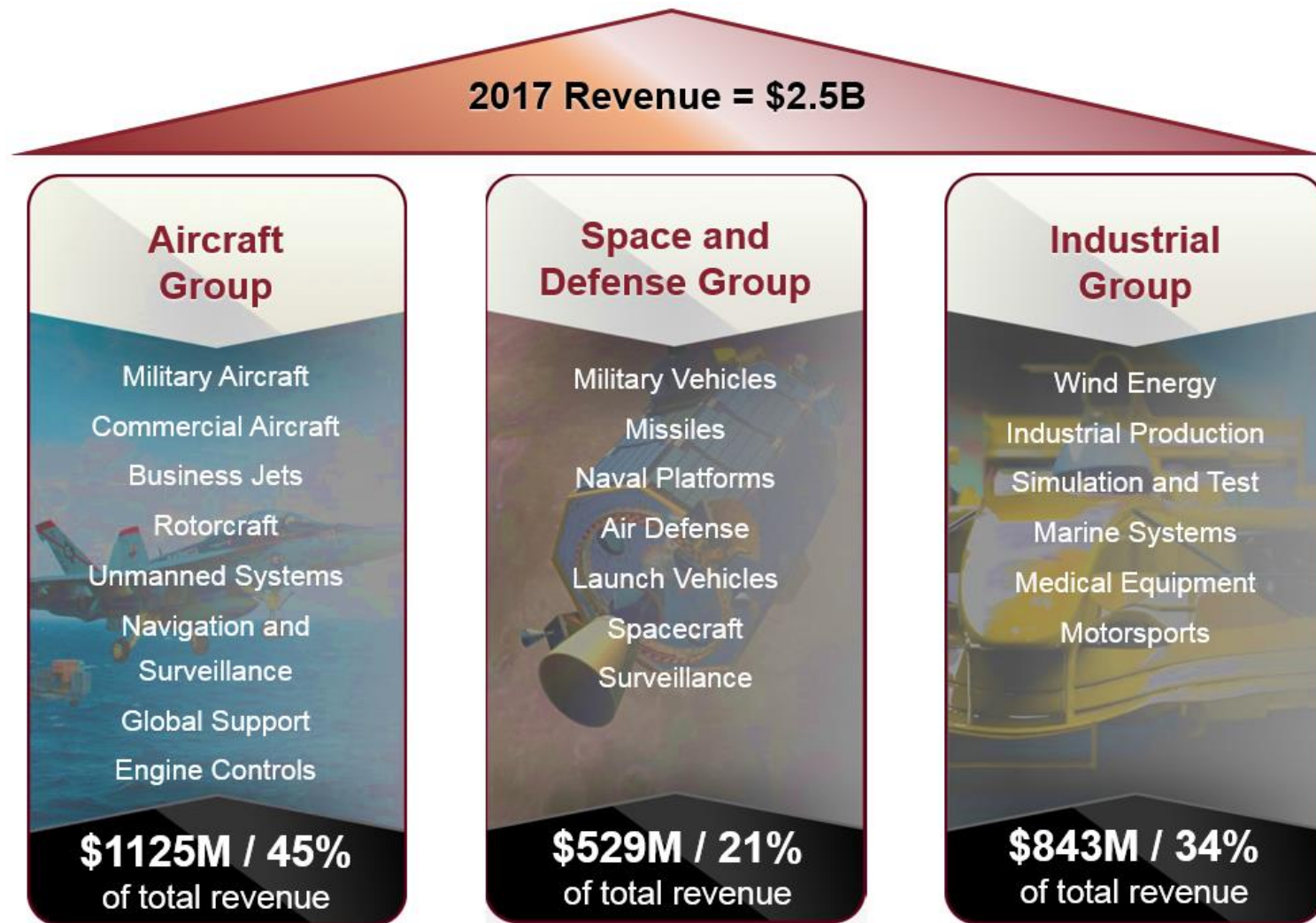
<https://www.youtube.com/watch?v=cLAQCzJEEcl>



Moog – When Performance Really Matters™

- Founded in 1951 by Bill Moog
- Headquarters in East Aurora, NY
- Multi-national Company
 - Over 100 locations in 28 Countries
- Over 11,000 Employees Worldwide
- \$2.5 Billion in Revenue (FY 2017)
- Aerospace, Defense, Industrial, Medical
- Precision Control System Provider
- Traded on the New York Stock Exchange (MOG-A)
- People-oriented environment with emphasis on individual responsibility

3 Operating Groups, Multiple Markets



FY'17 Sales / % of Total

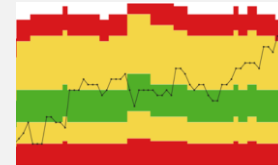
DDMRP Journey



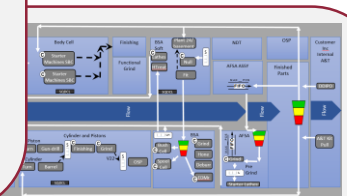
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DDMRP Journey
June 2017...



DDMRP Results



Next Steps

Why begin the Journey?

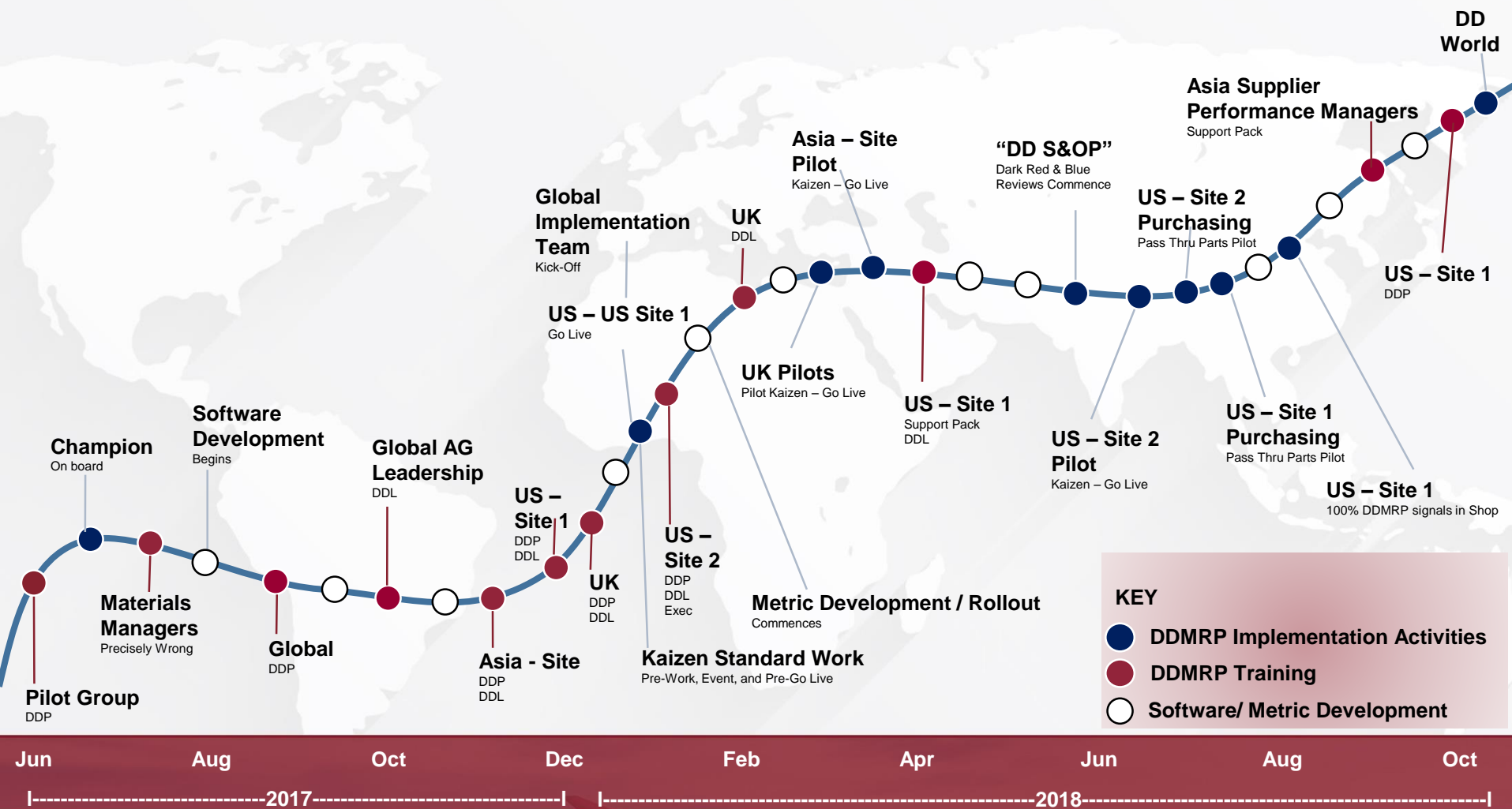
**Inventory ↑, OTD ↔,
Freight Expedites ↑, Late Delivery Fees ↑**



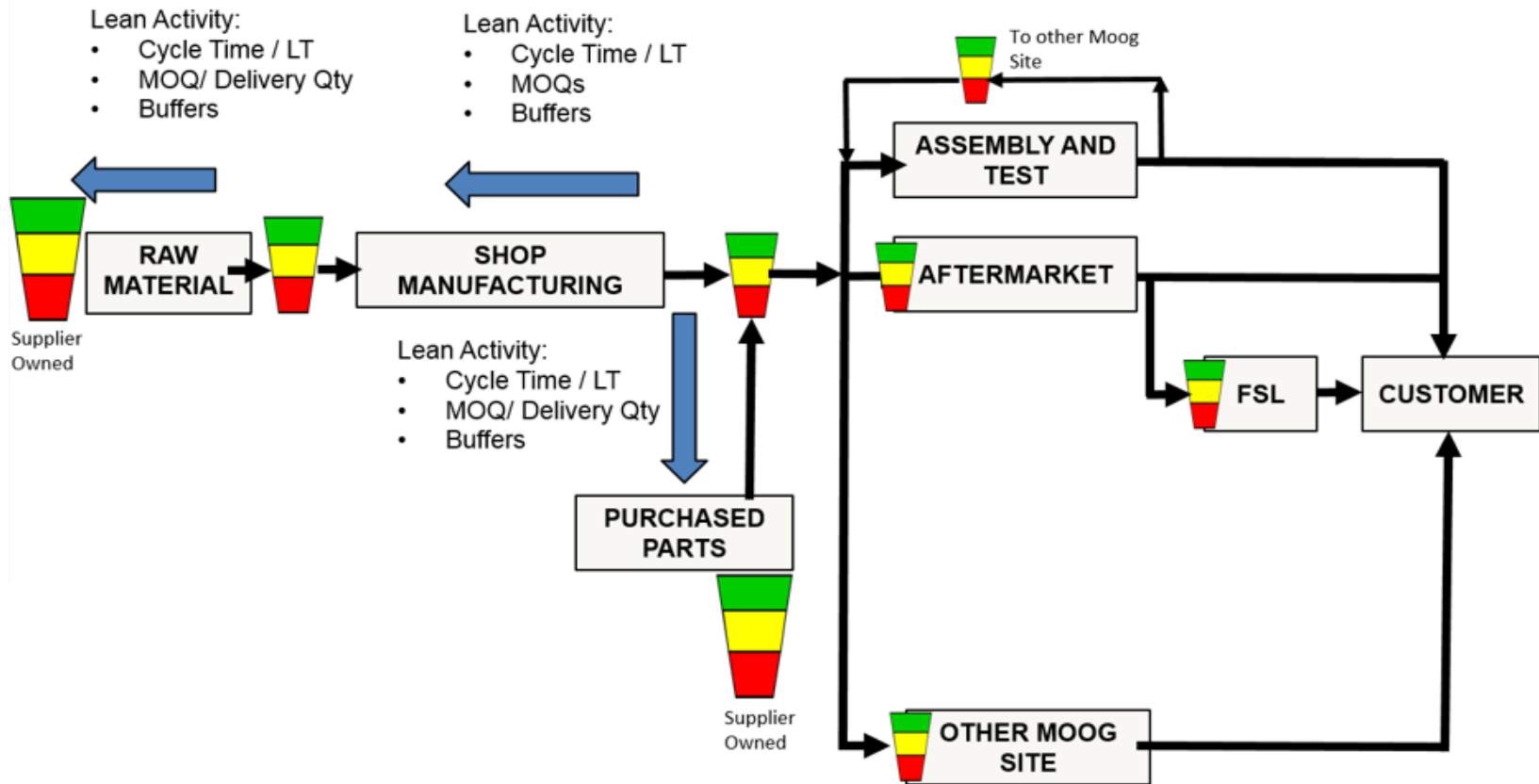
“What if we don’t change at all ...
and something magical just happens?”

Why begin the Journey?

- ✓ “Are we making the right parts at the right time in the right amount?” asked V.P. Moog Aircraft Operations



DDMRP Strategy



Lean efforts to reduce lead-times and MOQ's;
strategically place buffers using DDMRP methodology

DDMRP Pilots

	SITE	KAIZEN	GO LIVE	PART(S)
1	US Site 1	Multiple	Jan 2018	Commercial Aircraft Pumps
2	US Site 1	Multiple	Jan 2018	Military Aircraft Rudder
3	US Site 1	Feb 2018	Mar 2018	Military Aircraft Servo
4	UK Site 1	Feb 2018	Feb 2018	Aerospace Rotatable Stock
5	UK Site 2	Feb 2018	Feb 2018	Military Aircraft Bearing Swivel Module
6	Asia Site	Mar 2018	Apr 2018	Commercial Aircraft AGB
7	Asia Site	Mar 2018	Apr 2018	Commercial Aircraft Servomods
8	Asia Site	Mar 2018	May 2018	Commercial Aircraft Gearboxes
9	Asia Site	Mar 2018	Apr 2018	Supplier 1
10	US Site 2	Apr 2018	Jun 2018	Military Aircraft Wingfolds

AG Pilots on Schedule – Controlled Learning

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DDMRP Journey Lessons Learned

- ✓ Change Management
- ✓ Executive Champion
- ✓ Training – lots of it!
- ✓ Lean Maturity
- ✓ Protecting the customer downstream \$\$\$, often unachievable Safety Stock
- ✓ Buffers should be placed near to the process that creates them: Accountability, Visibility, Continuous Improvement
- ✓ Supplier and Operations communication; the build up of buffers takes planning
- ✓ Buffer Size greatly dependent on Lead-time and/or MOQ: Validate & Challenge
 - ▶ LT accuracy (e.g., Vendor Schedule), opportunity for multiple LT's: New Order versus Replenished
 - ▶ MOQ updates – Data Maintenance (e.g., based on Long Term Agreements)
- ✓ Standardized metrics / tools / standard work (Kaizen Event through Stabilization)
- ✓ Build Allies / Supporters
- ✓ DDMRP will not fix quality / delivery issues but the metrics will highlight where to focus attention
- ✓ Learning and Adapting – Change Management

DDMRP Journey Lessons Learned

✓ Change Management – DDMRP Home Page



DDMRP Workbook and Report Changes

Request Date	Created By	System	What is the change?	Why are we making it?
3/13/2018 10:57 PM	M...	Spotfire	Add Vendor Name and Remaining Days to WC Priority Tool	Adding Scheduled days at OP, Remaining...
3/13/2018 8:44 PM	C...	RapidResponse	Changing sort on DDMRP Open Orders tab of Buyer Workbenches	We are changing the sort to be based on...
3/14/2018 12:24 AM	C...	RapidResponse	Changed the Avg On Hand calculation for MRP Parts	For MRP parts, the average on hand calculation will be Multiple, the calc will be Mult. * .5

DDMRP Rapid Response Workbook

Frequently Asked Questions (FAQ's)

Topics

1. How can we identify a part in MBS INV3 as a DDMRP part?
2. How is the Variation Score calculated?
3. How is the Average Daily Usage (ADU) calculated?
4. What is the impact of Type 4 work-orders?
5. What is the "Can Build" feature?
6. How are As Required Parts handled?
7. What is included in On Order?
8. What Aggregated Demand is included?
9. What is considered Qualified Demand?
10. What should the lead-time be for IPO parts?
11. What is the impact of IPO in DDMRP?

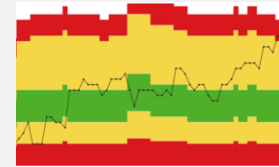
DDMRP Results



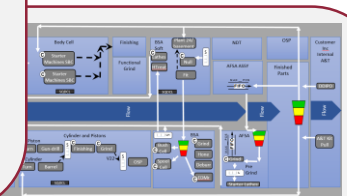
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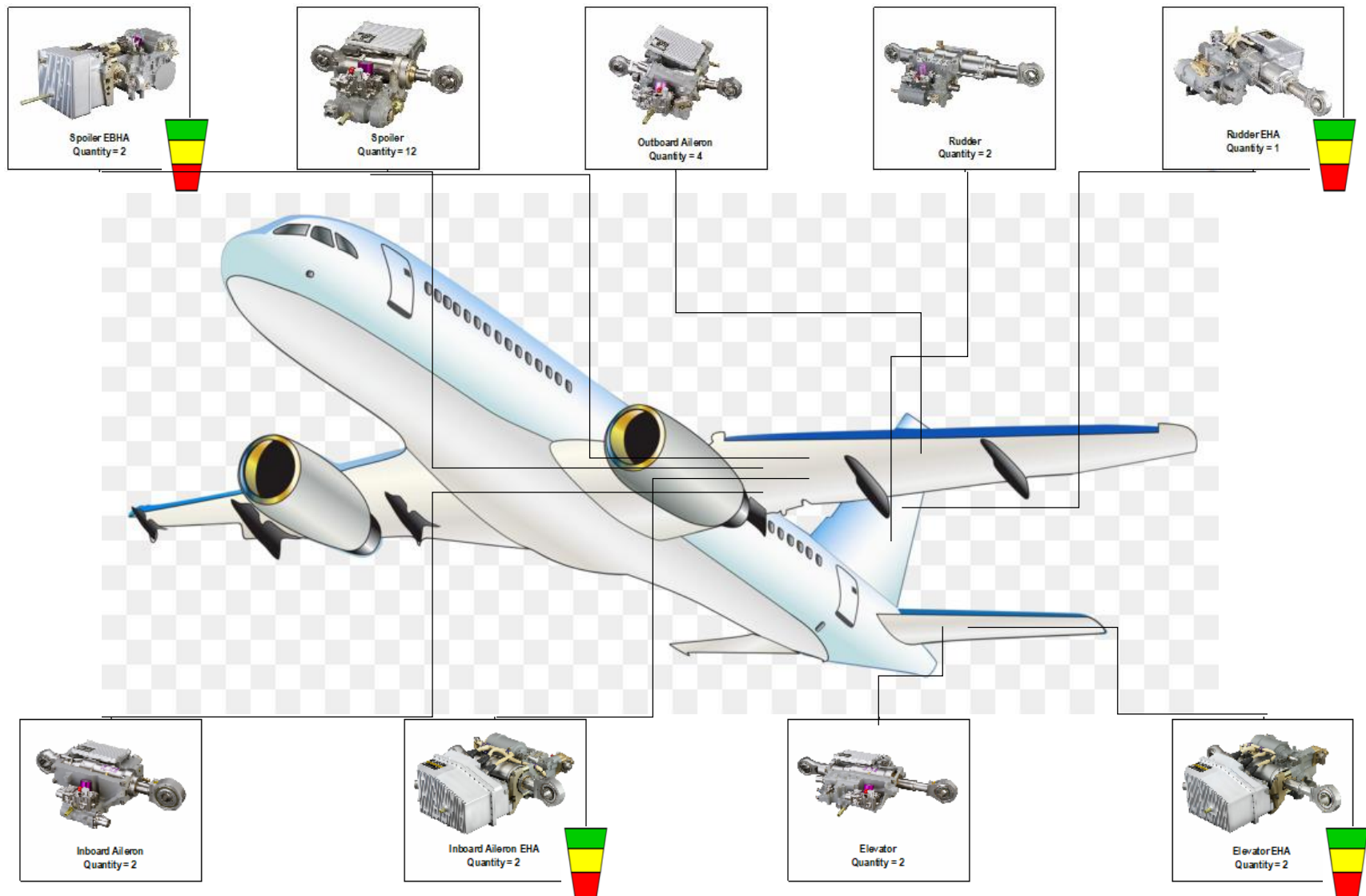
DDMRP Results



Next Steps

Commercial Aircraft Primary Flight Controls

Primary Flight Control Actuation



DDMRP Results - Lead-time

SITE	PART(S)	CURRENT CUM LT	TARGET DECOUPLED LT	% CHANGE
US Site 1	Commercial Aircraft Pumps	295	15	-95%
US Site 1	Military Aircraft Rudder	331	92	-72%
US Site 1	Military Aircraft Servo	198 - 437	5 - 123	-43% to -98%
UK Site 1	Aerospace Rotatable Stock	173	12	-93%
UK Site 2	Military Aircraft Bearing Swivel Module	333	98	-71%
Asia Site	Commercial Aircraft AGB	338	97	-71%
Asia Site	Commercial Aircraft Servomods	549-551	18-20	-96%
Asia Site	Commercial Aircraft Gearboxes	314	20	-94%
Asia Site	Supplier 1	110-234	72	-35% to -69%
US Site 2	Military Aircraft Wingfolds	266	20	-92%

Significant Lead-time Improvement

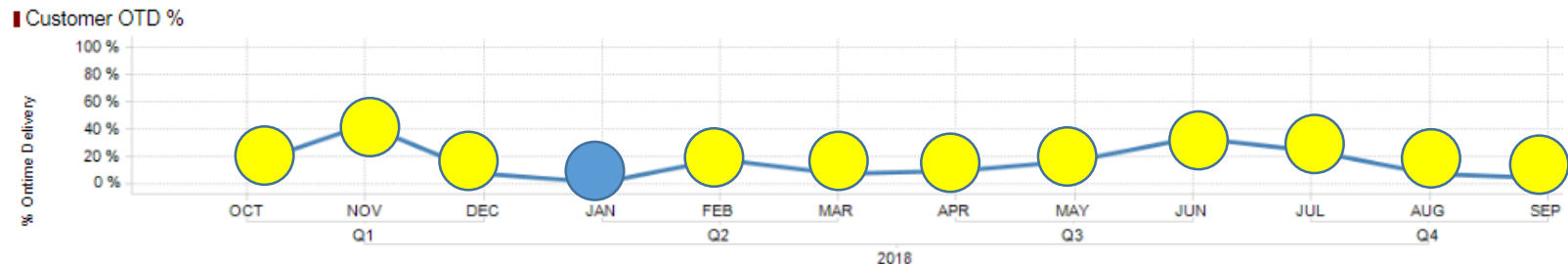
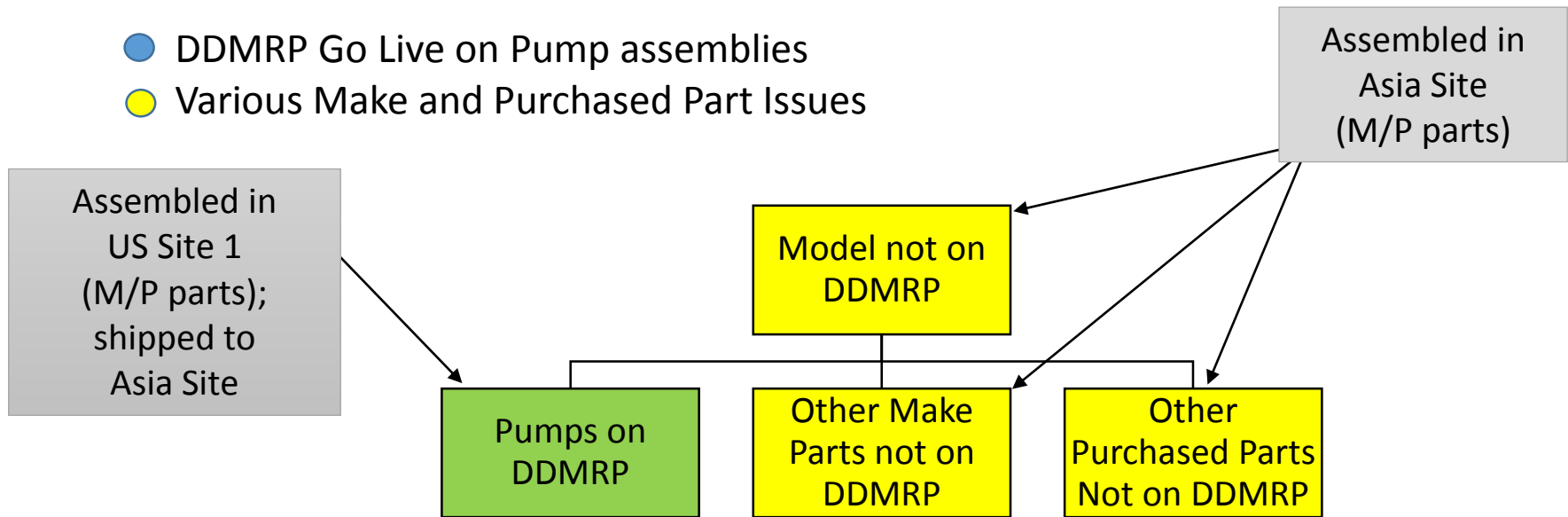
DDMRP Results - Inventory

SITE	PART(S)	INVENTORY CHANGE
US Site 1	Commercial Aircraft Pumps	-27%
US Site 1	Military Aircraft Rudder	-13%
US Site 1	Military Aircraft Servo	-31%
UK Site 1	Aerospace Rotatable Stock	-3%
UK Site 2	Military Aircraft Bearing Swivel Module	-18%
Asia Site	Commercial Aircraft AGB	-4%
Asia Site	Commercial Aircraft Servomods	-4%
Asia Site	Commercial Aircraft Gearboxes	-29%
Asia Site	Supplier 1	-49%
US Site 2	Military Aircraft Wingfolds	-9%

Lead-time reduction + Flow improvement =
Decreased Inventory

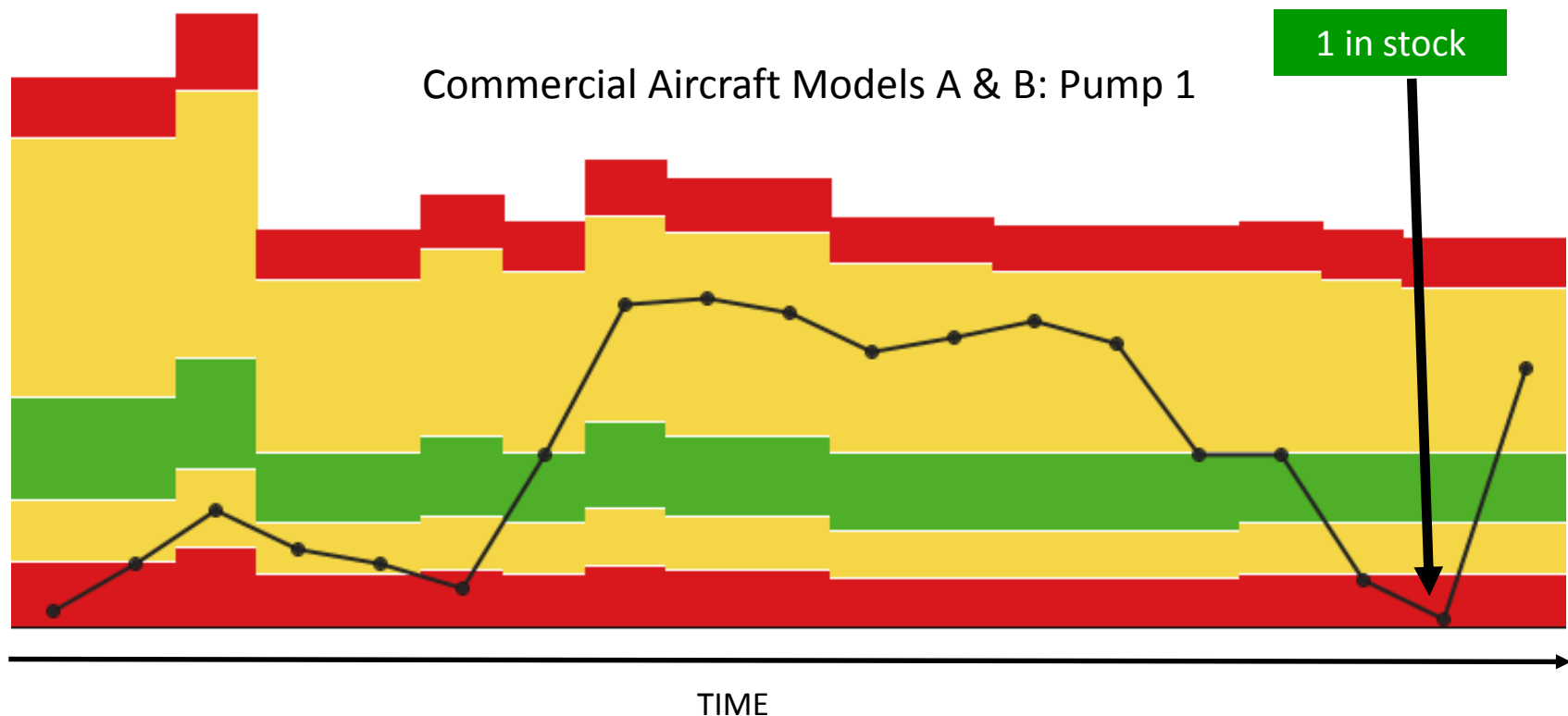
Commercial Aircraft Pilot – Pumps support 4 Models

- DDMRP Go Live on Pump assemblies
- Various Make and Purchased Part Issues



DDMRP Receiving Site: Asia Site

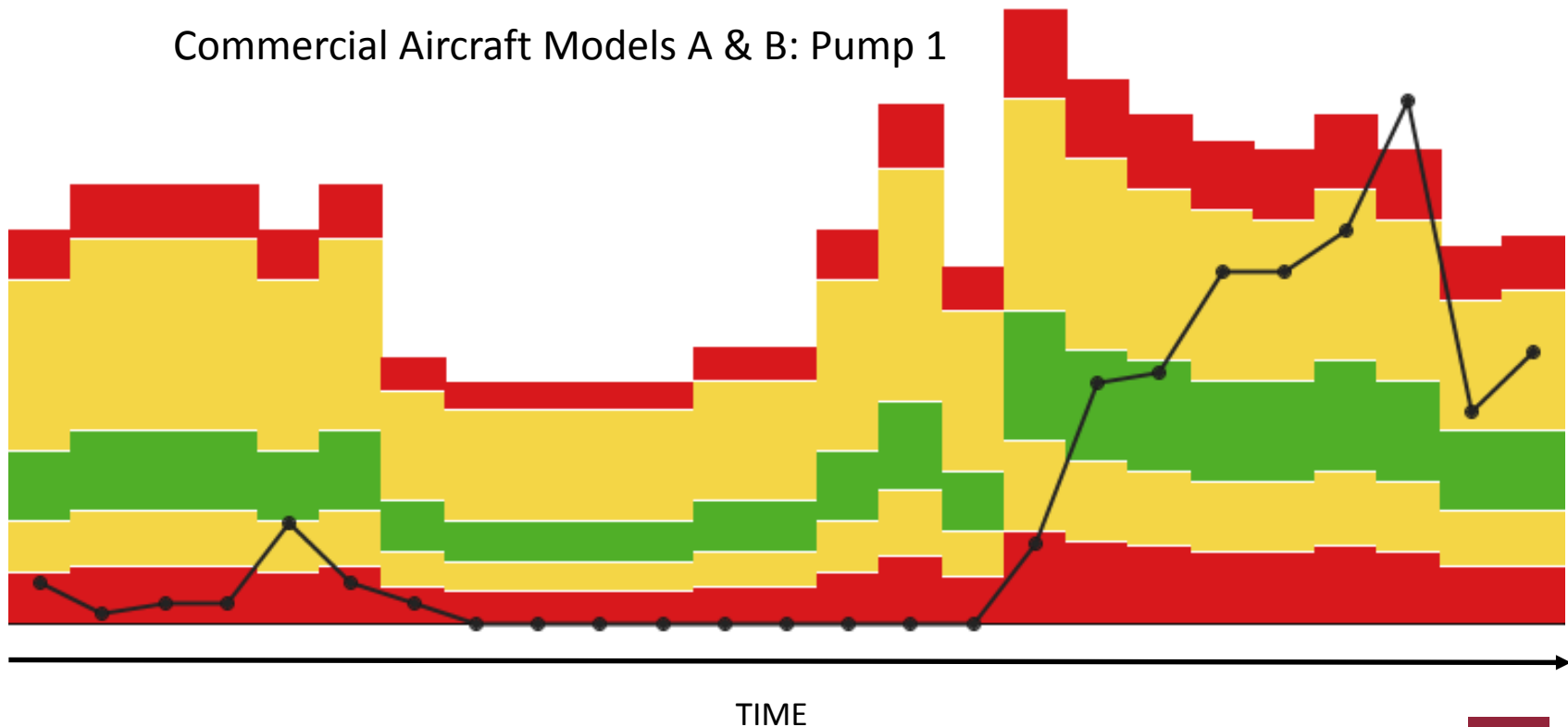
- ✓ Initial buffer only at Receiving Site – Manufacturing Site did not hold inventory – Push system; DDMRP signals not reacted to; ADU learnings.
- ✓ Current State: Buffer built and maintained with ZERO stock-outs



DDMRP Manufacturing Site: US Site 1

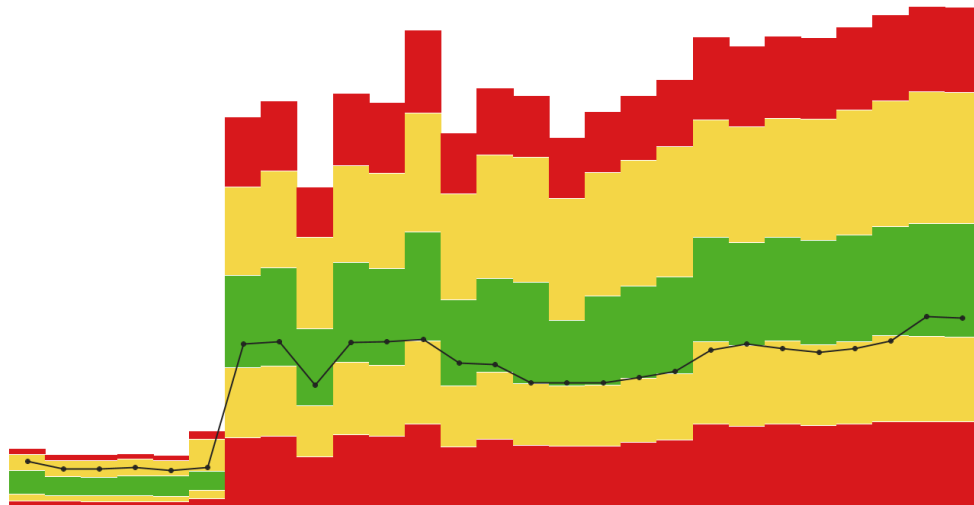
- ✓ On-Hand Buffer: It took a while to believe in signals and then create buffer but ZERO stock-outs at receiving / customer site.
- ✓ Current State: Each site now responsible for their own buffer status.

Commercial Aircraft Models A & B: Pump 1



DDMRP RESULTS

- ✓ Transformation from Push to Pull Signals
- ✓ Standardized Planner / Buyer Signals and Monitoring
- ✓ Stabilized Demand Signals at Lead-time
- ✓ Standardized Metrics and Visualization
- ✓ When Executed it Builds Protection into our Complex System



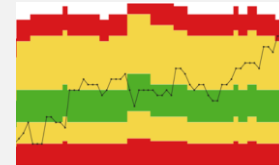
Next Steps



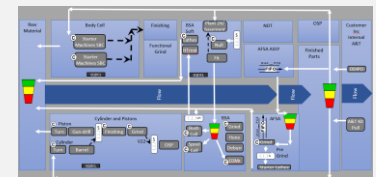
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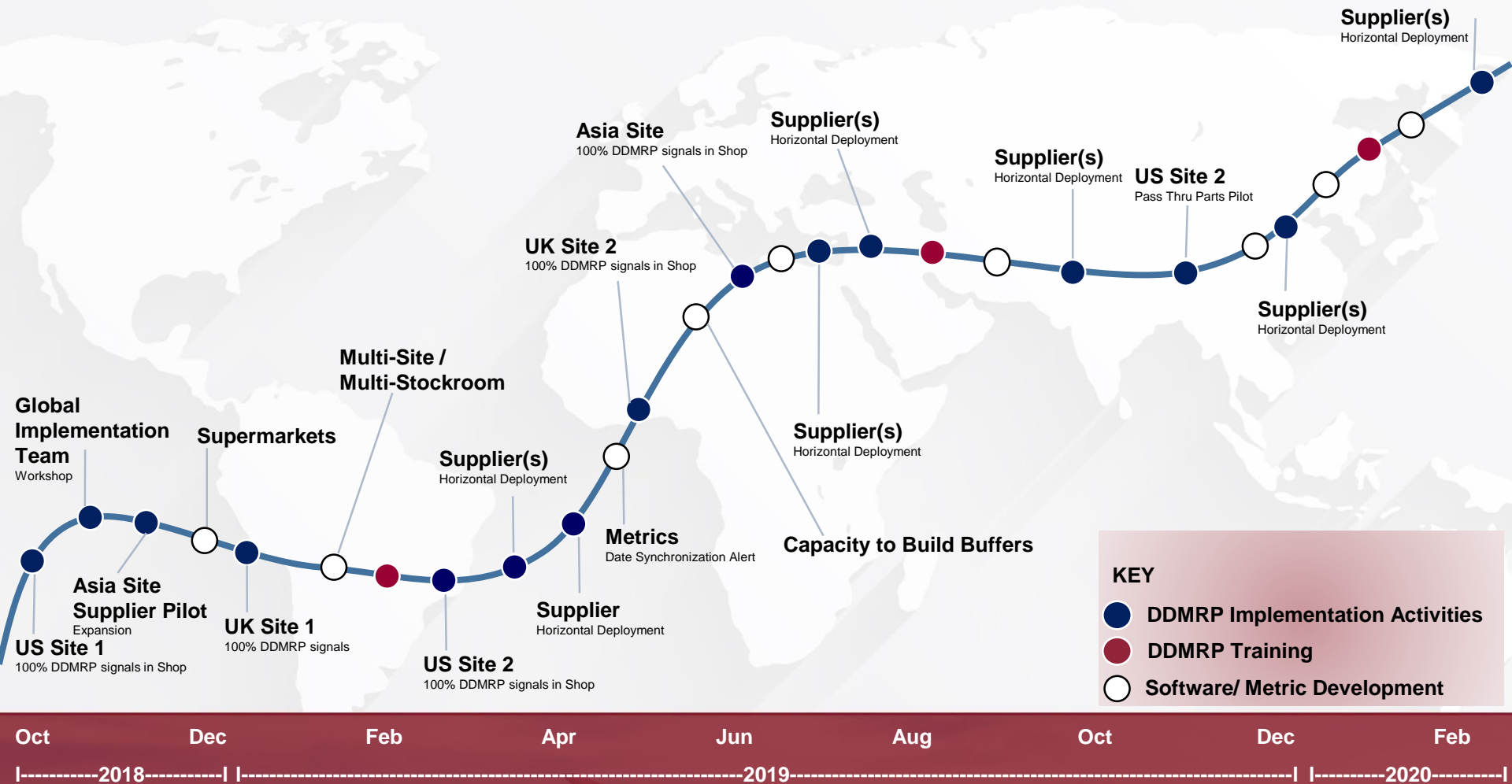
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June 2017...



DDMRP Results



Next Steps



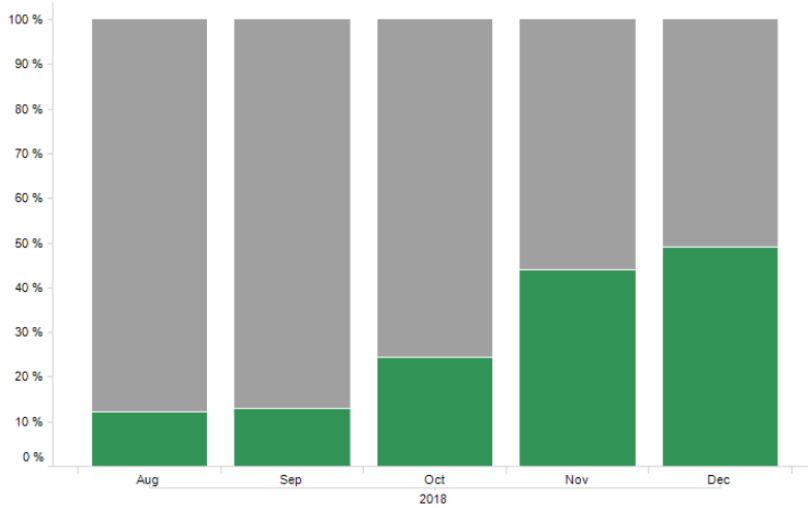
DDMRP Implementation Tracking

Site	DDMRP Go Live Parts	Strategic Buffers	Healthy Buffers (>50% RED OH)	Stocked Out Strategic Buffers (Dark Red)
ASIA Site	2%	70%	53%	13%
UK Site 1	60%	48%	52%	8%
UK Site 2	2%	93%	58%	16%
US Site 1	7%	28%	59%	13%
US Site 2	5%	76%	56%	8%
TOTAL	9%	42%	55%	10%

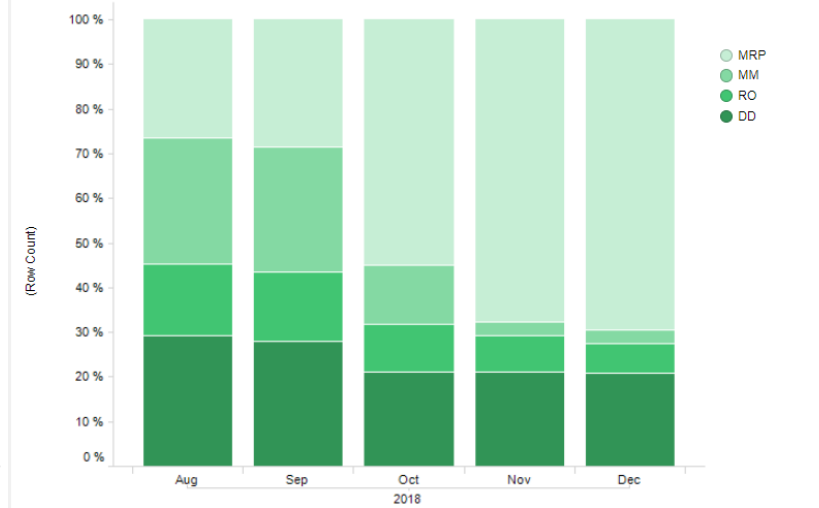
Commitment to Demand Driven: Shop – Suppliers – A&T

DDMRP Automated Tracking by Site

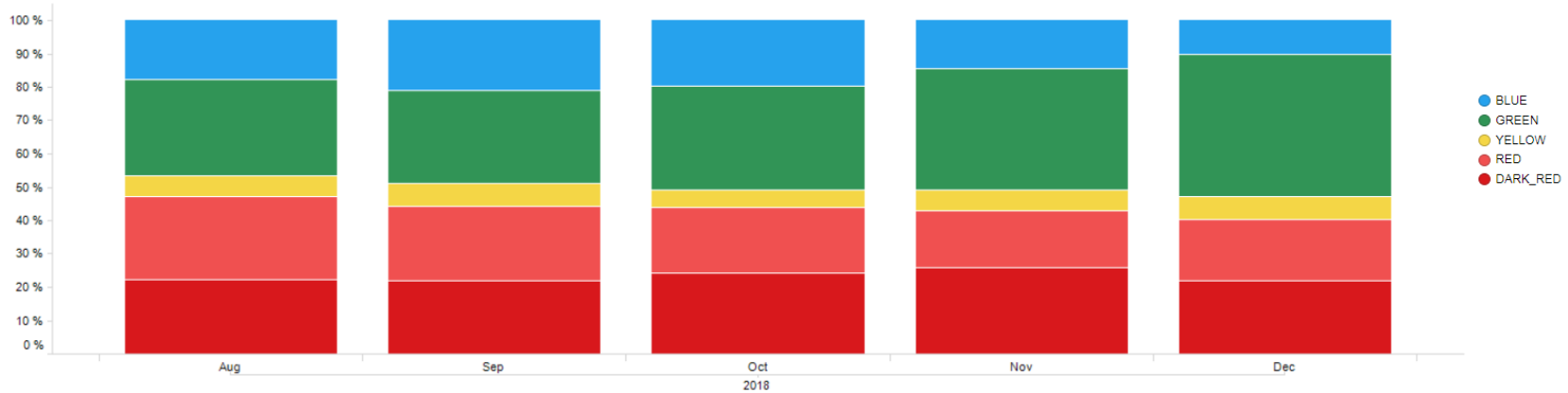
% DDMRP GO LIVE OF ACTIVE PARTS



BUFFER TYPE BREAKDOWN OF DDMRP GO LIVE PARTS

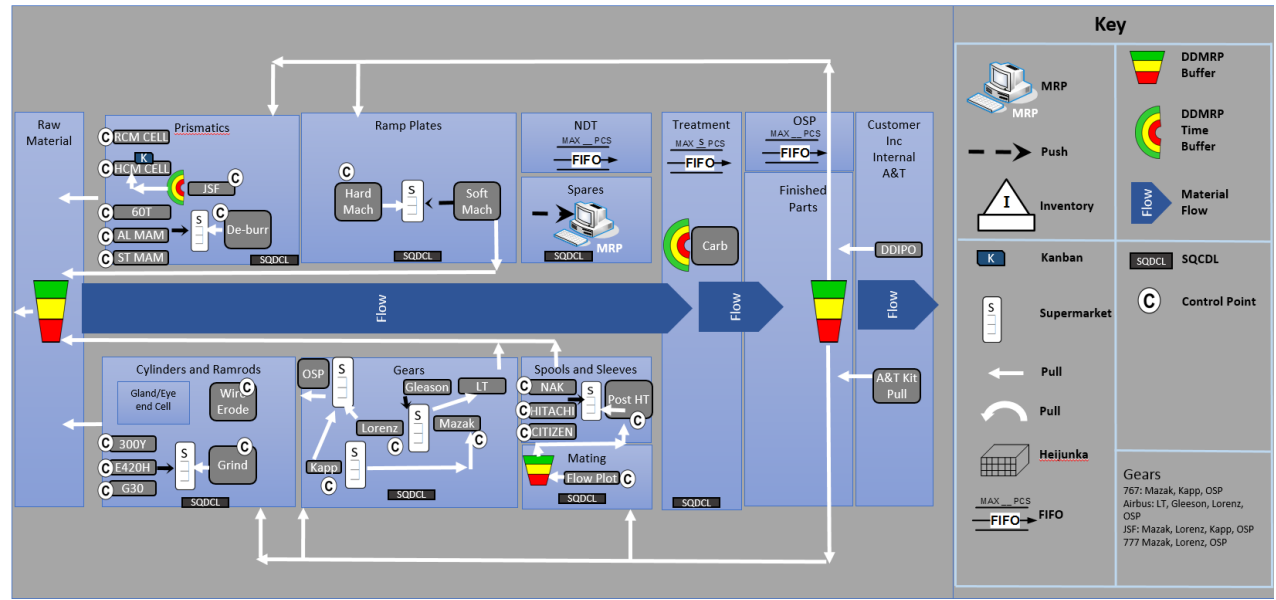


ON HAND BUFFER HEALTH OF ALL STRATEGIC (DD, RO) PARTS



Next Steps / Challenges

UK Site 2 Machine Shop Future State:
Pulling value to customer demand.
Ensuring parts are available, in stock, ready for build!



- ✓ Future State
- ✓ Training – New employees & continuous education
- ✓ Software Developments
 - ▶ Supermarkets
 - ▶ Multi-Site / Multi-Stockroom
 - ▶ Finite Scheduling
- ✓ ↑ Functional Area Engagement
 - ▶ Manufacturing Engineers
 - ▶ Finance
 - ▶ Supply Chain
- ✓ DDS&OP / Standard Work
- ✓ Change Management – KPI's



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✓ Thank you! Danke schön!