

**Supply Chain  
Work Group Kick-off  
August 13, 2020**

# Aerospace Supply Chain and Manufacturing

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# We heard you!



- Many original equipment manufactures complain about lack of resiliency of supply chain
- Challenges associated with finding suppliers in early design stages
- Challenges associated with local suppliers to support drone industry
- New type of vehicles ....



# Aerospace Needs Resilient Supply Chain and Manufacturing



# Supply Chain Basics



Supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer need



Aerospace supply chain is an ecosystem of different supplier tiers



Includes manufacturers, suppliers, transporters, warehouses, etc.



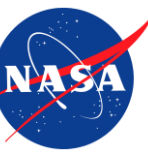
Supply chain management refers to coordination of all activities



# *Supply chain impacts the entire life cycle—from early conceptual design to high volume manufacturing*

- All types of aircraft in all phases – design to final production
- Maintenance, repair, and overhaul
- Skills and talents





## Basic Statistics on Manufacturing



Boeing and Airbus: 1600+ /year



General Aviation: ~2000  
(piston, turboprop, business jets)



Rotocraft: 1020



Cars: 70M (OICA, 2018)  
Cars in US: 2.8M



# Needs



**Many calls, texts, and interactions about looking for suppliers and manufacturers**

Over-molding

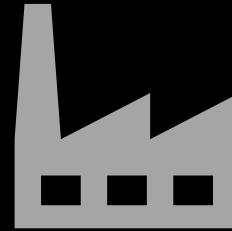
Actuators

Electric motors

Propellers

Casting

Many other components and manufacturing needs



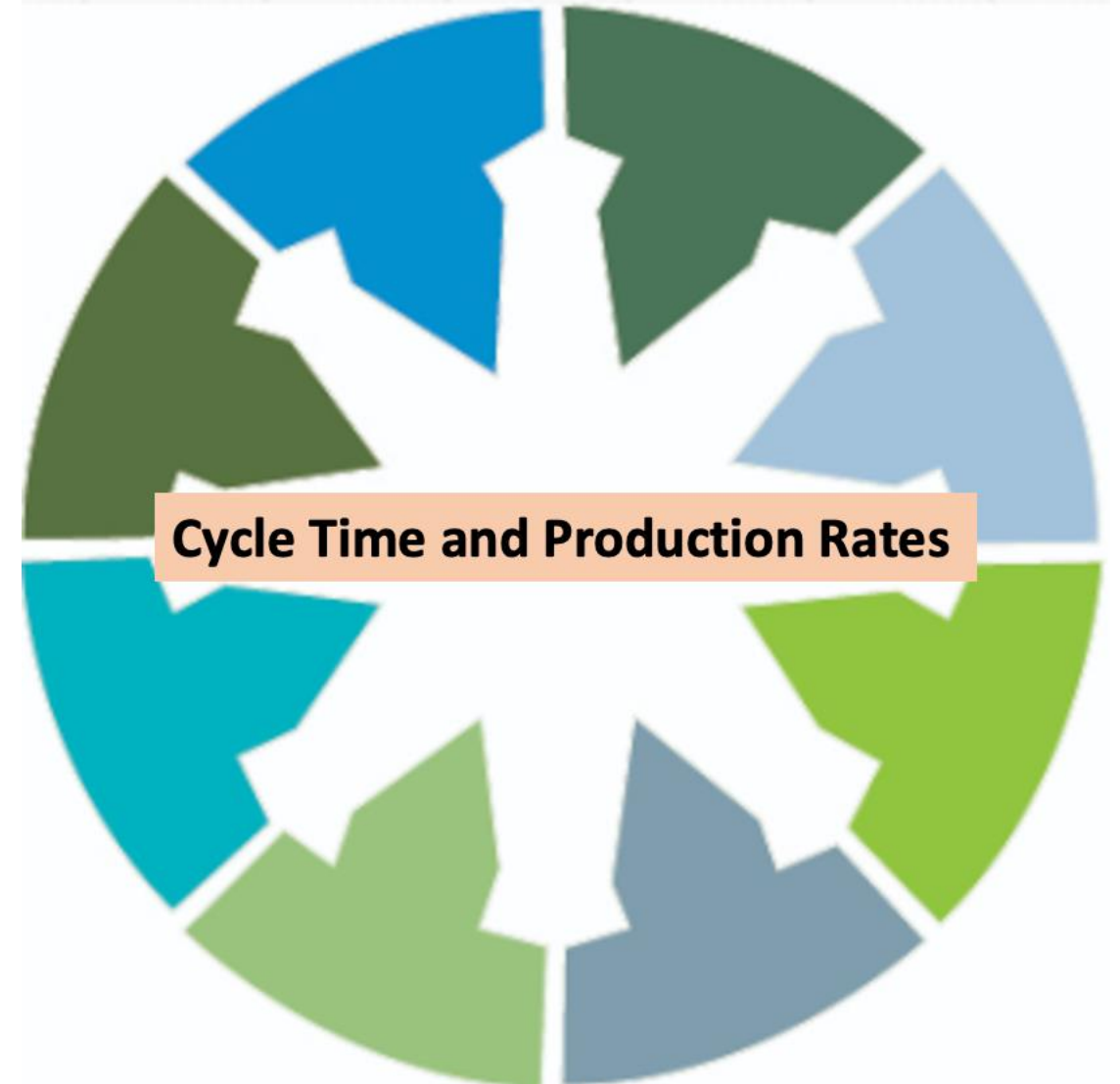
**Need suppliers for entire life cycle:  
Design to high volume manufacturing**



# Challenges



- Casings and forging
- Composites
- Auxiliary Power Units
- Printed Circuit Boards
- Actuators
- Software
- High volume manufacturing and assembly methods
- Many others







# Known Aero Supply Chain Related Issues (California Manufacturing Network, 2018)



Sourcing of raw materials – aluminum, steel, copper, etc.



Mitigating supply disruption risks (e.g., geopolitical considerations)



Coping with modernization and emerging technologies (e.g., wiring problems, software issues, late deliveries of lavatories)



Shortage of skilled workers (Tim Cook's view on outsourcing)



# Supply Chain Strategies



Many suppliers



Few suppliers



Vertical integration



Joint ventures



Horizontal integration



Keiretsu networks (part collaboration, part few suppliers, part vertical integration)



Virtual companies



## Recommendations: Supply Chain for Advanced Air Mobility Vehicles

- Drones
- Electric Vertical Take-off and Landing



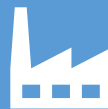
Time to start building an entire new eco-system



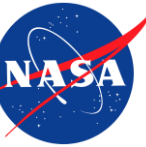
Take advantage of ALL manufacturing capabilities



Rebuild/train auto, heavy industries, and traditional aerospace suppliers to consider VTOL and drones as needed



Get regional manufacturing and supply chain associations exposed to emerging aero needs



# Recommendations: Supply Chain for Advanced Air Mobility Vehicles



Build modeling and simulation capability to assess supply chain preparedness: gaps, resiliency, scale, and cycle time



Build an electronic exchange platform to connect VTOL customers with suppliers

Job production  
Mass production  
Quality management based on FAA production need



Establish tiered system



Establish maintenance, repair, and overall (MRO) network



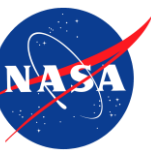
Train workforce: curriculum, skills, and entrepreneurs



# Launching Today



- Working group starts: all government supported (NASA, DOD, FAA, DOC) to help industry's urgent needs
- Build tiered system and entire supply chain – critical need
  - Key for efficiency
- Build modeling and simulation platform to assess gaps, needs, strengths, weaknesses, opportunities, and threats for future (resiliency, scale, economics)
- Build electronic exchange platform to reduce friction among suppliers, and suppliers and OEMs
- Open to other suggestions
- Let's prepare for future: Drones and Electric vertical take-off and landing



# Future Meetings

The AAM Supply Chain Working Group will hold their meeting on the *second Thursday of every month from 11:00AM - 1:00PM ET (8:00AM - 10:00AM PT)*.

- Sep 10, 2020: Topic 1: Current State of the Art for Drones & eVTOLS
- Oct 8, 2020: Topic 2: A Tiered Supply Chain System
- Nov 12, 2020: Topic 3: Where is Standardization Useful?
- Dec 10, 2020: Topic 4: Electronic Supply Chain Platform
- Jan 14, 2021: Topic 5: Modeling & Simulation Environment

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