ICAS EMERGING TECHNOLOGY FORUM 2019
Digital Factory: Being Digital from Design to Manufacturing

João Zerbini
Sr Manager - Digital Engineering & Manufacturing Technologies
EMBRAER was founded controlled by the Federal Government as a step to develop the aeronautic industry in 1969. The company is privatized, combining technological and industrial knowledge with an entrepreneurial culture in 1994. One of the world’s leading manufacturers of commercial and executive aircraft, with strong and growing performance in defense and security in 2019.

- **1946**: National Strategic Project to foster the aeronautics in Brazil - CTA (Aerospace Center of Technology) and ITA (Aeronautics Institute of Technology) were created.
- **1969**: EMBRAER was founded controlled by the Federal Government as a step to develop the aeronautic industry.
- **1994**: The company is privatized, combining technological and industrial knowledge with an entrepreneurial culture.
- **2019**: One of the world’s leading manufacturers of commercial and executive aircraft, with strong and growing performance in defense and security.

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JOINT VENTURES & AFFILIATES

- EMBRAER AERO SEATING TECHNOLOGIES
- EMBRAER CAE TRAINING SERVICES
- OGMA
- EZ AIR INTERIOR
- ATECH SAVIS VISIONA
OUR CHALLENGE
A NEW DESIGN ON
A PROVEN PLATFORM

fuel
17.3% lower fuel consumption over current E190

improved avionics
45% more display

new interior
Enhanced PAX experience and more overhead bin volume

4th Gen Full fly by-wire
Digital closed-loop control to improve flying qualities and fuel efficiency

new wing
More efficient, higher aspect ratio

fuselage
Extensive aerodynamic optimization to improve fuel efficiency

aircraft system
Re-designed to boost performance and reliability and to improve maintenance costs

landing gear door
Up to 1% fuel burn reduction

new engine
High By-Pass Ratio, Geared Fan Engines
INNOVATION VERTICALS

- Electrification
- Autonomy
- Advanced Design and Manufacturing
- Urban Mobility
- AI & Data Science
- Cybersecurity
- Passenger Experience
- Aircraft Efficiency
- Platform-Based Services
The Digital Value Chain

**Digital Thread**

**Design**

**Manufacture**

**Service**

**Concept** | **Design** | **Prototype** | **Certify** | **Supply** | **Build** | **Test** | **Quality** | **Support** | **Services**
Advanced Design and Manufacturing (ADAM)
STRATEGIC PLAN FOR ADVANCED DESIGN AND MANUFACTURING

- Guarantee the alignment of resources
- Avoid effort duplication and rework
- Prioritize the initiatives - corporate strategy
- Optimize the investments - leverage the competitiveness
ADAM Strategic Dimensions

**PROCESS**

*Tools*: SWOT, Benchmarking, Assessment (BPM), Workshops  
*Deliverables*: The Factory of the Future  
*Sub products*: VSM, Competitiveness Strategy Analysis, Make x Buy

**TECHNOLOGY**

*Tools*: Roadmaps  
*Deliverables*: TRMs (Technology Roadmaps) for 4.0 Technologies  
*Sub products*: Technologies Funnel, Maturity (TRL/MRL), Integrated Portfolio

**PEOPLE**

*Tools*: PEE, EMPower, School of Manufacturing Engineer, Community of Practice  
*Deliverables*: 4.0-Ready Skilled Engineers  
*Sub products*: Digital Culture, Training Plan
ADAM TECHNOLOGY DIMENSION

➤ DIGITAL ENGINEERING
  Anticipate the maturity of the products and processes
  Increase efficiency in the development phase

➤ SHOP FLOOR
  Increase efficiency, flexibility, throughput and quality of
  the productive process

➤ MANUFACTURING INTELLIGENCE
  Information to supports the decision making intelligence
Digital Engineering
Product Design
Anticipating the product maturity & efficiency

INITIATIVES

MBD
COLLABORATION
DATA REUSE
INTENSIVE SIMULATIONS
ENGINEERING AUTOMATION
MBSE
KBE
SE
GENERATIVE MODELING
HPC

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INITIATIVES

Digital Engineering
Manufacturing Design

Factory Deployments
done First-Time-Right

Discrete Event Simulation

Virtual Commissioning

Paperless Online Information

Machining & Robotics Simulation

Assembly Simulation
INITIATIVES

Incremental Sheet Forming
Hybrid Manufacturing

Shop Floor fabrication
New fabrication processes to increase flexibility

Additive Manufacturing
INITIATIVES

AGVs/AMRs

Robotics

Smart Tooling

Cooperative Systems

Shop Floor Automation

Flow and performance on Discrete Manufacturing
Exoskeleton

Augmented Reality

Cobots

Shop Floor Augmented Environment

Technology to augment operators capabilities
INITIATIVES

Manuf. Intelligence
Networked factory
Sensored industrial assets
to enable Automation
Initiatives

Manuf. Intelligence
Integrated Systems
Digital enterprise systems: orchestration & data++
FACTORY OF THE FUTURE
From Design, through Manufacturing, to Operations
TAKEAWAYS

- Anticipate maturity with digitalization to ensure first-time right
- Start small, Think Big, Move Fast: Incremental, achieve feasibility with early wins, choose wisely the demo/pilot case
- A bad process cannot be fixed with digitization (GIGO)
- Lean Engineering, Lean Manufacturing and Lean Services can help a lot simplifying and focusing on the value added tasks
- Have an implementation Roadmap carefully considering your legacy systems
- Being Digital is not only about technology: the 3 dimensions (Process, Technology & People) are equally important