6th International Carbon Composites Conference
2018 June 04 - 06, Arcachon, FRANCE

Automated Dry Preform Manufacturing

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DANOBAT

DANOBAT S.Coop.

	MONDRAGON	DANOBATGROUP
Turnover	11.368 M of €	269 M of €
Personnel	74.335 people	1.300 people
Export	71%	91%

COOPERATIVE. 100% employee owned

Founded in **1954**, in Elgoibar (Spain)

DANOBAT identified a tendency / need in the Aerospace market, where Dry Multiaxials could be of interest:

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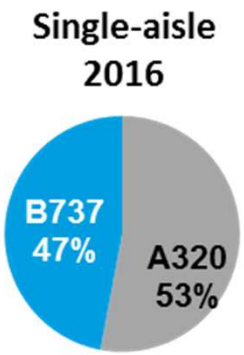
PRESENT

Boeing

Airbus



45 airplanes/month

FUTURE

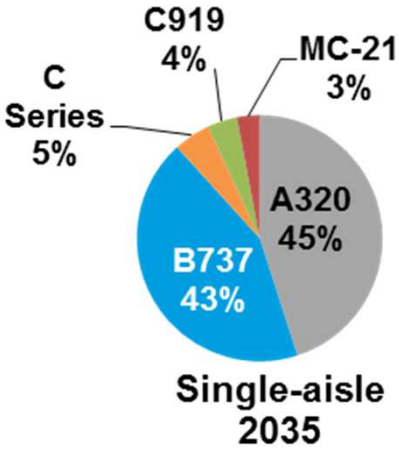
Boeing

Airbus

Bombardier

Comac

Irkut



> 60 airplanes/month

Source: Flight Fleet Forecast (Flightglobal)

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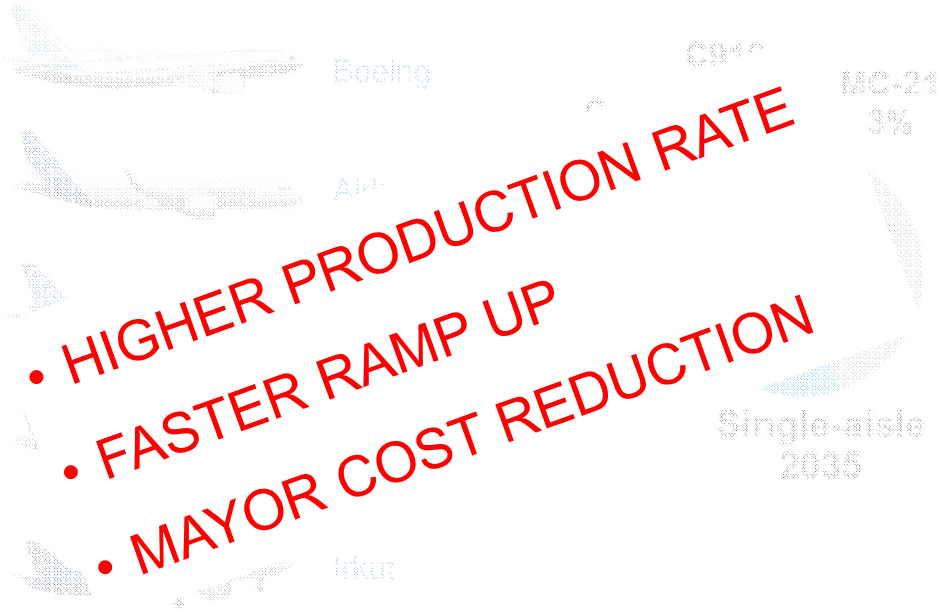
PRESENT	FUTURE
	
45 airplanes/month	> 60 airplanes/month

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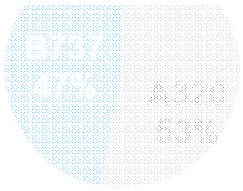
PRESENT

INCREMENTAL IMPROVEMENT of current production technologies:

- Metal
- Pre-Preg

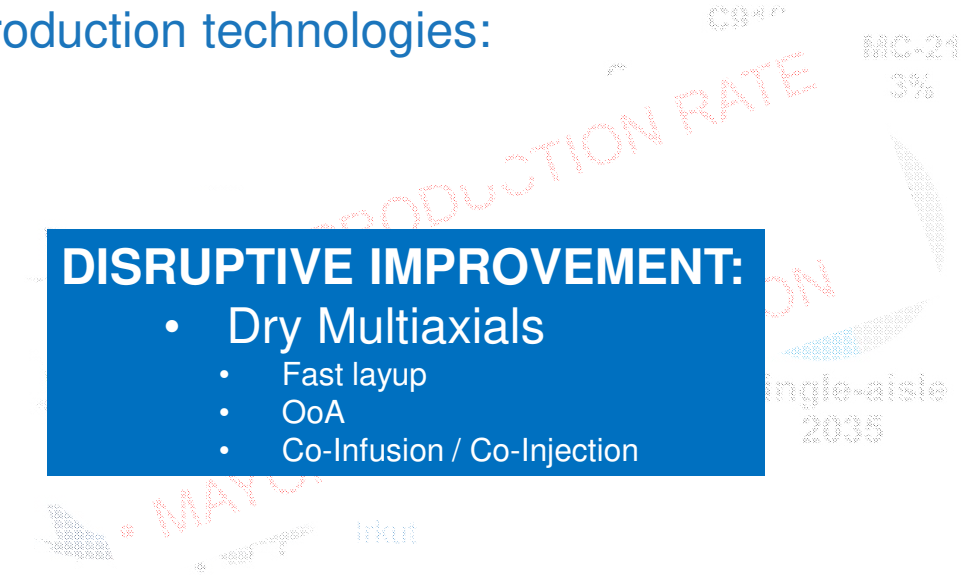


45 airplanes/month

FUTURE

DISRUPTIVE IMPROVEMENT:

- Dry Multiaxials
  - Fast layup
  - OoA
  - Co-Infusion / Co-Injection



> 60 airplanes/month

Source: Flight Fleet Forecast (Flightglobal)

DANOBAT has been working intensively in the field of the DRY COMPOSITES in the past years, having developed a technology for the precise deposition of a wide range of DRY MATERIALS:
ADMP® – Automated Dry Material Placement

- HIGH DEPOSITION RATE
- COMPLEX GEOMETRIES
- PRECISION
- WIDE RANGE OF MATERIALS (size & type)

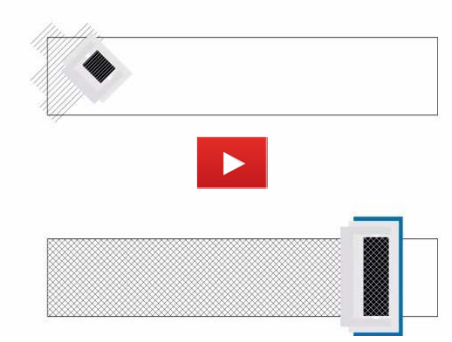
DANOBAT

HIGH DEPOSITION RATE

10 times higher than conventional ATL/AFP

DISRUPTIVE deposition rate as result of:

- Dry multiaxial deposition in a single course
- No need for ply by ply consolidation
- Large fabric width placement
- High deposition speed

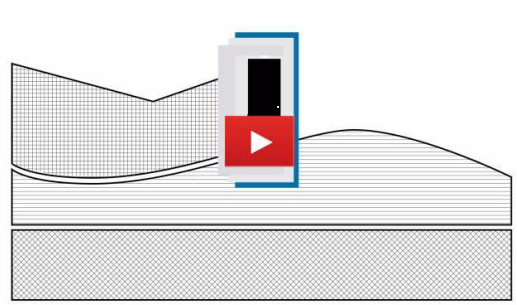


PRECISION

Equivalent to current pre-preg machines

ACCURATE deposition without multiaxial distorsion:

- Star and End point < +/- 1 mm
- Fibre angle deviation < +/ - 5º
- GAP between courses < 3 mm



WIDE RANGE OF MATERIALS (size & type)

Seamless versatility in material handling

OPTIMIZED material use:

- Automated roll changing system
- Quickly loaded onto the machine
- BtF and load optimization by means of materials on different formats

Fabrics	Tape / NCF / woven
Fibre types	Carbon, glass
Fibre directions	UD, biax, triax, quadrax
Areal weight	125 gsm to 1800 gsm
Fabric thickness	0.15 mm to 2.5 mm
Roll width	200 mm to 2000 mm or even more
Minimum ply lenght	150 mm

DANOBAT has work in collaboration with OEMs and Tier1s in the fabrication of manufacturing technology demonstrators. Few of them were presented at the las JEC-World exhibition in Paris (2018.03.06-08)

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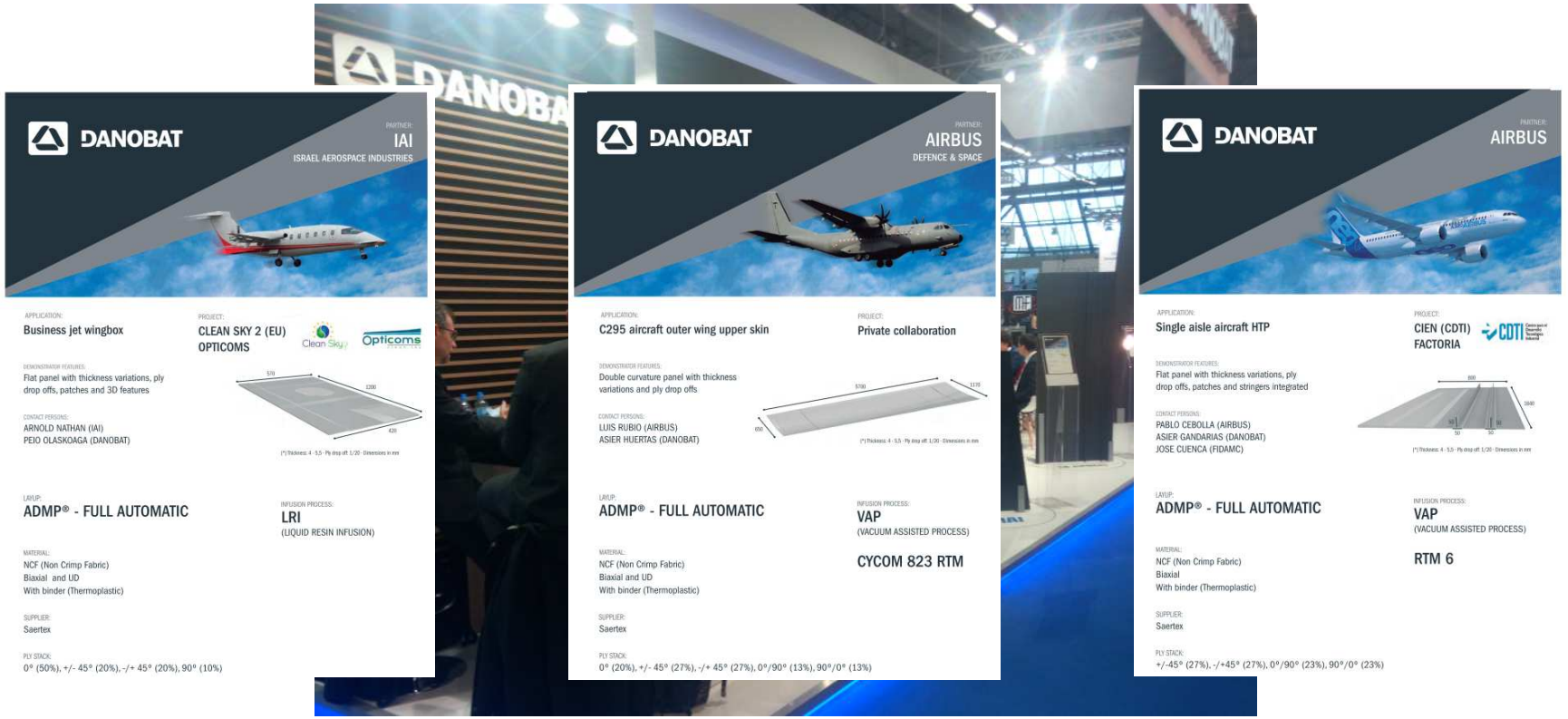

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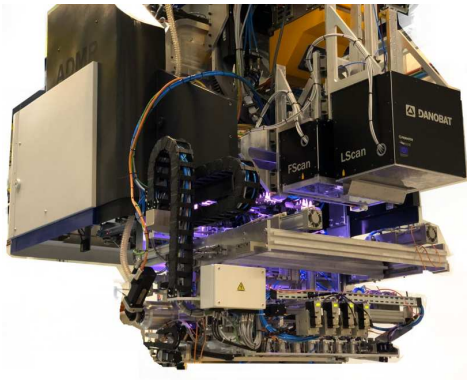
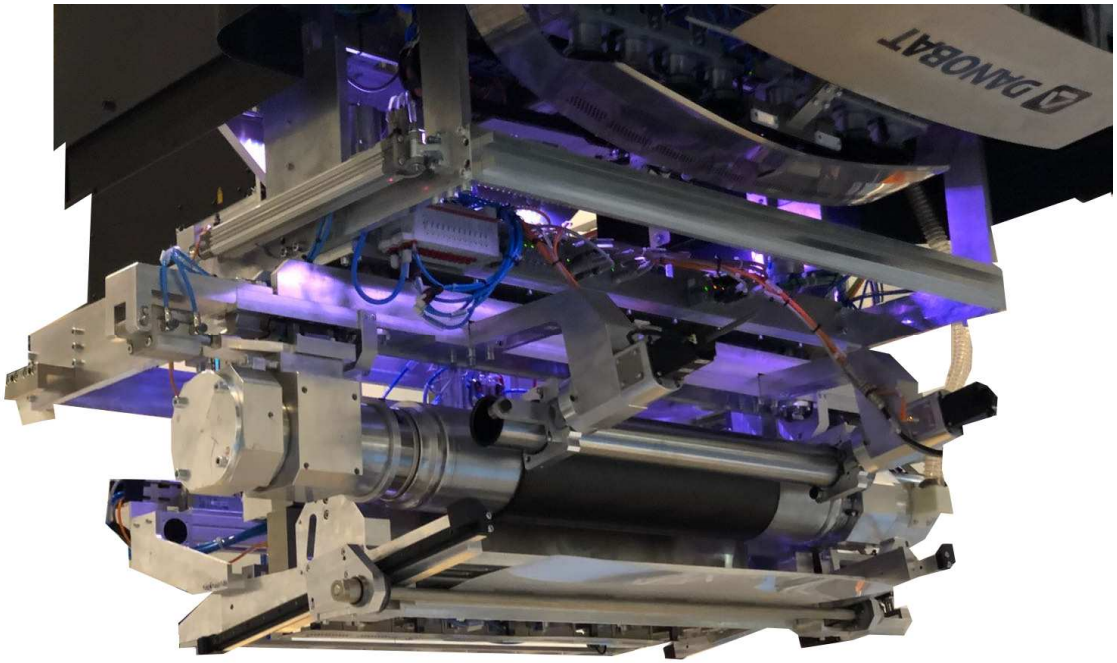
DANOBAT is working on a new **Roll & Place** concept based on the ADMP® Technology.





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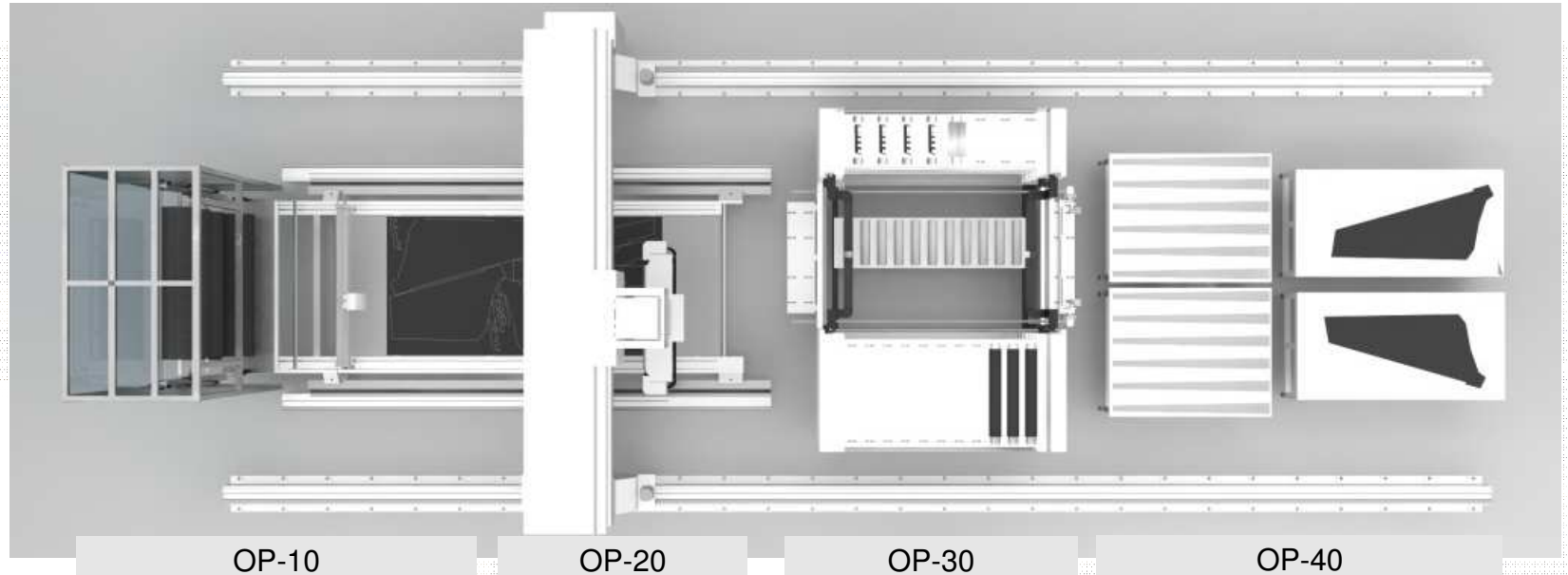

OP-10 cutting	OP-20 rolling	OP-30 storage	OP-40 3D layup

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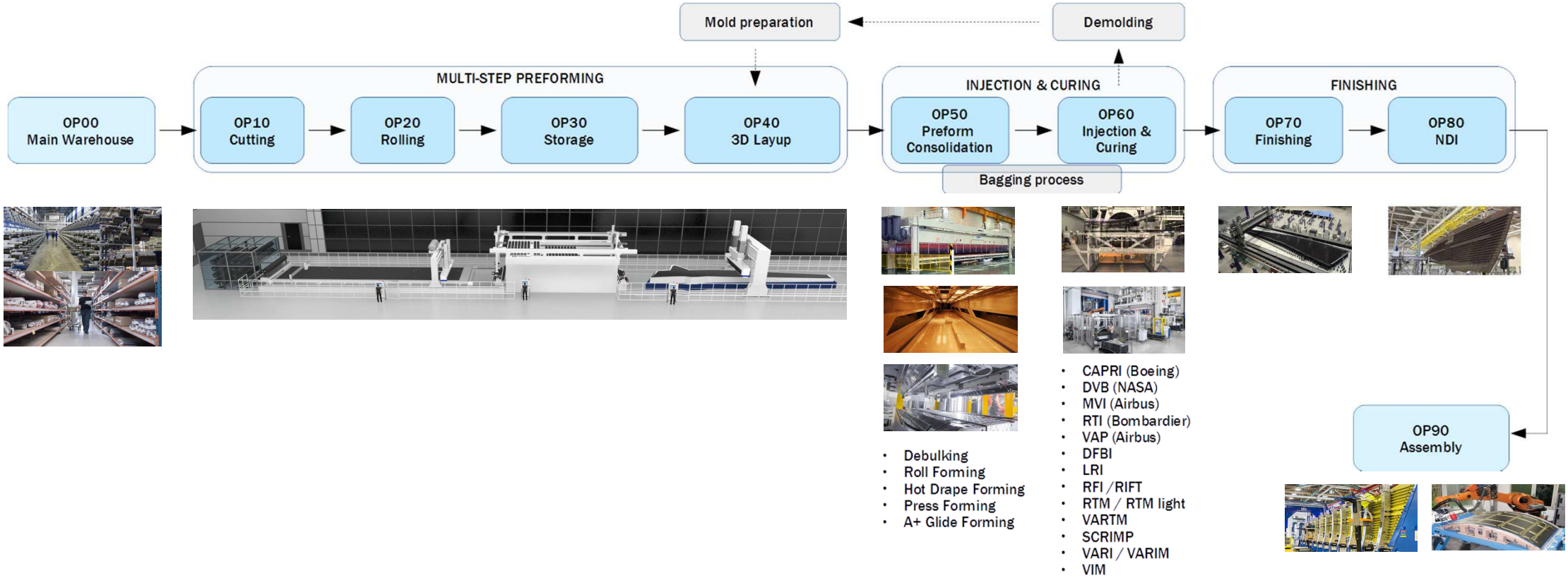

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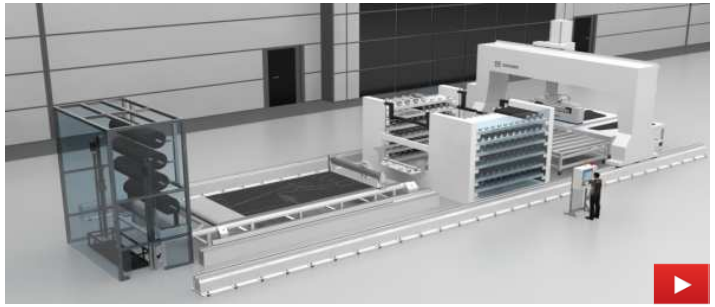
PAST & PRESENT
of
Dry Material Placement



FUTURE
of
Dry Material Placement

Brief summary of what we just discussed before.

- Single aisle forecast trend, requires **higher production rates with faster ramp ups, while reducing manufacturing cost** considerably.
- **DRY MULTIAXIAL** processes are catching attention due to capabilities of fast layup method, OoA processing combined with reduced storing cost.
- **ADMP® Technology** offers a credible method for automating the production of aircraft components with **DRY MULTIAXIAL**.
- A flexible and lean turn-key **Roll & Place concept**, including cutting, rolling, roll storage and layup operations has been proposed.
- **ADMP® Technology** is a potential game changer for the aerospace manufacturing of the future, allowing automating not only flyable materials but also ancillaries, helping improving time and process repeatability.

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