



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



Automated Dry Preform Manufacturing

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Business Development, Composites Division, DANOBAT

DANOBAT S.Coop.



COOPERATIVE. 100% employee owned

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

		MONDRAGON SUSTAINABILITY IN ACTION	FRONT INDUSTRY RESEARCH KNOWLEDGE	
 Turnover	11.368 M of €	269 M of €		
 Personnel	74.335 people	1.300 people		
 Export	71%	91%		



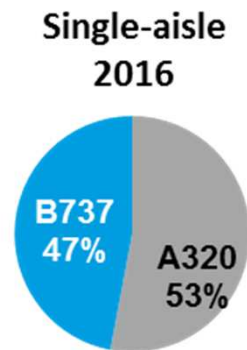
DANOBAT identified a tendency / need in the Aerospace market, where Dry Multiaxials could be of interest:

Golf



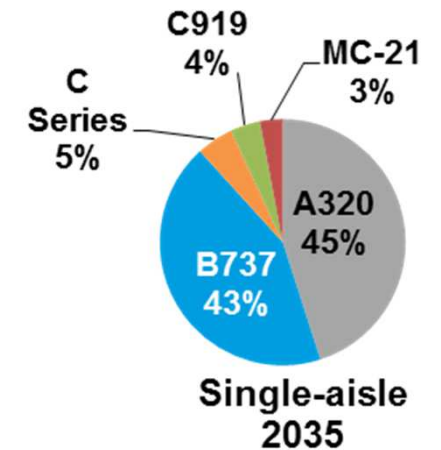
DANOBAT identified a tendency / need in the Aerospace market, where Dry Multiaxials could be of interest:

PRESENT



45 airplanes/month

FUTURE



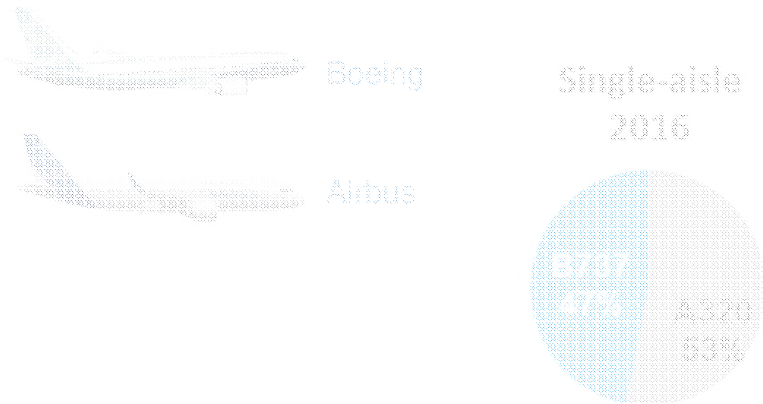
> 60 airplanes/month

Source: Flight Fleet Forecast (Flightglobal)

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

PRESENT

FUTURE



45 airplanes/month



- HIGHER PRODUCTION RATE
- FASTER RAMP UP
- MAYOR COST REDUCTION

> 60 airplanes/month

Sources: Flight Fleet Forecast (Flightglobal)

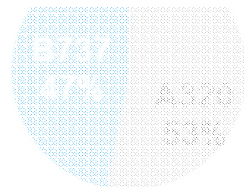
DANOBAT identified a tendency / need in the Aerospace market, where Dry Multiaxials could be of interest:

PRESENT

FUTURE

INCREMENTAL IMPROVEMENT of current production technologies:

- Metal
- Pre-Preg



45 airplanes/month

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)

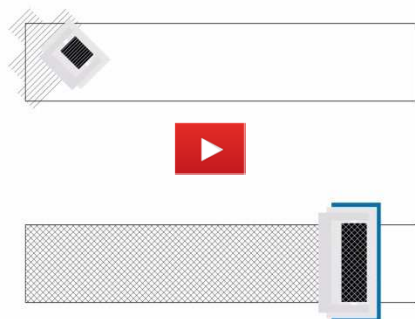


HIGH DEPOSITION RATE

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

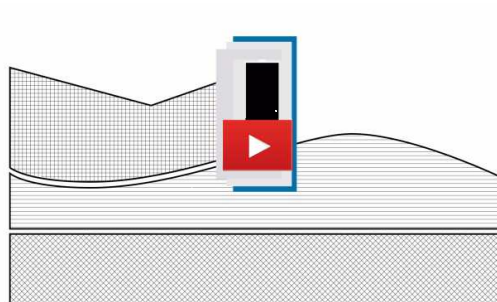


PRECISION

Equivalent to current pre-preg machines

ACCURATE deposition without multiaxial distortion:

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



WIDE RANGE OF MATERIALS (size & type)

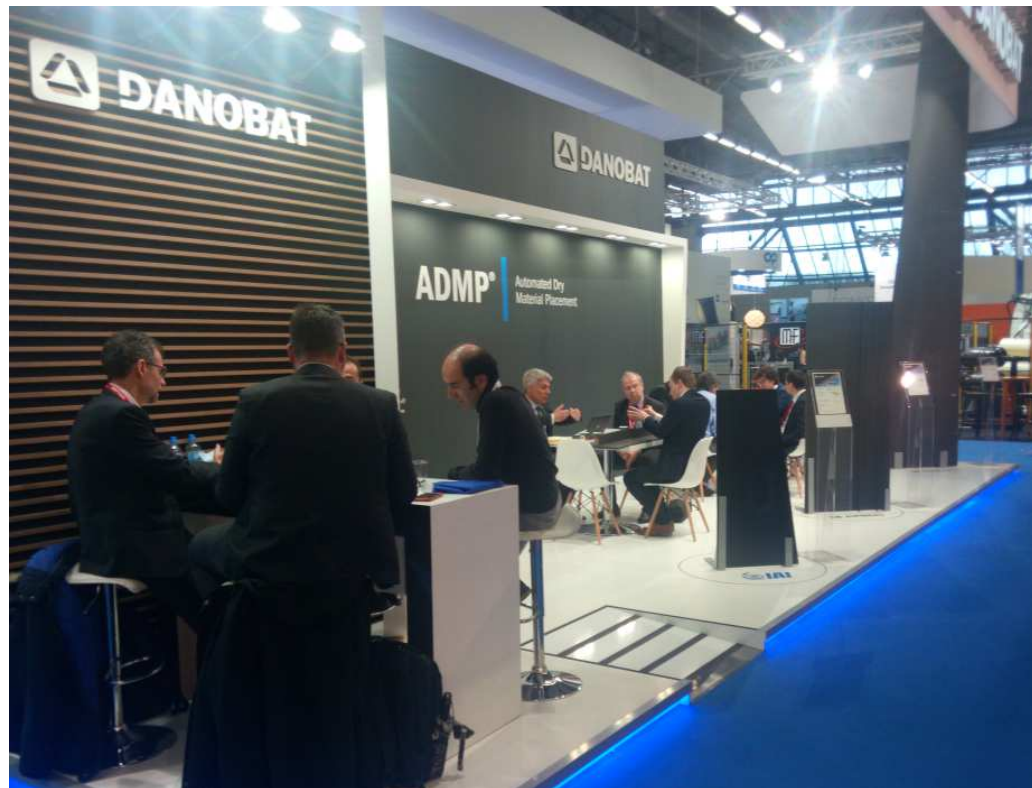
Seamless versatility in material handling

OPTIMIZED material use:

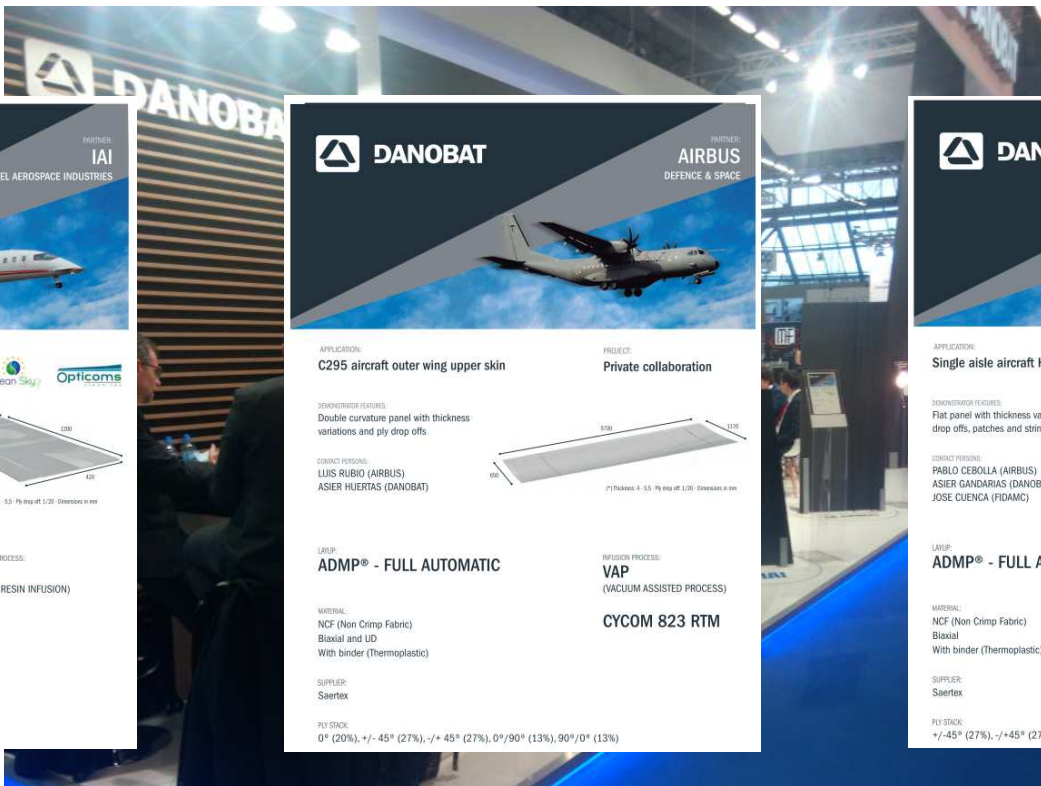
- Automated roll changing system
- Quickly loaded onto the machine
- BtF and load optimization by means of materials on different formats

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 length	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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DANOBAT PARTNER: **IAI**
ISRAEL AEROSPACE INDUSTRIES




APPLICATION: **Business jet wingbox**

PROJECT: **CLEAN SKY 2 (EU) OPTICOMS**



INFORMATION FEATURES:
Flat panel with thickness variations, ply drop offs, patches and 3D features



CONTACT PERSONS:
ARNOLD NATHAN (IAI)
PEIO OLASKOAGA (DANOBAT)

LAYER: **ADMP® - FULL AUTOMATIC**


INFUSION PROCESS: **LRI (LIQUID RESIN INFUSION)**

MATERIAL:
NCF (Non Crimp Fabric)
Biaxial and UD
With binder (Thermoplastic)

SUPPLIER:
Saertex

PLY STACK:
0° (50%), +/- 45° (20%), -/+ 45° (20%), 90° (10%)


DANOBAT PARTNER: **AIRBUS**
DEFENCE & SPACE



APPLICATION: **C295 aircraft outer wing upper skin**

PROJECT: **Private collaboration**

INFORMATION FEATURES:
Double curvature panel with thickness variations and ply drop offs



CONTACT PERSONS:
LUIS RUBIO (AIRBUS)
ASIER HUERTAS (DANOBAT)

LAYER: **ADMP® - FULL AUTOMATIC**


INFUSION PROCESS: **VAP (VACUUM ASSISTED PROCESS)**

MATERIAL:
NCF (Non Crimp Fabric)
Biaxial and UD
With binder (Thermoplastic)

SUPPLIER:
Saertex

PLY STACK:
0° (20%), +/- 45° (27%), -/+ 45° (27%), 0°/90° (13%), 90°/0° (13%)

DANOBAT PARTNER: **AIRBUS**

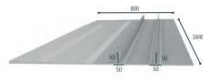


APPLICATION: **Single aisle aircraft HTP**

PROJECT: **CIEN (CDTI) FACTORIA**



INFORMATION FEATURES:
Flat panel with thickness variations, ply drop offs, patches and stringers integrated



CONTACT PERSONS:
PABLO CEBOLLA (AIRBUS)
ASIER GANDARIAS (DANOBAT)
JOSE CUENCA (FIDAMC)

LAYER: **ADMP® - FULL AUTOMATIC**

INFUSION PROCESS: **VAP (VACUUM ASSISTED PROCESS)**

MATERIAL:
NCF (Non Crimp Fabric)
Biaxial
With binder (Thermoplastic)

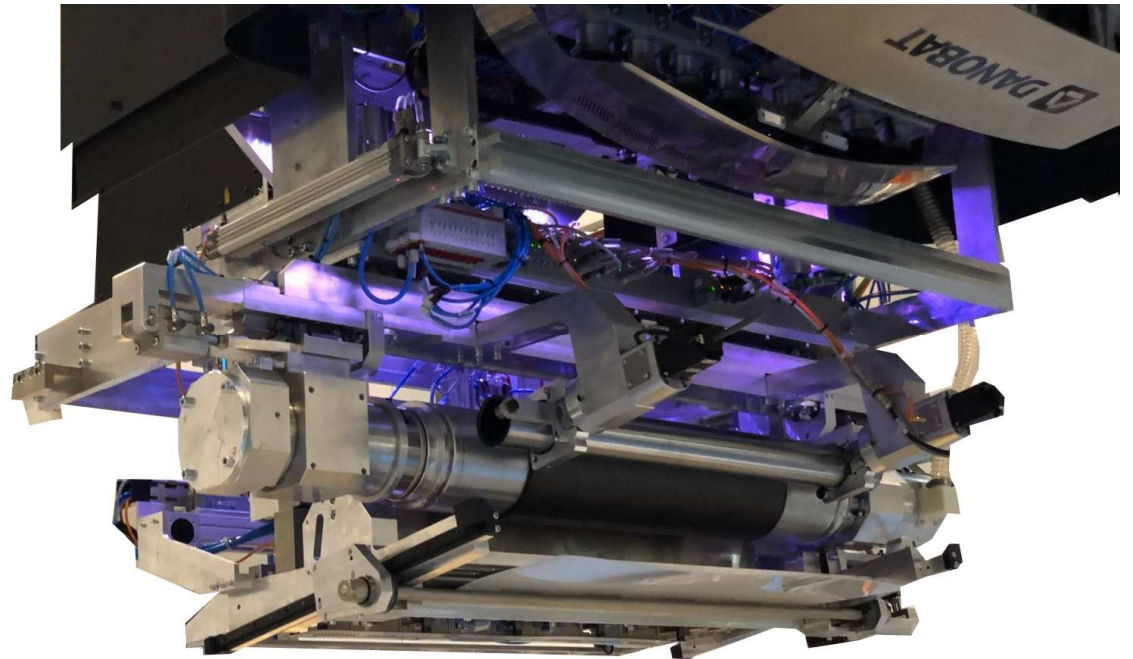
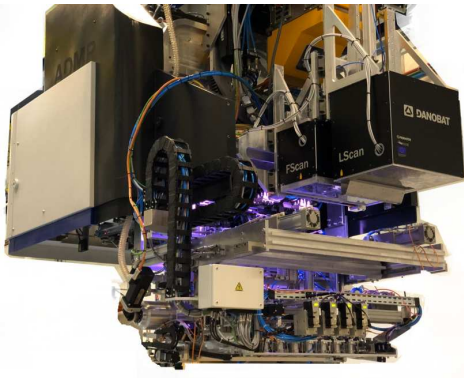
SUPPLIER:
Saertex

PLY STACK:
+/-45° (27%), -/+45° (27%), 0°/90° (23%), 90°/0° (23%)

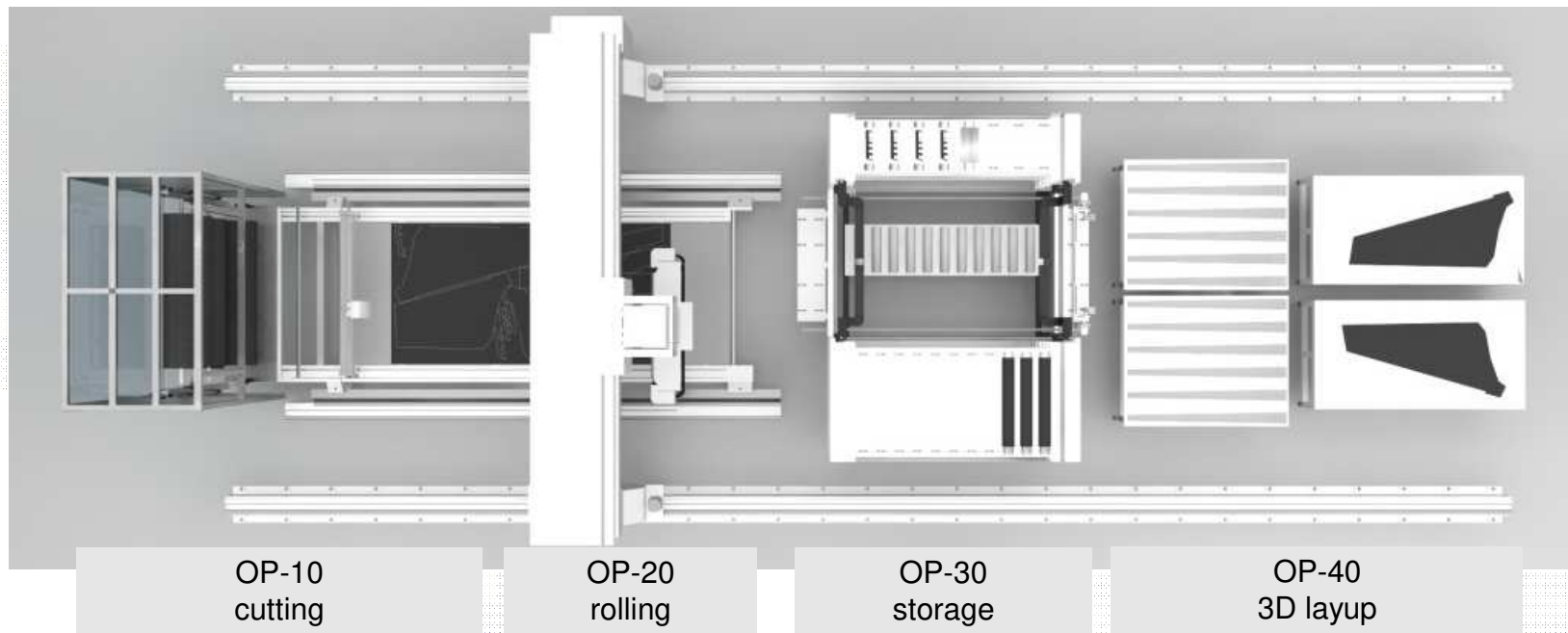
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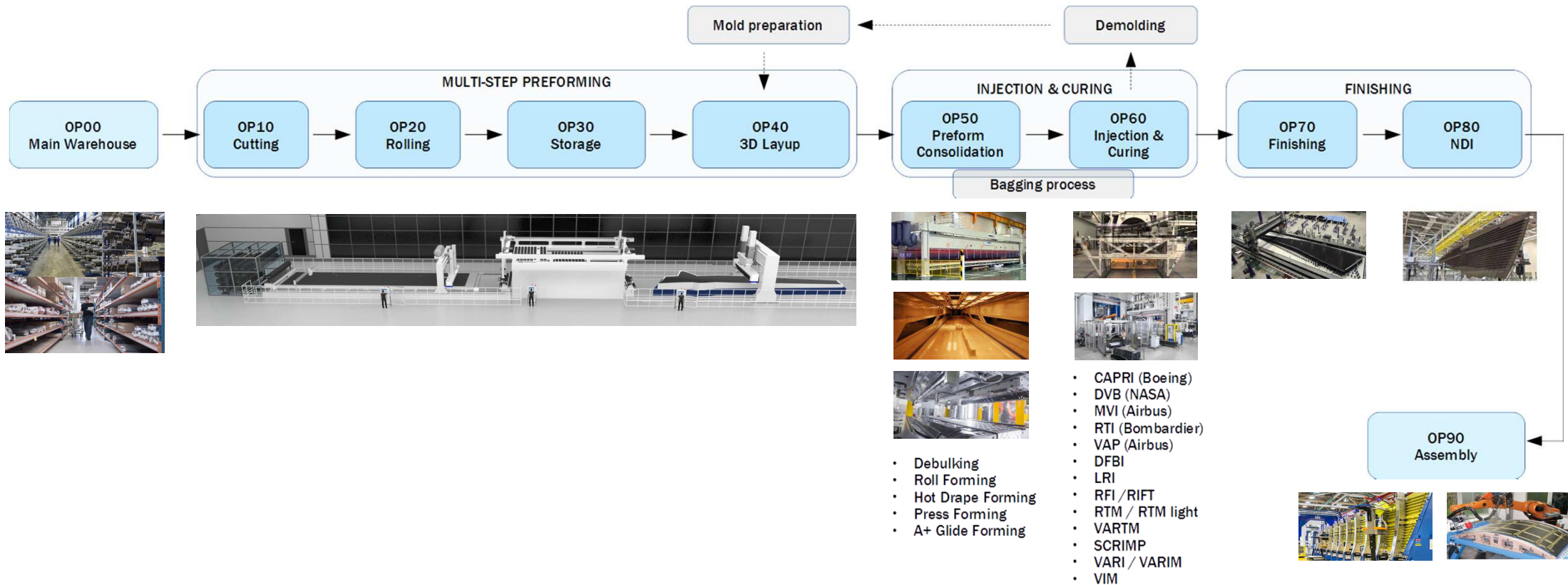
DANOBAT is working on a new **Roll & Place** concept based on the ADMP® Technology.



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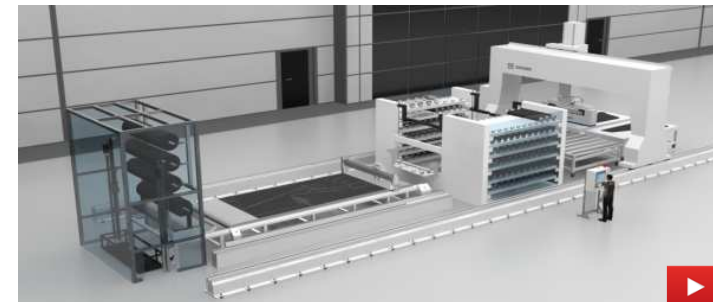
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PAST & PRESENT
of
Dry Material Placement



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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