



WORLD COMPOSITES WEEK

27TH OF MAY 2021

HAICoPAS

Highly Automatized Integrated Composites for Performing Adaptable Structures



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Highly Automatized Integrated Composites for Performing Adaptable Structures



Context and challenges

Composites in transportation

- - 50% in weight with composite (A350)
 - Integrated in cars (Prius, i3, BMW série 7xx...)
- **light weight, fatigue resistance, no corrosion...**

Other potential applications

- Oil & Gas: flexibles for deep offshore applications
- Space: Propergols tanks
- Military applications

Hexcel preferred supplier

- Composites in A350 (50% of the AC, incl. structure), exclusive supplier
- serie 7xx BMW



Courtesy of Technip



But...

Thermosets (TS):

- The production rates do not allow us to respond to larger markets (mass-produced vehicles, single-aisle aircraft, etc.)
- **No recycling**

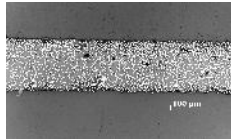
Need to develop new **thermoplastic composite** materials and associated **processes** to increase throughput while respecting **cost** and **environmental constraints**

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- 4 years PSPC project (2019-2023), partially funded by French government
 - Optimize **UD tape design** and **manufacturing process** for highly productive, cost competitive, composite part production
Target : OoA / in-situ consolidation
 - Develop highly productive **UD tape placement technology** and a new system providing the ability to assemble final parts by **welding** with **on-line quality control**
 - New technology from **Arkema / Institut de Soudure** : Innovative solution for **Welding** independently of Lightning Strike Protection, thickness change, etc.



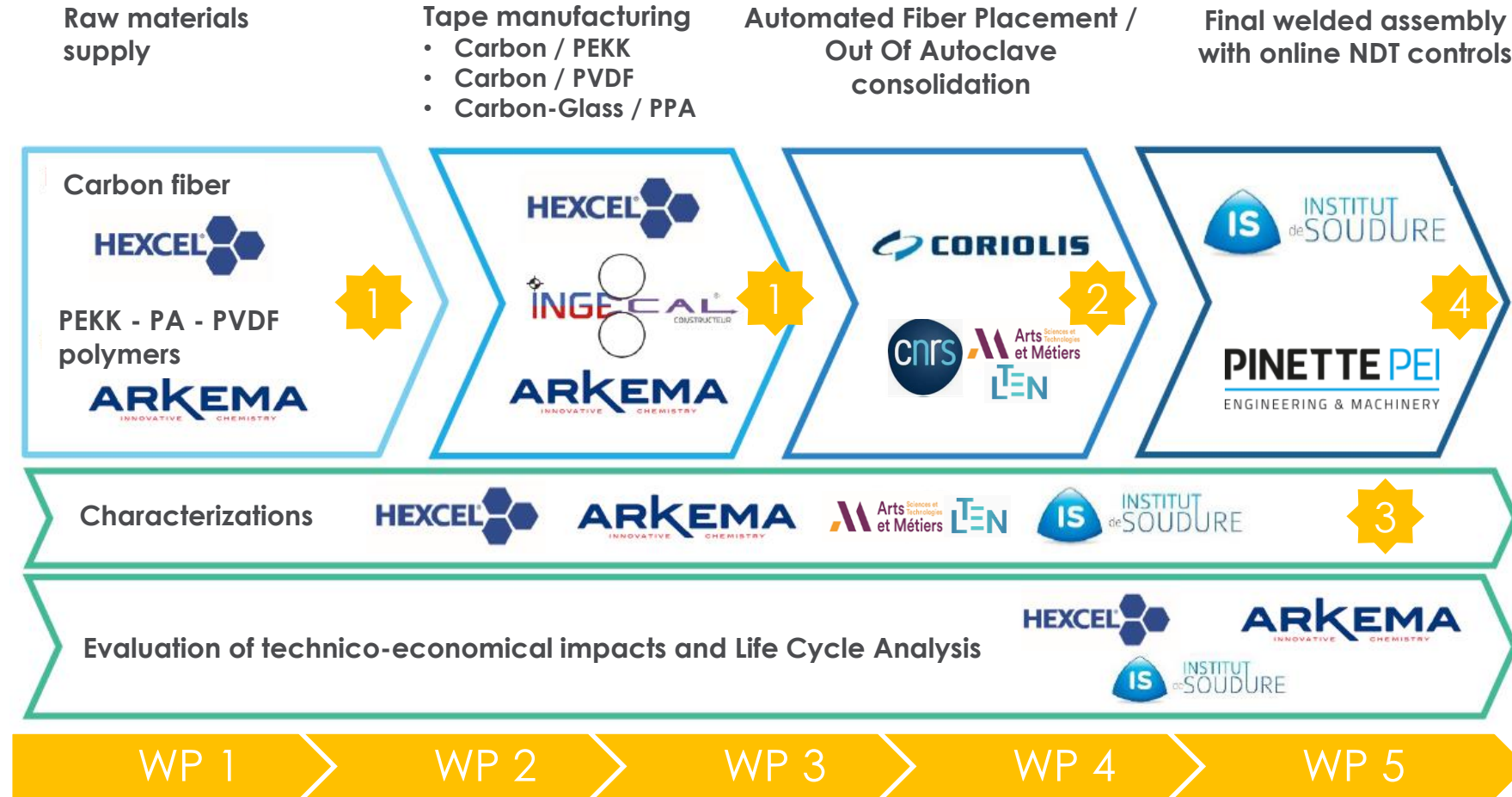
New material & process valuable chain offering light-weight composite solutions

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Collaborative and industrial approach



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Main achievements after 2 years of R&D

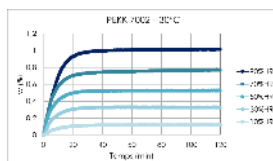
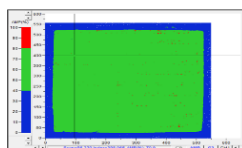
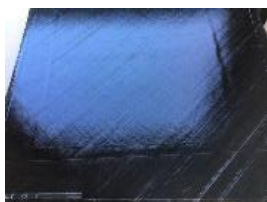
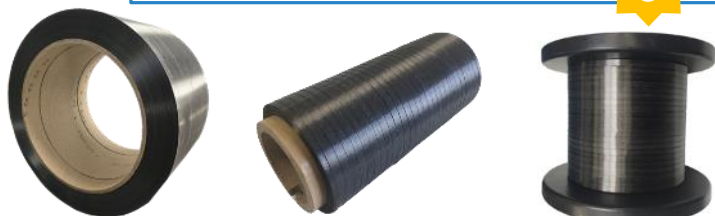


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High Performances TP C/UD tapes manufacturing

- ➔ Impregnation lines running (PEKK – PAHT – PVDF) **1**
- ➔ C/PEKK UD tapes (HLU, ATL, AFP) available with mechanical characterizations in line with market expectations **3**

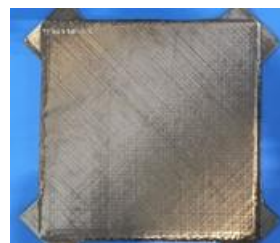
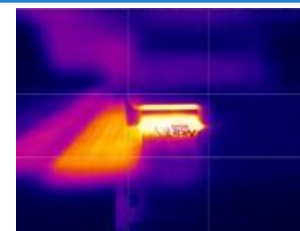


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Out of Autoclave Consolidation with In-Situ final target **2**

- ➔ Adaptation AFP technologies to targeted applications
- ➔ Process Optimization to reach OoA consolidation
- ➔ High rate deposition in line with expected production rates

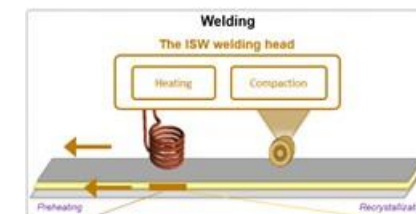


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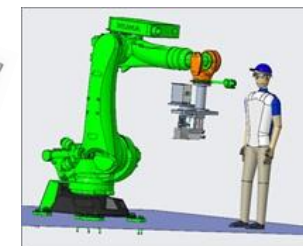
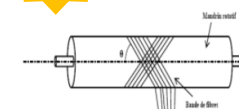


Final Welded assembly

- ➔ Study of welded interface behavior and characterizations
- ➔ ISW Process development
- ➔ ONLINE Quality Controls
- ➔ Certification **4**



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bpi france



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« Intermediate » Demonstrator



Thermoplastic Stiffened panel demonstrator

Manufactured with HEXCEL UD tape : PEKK / 34% / UD194 / AS7

- Skin with integrated Lightning Strike Protection consolidated at Compositadour
- Z stiffeners pultruded at Hutchinson with courtesy of Airbus
- Welding of skin and stiffeners with ISW technology developed by Institut de Soudure/ARKEMA

Logos: ARKEMA, HEXCEL, HUTCHINSON, COMPOSITADOUR, IS INSTITUT de SOUDURE GROUPE, HEXCEL

