



CENTRE NATIONAL D'ÉTUDES SPATIALES



RESCOLL

Research Company

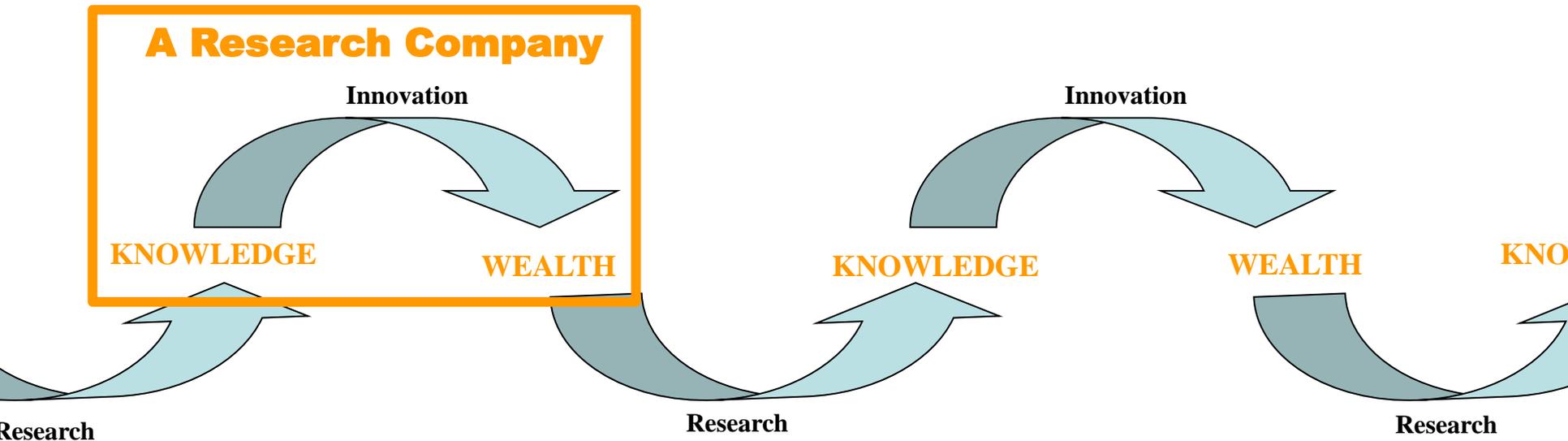
Leading to competitiveness through
innovation in materials and processes



RESCOLL

A Research Company ?

What is-it?





Market Segments

55%



ASD

15%



Health

10%



Energy

20%



Others



Rescoll is:

A service company performing

- **R&D**
- **manufacturing**
- **analysis and characterisation**

to support the industry with competitive innovation



**RESCOLL is a French Private SME,
Aerospace Valley founder member**



RESCOLL
Centre Technologique

RESCOLL in figures:

6,5 M€

Turnover

1,5 M€

of investment/year

80

Ing & Techniciens

4 000 m²

facilities

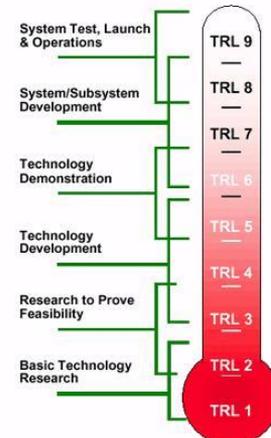
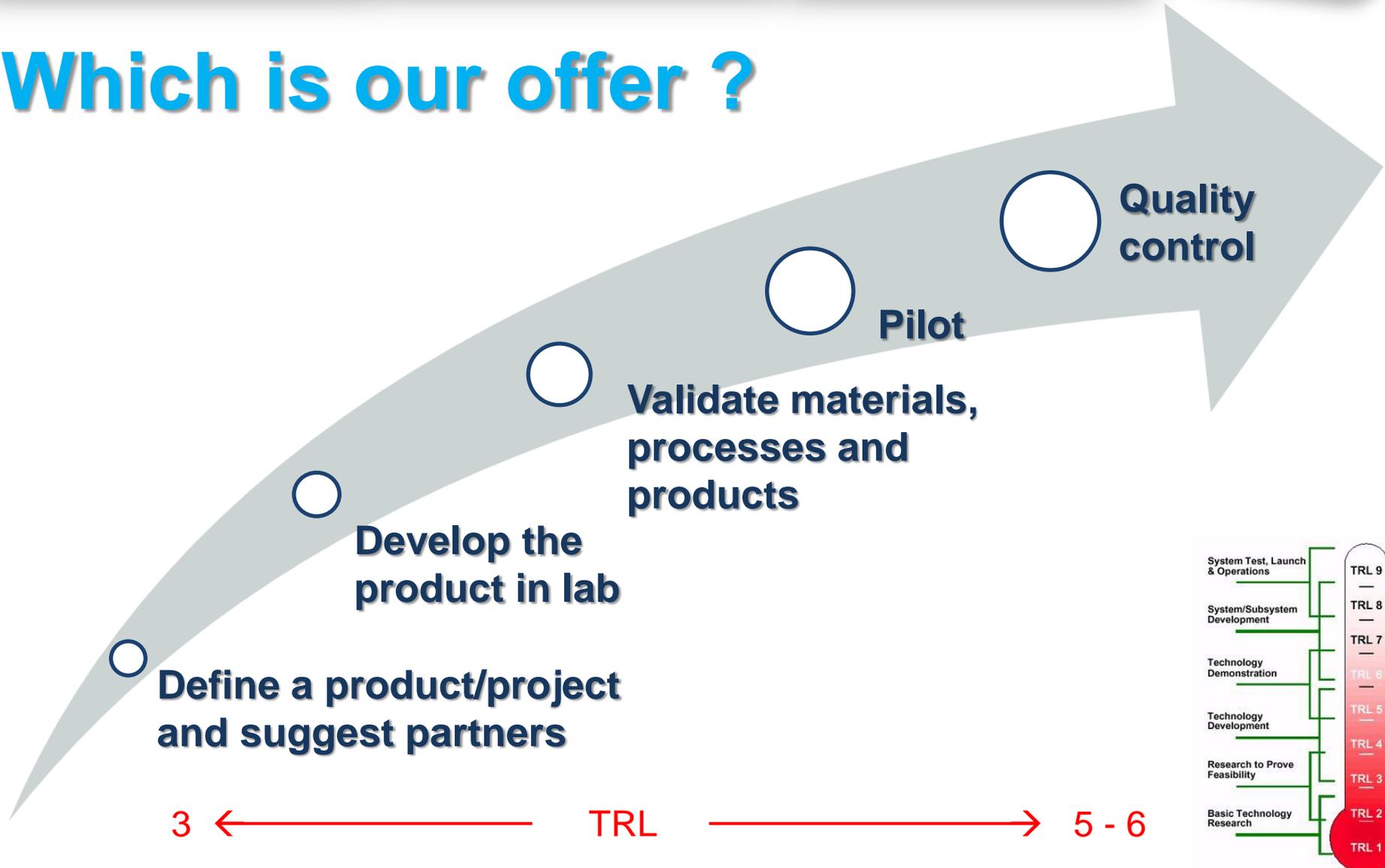
20 %

annual growth since 5 years

RESCOLL is viable: G3++ quotation of the Bank of France



Which is our offer ?



RESCOLL



A quality insurance



BUREAU VERITAS
DS/EN ISO 13485:2003



Gulfstream™

RESCOLL is

Accredited :

- ISO 17025 (# 1-1995; for Analysis and Characterisation)
- NADCAP “*Non Metallic Materials Testing*”
- ISO 17020 (#3-1004; for Environmental Technology Verification ETV)

Certified :

- ISO 9001 (all activities)
- ISO 13485 (for MD manufacturing)

Qualified :

- AIRBUS
- SAFRAN
- GE,...



Market Characteristics

RESROLL is working mainly in markets:

- Asking for high added value
- Regulated, with high entry barriers
- Dynamic

But also:

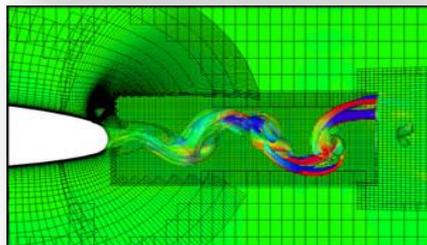
- Crosslinking different markets
- Transfer high level technologies to mass markets

Key Competencies in R&D



- * **Synthesis** of polymer and functionalised elements (e.g. PANI, adhesion precursors, grafting of active principles....) and nanostructured coatings (mainly sol-gel technologies)
- * **Formulation** of adhesives, coatings and thermoset polymers as epoxy, PU, acrylics... and thermoplastics for TP-ALM and new composites (PEEK,...)
- * **Functionalization** of polymers (e.g. corrosion protection, flame behaviour, electrical or thermal conductivity,...)
- * **Green technologies** : biobased products, recycling, LCA,...
- * Prototype, Handling (TP-ALM,...) and **processing**
- * **Regulatory issues** related to the application (ITAR, REACH, ROHS, ETV,...)

RESCOLL's Activities in ASD



- **Weight Saving** (e.g. composites, assemblies, multi-functionality ...)
- **Technical composites** (thermal and/or electrical conductivity, biobased products,...)
- **Assembling by adhesives** (low outgassing, INDAR process,...)
- **Advance coatings** (multi-functionality, mainly based on Sol-Gel chemistry)
- **Green Materials** (biobased materials, recycling, LCA,...)

Involved in:

- several R&D grants with CNES, AIRBUS, SAFRAN, THALES, DASSAULT AVIATION...
- the testing program of A350

Material development: Coatings



- **Adhesion primers (eg silane)**
 - R&D and production for a Prime Contractor
 - R&D on silane primers for CNES

- **Cr free anti-corrosion primers**



- **Electrically conductive paints** (de-icing, IEM shielding, anti-static, ...)

- **OSR coatings**

Phd in collaboration with CNES: Élaboration de nouveaux revêtements de contrôle thermique pour applications spatiales

(<http://www.theses.fr/2011BOR14330>)

- **Surface activation**

- Laser
- Plasma (atm, vacuum)



Material development: Adhesives

- **Vibration damping adhesives**

R&D with Metravib DMA+150

- **e&T conductive structural adhesives**

eg: eT Bond National Project (end users: AIRBUS DS, THALES)

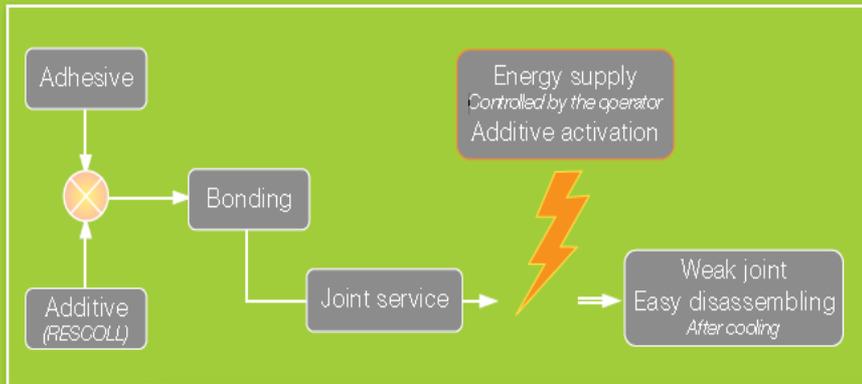


| | Raw adhesive | Rescoll Metal based Adhesive tech | Rescoll Cabon based Adhesive tech | Rescoll <u>Ceramic</u> based Adhesive tech |
|-------------------------|--------------|-----------------------------------|-----------------------------------|--|
| Thermal conductivity | 0,2 W/m.K | Up to 4 W/m.K | Up to 4 W/m.K | Up to 4 W/m.K |
| Electrical conductivity | insulative | Up to 10 ^{E5} S/m | Up to 1 – 10 S/m | Insulative |

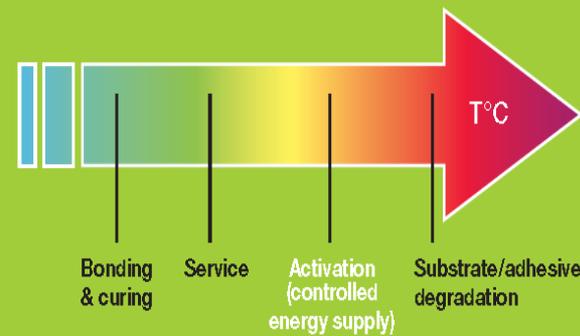
Material development: Adhesives

- **Debonding on command**

- *Patented process for dismantling of an adhesive joint*



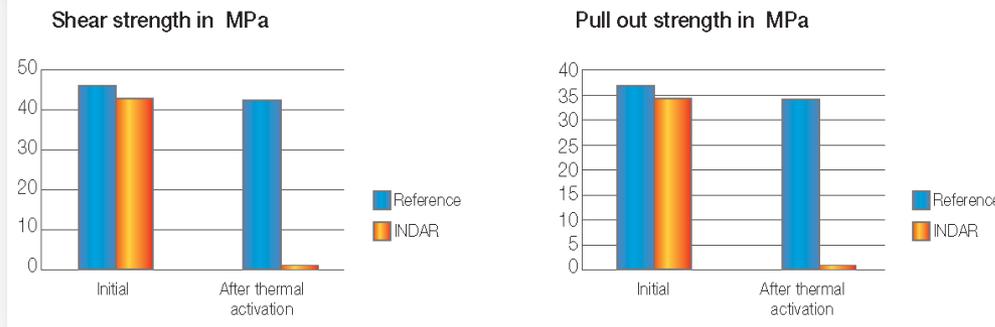
- *Activation temperature tuned to the bonding specifications*



3 activation temperatures available



Ceramic bonded on metal alloy with 2K epoxy (industrial reference modified with INDAR)



- **3 Temperature ranges**
- **Compliant with various adhesive types**

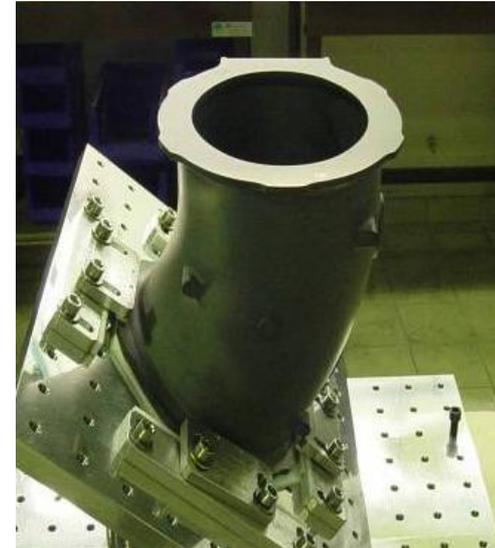
Patented by RESCOLL

Material development: Adhesives

- **Debonding on command**
Eg: Proof testing of Gaia Telescope SiC Torus



Thermal
activation of the
bonded system



Material development: Composites



- **e&T conductive composite materials**

Eg: PEEK/carbon processed by extrusion



- **Composite for oxygen and hydrogen containers**

- Base plate bonding and surface preparation
- Liner bonding
- Manufacturing of envelope prototypes by filament winding

- **Equipments**

- Autoclave (450°C/15bars/2x1m)
- Robot (6 axes) for wet and dry processing by filament winding
- Infusion bench
- Hot press (300°C/30kN-600kN/40x40cm)
- Cold room (storage of resins and prepregs at -27°C)
- Lab scale extruder (mono&twin screw) and lab scale injection machine





CENTRE NATIONAL D'ÉTUDES SPATIALES

RESCOLL : Company Research for materials dedicated to Space



**For further
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THANK YOU

