ADRYANS® V5.0

1-dimension object oriented survivability tool

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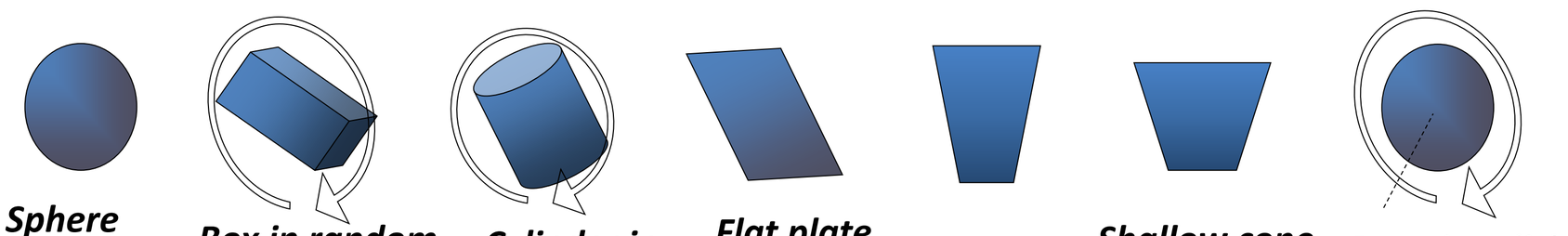
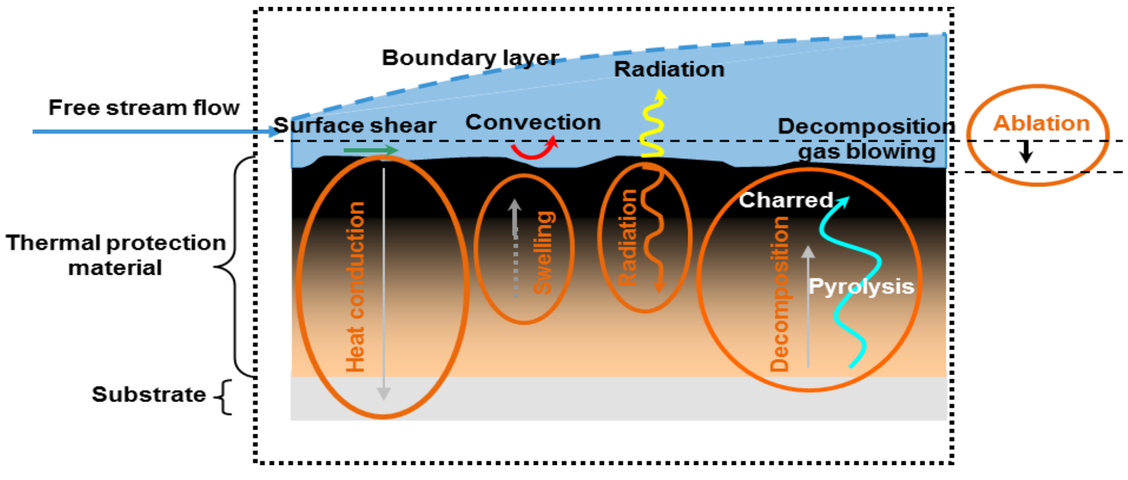
ADRYANS® V5.0 is a fast computer software that computes the survivability of space debris during their atmospheric reentry. Such approach allows for rapid computation of aerothermal heat fluxes and thermal responses on simple shapes like spheres, cylinders, boxes, cones or flat plates.



<u>New version 5.0 is now capable of:</u>

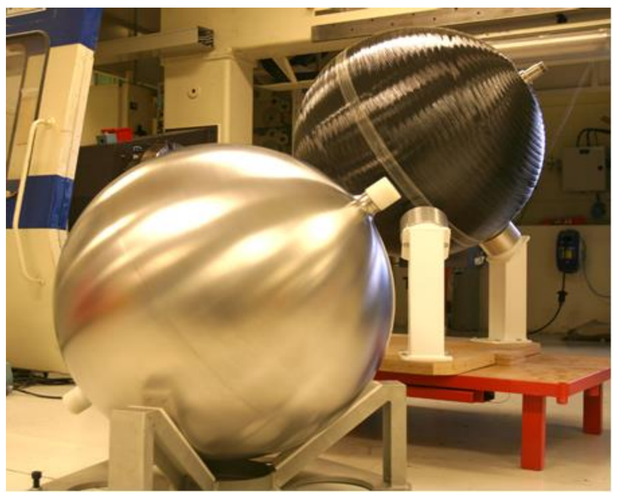
- **1-dimensional thermal model**
- **Composite materials and stack of different materials**
- **chemical simulation such as oxidation on external surface**
- **ablation responses on metallic and composite materials**
- **pyrolysis of composite materials**



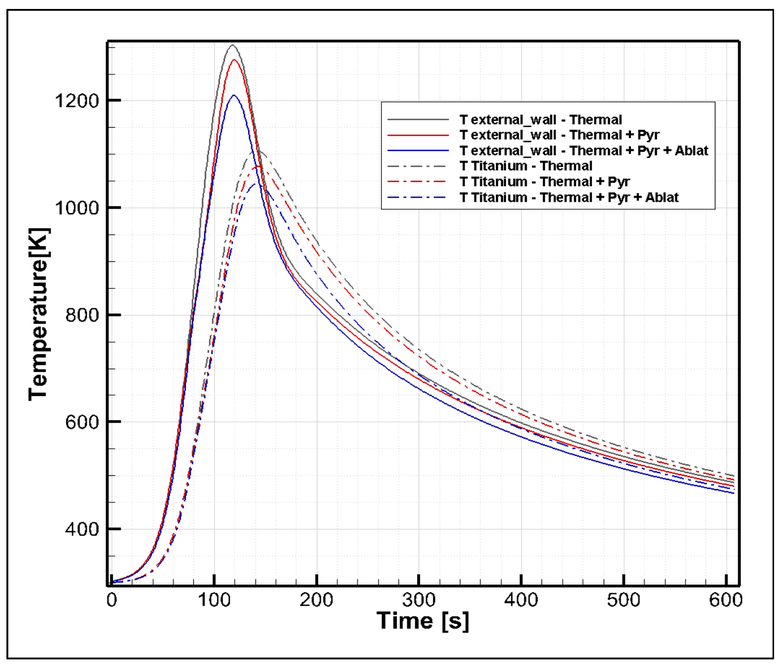
It has been developed at Airbus Safran Launchers co-funded by the French Space Agency CNES. The following test case focuses on the survivability of common materials present on the Ariane 5 and future Ariane 6 launcher family.

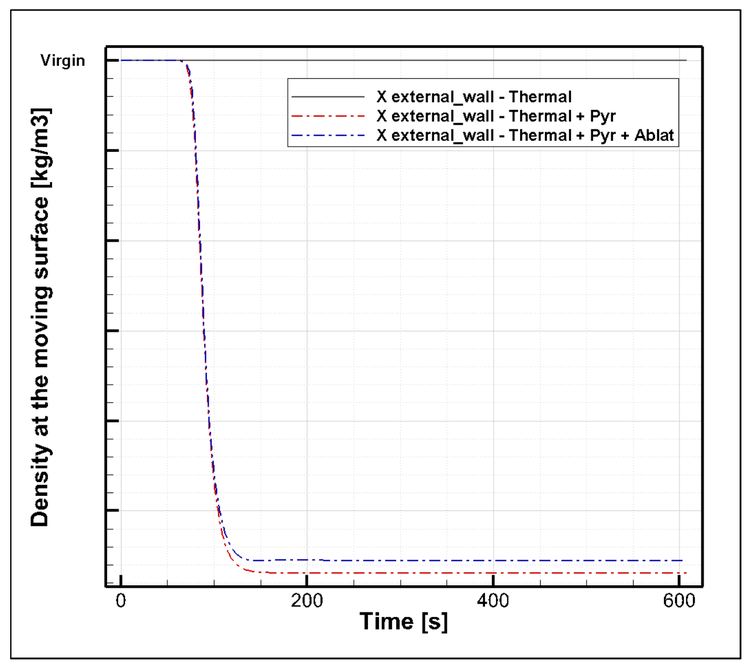
<u>Spherical tank test case</u>

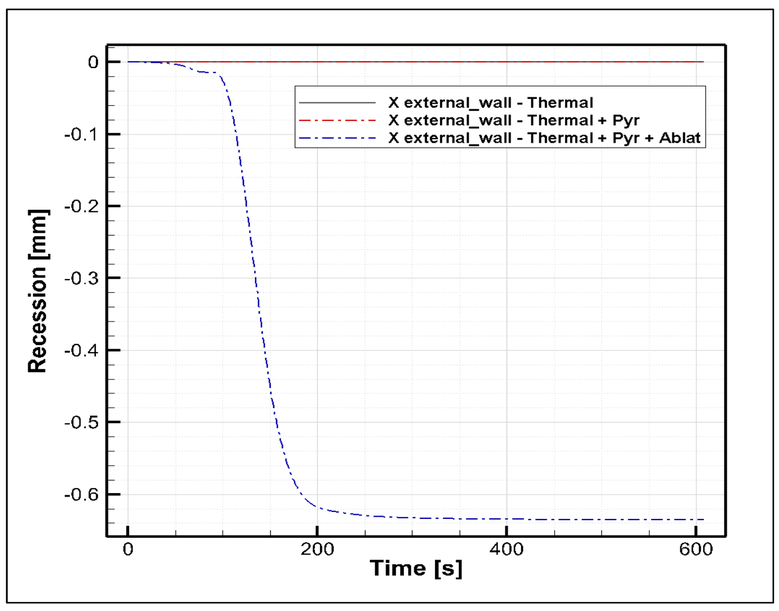
Ariane 5 ‘s 300L Helium spherical tank. Details of the design and the composition of the structure are presented hereafter:

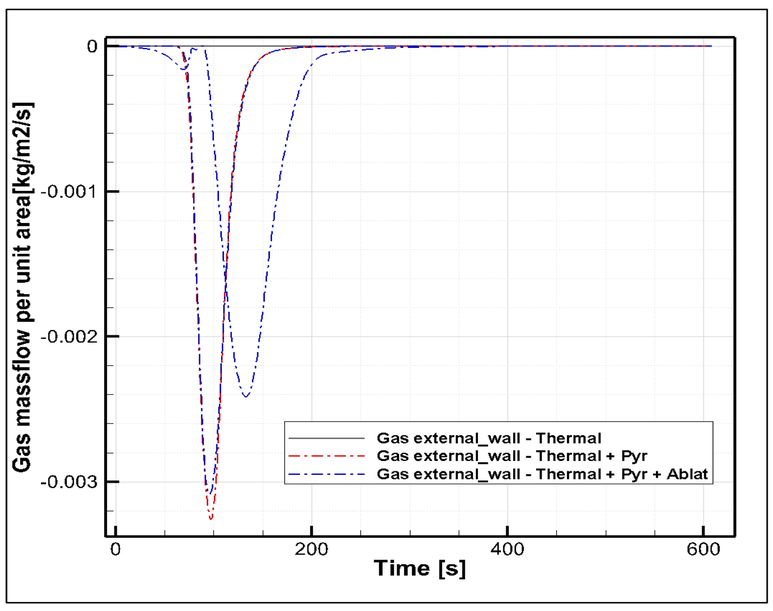


- <u>Reentry velocity at 120km:</u> 7600 m/s
- <u>Radius:</u> ~400 mm
- <u>Thickness and materials:</u> ~2 mm of Titanium, ~20 mm of wrapped carbon fibers, and ~1 mm of fiber glass between the liner and the overwrapped composite.
- <u>Computation:</u> black line – only thermal, dash-dotted blue – thermal + pyrolysis, dashed-dotted red – thermal + pyrolysis + ablation









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