

A detailed illustration of the Space Shuttle Columbia in flight, angled upwards against a backdrop of a blue sky with white clouds. The shuttle is white with orange and black thermal protection tiles on the nose and wings. The main engines are visible at the rear, with a large plume of fire and smoke trailing behind it.

AMORIM TPS

Aerospace



Reinventing thermal protection

Insulation and
ablative materials

AMORIM CORK SOLUTIONS

Cork, an exceptional raw material

Cork is the outer bark of the cork oak tree (*Quercus suber* L.), the 100% natural plant tissue covering the trunk and branches.

It consists of a honeycomb-like structure of microscopic cells filled with an air-like gas and coated mainly with suberin and lignin. One cubic centimeter of cork contains about 40 million cells.

Cork is also known as “nature’s foam” due to its alveolar cellular structure. It has a closed-cell structure making it lightweight, airtight and watertight, resistant to acids, fuels and oils, and impervious to rot.

It is sustainably harvested by specialized professionals without damaging the trunk, thus enabling the tree to grow another layer of outer bark that, in time, will be re-harvested. Over the course of the cork oak tree’s life, that lasts 200 years on average, the cork may be harvested around 17 times. This means that cork is not only a natural raw material, it is also renewable and recyclable.



Cork cell microscopic view.

Elasticity



Flexibility, installation and process friendly



Vibration control



Impermeable to liquids



Chemical resistance



Thermal resistance



Shock absorption



Performance



Product Range

Characteristics		P45	P50	P65
Cork particle size	(mm)	1/2	0,5/1	0,5/1
Sheet dimension	(mm)	1270x760	1270x760	950x650
	(in.)	50x30	50x30	37x25
Density @ 20° C ^(a)	(kg/m³)	300–350	448–512	580–650
	(lb/ft³)	19–22	28–32	36.2–40.6
Tensile Strength	(psi) ^(b)	>125	>247	2.93
	(MPa) ^(b)	>0,86	>1,70	425
Elongation	(%) ^(b)	>30	>13	3
Thermal Conductivity	(Btu in)/(h ft²°F) ^(c)	0,45	0,50	0.042 ^(e)
	(W)/(m²K)	0,06	0,07	0.073 ^(e)
Specific Heat	(Btu/lb °F) ^(d)	0,6	0,5	On going
	(KJ/Kg/°K) ^(d)	2,5	2,1	
Substrates to bond		Metal and Composite		

(a) ASTM F1315 (b) ASTM F152, Method B (c) ASTM C177 (d) ASTM C351 (e) indicative value Other sheet sizes may be available.

Molded P50

More effective solution to apply P50 directly to the final shape, to thermally protect the fairing of the launcher.

Time reduction during material application



Labor saving



Customized geometry



Main advantages

Process friendly

Easily bonded to most substrate materials, using common adhesive systems. Can be trimmed and machined with regular tools or equipment. Easily covered with specific coatings or varnishes. Easily integrated on sandwiches (CFRP composites).

Custom materials

Materials are made of cork granules agglomerated with special phenolic binders that can be tailored to suit a requirement (fire-proof, anti-fungi, etc). Orders shipped worldwide from our two production sites (Europe and North America).

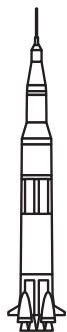
Proven technology

Our materials are used in TPS applications based in ablative heat shields in rocket applications as well as in space probes' entry heat shields. Internal thermal insulation in hot structures. Impact protection due to debris mitigation or pyrotechnic solutions, in several launch vehicles.



Success Records

Since the dawn of the space age, Amorim Cork Solutions has been supplying sheet materials or specially graded cork granules to the aerospace market worldwide.



"60's"

Scout
Mercury Spacecraft
Gemini Spacecraft
Saturn V



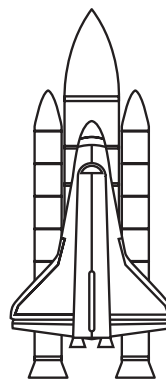
"70's"

Apollo
Ariane 1
Viking Landers



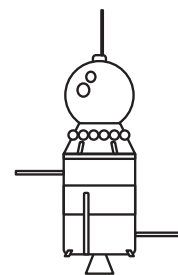
"80's"

Ariane 2
Ariane 3
Titan III



"90's"

Space Shuttle
Ariane 4
Titan IV
Pegasus XL



"Today"

Mars Rovers
Delta IV
Beagle
Pegasus XL
Ariane 5
Atlas III-A
Atlas V
Vega
Falcon 9
IXV Spacecraft

"Cork is nature's foam, a foam with unique combination of properties."

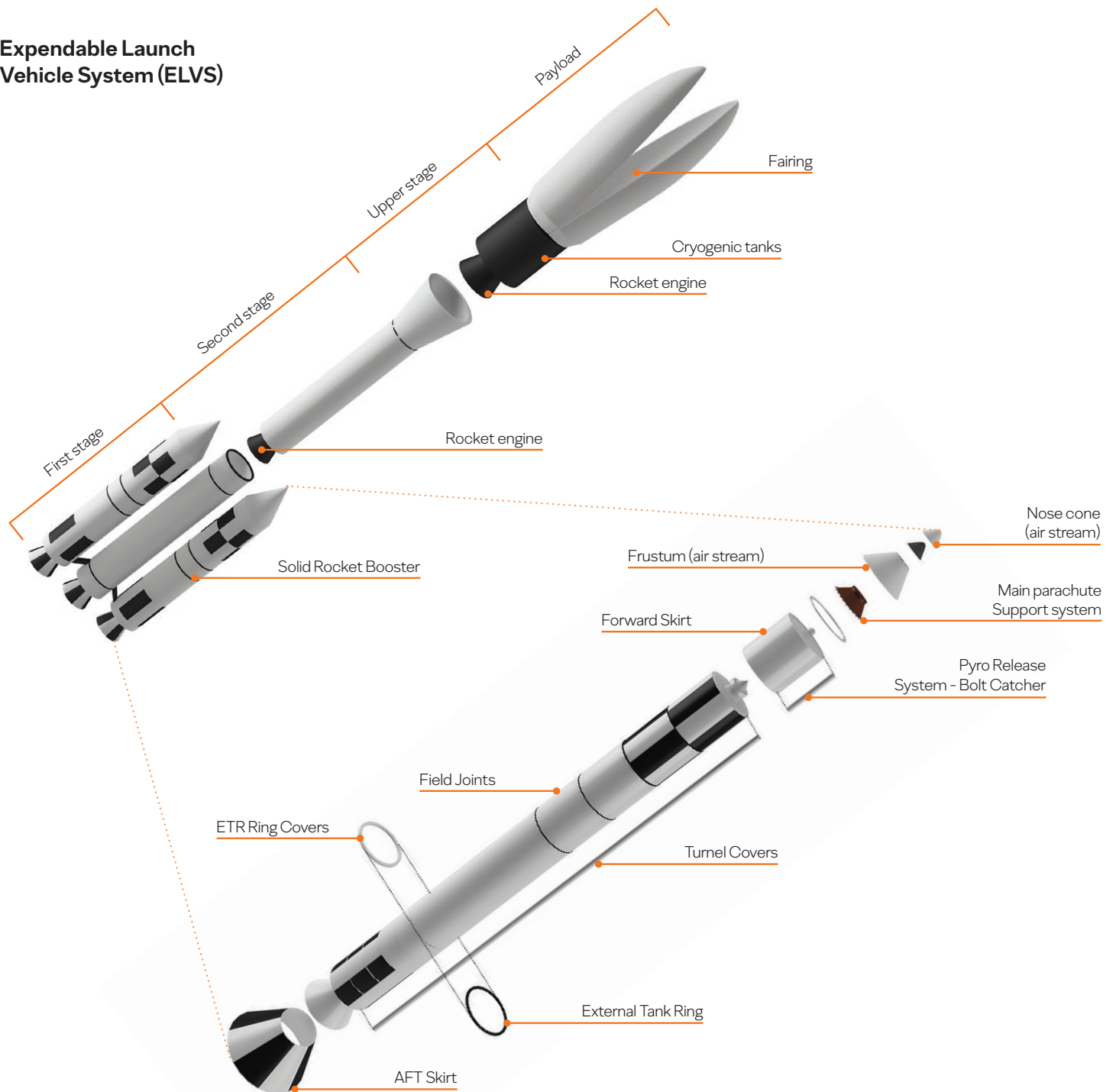
in NASA Technical Reports Server

Applications

Amorim Cork Solutions has been manufacturing and supplying cork-based materials used in Thermal Protection Systems for the Aerospace Industry since the dawn of the space age.

Our materials application portfolio ranges from Solid Rocket Boosters (SRB) to Expendable Launch Vehicle Systems (ELVS) that require thermal isolation and ablative thermal protection systems in various locations.

Expendable Launch Vehicle System (ELVS)



Solid Rocket Booster (SRB)

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