



PORTUGAL

## From the road of cork

By Junko Yoshida

**WHEN I WAS** at a farm in the Alentejo region of Portugal, I saw little connection between cork and engineering. Wrong. Cork has already taken flight – from bottle caps to aerospace. Alentejo, Portugal – I spent a week earlier this month at a farm in the Alentejo region of Portugal – the world's main source of cork. I was there to vegetate. Besides swimming at the farm's pool, working on watercolors and occasional sight-seeing, reporting wasn't in my plans.

After all, the farm's main business is growing cork oak trees. I failed to see much connection between cork and engineering.

Of course, I was wrong. Engineering, like roaches, is everywhere. When Philip Mollet, the farmer and the owner of the farm called Herdade da Maroteira, ushered several guests onto the back of his truck and showed us around his 540-hectare farm, I was reminded that cork and its composite have already taken flight – from bottle caps to aerospace.

The New York Times, back in 1981, reported that the space shuttle Columbia's huge external fuel tank was partly insulated with 497 pounds of cork. The cork used on the space shuttle came from 225 trees in Alentejo, especially set aside for the shuttle.

The advantages of cork and cork composite are clear. It's lightweight and heat-resistant. Cork burns at a uniform

speed, which helps carry heat away from the rocket while it disintegrates.

The NASA isn't alone in applying cork composites to space vehicles. EADS, European Aeronautic Defense and Space Company, leveraged materials consisting of cork particles agglomerated with phenolic resin for thermal protection systems (TPS) for atmospheric re-entry.

Further, the cork composite material could go to Mars. The European Space Agency (ESA) is considering cork for TPS in ExoMars – ESA's mission to planet Mars – scheduled in late 2013. Norcoat Liege, a special cork composite material, will be used in panels and tiles to protect both the front-shield and back-cover areas, according to a technical paper published by Joao Daniel Ramos Ricardo, at Lisbon Technical University.

### **Europeans haven't stopped dreaming of flying cork.**

Under a European Union-funded project called Aerocork, a group of companies have been developing, testing, manufacturing and certifying a new aircraft incorporating innovative cork composite.

The goal for Dyn'Aero Ibérica, a light aircraft manufacturing firm, is to build its ultra-light two- and four-seat planes from cork instead of plastic.

The first model plane was scheduled to fly late last year.

When I called Aerocork Project's manager in Portugal to check on progress, its office confirmed that the plane had not yet made its first test flight. But the person who answered the phone at the office (the engineer in charge was busy on the factory floor) reminded me that the EU project runs through the end of this year. She was confident that Aerocork's contraption would still fly.

Still, while science/engineering projects are typically prone to delay, I was a little worried about the Aerocork Project.

Cork has been used extensively for the manufacture of stoppers, floorings, and tiles. It is also used in gaskets, acoustic and thermal insulation systems, in a broad range of industries including construction, automotive and space.

But as Mollet, the owner of the farm, tells the story, today's cork industry in Portugal is still largely dependent on the traditional wine bottle stopper market – despite the reality that the wine market segment is gradually succumbing to screw-tops and synthetic corks.

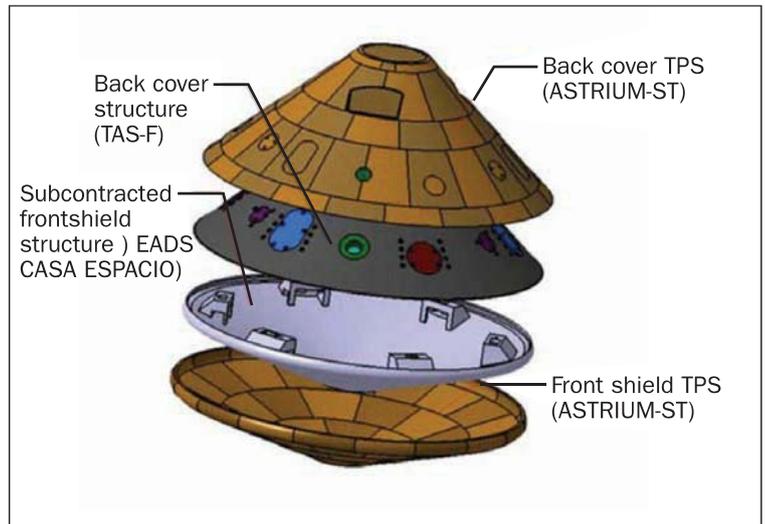
Portugal's annual output of 157,000 tons of cork is just over half the world's total.

Cork-based materials are light-weight, eco-friendly, and naturally fire-retardant. "Cork has a lot going for it," said Mollet. And yet, cork oak farms today are still in a dire need of an engineering vision to help Portugal's arid south from becoming a desert. ■



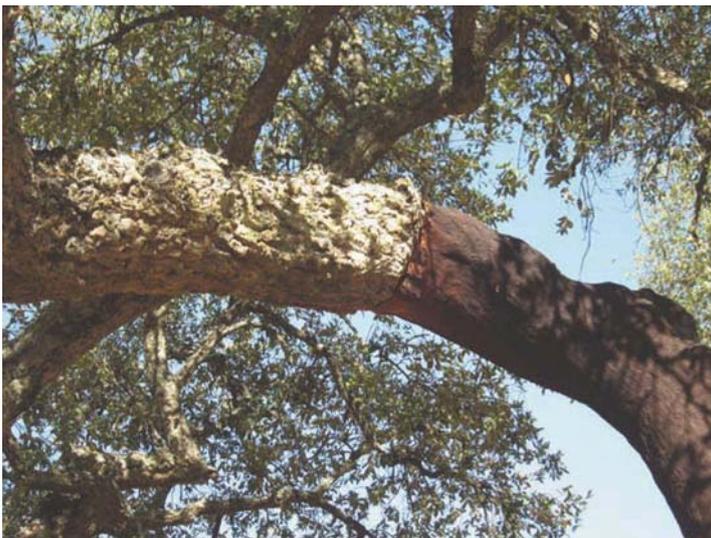
### Cork in Space Shuttle Columbia

The Space Shuttle Columbia's huge external fuel tank was partly insulated by 497 pounds of cork.



### Cork goes to Mars

The European Space Agency is considering the use of the cork composite material for ExoMas, ESA's mission. Norcoat Liege will be used in the form of panels and tiles for protecting both the front-shield and back-cover areas.



### A clear demarcation

You can see a clear line where the cork's outer bark has been stripped. Despite losing its outer skin regularly, the average cork oak lives 600 years.



### Dyn'Aero's MCR UL aircraft

Under the Aerocork project, the goal is to outfit one of Dyn'Aero's MCR UL aircraft with cork composites in its structural, safety and aesthetic applications. The demonstration flight, originally scheduled in late 2011, was delayed to this year.