

## Destroying old airliners and protecting the environment

by Christina Mackenzie

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**PARIS:** Boeing and Airbus, the rivals who dominate the aircraft manufacturing industry, do not just make planes; they break them, too. Move over Shiva, goddess of destruction. Make way for Pamela and Afra, the Process for Advanced Management of End of Life Aircraft, and the Aircraft Fleet Recycling Association.

When aircraft are too old to fly, they cannot just be crunched up like an old car into a cube of metal. Not only does a plane contain pollutants and toxins, it also has parts that can be recycled.

Airbus, which prides itself on building environmentally friendly aircraft, turned its attention in March 2005 to developing an environmentally friendly way to destroy them. It was at that time that it realized that the first planes it had rolled off its production lines, dating back to the 1970s, would soon reach

the end of their flying lives.

And so, in May 2005, Airbus started Pamela, a project to develop a decommissioning process that could dismantle aircraft from any manufacturer.

Boeing responded to the recycling challenge in June 2006 with the establishment of Afra, a network of brokers and scrap merchants that seeks to improve the way aircraft are dismantled.

Estimates of the number of aircraft that will reach the end of their life cycles over the next 20 years vary between 6,400 and 8,500, but Martin Fraissignes, chief executive of Afra, says the number could be much higher. "If the price of oil continues to rise, kerosene-greedy aircraft will be grounded earlier than originally planned," he said.

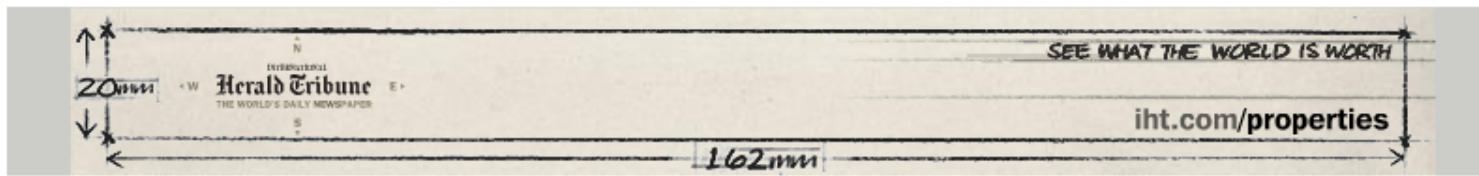
Steve Coffaro, vice president of the Evergreen

Maintenance Center in Marana, Arizona, a founding member of Afra, said that while there are no increases yet, the industry would be watching air travel over the summer vacation and decommissioning companies could see a "lot of activity in the fourth quarter of 2008."

Still, decommissioning rates could be affected by changes in end-of-life management, Coffaro said. Evergreen is currently dismantling about half as many planes as it did five years ago, but not because more aircraft are being kept in service by U.S. airlines.

"A lot of older aircraft are being sent to third-world countries," he said, which translates to fewer planes being parked or dismantled.

Jean-Luc Taupiac, who represents the Airbus stake in Tarmac Aerosave, an aircraft stocking and dismantling company in Tarbes,



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France, said that Airbus started Pamela because it wanted to see for itself what this "new world" of dismantling was about and because it was anxious to set up a certified network for second-hand Airbus parts "because a black market does exist in aircraft spares."

Olivier Malavallon, head of the Pamela project at Airbus, said that in the absence of international regulation for dismantling aircraft, many retired airplanes are simply being parked in desert lots or abandoned in airfields around the world. Once there, they can be ripped apart by raiders looking for anything with potential market value, from copper wire to electronic parts. In the process, toxins can seep out, polluting the ground.

The aim behind Pamela was to establish a standard procedure for dismantling aircraft and reusing or recycling at least 85 percent of

the initial weight.

The first stage would cover decommissioning - cleaning and decontaminating, emptying the fuel tanks and securing the plane. In stage two, equipment would be removed, parts dismantled and everything repairable or reusable would be sent back to the manufacturer's workshops.

In a third stage of deconstruction, all circuits would be emptied, dangerous or polluting materials would be removed and sent to specialized waste handlers, the carcass of the aircraft would be cut up, sorted and the pieces would be sent to specialized waste recyclers.

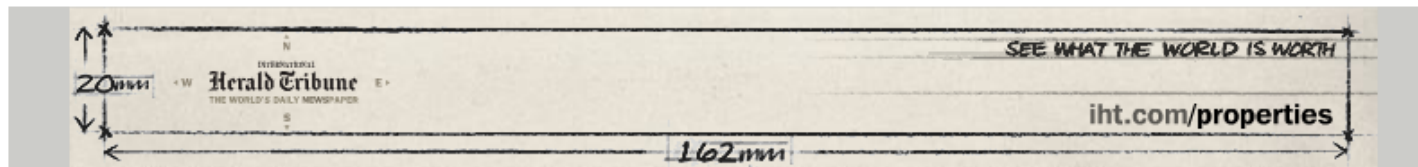
To test the process, Airbus decided to deconstruct one of its own aircraft, an A300-B5, and teamed up with partners including Sita France, a French waste management company; specialized units of the Airbus

parent company European Aeronautic Defense & Space; and the regional government of the Hautes-Pyrénées in southwest France.

The guinea-pig plane originally weighed 106,000 kilograms, or 234,000 pounds. After the full deconstruction process, it tipped the scales at a slender 13,500 kilograms. "By the end of stage one, when we had emptied the fuel, the drinking water and the soiled water we were already down to 88,000 kilograms," Malavallon said.

"We then removed the two engines, the three landing gears, the avionics, the equipment, the auxiliary power units, which could all be reused after being refurbished and recertified. That brought us down to 74,500 kilograms."

At that stage, the plane could still have been returned to service with new parts. The same was not true with what followed.



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"In stage three, we were able to recycle the fuel, the fuselage, the wings, the rudder, the wiring, the avionics and various flight systems," Malavallon said. "That brought us down to the 13,500 kilograms we could do nothing with: the cabin and cargo lining, the insulation and components, which contained soiled materials."

The decommissioning project, which has the backing of a European Union environmental program, was the first full-scale demonstration of aircraft deconstruction undertaken by an aircraft manufacturer.

"It enabled us to identify good practices for an aircraft which has reached the end of its life and provided very good lessons learned, to pass back up to the design offices so that they design airplanes that are more easily disposable," Malavallon said.

The processes thus defined will be applied by Tarmac Aerosave and will also be proposed as a norm for other dismantling centers around the world, with the aim of creating a certified international network.

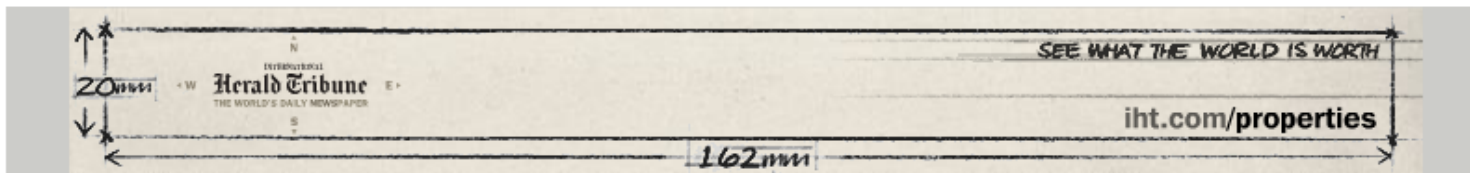
Snecma Services, which maintains and overhauls engines made by Snecma and General Electric, has used second-hand spares for years. "As long as these parts meet all the quality and safety criteria of the original engine manufacturer, then they are qualified as 'serviceable' and can be reused," said Christine Orfila, a spokeswoman for the company.

Meanwhile Afra, a nonprofit organization based in Washington, with 34 members from companies and universities in nine countries in North America, Europe and Africa, is focusing not only on returning aircraft engines and parts to the fleet but also recycling what cannot be reused.

In January, the association published a 29-page manual with guidelines for managing the recycling of parts removed from aircraft during disassembly and recommendations on the facilities that should be available at deconstruction sites.

"Similar documents will be published for dismantling the fuselage, for example," Fraissignes, the chief executive, said. For Afra, the goal "is very simple: the aeronautical industry must show good citizenship where the environment is concerned. For the time being only about 70 percent of an aircraft can be recycled," Fraissignes said. "Our objective is that 90 to 95 percent of the airplane be reused."

But Taubiac said he considered that target overly ambitious. "Nobody yet really knows how to treat composite materials," which are increasingly used in building aircraft, he said.



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In contrast, the 85 percent recycling goal of the Pamela program "is a credible industrial objective mid-term."

In the next five years, old aircraft being sent to the breakers will still have aluminum fuselages, which can be recycled profitably because it takes far less energy to melt and reuse aluminum than it does to produce it from smelting ore.

But in the new Boeing 787 Dreamliner, for example, most of the fuselage is made of carbon fiber instead of aluminum.

Boeing is working with two companies, Milled Carbon of Britain and Adherent Technologies of New Mexico, to develop composite recycling technologies for carbon fiber.

These involve breaking down the material under heat in a complex process that produces a sort of souplike substance, from

which the various resins can be separated for mixing with other substances to become recycled carbon fiber.

North Carolina State University has tested the recycled material on behalf of Boeing and has found that it has at least 90 percent of the properties of virgin carbon fiber.

While that may not be good enough for reuse in the aerospace industry, it should be adequate for other applications, like mobile phones, computers, cars or sporting goods.