Flexing metal muscles

A&M researchers designing innovative technology with Shape Memory Alloys

By Kyle Ross
THE BATTALION

Shape Memory Alloys are nothing new. In the early 1960s, a combination of nickel and titanium was found to exhibit the phenomenon of shape memory. This new metal could be bent and deformed at higher temperatures, only to return to its natural structure when cooled. These shape-altering cycles could be performed millions of times without any noticeable breakdown, giving the alloy an unlimited lifespan and an unlimited worth.

Twenty years later, SMAs began showing up in medical and orthopedic applications but, for the most part, remained an untapped technological treasure. Not until recently have scientists and innovators begun to understand just how far they can go with this exceptional metal alloy.

Researchers at Texas A&M have jumped headfirst into this growing field of study and have already contributed exciting innovations that stand tall at the forefront.

"Our group here at Texas A&M is one of the top groups worldwide," says Pavlin Entchev, postdoctoral research associate for the aerospace engineering department.

The Office of Naval Research has sponsored an A&M project to design an underwater vessel using SMAs. The vessel is built to replicate the propulsion of a fish including the use of an artificial tail. SMAs are used as the "muscles" that move the tail just like an everyday goldfish. Without the need of a motor, sound detection is significantly diminished while the inside space is increased, two aspects that are important to the development of military underwater vessels.

Researchers in the aerospace engineering department are also using Shape Memory Alloys to design "smart" wings on planes. Powered by SMAs, these "smart" wings have the ability to change their surface area, in effect becoming thinner or fatter depending on specific times of the flight. This vastly improves the efficiency of air travel, because the wings remain at optimal size, minimizing drag.

Recently, A&M researchers have set their sights on how Shape Memory Alloys may fit into the world of medicine. Work is being done to give the SMAs porous qualities so that they may be used for bone implants.

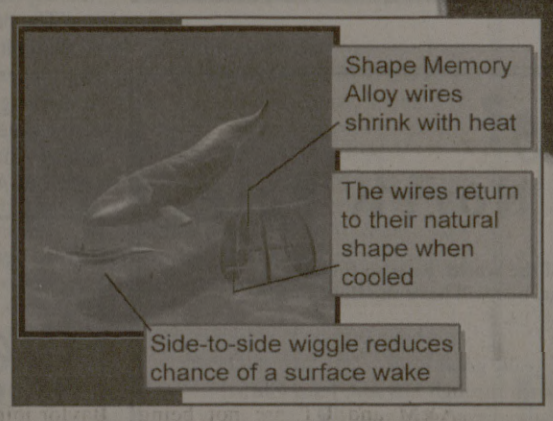
"The advantage of SMA implants is that they accommodate shape changes without breaking and they allow the actual bone to grow inside the pores themselves. This does wonders in the healing process," Entchev said.

This cutting-edge technology is now finding its way into the undergraduate programs as well. Rita Caso, an assessment & evaluation manager for Combined Research Curriculum Development at A&M, says the addition of SMA subject matter into certain classes has shown wonderful results.

"We have found that students taking classes with smart material (SMA) subject matter have responded more positively in concern to themselves and their area of study than those without the subject matter," Caso said.

Caso said she hopes to introduce SMAs to students earlier in their educational career. It helps keep them interested in being engineers and establishes groundwork for future studies and possible research in the field, she said.

"We give the students these magical materials to play with, to do wonderful things with," Caso said. "Being able to work with this and other technologies makes them feel happy with their decision to be an engineer. It's all about keeping engineers, engineers."



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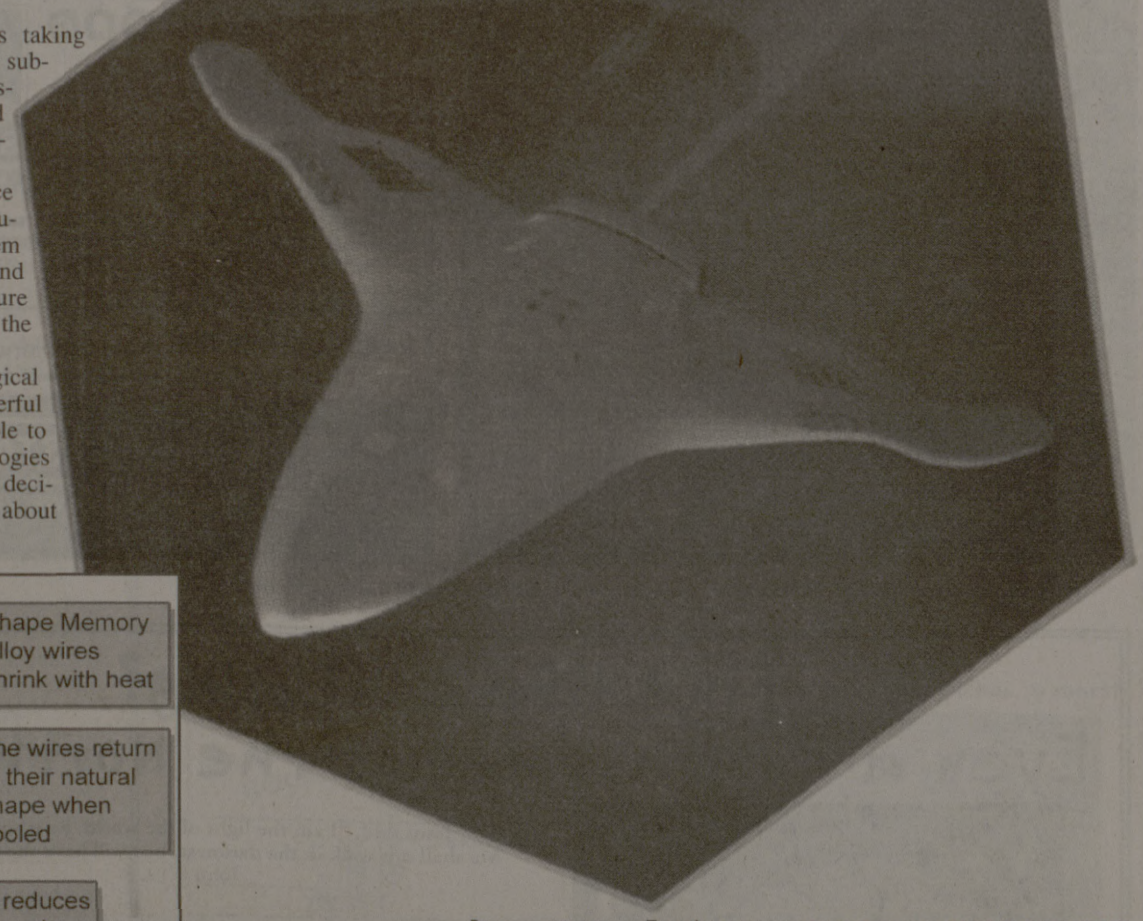

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Shape Memory Alloys allow researchers to do things formerly unheard of with metals, such as control their size and shape. Above is an aerospace application for SMAs. Note the aircraft's bendable wings.