Combustible Structural Composites: Built-in Self-Destruction

Technology marketing summary:

Sensitive data and proprietary technology are challenging to safeguard when highly mobile equipment such as unmanned aerial vehicles (UAVs) or portable devices such as cellphones, laptops and tablets are involved. Although technology exists to wipe data from phones and tablets, it may not always completely eradicate data. In some cases, it would be preferable to physically destroy a device rather than let it fall into unauthorized hands. And a UAV or other self-propelled device could go twice as far if it could simply be destroyed at the end of its mission. Until now, a simple way to destroy such equipment did not exist. At Idaho National Laboratory, researchers have developed a patented method that includes self-destructing capability within the structure of a device. They combined a combustible material with structural-reinforcing fibers to create a sturdy composite material that can form load-bearing components of devices, vehicles and buildings. This material contains sufficient combustible components capable of partial or complete destruction by self-sustaining combustion. Sheets of combustible structural composites could be used for surface or internal structural components, allowing users to selectively choose to partially or wholly destroy a structure or piece of equipment.

Technology description:

Combustible materials made of fuel metal and metal oxides are typically too brittle to use as structural supporting members. Adding structural reinforcing fibers such as Fiberglas, carbon fibers, and aramid fibers (i.e., Kevlar®) to the composite at a weight

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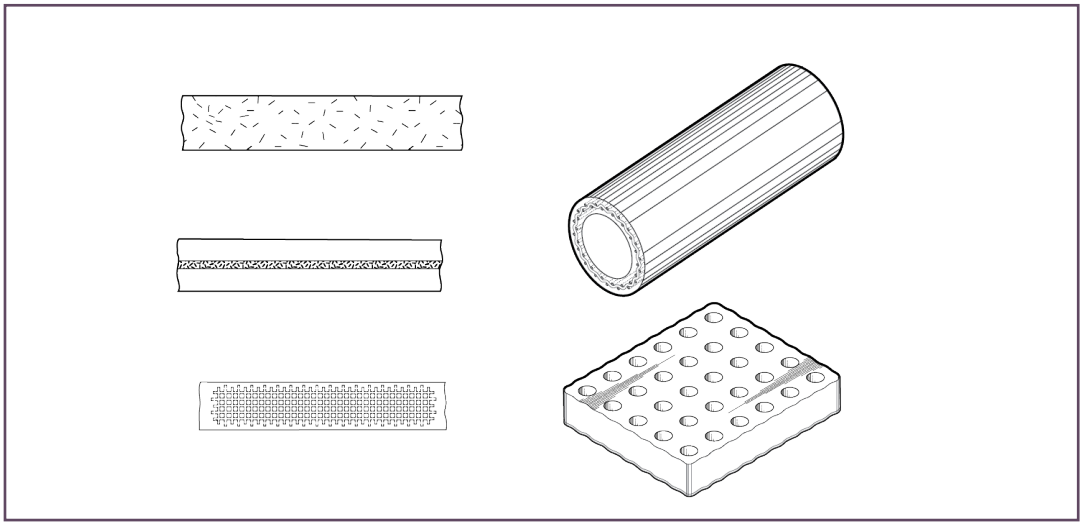

Combustible structural composites can be configured in a variety of forms and cross-sections to best support the intended application.

ratio of from 1:20 to 10:1 of fibers to the combustibles results in a composite that can carry significant structural design loads. And composite combustible materials can be reinforced with fiber, sheets of wire mesh, or solid sheets formed from the fuel metal. Components can be configured in a variety of forms and cross-sections to best support the intended application. The composite can be formed/added by molding, hot pressing, as a thermal spray coating, and by injection.

Depending on project need, the composition of the combustible portion of the composite can be varied based on energy required for ignition. In some applications, combustion could be initiated by striking a match. In other cases, the energy source might be an electrical impulse or microwave or other radiation. Finally, combustible elements of the composite can be tailored for multistep combustion; i.e., initial combustion initiation by match, followed by secondary combustion of additional structural elements triggered by the energy released in the initial combustion.

Technology benefits:

Protection of sensitive data and proprietary technology, and other assets

Extended range for missions – vehicle self-destructs following mission completion

Applications:

Personal electronics, Unmanned aerial vehicles, robotics

For more information

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