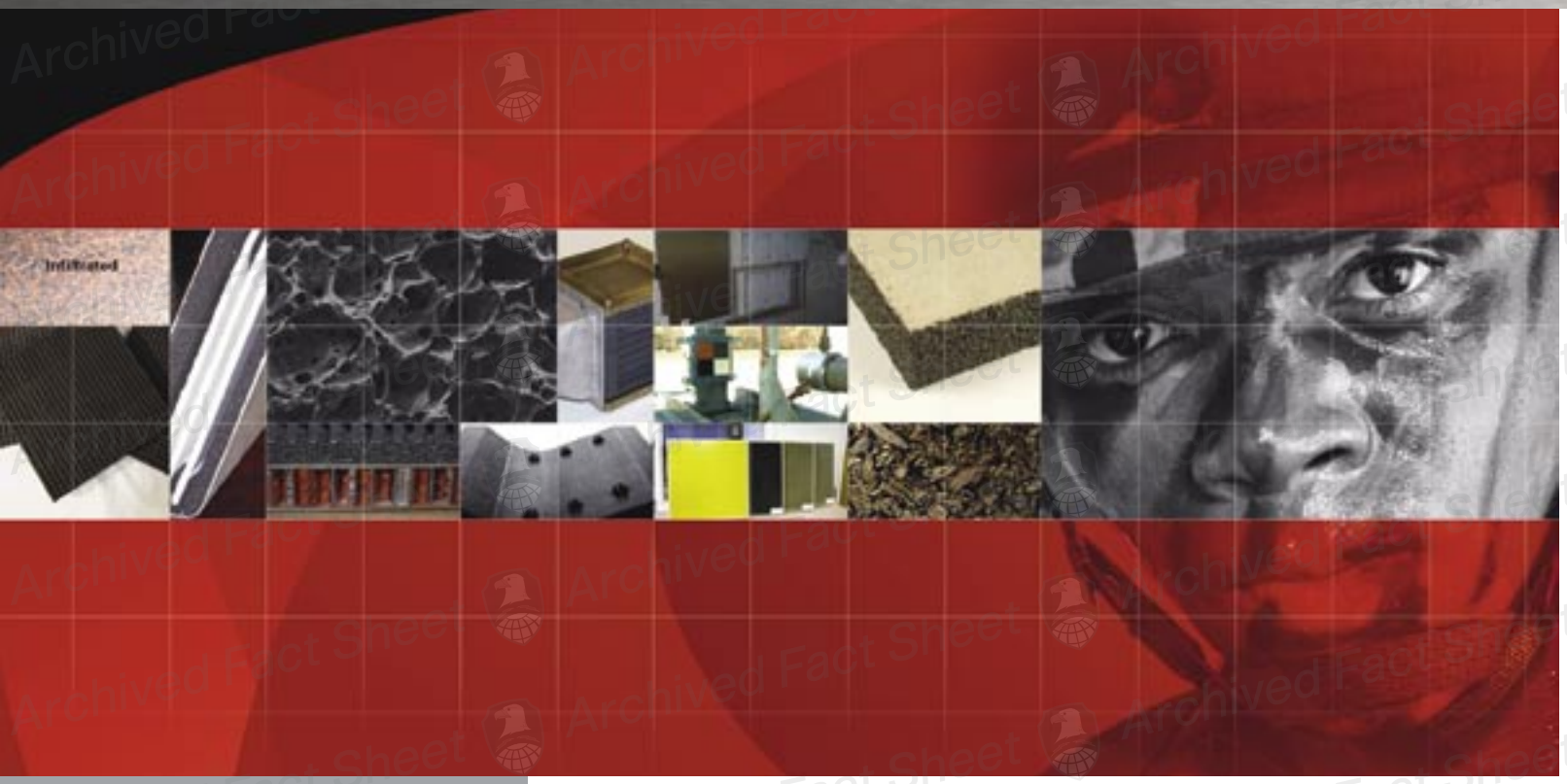
Coal-Based Carbon Foam



Summary

- Rapid, Durable, Low Cost, High Temperature Composite Tooling
- High Energy Vehicle Blast Panels – Coal Energy Absorbing System (CEAS)
- Radar Absorbing Panels
- Hot Structures - Exhaust and Suppressor Systems
- Ablation Panels
- EMI Shelter/Enclosures
- Heat Exchanger Systems

Coal-based carbon foam is an enabling technology critical to improving the performance of a wide variety of next-generation material systems and components.

Coal-based carbon foams are a new structural material made in a cost-effective proprietary process. The result is an inexpensive, lightweight, fire-resistant, impact-absorbing material that can be thermally insulating or conducting, and whose electrical resistivity can be varied over many orders of magnitude. Coal-based carbon foams offer systems designers alternatives to current design materials, extending the performance ranges in material systems where they replace more conventional materials whose peak performance levels have already been reached. With its ease of use, coal-based carbon foams can be cut, milled and turned with conventional equipment and tooling. Integration with other materials including impregnation with phenolic or other resins, and lamination with Kevlar™ or other laminates, is straight-forward, creating a broad spectrum of potential applications to defense, aerospace and commercial markets.

Coal-Based Carbon Foam

Technical Center

Overview

Coal-based carbon foams are currently being developed for a variety of uses. Being a domestically produced material, it offers advantages in availability as well as cost, enhanced structural properties, fire resistance, radar cross-section, corrosion susceptibility, and low weight, making it ideal where these properties or combination of properties are coveted.

Benefits for Tomorrow's Defense

Coal-based carbon foams will help to enhance capabilities and improve affordability, supporting today's warfighter. Applications for coal-based carbon foams continue to be developed as the material is accepted as a mainstream structural building block for tomorrow's technology. Current application examples include targeted advances in composite tooling, vehicle blast mitigation, radar absorption, and ablation panels.

Technical Concept

Composite Tooling – Coal-based carbon foam material enables tooling systems that represent fast, low-cost systems that will significantly increase production rates and reduce program costs for composite structures and the aerospace industry. A coal-based carbon foam tooling system would allow fabrication of multiple material forms on a single platform, reducing development costs. The ability to reuse tooling also significantly reduces costs associated with storage and disposal.

Blast Mitigation Panels – Coal-based carbon foam has a unique response to high energy blasts. The microstructure of the material resembles the structure of pumice, a common material used to absorb blast energy. An advantage of coal-based carbon foam is that the strength of the material can be precisely controlled and matched to the strength of the specific energy mitigation needed. The foam is integrated with high elastic polymers and hardened materials to form a new state-of-the art coal energy absorbing system (CEAS).

Radar Absorption Panels – Coal-based carbon foam panels have natural radar absorbing capabilities. High temperature signature areas would be candidate areas for incorporation of this technology in fixed wing, rotary wing and shipboard applications.

Ablation Panels – Coal-based carbon foam offers an unparalleled application as an ablative material. Specific applications include its ability to be used as a lining material for missile launch tubes. Other ablative-resistant applications being pursued include the use of the material as a landing pad to prevent spalling from harsh environments during take-off and landing of vertical take-off and landing (VTOL) aircraft as well as rotary wing aircraft.

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