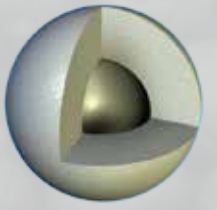
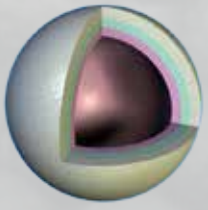
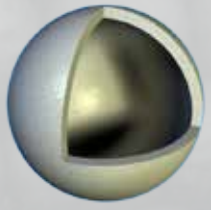
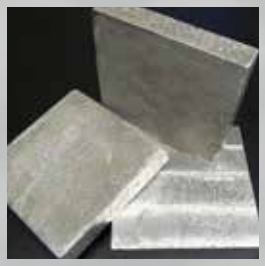
DEEP SPRINGS TECHNOLOGY

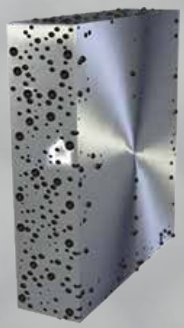
ENGINEERED HOLLOW SHELLS FOR

INDUSTRIAL, COMMERCIAL, AND

MILITARY APPLICATIONS



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LEADERSHIP STATEMENT

Deep Springs Technology (DST) was founded in 2007 as a spinout company to commercialize "hollow shell" technology, called DST-shells. It is the world leader in small hollow sphere manufacturing. We manufacture high quality shells for industrial, commercial and military applications. Our shells can be fabricated from various materials such as metal, glass or ceramics, including silicon carbide.

COMMERCIAL VALUE

Hollow shells have commercial value as fillers in advanced composite materials. Impervious hollow shells embedded in a matrix material are a special class of composite material known as syntactic foam. Syntactic foams derive their material properties from both the hollow shell filler and the selected matrix material. By selecting appropriate glass, ceramic or metal shells and pairing them with appropriate glass, ceramic metal or even polymer matrices, syntactic foams can be tailored for many applications. For example, syntactic foams are used in insulation, for shock and energy absorption applications and for lightweight structural or buoyancy materials.

DST-shells are thin walled beads or bubbles. DST's proprietary process offers a large range of materials selection. In addition to glass and oxide ceramics, DST can fabricate hollow shells of carbides, nitrides, metals, and metal alloys. DST's proprietary processes and techniques, protected by a strong patent portfolio, produce highly uniform impervious hollow shells of controlled sizes and geometries, from essentially any material.

PARTNERS

In the 8 years DST has been in business, we have formed relationships with many of the top universities and research labs in the US. This includes researchers in academia as well as DoD at Polytechnic Institute of New York, Brown, Georgia Institute of Technology, Virginia Polytechnic Institute, University of Wisconsin–Madison, North Carolina A&T, AFRL–Wright Patterson AFB, ARL–Aberdeen, NRL, ,ONR, NSWC-DD, UDRI. By collaborating with the best research labs,

MARKETS

Since its founding, DST has been developing and tailoring hollow shells for syntactic foams used in aerospace, advanced armor and protective applications, automotive motor vehicle parts, deep sea submersibles, and advanced energy systems including both nuclear and fossil fuel industries.

CUSTOMERS

- **DARPA** – Armor panels feature silicon carbide hollow shells embedded in a metal matrix
- **Department of the Navy** – Boron Carbide (B4C) Ceramic Spheres
- **Office of Naval Research** – Affordable High Strength Mo-Si-B Alloys for High Temperature
- **Army** – 21st Theater Army Area Command
- **WM** – Hollow Sphere Reseach
- **WM-MD** – Hollow Sphere Magnesium Alloy Plates

TECHNOLOGY OVERVIEW

Deep Springs Technology (DST) produces hollow shells of glass, ceramic and metal as shown in Figure 1. These shells are called DST-shells ™, and can ranging in size from 500 microns to 15,000 microns. The shells have many applications, including light weight high strength material for vehicle bodies, syntactic foams for impact resistance, and filler for high strength, low density buoyancy modules.

DST has developed a proprietary method for fabricating highly uniform hollow shells of controlled geometries, densities and sizes. The process is low cost, high speed, easily controlled and can be tailored to various requirements and applications. DST has fabricated hollow shells from a wide variety of materials including: alumina, silicon carbide, and carbon steel, Maraging steel, Al2O3, Y2O3, and ZrO. DST-shells are produced in sizes ranging from 500 microns to 15 millimeters in diameter. The process is highly controlled with shell thicknesses controlled to within a few percent of variation. DST Shells are also able to be manufactured in a variety of shapes other than spheres, including right circular cylinders and hexagonal prisms.

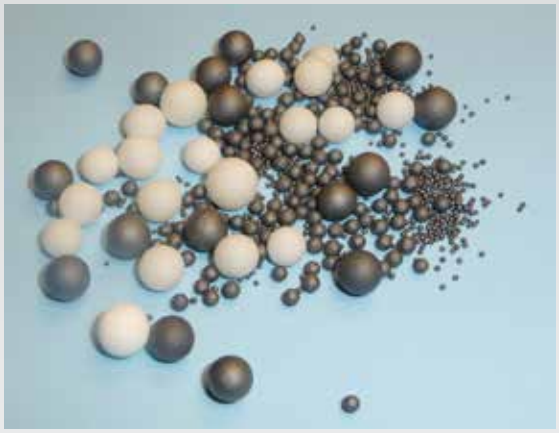
The alumina shells are our most commonly manufactured shells. They offer superior physical properties. The shells are strong, heat resistant, corrosion and abrasion resistance. Additionally, alumina DST-shells are lightweight, strong, and have a low material cost.

The incorporation of DST-shells into engineered voids gives the metal matrix syntactic material two important properties; namely lightweight and compressibility. Syntactic metal matrix composites used in applications that require lightweight structures and energy absorption against impact. In comparison with open cell metal foams, they have higher compressive yield strength and more homogenous mechanical properties.

HOLLOW SHELL APPLICATIONS

Buoyancy Modules

Alumina shells are currently being evaluated by at least 3 firms for incorporation into buoyancy modules. Alumina shells can be fabricated at a low density (.3g/cc) with a high strength (25Kpsi) at a cost that is comparable with other technologies. DST has the ability to test each shell for impermeability, which will maximize the strength of the buoyancy modules. Modules with our shells will greatly increase the depth a submersible can go to.



Armor

DST is currently working with several DOD research labs to evaluate the incorporation of DST Shells into armor systems. DST shells are incorporated into a metal matrix composite, used in conjunction with other layers of armor protection. DST shells created a controlled void that serves the dual purpose of reducing the weight of the armor system, while improving the ballistic protection.

Ablatives

DST Shells manufactured from Silicon Carbide (SiC) are being evaluated for ablative applications. Properties of SiC in conjunction with properties of hollow shells make them uniquely suitable for this application. SiC is naturally a lightweight, high strength material with extra low thermal expansion, and very resistant to thermal shock. This coupled with the shells properties of uniform size, and the insulative properties of the hollow center of the shells are making DST shells very attractive to the aerospace industry.

Other DST Technology

Although DST's core competency lays in hollow shells, we also manufacture other products for ceramic. This includes solid spheres, ceramic tiles, and are currently in initial stages of developing castable Mo-Si-B.

Solid ceramic shapes

Deep Springs Technology produces custom solid ceramic shapes. Ceramics of interest include silicon carbide (SiC) and boron carbide (B4C) having densities in excess of 98% true maximum density. DST concentrates on working with complex shapes such as spheres and interlocking tiles.

MoSiB

Molybdenum silicon boride (Mo-Si-B). composites have the potential to replace nickel superalloys in rotating and static jet engine components. Mo-Si-B has an oxidation resistance to 1300°C exceeding nickel alloys 1100°C limit. DST has scaled the production of Mo-Si-B powder to be used as feed stock for the production of powder metal parts while maintaining quality metrics.

MANAGEMENT

Oliver Strbik (Executive Vice President) directs DST's contracts, products, and plant operations with a focus on the manufacturing process. He is a mechanical engineer (Ohio P.E.) with over 20 years of industrial experience. He has developed several unique processes and equipment for a wide range of industries including dry/wet chemical storage and processing, rubber (mixing, blending, weighing), industrial products, and jewelry. Oliver is currently focused on the fabrication of hollow shells and lightweight syntactic materials for a variety of applications.

FACILITIES

DST is a U.S. based company located in Toledo, Ohio. DST occupies a 27,000 square foot facility including engineering and manufacturing space and is co located with its parent company Imaging Systems Technology (IST). DST has all the equipment needed to manufacture and DST Shells, as well as evaluate their properties.

DST is located two miles for the University of Toledo. DST personnel are trained in use of the university's Powder X-Ray Diffraction (XRD), Infrared Spectroscopy equipment, Scanning Electron Microscopy (SEM) and Energy Dispersive X-Ray Spectroscopy (EDS) equipment.