



SPECIAL PRODUCTS GROUP

Customers Include

ABB Bomem
BAE Systems
Boeing
ITT
Lawrence Livermore National Laboratory
Lockheed Martin
Northrop Grumman
PerkinElmer
Raytheon
Rockwell Collins
SRI
SSG
Teledyne
Thales
Wright-Patterson Air Force Base



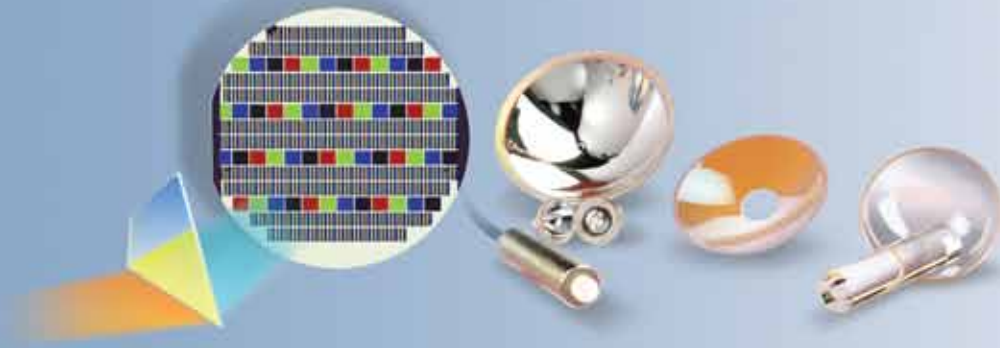
DSI[®] Deposition Sciences
INCORPORATED

SPECIAL PRODUCTS GROUP

World Leader in
High Performance,
Ultra-Durable
Thin Film Coatings

Bringing Technology to Light





Coatings that can take the heat

DSI's Special Products Group (SPG) provides innovative thin film coating products designed specifically to meet the demanding requirements of military, aerospace, and defense applications. Our SPG team is dedicated to supplying thin film solutions and services based on our broad knowledge and expertise in unique optical coating technologies. DSI is proud to be a leading developer of durable, high performance optical coatings for extreme environments. Since 1985, DSI has established new, ever-rising standards for optical performance and has made vital contributions to the technologically advanced aerospace and defense programs in which our thin film coatings are used.

We deliver the latest advances in optical thin film coating technology to industries worldwide, such as aerospace and defense, lighting, projection display, biomedical and telecommunications. As a highly respected supplier of state-of-the-art thin film coatings, DSI has been a select vendor for a variety of aerospace programs, including:

- NPOESS
- BSTS
- MES
- MSTI-3
- Warfighter
- SBIRS-High

Products:

Anti-Reflection Coatings

Bandpass Filters

Beamsplitters

CCD Filters

Dark Mirrors

Dielectric Filters

Edge Filters

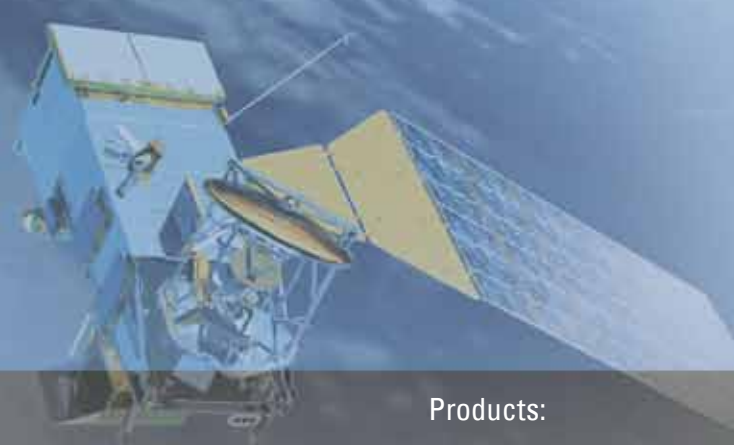
Heat Resistant Coatings

Infrared Filters

Multispectral Filters

Neutral Density Filters

Notch Filters





■ **Partnering with you**

We work closely with our customers from concept through completion, maintaining long term relationships and product partnerships. We welcome the opportunity to work with you, developing high performance, highly durable optical systems for extreme and rugged environments.

■ **DSI operations**

Our modern 144,000 sq. ft. facility is located in Santa Rosa, California. With lean manufacturing standards, talented engineers and dedicated staff, we meet the diverse needs of customers who require research and development, high volume manufacturing and cost-effective thin film coating solutions.



Optical Mirrors

Optics for Night Vision

Rugate Filters

Solar Cell Coverglass

Sunshade Solar Rejectors

Telescope Optics

UV Filters

Visible Filters

Specialized coating processes

DSI's core competency lies in our ability to develop, manufacture and apply highly specialized durable coatings. We utilize multiple coating processes which provide a complete toolbox of solutions to address specific customer needs, no matter how unique. The result is greater innovation, higher performance, and more durability in our thin film coatings.

MicroDyn® Reactive Sputtering

The MicroDyn process is a short-throw reactive sputtering process that is proprietary to DSI and is the subject of a number of patents. The process is highly flexible, with the capability to deposit metals, metal oxides, nitrides, mixed materials with fixed or graded compositions, rugates, ITO, and semiconductor materials. The coatings are highly durable, with capability to operate at temperatures as high as 1000°C. They can withstand the thermal shock of direct transition from liquid nitrogen to boiling water. MicroDyn coatings have minimal wet-to-dry spectral shifts. The process is capable of producing highly precise filters, including narrow bandpass and other filters for telecom applications. The MicroDyn process can be operated at temperatures as low as 100°C, and is capable of deposition on engineering plastics and fiber optic cables. Coatings can be applied even to highly convex and concave surfaces such as lamp envelopes and reflectors with no loss of durability or performance. MicroDyn coatings, including complex filters, can be patterned using both contact masking and photolithography techniques.

IsoDyn™ Low Pressure Chemical Vapor Deposition (LPCVD)

The LPCVD process is a thermally driven organo-metallic process that is currently configured to deposit multi-layers of silicon dioxide, tantalum oxide, and titanium dioxide as needed. The LPCVD process is useful for coating almost all optical glasses, crystalline materials, ceramics, and metals, but due to the process temperatures of about 500°C, cannot be used for plastics or other low temperature materials. The unique aspect of the LPCVD process is its capability to uniformly coat all surfaces of even the most complex shapes with a high quality multi-layer optical coating. Like the MicroDyn process, the IsoDyn LPCVD process provides coatings with service temperatures as high as 800°C, with high resistance to thermal shock. The LPCVD process is fully automated and is capable of manufacturing complex filters.



IsoDyn™ Plasma Enhanced Chemical Vapor Deposition (PECVD)

DSI's PECVD process uses a high intensity microwave source to drive the plasma that provides the energy for deposition. The PECVD process is capable of depositing metal oxides, nitrides, and semiconductor materials. The unique aspect of the PECVD process is that it allows deposition on the inside (or outside) surface of a tube or cylinder. As with the MicroDyn and LPCVD processes, the coatings produced are capable of operating at temperatures as high as 800°C and withstanding severe thermal shock.

Evaporative Coating

DSI's evaporative coating chambers are used for complex infrared coatings. Advanced thin film designs are deposited in precision, cryo-pumped vacuum chambers using electron beam guns, resistance sources, and plasma enhanced sources. Coatings are stable, can be laser and nuclear hard, have minimum scatter and absorption, are space qualified and meet all applicable military specifications.

Evaporation is especially efficient for depositing complex multilayer interference coatings on flat and slightly curved substrates. Infrared coatings with spectral performance requirements out to 25µm in wavelength can be produced. Typical applications are long-wave passes, short-wave passes, narrow bandpasses, beamsplitters, and anti-reflection coatings. Metals, metal oxides, dielectrics and semiconductors are deposited on various substrates, some of which include glass, silicon, germanium, zinc sulfide, and zinc selenide.

Applications:

Aerospace & Defense Products

Industrial IR & UV Curing Filters

Information Displays

Large Optics

Night Vision

Ophthalmic Lens Coatings

Projection & Digital Display Systems

Solar Simulation & Material Aging

Space & Satellite Apparatus

Thermal Imaging

Capabilities

DSI has the expertise to participate at any level of your product development. From engineering to prototyping to full-scale manufacturing, we will work with you to develop practical specifications, designs, and manufacturing techniques to meet your requirements.

Test and Measurement

Quality testing capabilities include measurement of in-house produced materials as well as the independent verification of external coated and uncoated samples for vendor/supplier surveillance, process analysis and qualification testing. Our quality system is ISO 9001:2000 certified. Below is a summary of some of our test and measurement capabilities.

Spectral Measurement Capabilities:

- Spectral Range 0.190-50 microns
- Reflectance and Transmittance (near normal to 45 degrees)
- Cryogenic Measurements (ambient to < 10 Kelvin)
- Polarized Measurements (S&P)
- Hemispherical Transmittance and Reflectance (0.190-20 microns)

Environmental Testing:

Environmental Testing can be performed in accordance with various military specifications, including MIL-C-48497 and MIL-F-48616.

- Humidity
- Salt Fog
- Abrasion
- Temperature Cycle
- Adhesion
- Solubility
- Cleanability



Substrate Materials:

<i>Al₂O₃</i>	<i>Glass</i>	<i>Plastics</i>	<i>Si</i>	<i>ZnSe</i>
<i>Ceramics</i>	<i>Kapton®</i>	<i>Polyester</i>	<i>Tape</i>	
<i>Ge</i>	<i>Most metals</i>	<i>Quartz</i>	<i>ZnS</i>	

Physical:

- Flatness/Reflected Wavefront Error (capable of ± 0.050 waves, peak to valley @ 632.8 nm on up to 4" diameter samples)
- Surface Quality Characterization (scratch/dig, scatter, BRDF)
- Surface Resistivity (0 - 50k ohm/sq)
- Dimensional verification (± 0.5 micron)

Infrastructure Support

SPG has in place the infrastructure to support government and aerospace contracts. We have the experience and expertise to manage subcontracts and efficiently navigate government reporting requirements.

Support Includes:

- ISO 9001:2000
- DoD Accredited Facility
- DCAA Approved Accounting System
- Familiarity with Government Required Program Management Activities (e.g. SDRL reporting)
- ITAR Compliant
- GFE/GFM Traceability System

Other Services

- Coating Design
- Prototyping
- Pilot Production
- Volume Production
- Concurrent Engineering
- Materials Research
- Photolithography
- Filter Dicing
- Color Modeling and Measurement
- Manufacturing in Class 100 and Class 1000 Clean Areas



Substrate Types:

Complex Shapes

Flexible Substrates

Planos and Lenses

Rods and Tubes