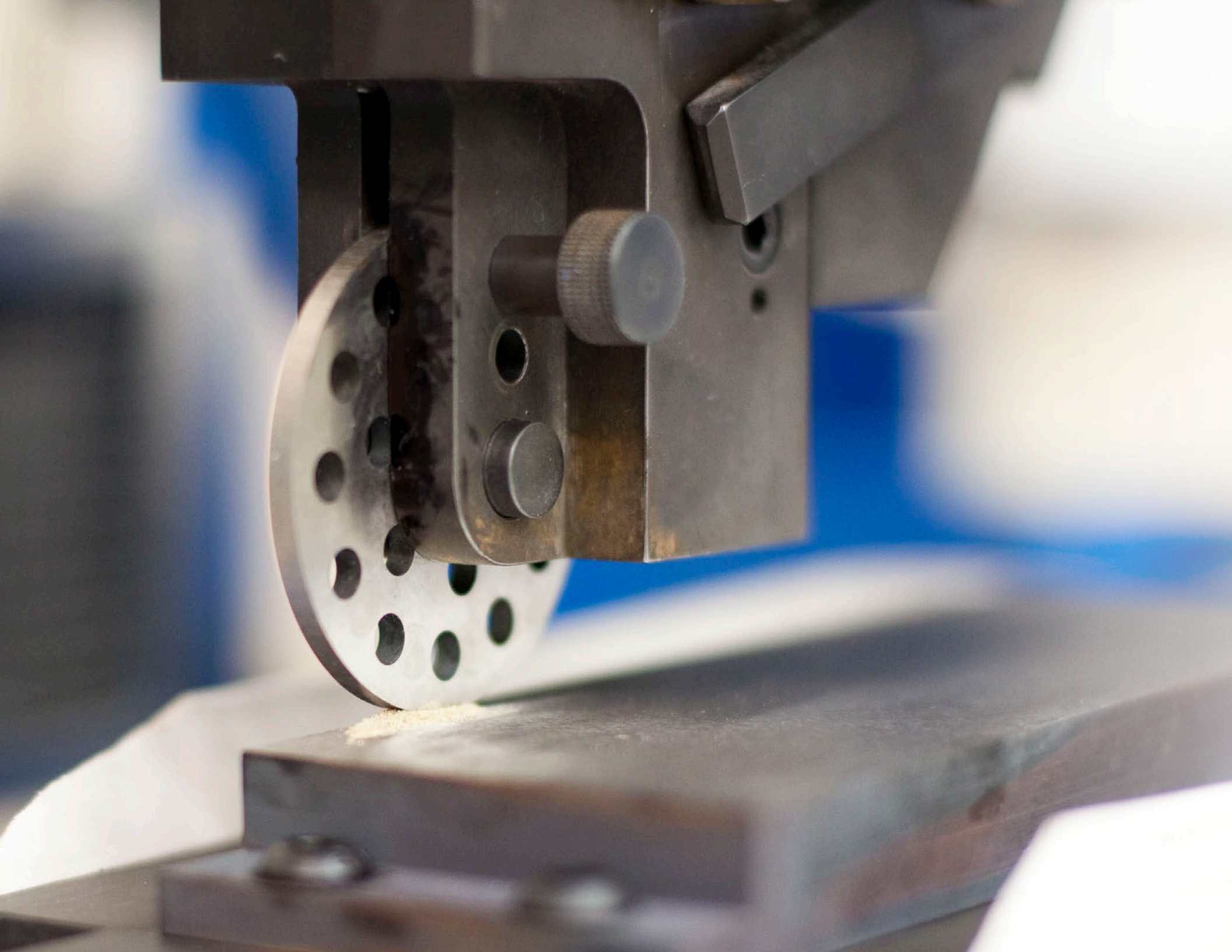




Safeguarding People, Processes, and the Environment Since 1998



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Mission Statement

THE MISSION OF SAFETY MANAGEMENT SERVICES, INC. IS TO SAFEGUARD PEOPLE, PROCESSES, AND THE ENVIRONMENT. OUR MISSION IS ACCOMPLISHED BY ASSISTING OUR CLIENTS IN MAINTAINING THE SAFETY OF THEIR OPERATIONS THROUGH THE SYSTEMATIC IDENTIFICATION OF SAFETY-RELATED DEFICIENCIES, ALONG WITH THE DEVELOPMENT AND IMPLEMENTATION OF SOLUTIONS BASED ON SOUND PRINCIPLES.

Safety Management Services, Inc. (SMS™) is an engineering firm comprised of engineers and scientists that have unique and specialized experience in applying risk management methodology and testing to a wide variety of energetic and hazardous material processes. SMS capabilities include hazards analysis; energetic material characterization testing and interpretation; facility siting and design for explosive operations; regulatory compliance; OSHA safety program development and auditing; accident investigation; ergonomic analysis; D3 operations; and other risk management services. SMS is also approved by the US Department of

Transportation (DOT) to recommend shipping classifications for explosive materials and articles based on witnessing and/or performing classification testing. SMS risk assessment expertise, coupled with our diverse engineering background, allows us to assist clients with the identification of risk mitigating solutions that are based on sound, cost effective engineering and explosives safety principles. Our knowledge of government and industry regulations coupled with our explosive safety and risk management expertise allows us to support contracts important to government and industry clients.



SOME THINGS
ARE TOO
IMPORTANT TO
IGNORE

Capabilities

Risk Management

The SMS™ approach to risk management focuses resources on addressing critical and credible failure scenarios by prioritizing changes to operations/equipment based on perceived risk, material type and quantity, identifying and ranking potential hazards using qualitative methodologies (e.g., JSA, HAZOP, FMEA, etc.), and use of quantitative methodologies (e.g., probability risk assessment, Fault Tree, event probabilities, PROBIT analysis, etc.) to evaluate critical scenarios. SMS provides Hazards Analysis support for a considerable number of clients on a diverse array of processes. SMS risk management emphasizes the following areas:

- minimizing exposure of personnel
- minimizing quantities of hazardous materials
- “safety by design”
- accurate procedures and standards
- rigorous training of personnel

Testing

SMS™ performs all testing necessary for the classification of energetic materials/articles for transportation, storage, and “in-process” conditions. Capabilities include laboratory, bench-scale, sub-scale, and full-scale testing. This includes over 70 standard tests used to characterize materials under conditions that simulate actual process conditions. These standard tests include material sensitivity testing (e.g., impact, friction, ESD, electrical properties, thermal, chemical compatibility, etc.), DOT and DoD testing, material propagation testing (e.g. #8 cap test, card gap test, UN gap test, super large scale gap test, DDT, bonfire, etc.), and TNT equivalency testing. Our capabilities also include custom testing tailored specifically to the client’s requirements. SMS is authorized by the U.S. Department of Transportation (DOT) to examine, test explosives, and assign a recommended shipping description, division, and compatibility group.

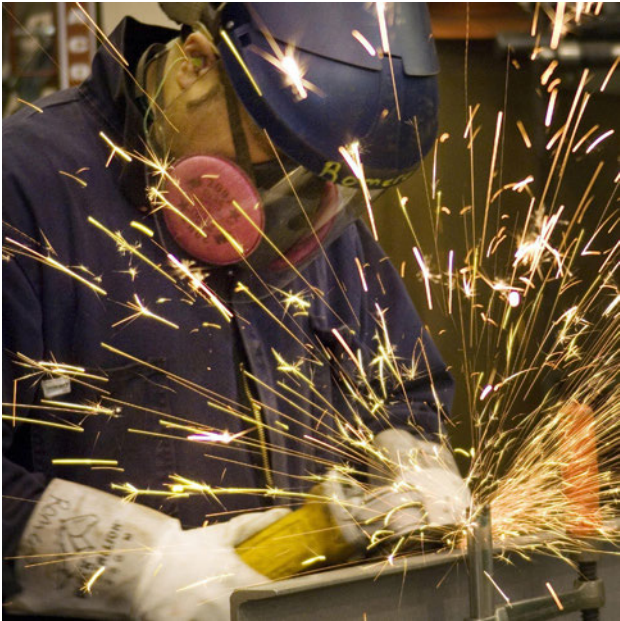
Test Equipment

SMS™ manufactures sensitivity testing equipment for clients who require in-house testing capability for Explosives Testing, In-Process Simulation, or DOT Classification. Available test sensitivity equipment includes the SMS™ ABL Electrostatic Discharge (ESD) Machine, ABL Friction Test Machine, Modified Bureau of Mines (MBOM) Impact Test Machine, Simulated Bulk Autoignition Temperature (SBAT) Apparatus, Vacuum Thermal Stability, and Volume Resistivity Test Cell. For two decades SMS has manufactured the sensitivity test equipment in close collaboration with ATK who originally developed the equipment. SMS also manufactures the Time-Pressure Apparatus, the Koenen Apparatus, impingement sensitivity test machines, and shipping containers for transportation under the Department of Transportation SP 8451 and SP 13481. All equipment is custom made and can be tailored to customer needs.

Engineering Support

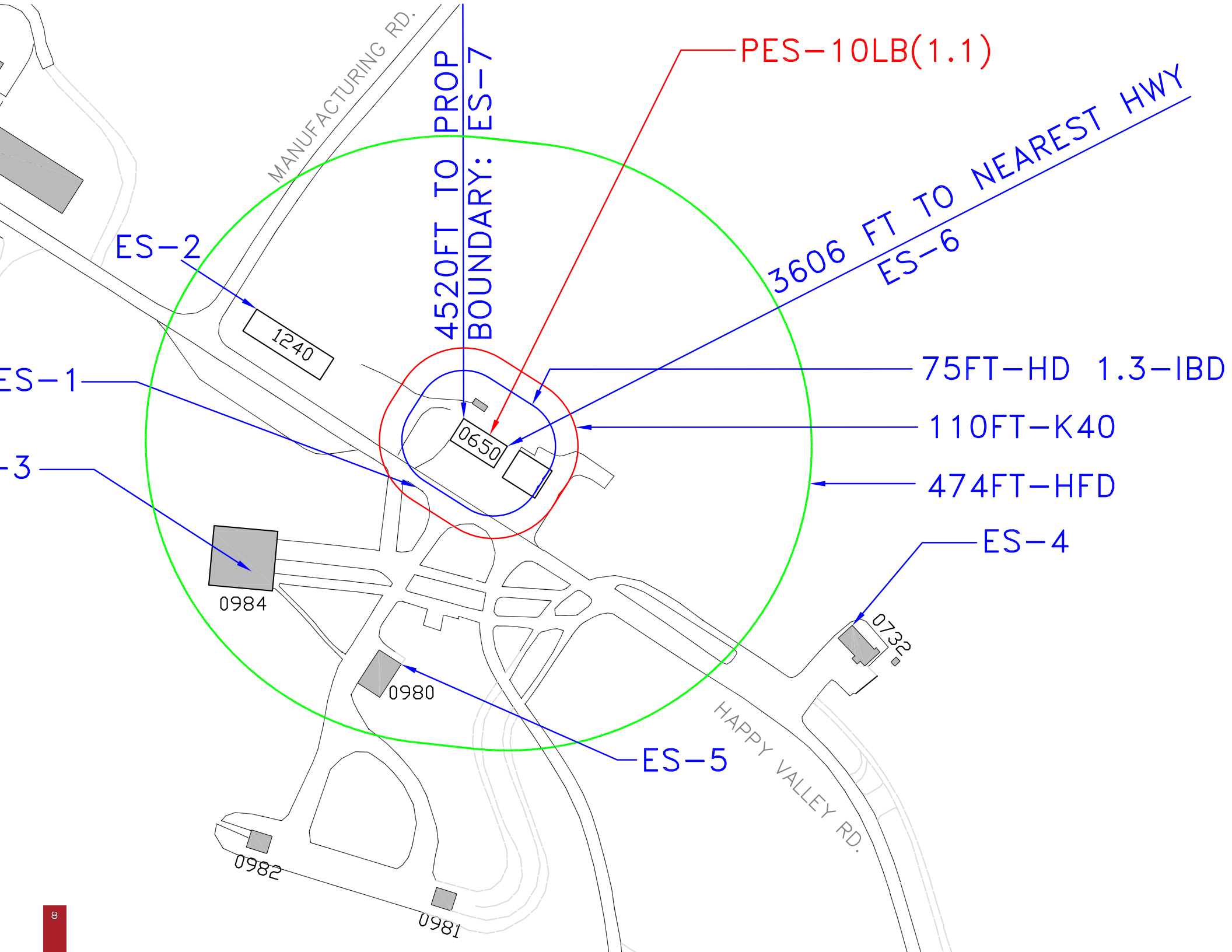
Our engineering support team provides expertise throughout the entire manufacturing process. All of our team members are trained engineers with years of experience providing engineering support services to a broad range of clientele, ranging from aerospace to energetic material manufacturing companies in both private and public sectors. Our history and experience in working with manufacturing and testing provides our clients access to a unique set of skills enabling us to solve almost any problem your company may face. We offer a variety of services:

- computer aided design and drafting (CADD), including SolidWorks & AutoCAD
- research and analysis
- technical writing (procedures, manuals, etc.)
- tooling design and fabrication
- P&ID review
- modeling
- control system checkout
- on and off-site engineering support



SAFETY
BY
DESIGN





Risk Management

Process Hazards Analysis

The SMS™ approach to risk management focuses resources on addressing critical and credible failure scenarios. This is accomplished by prioritizing operations/equipment based on perceived risk, material type and quantity, identifying and ranking potential hazards using qualitative methodologies (e.g., JSA, HAZOP, FMEA, etc.), and use of quantitative methodologies (e.g., probability risk assessment, Fault Tree, event probabilities, PROBIT analysis, etc.) to evaluate the critical scenarios. SMS provides hazards analysis support for a considerable number of clients on a diverse array of manufacturing, chemical, oil refining, and energetic processes.

Proper risk management focuses not only on normal operations/conditions but also on abnormal operations/conditions, equipment design, human factors, standard operating and contingency procedures, maintenance operations, and facility design and siting.

SMS has unique capabilities and experience comparing in-process energies to the response of energetic material to mechanical stimuli. We have developed effective methods for measuring, calculating, and/or modeling the normal and potential abnormal in-process energies. Our methodology allows us to compare this information with the energetic material response data, which is also in engineering units, and determine the probability of an initiation and incident.

Understanding the nature of the energetic or hazardous materials, the potential failure scenarios, in-process energies, material response, and consequences, allows SMS personnel to make recommendations for process/equipment design, system operating parameters, and facility design and siting. SMS takes considerable pride in assisting our clients in identifying risk-minimizing solutions that are based on sound, cost effective, and practical engineering and explosives safety principles.

Facility Design & Siting

SMS™ personnel understand civilian and military explosives manufacturing, along with storage regulations and their application. SMS uses industry and government accepted methodologies (e.g. DoD, BATF, Uniform Building and Fire Codes (UBC & UFC), International Building Codes (IBC & IFC), etc.) for the evaluation of siting and orientation of facilities to minimize the potential hazards from reactive chemicals and explosives for a given facility. The objective of a siting evaluation is to protect personnel and facilities from explosive or other highly reactive operations through proper facility design or separation. The rationale is to minimize the exposure of personnel and/or facility damage that could be caused by a worst case scenario involving hazardous material releases, fires, or explosions. SMS has the capability to model such events and evaluate the credible consequences of fires, fireballs, BLEVEs, deflagrations, and detonations. We also provide recommendations based on the results from explosion modeling and vapor/plume dispersion modeling.

Decontamination, Decommission, Demolition

SMS™ has developed a safe and reliable system to assess, categorize, decontaminate, disassemble/decommission equipment, and demolish (D3) facilities utilized in the manufacturing or processing of energetic materials. We have successfully applied our risk-based approach to a wide variety of D3 operations associated with research and development laboratories, subscale to full scale propellant mixing areas, prototype processes, explosives ingredient grinding, drying, feed systems, along with liquid and solid rocket motor test systems, and explosive waste treatment systems. Whether items are meant for reuse, recycle, or disposal, SMS can safely lead a team to perform D3 activities in a safe and efficient manner.

Risk Management

Personnel Training

Our staff is knowledgeable and experienced in a wide range of safety-related topics and has conducted training seminars/workshops in many aspects of process safety management. Courses are tailored to meet the specific needs of the client company and its employees. The following courses are offered at the clients' locations or annually in Salt Lake City, Utah:

- Process Safety Management (PSM) Principles for Explosives Operations
- DOT, ATF, and In-Process Classification Testing
- Process Hazards Analysis (PHA) Training for Team Leaders
- Explosives Recognition and Decontamination
- Fundamentals of Explosives Safety
- Fundamentals of Explosives Testing

Incident Investigation

Unfortunately, even companies with the best safety program may experience accidents and must deal with an investigation into the root causes. Some accidents leave very clear trails of evidence to their root causes. Others leave very few clues due to destruction or loss of evidence. When this occurs, only a very detailed and careful reconstruction of the situation can result in identification of the root causes and development of the "most credible scenario" in order to make appropriate changes to prevent reoccurrence. SMS personnel are experienced in leading or being a member of incident investigation teams in the explosives, chemical, and manufacturing industries. We specialize in root cause analysis, reconstruction of events, and development of incident scenarios. SMS personnel are very versatile and can be quickly mobilized to your facility should the need arise.

Regulatory Compliance Audits

SMS™ personnel understand the appropriate interpretation and application of DoD, DOT, OSHA, and EPA regulations. The regulations of OSHA 29 CFR 1910.119 "Process Safety Management" and EPA 40 CFR Part 68 "Risk Management Programs" reflect our developed philosophy and approach that has been implemented since 1972. SMS can assist your company or organization in complying with these and other OSHA, EPA, DoD, DHS, and DOT regulations through a coordinated, cost-effective team approach.

Site-specific Explosive Safety Guidelines

SMS™ can assist your company in developing explosive safety guidelines that are specific to the unique energetic materials, equipment, operations, and facilities at your site(s). These guidelines consist of design specifications and operating parameters that are derived from site-specific hazards analyses, near-miss/accident investigation reports, lessons learned, industry best practices, etc. They serve as an excellent reference for process, design, and facilities engineers; operations and maintenance personnel; and management. Such guidelines facilitate "safety by design" when modifying current processes or developing future processes. Guidelines are expected to be routinely updated to maintain the intent and spirit of continuous improvement.

DHS Chemical Facility Anti-Terrorism Standards

SMS™ assists clients with CFATS compliance by performing Top-Screen submittals, Security Vulnerability Assessments (SVAs) and developing Site Security Plans (SSPs) in accordance with DHS protocols. SMS evaluates appropriate attack scenarios and facility characteristics including cyber control systems on a case-by-case basis to assure accurate site specific assessments are conducted. The deliverables for these projects typically include submission of site information through the online Chemical Security Assessment Tool (CSAT) and written summaries of the concise, pertinent details for each of the 18 sections making up the Risk Based Performance Standards Guidance (RBPS) document.



SMALL
SCALE TO
LARGE SCALE
TESTING



Testing

DOT/DOD Classification Testing

SMS™ is an approved and authorized Examining Agency for the US Department of Transportation (DOT) to perform explosives and other hazardous materials examination services. These services determine the transportation and/or storage hazards classification, including the proper name, hazard class and division, and compatibility group for explosive substances and articles. SMS can conduct DOT/DoD tests at one of our secure, restricted-access test facilities (including a local DoD test site with clearances for CLASSIFIED materials) or witness testing at your facilities. Clients are welcome to view their tests performed at our facilities.

SMS also administers the fcnumbers.com website where applications can be submitted online to rapidly receive an FC number. An FC number is an authorization by the DOT to ship 1.4G fireworks. See fcnumbers.com for further information.

In-process Classification Testing

Using the established DOT/DoD hazards classification systems in combination with other recognized tests, SMS™ has produced a systematic approach to classifying the hazards of in-process explosive materials (concept approval by IBC, NFPA 495 Committee, and others). A few examples of the classification tests include the following:

- **Critical Height:** Determines the height at which the sample provides enough confinement to transition from a fire to an explosion.
- **Critical Diameter:** Determines the diameter below which an existing detonation will not propagate.
- **Worst-Case Propagation:** Determines if an accidental initiation will propagate to the surrounding process.

Operational Shield Testing

Operational shields are barriers or enclosures constructed to protect personnel, material, or equipment from the thermal, pressure, and fragmentation hazards resulting from an accidental or intentional initiation of explosive materials. SMS tests prototype operational shields against the protection criteria of MIL-STD-398 (replaced by DoD Manual 6055.09-M Volume 1) to determine whether the shield provides adequate protection. SMS's data acquisition system measures the positive incident pressure, noise levels, and the heat flux level/exposure time.



Testing

Portable Data Acquisition

The portable data acquisition systems utilized by SMS™ enable measurement of detonation or deflagration events in accordance with the UN Manual of Tests and Criteria, TB 700-2, and DoDM 6055.09-M-V1.E9. (supersedes MIL-STD-398) requirements. The systems can be configured for stand-alone operation or for real-time monitoring, control, and analysis via remote laptop. SMS can transport these systems to the client's facility, along with dynamic sensors to measure detonation velocity, air-blast overpressure, impulse noise, heat flux, and temperature, facilitating on-site evaluation and assessment of configuration-specific designs. The high definition (HD), high-speed, or thermal imaging video cameras utilized by SMS are portable and weatherproof, enabling the capture of dynamic test views under adverse conditions.

Electrostatic Discharge Risk Evaluation

SMS™ has developed the capability to quantitatively assess the risk of electrostatic discharge (ESD) from persons working with static sensitive materials such as explosives, flammable vapors and gases, Electro-Explosive Devices (EEDs), and electronic components or articles. The approach for this quantitative study includes the following:


- Measurement and documentation of the maximum electric potential found on operators under their various operating conditions
- Quantification and documentation of ESD discharge current traces under these various conditions

With this information, SMS compares these actual measured energies against the ESD sensitivity of the material receptor(s) (e.g. explosives, flammables, articles, etc.). From this comparison, an assessment of risk can be determined.

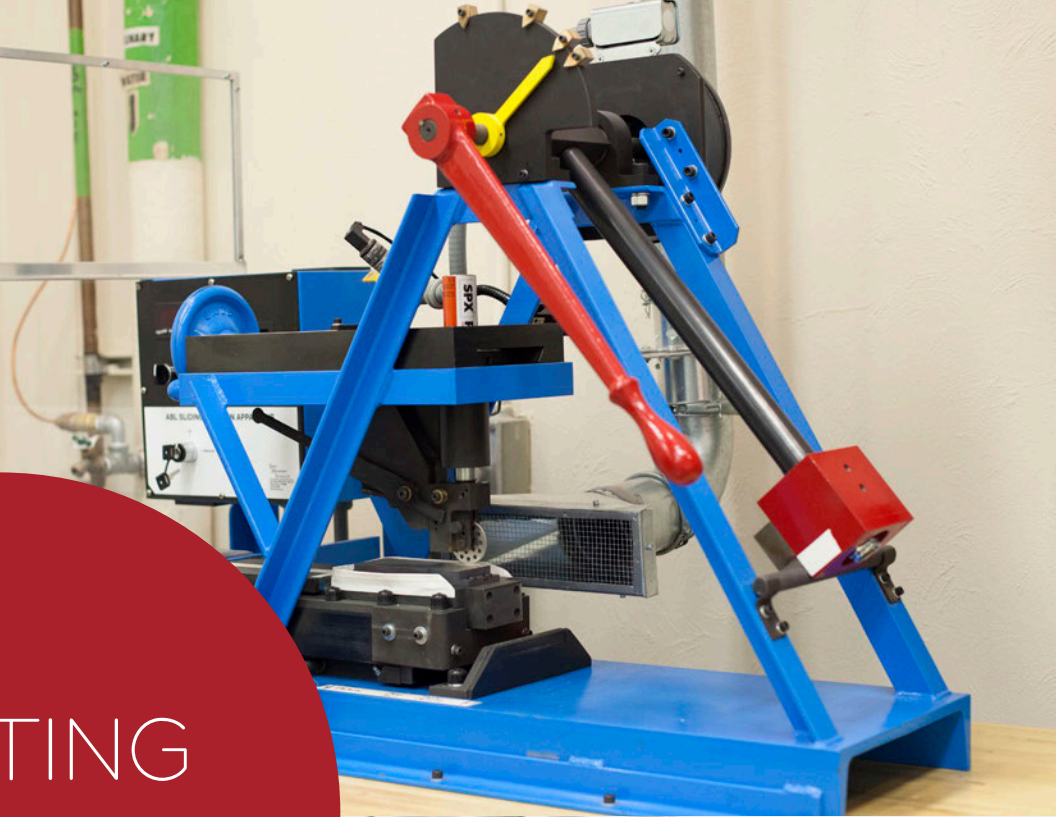
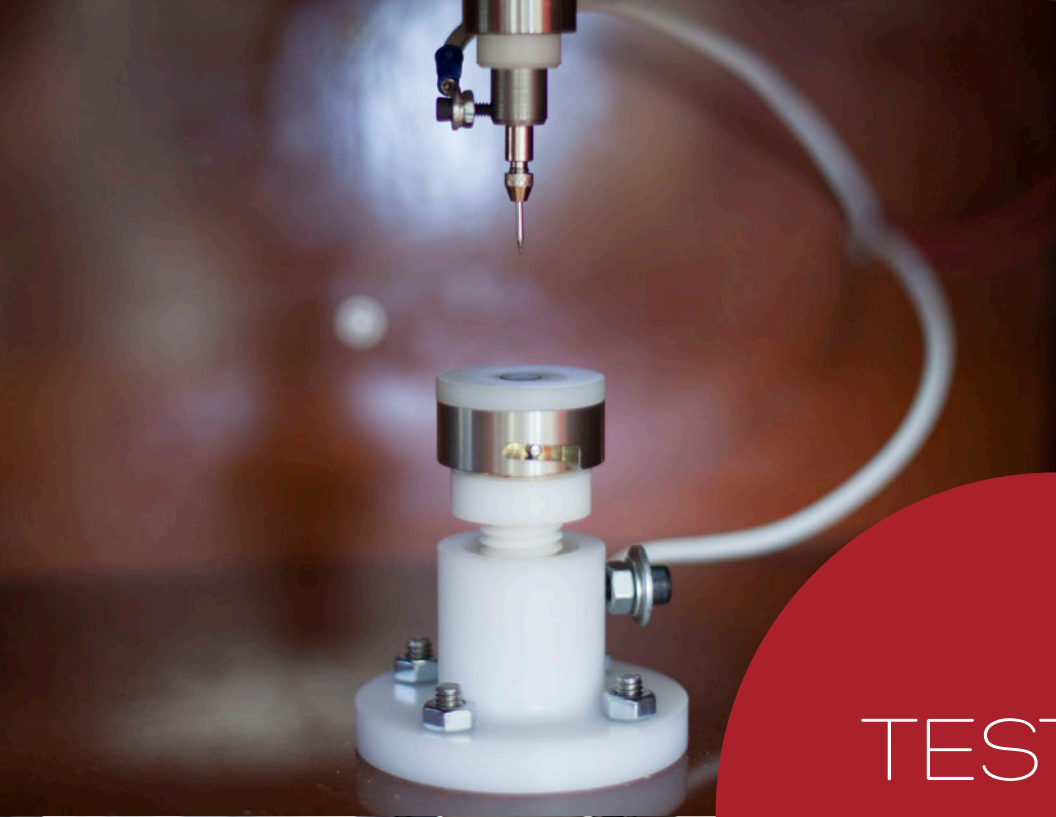
BlastX Analysis

SMS™ is experienced in utilizing DoD BlastX software to analyze the deflagration and/or detonation of energetic materials in single and multi-room structures for shock wave reflection and gas pressures. A maximum credible event (MCE) is determined for the room or building using established hazards analysis methodologies. The room is then modeled in BlastX, including openings, wall construction, MCE charge weights, and MCE charge locations. BlastX is used to analyze the specified configuration for shock reflections and/or venting.

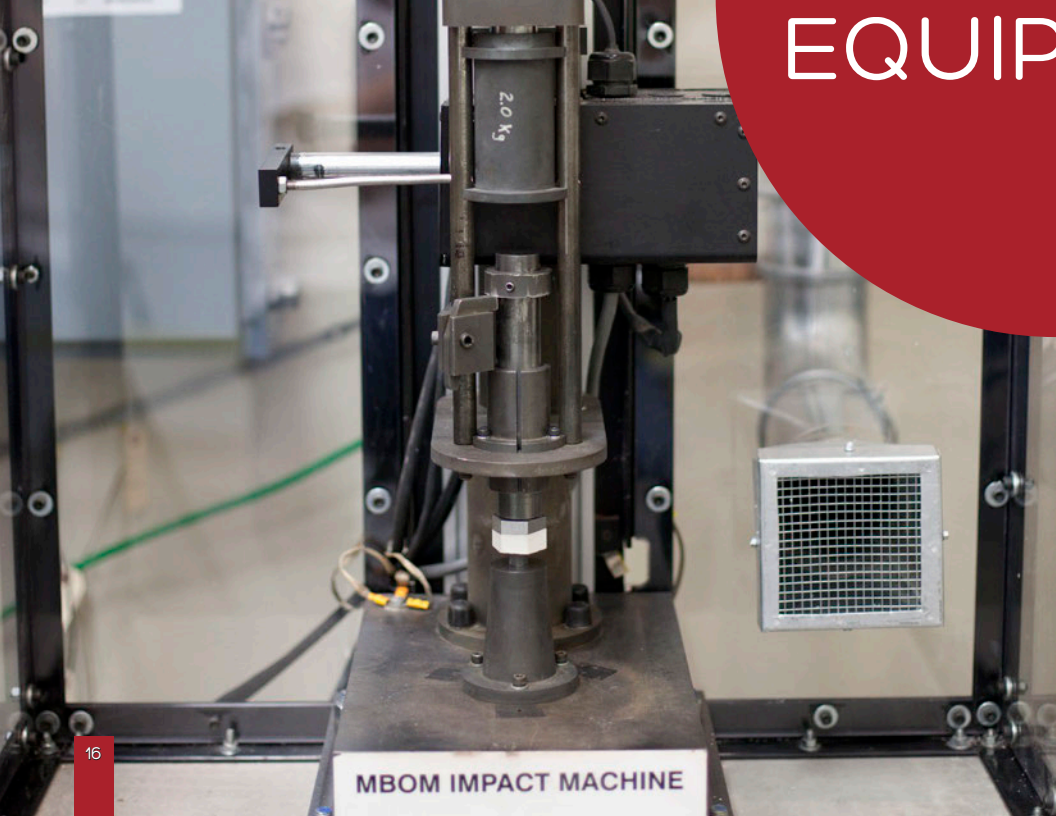




SENSITIVITY
TESTING
LAB



TESTING
EQUIPMENT



Test Equipment

FOR TWO DECADES SAFETY MANAGEMENT SERVICES, INC. HAS MANUFACTURED SENSITIVITY TEST EQUIPMENT IN CLOSE COLLABORATION WITH THE ORIGINAL DESIGNERS OF THE EQUIPMENT (ATK).

SMS™ ABL Electrostatic Discharge (ESD) Machine

The SMS™ ABL Electrostatic Discharge (ESD) Machine is used to determine the discharge energy required to initiate propellant, explosive, and pyrotechnic (PEP) materials. It utilizes an approaching needle mechanism to appropriately simulate in-process initiation scenarios for solid, liquid, slurried, and powdered PEP materials. The sample is placed on a grounded probe below the approaching needle mechanism. A small removable Lexan™ shield surrounds the sample to contain the reaction and to facilitate gaseous vapor detection. The operator uses the manual dials to configure the array of capacitors (0.0001 to 0.5 microfarads) to store the desired energy (0.003 to 6.44 joules, typically at 5000 volts). With the system energized, the approaching needle mechanism is activated which results in electrostatic discharge through the test sample as the needle approaches the grounded probe. Initiation can be determined visually, audibly, or by means of gaseous vapor detection equipment.

SMS™ Modified Bureau of Mines Impact Test Machine

The SMS™ Modified Bureau of Mines (MBOM) Impact Test Machine measures a material's sensitivity to impact energies. The machine simulates in-process conditions where an explosive material may be subjected to impact by processing equipment/tooling. This machine can be used to test solids, liquids, slurries, and powders. The primary parts of the test machine are an anvil upon which the sample is placed, a hammer of known contact area that rests on top of the sample, and a drop weight (2 kg [4.4 lbs]). The amount of energy imparted to the sample is controlled by the height (0 - 116 cm [0 - 46 in.]) at which the drop weight is released. This machine includes a design feature that prevents a double impact on the sample. Initiation is observed visually, audibly, or using gaseous vapor detection equipment.

SMS™ ABL Friction Test Machine

The SMS™ ABL Friction Test Machine is designed to simulate a wide range of in-process frictional energies and velocities that PEP materials may experience during the manufacturing process. The machine can be used to test solids, liquids, slurries, and powders. The sample is placed on an anvil that is designed to move at constant velocities. The velocity range is from 0.3 to 2.4 m/s (1 to 8 ft/s). A stationary wheel is placed on the sample and a load applied via a hydraulic ram. Tests can be performed with loads from 0 to 4450 N (0 to 1000 lbf) at constant velocities. The stationary wheel is designed to be easily indexed to provide a new surface for each test. The anvil and wheel construction material can be changed to represent materials found in a manufacturing process. Anvils are also available that allow testing at elevated temperatures. Initiation of the sample is usually determined visually, audibly, or by using a gaseous vapor detector. SMS also manufactures the SMS™ Tabletop ABL Friction Test Machine as an economical alternative. The smaller size of this apparatus allows it to be mounted to any stable workbench.

SMS™ Simulated Bulk Auto-Ignition Test Apparatus

The SMS™ Simulated Bulk Autoignition Temperature (SBAT) Apparatus utilizes a 2-5 gram sample in a heavily insulated fixture to accurately simulate the thermal behavior of bulk energetic materials in response to temperature. The SBAT Apparatus can independently monitor up to five samples at one time and can operate in two modes: 1) temperature ramp (programmable, default of 13°C increase per hour), or 2) isothermal hold. The maximum operating temperature of the SBAT is 350°C (662°F). An additional upgrade modification is available that will allow the SBAT to also perform the Vacuum Thermal Stability (VTS) test.

Test Equipment

SMS™ Impingement Guns

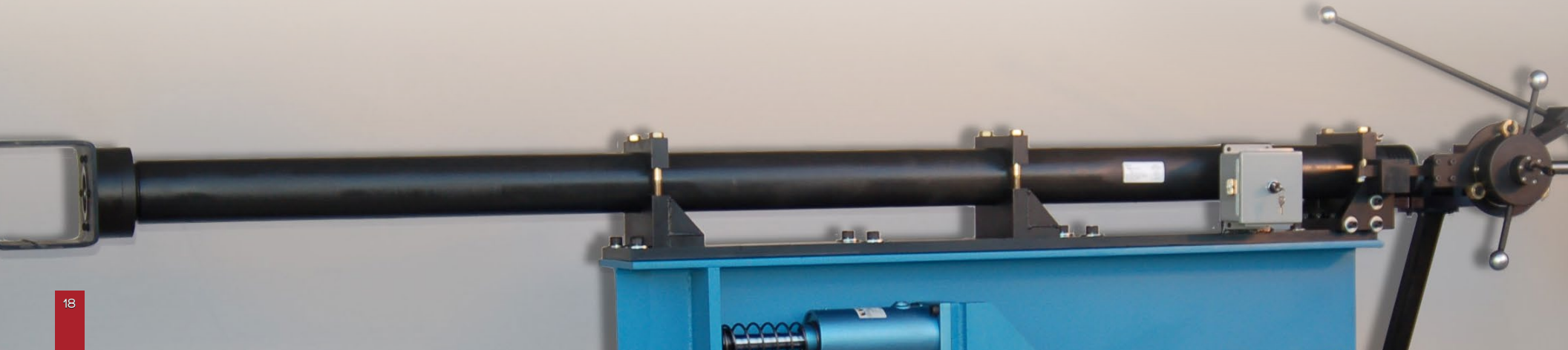
Damaged PEP materials are more susceptible to initiation and may transition to a more severe reaction, including detonation. SMS™ manufactures impingement guns for studying high velocity impact in the following sizes (selectable barrel length): 17mm, 18mm, 25mm, and 70mm.

SMS™ Koenen Test Apparatus

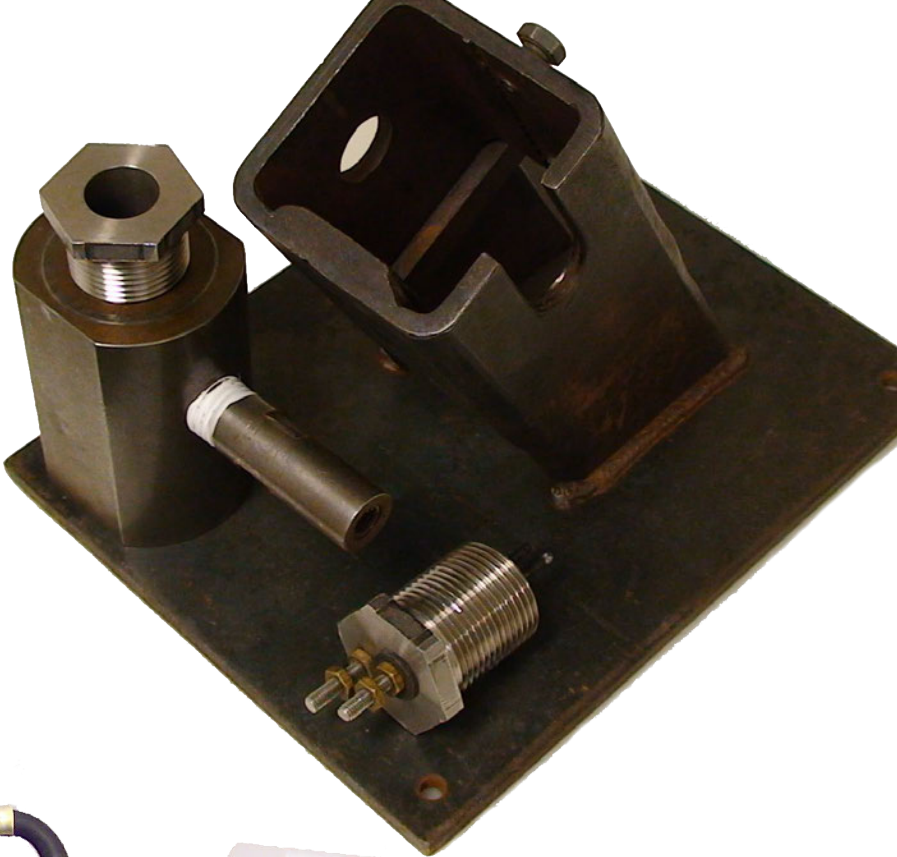
The Koenen Test Apparatus is used to measure the sensitivity of energetic materials in response to intense heat while under partial confinement. The apparatus consists of a Koenen test tube (non-reusable), closing device with variable orifice (reusable), protective welded box with propane burners, and a control box. The SMS Koenen test apparatus is enhanced with several safety features, including a remote operator control box with flame indicators for all burners.

SMS™ Time-Pressure Test Apparatus

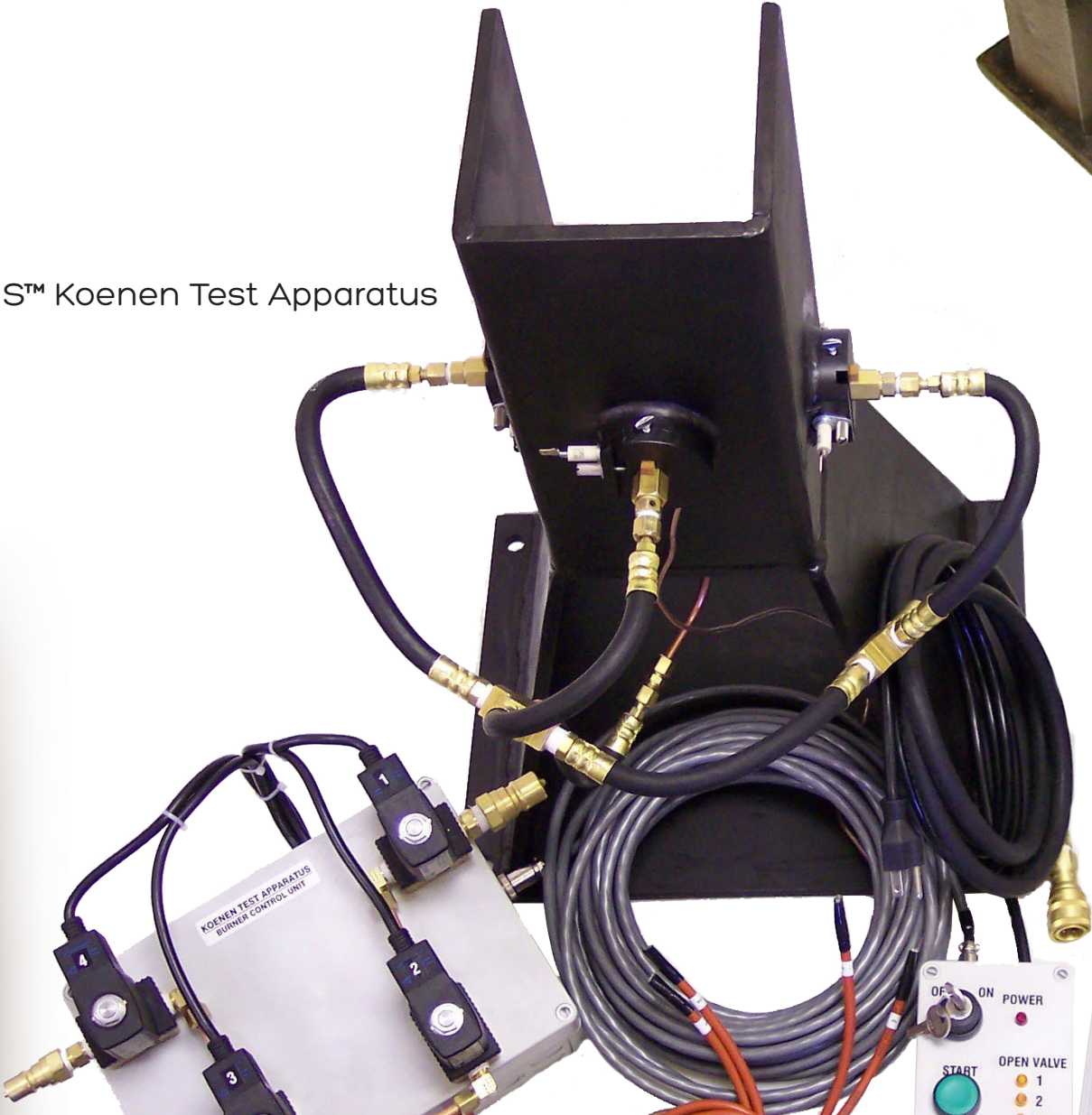
The Time-Pressure Test Apparatus is used to measure the sensitivity of energetic materials in response to ignition while under confinement. The apparatus consists of an instrumented pressure vessel equipped with a replaceable rupture disc. A test sample is placed in the pressure vessel and ignited by flame, pressurizing the instrumented test vessel.



SMS™ Time-Pressure Test Apparatus



SMS™ Koenen Test Apparatus



GoDetect-ESD™

GoDetect-ESD™ was developed at SMS™ to facilitate the reaction detection during sensitivity testing with the SMS™ ABL Electrostatic Discharge (ESD) Test Machine. Use of GoDetect-ESD™ results in the following:

- Automatic determination of reaction (Go or No-Go)
- Significant reduction in test time
- Reduction or elimination of operator subjectivity of reaction determination
- High-speed test videos recorded and stored
- Quantified reaction results documented
- Test data that can yield machine variability or drift
- Test data can be used to obtain material variability or drift
- A summary of the reaction probability

In the past, operators would make a determination whether or not a trial at a given ESD energy resulted in a Go or No-Go. This determination was subjective and could not be quantified. With GoDetect-ESD™ a quantified determination of the trial result is obtained from image analysis that compares multiple image properties of the trial to multiple background runs. The four indicators used to quantify the light emitted are the following:

- Brightness
- Buoyancy
- Shape
- Uniformity

A linear combination of each of the quantified indicators is used to characterize a trial. At least twenty-five background

trials at each energy level are recorded and analyzed. The summarized quantified information from the background runs are used to determine whether or not a trial run is a Go or a No-Go reaction. That is, the combination of the four above quantified indicators of the trial run is compared against the background data to yield a Go or a No-Go indication.

The GoDetect-ESD™ software is a Labview based stand-alone program that can analyze high-speed images in the CINE file format. The systematic method used to organize the high-speed video data files is useful for future reviewing of results or re-analysis of past results. When the program is run, summary files of the background data and trial results are created, organized, and easily accessed.

The GoDetect-ESD™ system has been successfully tested with various energetic materials not limited to smokeless powders, black powder, flash powders, PETN, and ammonium perchlorate. Included with the software is a Phantom M310 (or equivalent) high-speed camera.

GoDetect-ESD™ Advanced

GoDetect-ESD™ Advanced analyzes the data files produced by GoDetect-ESD™ to yield valuable information about the material, testing results, and SMS™ ABL Electrostatic Discharge (ESD) Test Machine. From the generated summary files for the background shots and the substance summary files the following analysis can be performed:

- Machine variability and potential drift
- Substance variability and potential drift
- Type I and II error
- PROBIT plots

Evaluation of the machine variability and potential drift over time can indicate a potential problem with a machine component or indicate cyclical variations. With the Advanced software package, the information from the background data from each test day for each energy level is plotted with the click of a button for easy review. Likewise, an analysis giving the sensitivity of a given material as a function of time may indicate a shift in the material's characteristics.

Type I and Type II errors are an indication of the reliability of the data obtained with the GoDetect-ESD™ software system. Type I error is the probability of a No-Go reaction being identified as a Go reaction whereas Type II error is an indication of the opposite. Knowing the Type I and II errors give an indication of the accuracy of the reaction determination as a function of the material tested. Coupling the Type I and Type II error reports with a PROBIT or other reactivity assessment can lead to better extrapolation of the reaction probability when applied to in-process risk evaluations.

A PROBIT plots the stimulus energy versus the probability of a reaction. PROBIT plots are used when comparing different samples or for comparing in-process energies to the material response to evaluate the associated in-process risk. The PROBIT analysis is conveniently given in an Excel spreadsheet which is automatically completed upon execution of GoDetect-ESD™ Advanced.

GoDetect-View™

The GoDetect-View™ software is designed to function with any type of sensitivity equipment. The GoDetect-View™ software gives the user the ability to easily scroll through captured high-speed video frames to determine if a recorded reaction is a Go or a No-Go. Once the user has determined the reaction (No-Go, Go-Light, Go-Sound, Go-Smoke) the software takes the user's input and documents the reaction determination. The software also generates the necessary storage folders to systematically file the high-speed video for future retrieval or re-analysis. The functionality to easily generate PROBIT plots from the documented results is also included.



Safety Management Services, Inc. established the Explosives Testing Users' Group to focus on improving sensitivity and reactivity testing of energetic materials. We have annual meetings to systematically minimize the variability associated with energetic materials testing to enable consistent/repeatable test data and interpretation of test results. Please see the ET Users' Group website for further information: www.etusersgroup.org.

Shipping Containers

SAFETY MANAGEMENT SERVICES, INC. OFFERS THE DEPARTMENT OF TRANSPORTATION (DOT)-EXEMPT SHIPPING CONTAINERS UNDER SPECIAL PERMIT (SP) 8451 AND 13481 TO COMPLIMENT THE DOT CLASSIFICATION TESTING SERVICES OFFERED.

DOT-SP 8451 Shipping Containers

Each container consists of a Schedule 80 seamless pipe and 3,000-psi end caps. The complete shipping container includes a UN Non-bulk Performance-oriented Packaging (POP) tested 4D plywood box. The plywood box is equipped with retracting handles for easy lifting and foam supports to support the pipe. Internal packaging is not included.

Each shipping pipe consists of the following:

- Schedule 80 seamless steel pipe nipple
- Either 6" diameter x 14" long nipple or 4" diameter x 14" long nipple

- 3,000-psi end caps (ASTM 105)
- Threads cut so that the end caps can be screwed on a minimum of 5 threads by hand

Shipping pipes are compliant with DOT SP 8451 requirements

Each UN 4D Plywood box and consists of the following:

- Durable 0.75" thick plywood
- Retracting steel handles
- Foam cushioned pipe supports
- Removable top lid
- Certified to UN Non-bulk Performance-oriented Packaging (POP) Standards

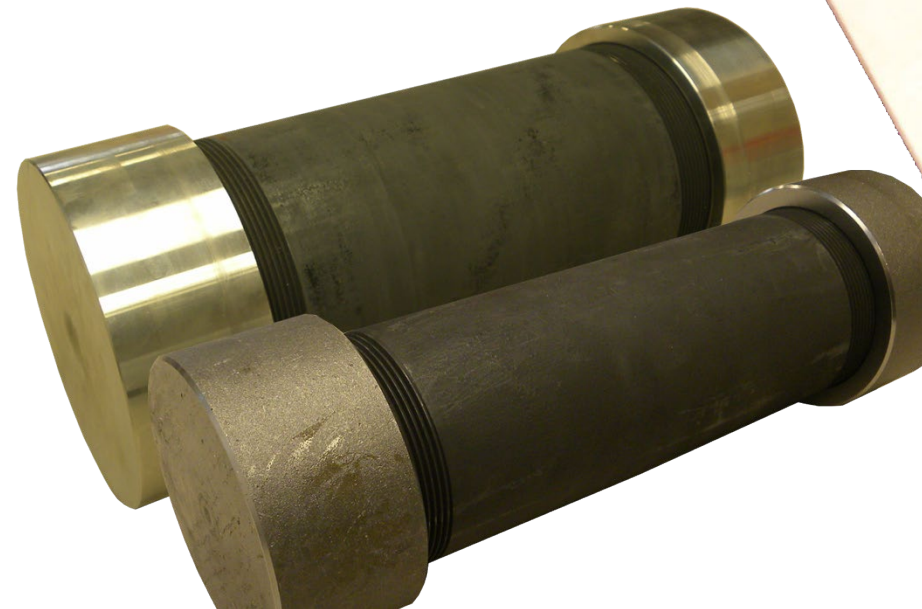
Item Description	Part No.
4-inch x 14-inch long shipping pipe	PA-010
UN 4D plywood box (for 4-inch pipe)	PA-015
4-inch x 14-inch pipe and plywood box	PA-020
6-inch x 14-inch long shipping pipe	PA-030
UN 4D plywood box (for 6-inch pipe)	PA-035
6-inch x 14-inch pipe and plywood box	PA-040

For current pricing and availability please visit www.smsenergetics.com
Larger shipping containers are available upon request

DOT-SP 13481 Shipping Containers (Liquid)

For ease of handling we can provide the UN 4D Plywood box for the 4-inch x 15-inch long liquid shipping pipe only. This box is not required for shipping under the special permit.

Item Description	Part No.
4-inch x 15-inch long shipping pipe	PA-050
UN 4D plywood shipping container box for liquids (4") - optional	PA-051
6-inch x 15-inch long shipping pipe	PA-055



DOT-SP 13481

DOT-SP 13481, previously identified as DOT Exemption 13481 (DOT-E 13481), authorizes transportation of no more than 25 grams of liquid explosive substances (with an energy density not greater than pure nitroglycerin or NG) as Division 1.4E when also packed in a special shipping container. Allowable shipping containers include 4-inch x 15-inch (and larger) flanged Schedule 80 seamless pipe section capped on both ends with 8-bolt 150-pound flange plates which are sealed with high-temperature resistant graphite gaskets. SMS requires the inside welded joints on the DOT-SP 13481 shipping pipes to be continuous with 100% fusion. SMS also requires that the inside welded joints are inspected to ensure a liquid-tight weld.



DOT-SP 13481 Shipping Pipe



UN 4D Plywood Box with Pipe

DOT-SP 8451

DOT-SP 8451, previously identified as DOT Exemption 8451 (DOT-E 8451), authorizes the transportation in commerce of not more than 25 grams of solid explosive or pyrotechnic material (with an energy density not significantly greater than that of PETN), classed as Division 1.4E, when packed in a special shipping container. In May 2010 this special permit was amended to clarify that it can be used for international transportation via cargo plane.

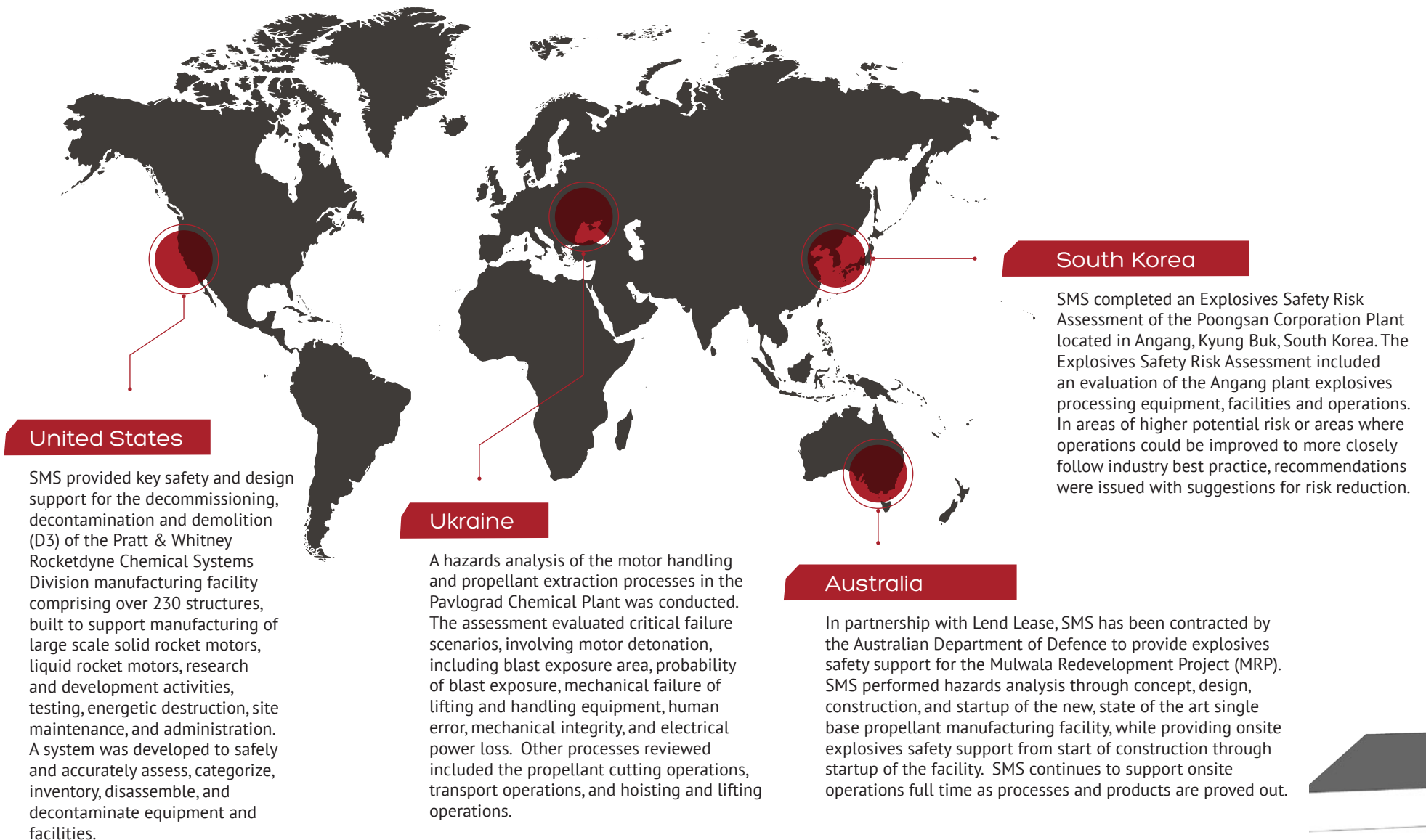
Allowable shipping containers include 4-inch x 14-inch and 6-inch x 12- or 14-inch Schedule 80 seamless steel pipe nipples closed at both ends with appropriately-rated end caps. The pipe threads must be cut so that the caps can be hand screwed to a minimum of 5 threads.

The energetic materials must be sealed in a leak-proof receptacle centered internally in the pipe or wrapped with cushioning material to keep the energetic material away from the side walls and ends of the capped pipe container.

The pipe shipping container must be shipped within a cushioned outer package that has been certified to UN Non-bulk Performance-oriented Packaging (POP) Standards. Acceptable outer packages are listed in the special permit and include the UN 4D plywood box.

Use of these containers requires that a company be party to DOT-SP 8451. Information regarding this Special Permit can be found under Special Permits and Approvals at <http://phmsa.dot.gov/hazmat/regs/sp-a/special-permits>

International Projects



United States

SMS provided key safety and design support for the decommissioning, decontamination and demolition (D3) of the Pratt & Whitney Rocketdyne Chemical Systems Division manufacturing facility comprising over 230 structures, built to support manufacturing of large scale solid rocket motors, liquid rocket motors, research and development activities, testing, energetic destruction, site maintenance, and administration. A system was developed to safely and accurately assess, categorize, inventory, disassemble, and decontaminate equipment and facilities.

Ukraine

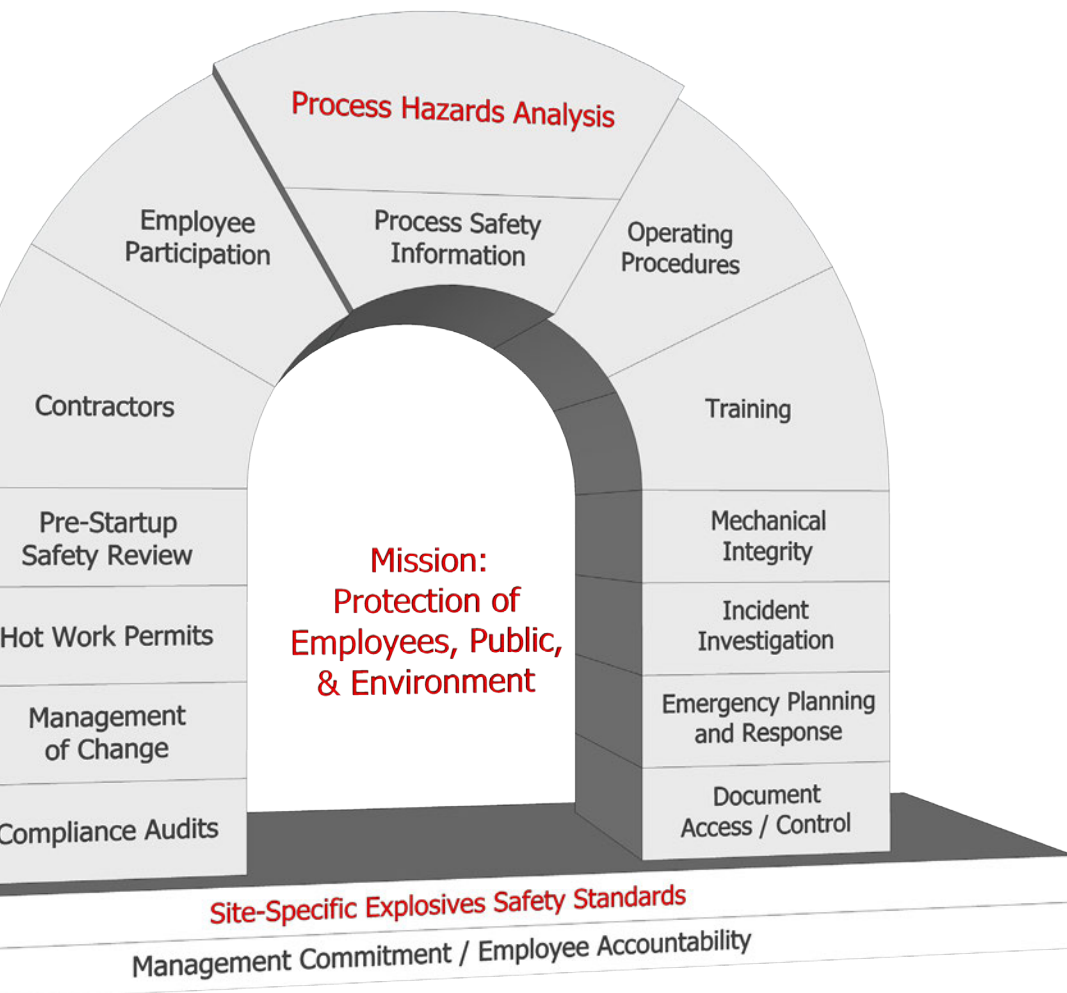
A hazards analysis of the motor handling and propellant extraction processes in the Pavlograd Chemical Plant was conducted. The assessment evaluated critical failure scenarios, involving motor detonation, including blast exposure area, probability of blast exposure, mechanical failure of lifting and handling equipment, human error, mechanical integrity, and electrical power loss. Other processes reviewed included the propellant cutting operations, transport operations, and hoisting and lifting operations.

Australia

In partnership with Lend Lease, SMS has been contracted by the Australian Department of Defence to provide explosives safety support for the Mulwala Redevelopment Project (MRP). SMS performed hazards analysis through concept, design, construction, and startup of the new, state of the art single base propellant manufacturing facility, while providing onsite explosives safety support from start of construction through startup of the facility. SMS continues to support onsite operations full time as processes and products are proved out.

South Korea

SMS completed an Explosives Safety Risk Assessment of the Poongsan Corporation Plant located in Angang, Kyung Buk, South Korea. The Explosives Safety Risk Assessment included an evaluation of the Angang plant explosives processing equipment, facilities and operations. In areas of higher potential risk or areas where operations could be improved to more closely follow industry best practice, recommendations were issued with suggestions for risk reduction.



SMS™ Heritage

The Safety Management Services, Inc. heritage began in the Hazards Analysis Groups at Hercules Aerospace. These groups were established in the late 1960s to evaluate the hazards with propellants, explosives, pyrotechnics, and specialty chemical operations/processes. The methodologies and approaches to analyzing process hazards and material characterization testing evolved with the development of automated operations and complex control systems.

In 1992 SMS personnel became part of a Hercules Aerospace subsidiary, Global Environmental Solutions (GES). Providing commercial and governmental risk management support was a primary business objective of GES. Additionally SMS personnel were responsible for evaluating and minimizing the risks associated with state-of-the-art demilitarization operations and environmental cleanup of sites contaminated with energetic materials.

Alliant Techsystems (ATK) purchased Hercules Aerospace and GES in 1995. The charter of SMS personnel was expanded to include risk assessment support of ATK domestic operations and international demilitarization operations.

Safety Management Services, Inc. was founded in April 1998 as an employee owned company.

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