Owner operators recognize that ensuring process safety and asset integrity is a crucial requirement to maintain their license to operate and ensure secure, safe, reliable production at the lowest sustainable cost. While the financial benefits from implementing process safety management (PSM) programs are difficult to quantify, industry surveys show that PSM investment positively impacts bottom-line performance. According to a 2009 report from the American Society of Safety Engineers, improving safety produces a return on investment ranging from a factor of three to eight.
PROCESS SAFETY INFORMATION

Process Safety Information (PSI) includes information about hazardous chemicals, the technologies involved with those chemicals, and the equipment involved. It is important to maintain a register of chemicals stored, applied, and managed within a facility. Within the chemical index or register, all relevant information about these chemicals must be maintained, including, but not limited to:

- Location
- Characteristics
- List of equipment and parts within the plant where the chemicals are used
- Critical documents related to the chemicals (such as MSDS and Reactivity Matrix)

The registers aid in assessing safety risks not only during modifications, but also during normal maintenance activities. It is essential that this information is quickly and easily available in the case of incidents such as accidental release of hazardous materials.

Information about the technologies involved is held as part of the engineering design basis within our information management solutions but also comprises safety-specific information. The safety-specific information includes data related to upper and lower safety limits and an evaluation of the consequences of deviations. While the P&ID is the key document for process safety analysis, the engineering and asset basis for the plant as a whole - including 3D models, piping isometrics, engineering schematics, and vendor documentation - also provides vital information.

Our information management solutions also provide the means to flag PSI documents and Safety Critical Equipment (SCE) within a facility and identify these quickly for safety assessments, along with all relevant data and documents required to be maintained against this equipment. The Management of Change (MoC) process enables individual stakeholders to quickly visualize the PSI and SCE involved in the MoC process such that relevant review steps and assessments may be carried out.

Typical Elements of Process Safety and Asset Integrity on Your Plant:
- Process Safety Information
- Process Hazard Analysis
- Risk-reducing Measures
- Design Integrity
- Operating Procedures
- Training
- Pre-Startup Safety Review
- Mechanical Integrity
- Non-routine Work Authorization
- Management of Change
- Incident Investigation
- Compliance Audits
- Trade Secrets
- Emergency Planning and Response

63% of surveyed customers would use technology to automate data capture, transfer, and validation in their next project to address challenges of project information handover.

Source: TechValidate survey of 71 users of Intergraph Information Management/Owner Operator Solutions
# DESIGN INTEGRITY

Design integrity can be defined as the assurance that facilities are designed in accordance with governing standards and meet specified operating requirements. It is subject to human failings through fatigue in a high-pressure project or operations environment, but Intergraph’s approach reduces opportunity for human error by removing much of the laborious and repetitive content of this work through automating the enforcement of best practice design rules. Capturing deviations from best practices and inconsistencies and correcting these early in the design process can prevent major costs and delays at later stages of the project plant life cycle – this is often known as the $1 - $10 - $1,000 rule.

<table>
<thead>
<tr>
<th>PSM Element</th>
<th>SPO Solution</th>
<th>How SPO addresses this element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing PSM</td>
<td>SPO Core</td>
<td>Provides rapid access to PSI and associated documentation. Flagging of Safety Critical Equipment and PSI documentation for rapid assessment. Access to relevant Engineering design basis information about the technology and equipment involved. Manage Chemical Index (CI) to maintain a complete list of all hazardous chemicals within a facility.</td>
</tr>
<tr>
<td>Training</td>
<td>3D PACT Integration with third party Control of Work software</td>
<td>Provides realistic training scenarios using 3D models or photorealistic laser scans. Provides out-of-the-box tight integration with eVision’s control of work solution for managing risk analysis and permit to work.</td>
</tr>
<tr>
<td>Lock-out/Tag-out (LOTO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Planning and Response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance audit</td>
<td>SPO Core</td>
<td>Provides ready access to information and audit-able traceability of all updates of the engineering design basis and related work processes.</td>
</tr>
<tr>
<td>Design Integrity</td>
<td>SP Engineering Integrity</td>
<td>Validates engineering design outputs against a wide range of engineering business rules. A large set of out-of-the-box rules are provided that can be easily expanded as required to meet local or company specific needs.</td>
</tr>
<tr>
<td>Operating Procedures</td>
<td>SPO Core</td>
<td>Ensures information on start-up/shut-down is readily available and that the latest version of information is always presented with Intelligent System Operating Manuals</td>
</tr>
<tr>
<td>Mechanical Integrity</td>
<td>SPO Operating Plant</td>
<td>Manages the planning and execution of equipment inspections including capture of information in the field on mobile devices and resolution of punch items</td>
</tr>
<tr>
<td>Management of Change</td>
<td>SPO Operating Plant</td>
<td>Manages the submission, review, approval and implementation of changes with full audit-able traceability. Change impact analysis and synchronization of changes to the engineering design basis with CMMS and other systems is supported.</td>
</tr>
<tr>
<td>Contractors</td>
<td>SPO Core</td>
<td>Provides authorized contractors with security controlled access to relevant information required to perform their work.</td>
</tr>
</tbody>
</table>

One plant owner has calculated that **30%** of the cost of plant modifications is typically spent in physically verifying the “as-is” status of the plant prior to designing modifications.

When intelligent, integrated, rule-based SmartPlant Enterprise design tools are deployed by contractors (gaining design integrity) and maintained during operations, information will be:

- Internally consistent
- Compliant with the defined engineering database
- Compliant with defined rules

In a survey of current users, **82%** agreed, “Smart Plant Enterprise for Owner Operators has resulted in faster and better access to information and documentation.” This reduces the need for physical verification and the inherent increased risks of trips, slips, and falls.

For additional information on how our solutions assist with process safety management, read our white paper, “Ensuring Process Safety and Asset Integrity on Your Plant”
MOC (MANAGEMENT OF CHANGE)

- Managing Change – A Safety-critical Process
- Managing Plant Change – The Intergraph Approach
- Benefits of SPO Management of Change

Management of change is a safety-critical process, and SPO provides an out-of-the-box process for managing plant change. Unauthorized design changes and changes that have not been properly evaluated prior to implementation pose a major risk factor to plant asset integrity; vital changes that are not selected for implementation after evaluation also pose a risk factor. SPO’s process provides rigorous management of change (MOC) of engineering information with full traceability and audit trail and provides a basis for successful, compliant asset integrity management to satisfy international standards. The preconfigured MOC process includes an electronic workflow for managing the review, authorization, design, and approval of changes in the engineering design basis, and optionally the notification of maintenance to perform changes by creating notification records in the plant computerized maintenance management system (CMMS) such as SAP® PM.

ABOUT INTERGRAPH

Soon to be known as Hexagon Process, Power & Marine, Intergraph Process, Power & Marine is the leading global provider of engineering software for the design, construction and operation of plants, ships and offshore facilities.

Key Benefits of SPO for PSM:

- Demonstrate compliance with local operating rules and regulations, quickly and easily
- Full auditable traceability of the operating plant
- Minimize on-site safety hazards and emergency situations
- Reduction of work hours spent performing laborious manual verification of critical safety data
- Minimization of unnecessary errors in plant documentation due to human error
- Monitor on an ongoing basis whether asset information quality is deteriorating or improving over time on the operating plant
- Effective management of unstructured information within the legacy design basis