Engineering Solutions & Services

Conceptual Engineering & Design Solutions

Detailed Engineering & Design Solutions

Procurement Fabrication & Construction Solutions

Operations & Maintenance Solutions

Technology Services Consulting

Performance Management Solutions

*Innovative technology
for impactful insights*

ROLTA

Rolta Engineering & Enterprise Solutions

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Market Overview

With a soaring GDP the Indian energy demand, in the last decade has grown at an annual rate which is almost double the global growth rate. Conventional power generation and refining capacities are both expected to double in the next decade in India. According to Frost & Sullivan, over the next 7-10 years, E&LP investments in India alone are expected to be in the range of US $90-110 billion, with expected investments worth over US $40 billion under the Eleventh Five-Year Plan (2007-2012) across the oil and gas value chain. According to McKinsey & Co., India's power sector will need investments of about US$ 600 Billion by 2017. While the International Energy Agency states that US$ 26 Trillion infrastructure investment will be required to meet global demand for energy which is expected to increase by 40% by 2030.

All such power and process plants have thousands of interrelated real-time and operational decisions to produce gasoline, electricity, chemicals, etc. Disconnected pieces of information spread across the organization need to be bound together to extract actionable intelligence while driving the culture of data based decision-making to achieve Operational Excellence.

Organizations are under growing pressure from the Environment and Compliance Regulations. Additionally they need to optimize utilization, avoid failures and lower operational expenditure whilst maintaining customer satisfaction. The need for Innovation and Value maximization has therefore become more critical than ever before.For Engineering Procurement and Construction (EPC) companies, India has emerged as a destination of choice for engineering outsourcing and as a consequence, design & engineering work for numerous projects across the globe is now being executed in India.

Owner-Operators (O/Os) of plants have started to realize the benefits of using modern information technology tools for project & plant life cycle management i.e. Design, Build, Operate & Maintain phases, as a result of maturing of the such tools, as well as the changing economies. O/Os are, therefore, seeking services to not only obtain digital intelligent models of their plants, but also to have their engineering design systems integrated with other enterprise-level systems to efficiently manage the EPC as well as O&M phase. The benefits of integrating such enterprise wide systems across disparate databases and heterogeneous platforms are pushing up the demand for a comprehensive and integrated solution to address this need.

Rolta, with its years of domain experience, expertise & insights together with innovative and specialized knowledge of tools and technology is uniquely positioned to address these modernization requirements. The Company's exceptional combination of Engineering and IT expertise enables it to provide comprehensive solutions for EPCs and O/Os, from concept to completion of new plants and then for their ongoing operations.

Rolta Engineering Services

Rolta's Engineering and Enterprise Solutions (E&ES) include Consulting, Conceptual Design, Detailed Design & Engineering, Project Management, Procurement Management, Construction Management, As-Built, Operations & Maintenance. These solutions & services help O/Os within the process and power industries to optimize Asset Design, Asset Performance etc.

Rolta is already working with various Indian government organizations like Department of Atomic Energy and other leading agencies on sophisticated projects in the nuclear power sector, such as the prestigious engineering design project for a significant nuclear reactor system of international importance involving a high level of specialized expertise in conceptual design, system development, finite element analysis, and safety analysis, besides multi-disciplinary engineering competence and domain expertise.

According to a NASSCOM report, outsourcing of Engineering services is expected to cross US$ 60 Billion by 2020. Rolta's dedicated in-house Technology Services Group provides design tool automation and integration services to clients around the globe desiring to improve the productivity of their existing design tools and implement new state-of-the-art tools.

Enterprise Solutions: SmartPlant® Enterprise Suite

In partnership with Intergraph, Inc., USA, Rolta offers solutions and services that help integrate engineering tasks that support Plant Life Cycle, generate schematics, intelligent 3D models, help procure accurate materials and assist constructions activities that reduce the overall project completion period. These tools enable simulating construction planning, equipment movement, managing documents, drawings and data associated with a plant's daily operations benefitting Owner Operators *(O/O)* and Engineering, Procurement and Construction (EPC) companies. Rolta offers Intergraph's SmartPlant Enterprise suite - the world's no.l platform of engineering, procurement, fabrication, construction and plant life cycle information management offering a complete design workflow for any type of plant facility across diverse verticals such as fossil and nuclear power, oil and gas (upstream, midstream and downstream), minerals and mining and life sciences.

Decision Support & Performance management Solutions: Rolta One View™ Enterprise Suite

Rolta OneView™ features a comprehensive framework spanning Strategy Management, Analytics, Performance Management and Real-Time Intelligence. Rolta OneView™ is a Web based innovative Business Intelligence solution with field-proven benefits for plant operators to significantly improve operational efficiencies and reliability. This Suite has been developed by leveraging Rolta's deep understanding of Process and Power operations coupled with its technology expertise in Business Intelligence and Enterprise Integration. Built on best in breed technology platforms, Rolta OneView™ can be accessed from a variety of devices including Smartphones and Tablets. Rolta OneView™ Operational Insights covers functional areas such as Production, Maintenance, Reliability, HSE, Quality, MRO and Supply Chain. Major benefits include pre-empting reliability related failures, reducing reportable environmental events, steadily increasing uninterrupted runs of operating units and lowering operating costs due to more responsive analytics.

Customers

Rolta has provided path-breaking solutions to a number global customers that include 3M, ABB-Lyondell, ADNOC, Air Liquide, Aker Yards, Alsthom Power, Aquatech, Babcock Borsig, BAPCO, BASF, Bateman, Bayer, Bechtel, BHEL, Burns & McDonnell, CEGELEC, Chevron, CNRL, ConocoPhillips, Doosan, Dow Corning, Dosal, Dow Chemicals, DSP DuPont, Emirates Aluminum, Endurance, EIL, Equate Petrochemicals, Essar, Ever Technologies, FEDO, Florida Power & Light, Flour Daniel, GE, GASCO, HPCL, IOCL, ISRO, ITER, Jacobs, Jubail, Kashima Oil, KBR, Kentz, KNPC, Kvaerner, L&T Group, Lanco Infratech, Lanzou Petrochina, Linde, Litwin, Lurgi, Mazagaon Docks, MECON, Mitsui, Mott MacDonald, Mustang Engineering, NanaColt, NMRL, Nova Chemicals, NPCIL, NTPC, ONGC, PDIL, Petrobras, Petrofac, Pfizer, QAPCO, Q-Chem, Reliance Industries, Reliance Infrastructure, Rockwell Automation, Saipem, Samsung, Saudi Aramco, Shell, Siemens PG, SNC Lavalin, SNC/AMO, Statoil, Sumitomo Chemicals, SUNCOR, Tata Chemicals, TCE, Technip, Tecnimont ICB, Thermax, Toshiba India, Toyo Engineering, Triune, United Olefins, Valdel, WGI, Yansab, among others.

Portfolio of Rolta Engineering Services

Conceptual Engineering & Design Services

- Feasibility Studies
- Extended Basic Engineering
- Engineering & Design
- Process Flow Diagram & Equipment
- Data Sheet Preparation
- Front End
- Pre-Bid Engineering Support (FEED)
- Process Simulation

Detailed Engineering & Design Services

- Process
- Instrumentation & Controls
- Electrical
- Mechanical
- Plant Design & Piping
- Civil /Structural
- Marine Training

Project Management

- curement Services
- ne Contract & Sub Contract
- lagement
- Project QA / QC
- Supplier Qualification & Purchasing
- Expediting & Logistics Site
- Management Office & Site
- Health & Safety Management
- Commissioning & Startup

Operations & Maintenance Services

- Engineering Information Management Services As-Built Plant Information & Modeling Services Plant 3D Visualization
- Shutdown Planning
- Plant Safety & Reliability
- Plant Revamp & Decommissioning

Technology Services Consulting

- Technical Information Management
- Software System Deployment
- Customization &
- Training
- Reference Data Creation &
- Management
- Software
- Data Migration, Audit & Compliance Integration

Rolta Engineering Design Services

At Rolta we provide a range of services for major markets in process & power industries with Rolta's worldwide domain expertise in engineering design, cutting edge process engineering & data management technology and support.

Unlike other EPCs, Rolta's portfolios of technologies deliver a unique combination of detail engineering excellence and IT expertise to clients in India and the Global markets. This new and unique combination offers leading technological edge in many sectors of the power industry thereby offering clients an optimum business advantage.

Rolta provides Engineering services for variety of Process & Power Plants. These activities include extended basic engineering, detail engineering, project management, procurement services & construction management services. Supporting this program is a range of advance design tools including the latest computer based plant modeling systems, Simulation systems and linked design / documentation programs. Advance services also include seamless engineering design automation, engineering data migration/integration, and automation for the entire lifecycle of Process & Power plants.

Feasibility Study

Techno-economic feasibility studies are undertaken typically during the project conceptualization stage to establish the feasibility of the Project with respect to technical soundness, operational flexibility and economic viability.

Rolta's Project services group recognizes the importance of such studies and possesses required multi discipline domain expertise to undertake such activities for grass-root projects as well as revamping of existing plants. Rolta, undertakes such feasibility studies complimented with its extensive knowledge of various technologies in different industries provides some of the best practices in design, engineering and plant commissioning skills.

Extended Basic Engineering

The Basic Engineering services offered by Rolta consist of core documentation of the project, which includes process flow diagrams, heat & mass balances, P&ID, control & operational philosophy, basic equipment sizing, equipment specifications and conceptual equipment layout, etc. With its experience in varied field of the Process & Power engineering industry, Rolta provides its clients the best of class support for extended basic engineering needs. This is supported by its expertise in providing multi-platform based IT enabled engineering design services. The design teams are well acquainted with practices and technologies associated with varied power industry.

Rolta is well equipped with a large range of the latest industry standard design automation software tools for engineering calculations, simulation, modeling and computer aided designing. The design cell is also equipped with the latest hardware and high-speed secure networking for quick turnaround and secure information transfer to its clients.

Detail Design & Engineering

To ensure perfect synchronization between Basic engineering, Rolta provides extensive engineering services to ensure an optimal adaptation of the technology. These engineering services provided by Rolta help clients in ensuring the best yields.

Rolta employs domain knowledge experts and cutting edge software tools and in house developed special applications for performing intricate engineering. These include a seamless integration of basic engineering through a common design database, which provides consistent and correct data in all the design deliverables and design cycles.

To ensure optimum quantities, work-volumes, constructability, operability, maintainability and safety of the plant, Rolta offers one of the best of class detail engineering services.

Rolta offers a range of services in India and the world for implementing Plant Design Automation solutions. These services are focused towards EPCs & O/Os in the Process, Power and Marine industries.

Based on the basic design, Rolta provides these detail engineering services by delivering intelligent engineering designs and associated documentation. This is achieved through extensive use of integrated engineering workflows, use of multi-platform engineering applications for design and analysis of mechanical, piping, electrical, instrumentation and civil activities.

Rolta provides the following Detailed Engineering Services:

Process Engineering

The process engineering group undertakes complete detailed engineering of process plants based on the basic Know How (FEED) package provided by technology supplier. The intelligent data generated from SmartPlant P&ID can be further integrated with PDS & SmartPlant 3D models. The various services covered as part of detailed engineering are as listed below.

- Process simulation
- Heat and material balance calculations
- Materials of construction diagrams
- Hydraulic analysis, line sizing and relief valve sizing
- Design of process equipment
- Development of Process Flow Diagrams (PFD's) and equipment data sheets
- Development of Process and Instrumentation Diagrams (P&ID's)
- Safety and Hazards and Operability (HAZOP) reviews

Rolta uses specialised tools like:

Aspen Plus, HTFS, HTRI, PVElite, SmartPlant P&ID, Zyqad and a number of internally developed equipment design programs.

Instrumentation & Controls Engineering

The Instrumentation & Control systems engineering group executes complete detail engineering activities for all types of Instrumentation for Process & Power industries.

Major activities of the discipline includes Instrument markups on P&IDs, Creation / Import of Instrument Index, Flow sensor, Control valve and Thermo well sizing calculations, Preparation of Specification datasheets, development of Field Instrument/JB/Panel Location plans, Preparation of Wiring and loop diagrams, Hook-up drawings, PLC/DCS I/O assignment, DCS configuration etc.

This group comprises of industry experienced team of Instrumentation Engineers & Designers who have executed multiple Instrumentation engineering projects for the Domestic and Overseas customers on stringent schedule requirement and are well conversant with Industry Standards.

This group has trained resources with extremely sound knowledge/skills in the use of international and industry standard engineering tools. The various services covered as part of detailed engineering are as listed below.

- Complete control system design and architecture
- Distributed Control System (DCS), Programmable Logic Controller (PLC) and Supervisory Control and Data Acquisition (SCADA) design and specification
- Control valve sizing and selection
- Instrument design and specification
- Procurement services for all types of I&C equipment

Rolta uses specialised tools like:

AutoCAD, SmartPlant Instrumentation, Infomaker, MicroStation, PDS, SmartPlant3D & other platform for 3D modeling.

Electrical Engineering

The electrical engineering group deals with design and detail engineering services for process and power plants. The discipline also carries out power systems studies using ETAP and other applicable software. The group also undertakes 3D modeling of trays, lighting fixtures and other electrical equipments. The various services covered as part of detailed engineering are as listed below.

- Electrical load analysis and design of system architecture
- Power distribution system design
- Motor control center and substation design
- Protective relay coordination
- Lighting design
- Grounding design
- 3D design of electrical components
- Cable and tray routing, sizing, scheduling
- Hazardous area classification
- Supervisory Control and Data Acquisition (SCADA) design and specification

. Plant communication system design

- Procurement services for all types of electrical equipment

Rolta uses specialized tools like:

AutoCAD, CG Lux, ETAP, MicroStation, SmartPlant Electrical, PDS, SmartPlant3D & other platform for 3D modeling.

Mechanical Engineering

The mechanical engineering group carries out design of various static and dynamic equipments using internationally accepted design codes / software. The various services covered as part of detailed engineering are as listed below.

- Design of static and rotating equipment such as pumps, vessels, tanks and heat exchangers, reactors, columns and agitators
- Heat exchanger setting plans
- Finite element analysis
- Design of material handling equipment such as conveyors, crushers, elevators, and cranes
- Preparation of technical specifications for procurement of equipment
- Generation of fabrication drawings
- Technical bid evaluation
- Vendor coordination and Expediting services

Rolta uses specialized tools like:

ANSYS, AutoCAD, COMPRESS, CodeCalc, MicroStation, PVElite, SmartPlant 3D, Tank and a number of internally developed equipment design programs.

Plant Design & Piping Engineering

The piping engineering group carries out the entire range of activities viz. stress analysis, conceptual planning and studies 3D modeling, Isometrics, Pipe Supports, interference check, design reviews and reports. The various services covered as part of detailed engineering are as listed below.

- Complete plant layout services, including equipment arrangement, plot plan development and conceptual layout
- 2D and 3 D equipment and piping modeling
- Static and dynamic piping stress analysis
- Laser scanning and "as-builting" services
- Complete piping material management services, including pipe specification and reference data base (RDB) development and maintenance
- Procurement of piping materials and specialty items Site construction support services

Rolta uses specialized tools like:

AutoCAD, CAESAR II, Isogen, MicroStation, Orthogen, PDS, SmartPlant3D & other platform for 3D modeling, Global Server, Pelican Forge Pipe Support Modeler, SmartPlant Materials, SmartPlant Review, SmartPlant Spoolgen, Smartsketch.

Civil/ Structural Engineering

The civil/structural engineering group undertakes complete detail engineering of all structures and foundations pertaining to any plant, non-plant, utility, offsite and offshore structures. The group comprises of a team of engineers and designers equipped with international design codes and experience in executing all types of structural analysis design and drafting assignment. The various services covered as part of detailed engineering are as listed below.

- Structural analysis and design
- Foundation and reinforced concrete analysis and design
- Cut and fill design
- Site drainage and road design
- Structural steel connection design and detailing services

Rolta uses specialized tools like:

ACE Frameworks Utilities, Base Plate, Frameworks Plus & PCA-Columns, STAAD.Pro, SDS/2, PDS, SmartPlant3D & other platform for 3D modeling and a number of internally developed structural and foundation design programs.

Marine Engineering

Rolta's ship design group includes a core team of professionals from the marine sector comprising of naval architects, marine, mechanical, electrical and structural engineers. They collectively have years of experience in ship/submarine design, FPSO offshore platform, ship construction and repairs. Rolta's ship design professionals are well versed with ship design/construction standards, class rules and specifications and have worked in some of the leading shipyards on various projects in India and abroad. The various services covered as part of Marine engineering are listed below:

- Hull Structures
- Outfitting
- Machinery and HVAC
- Electrical and Instrumentation
- Top sides & Structures for FPSO
- Documentation and Project Management

Rolta uses specialized tools like:

SmartMarine 3D, PDS & other platform for 3D Marine modeling, Orthogen, Isogen, CATIA V5, CADDS 5, AutoCAD, MicroStation, SmartSketch, Nupas-CADmatic etc

Project Management

Project planning and management is the bedrock of all EPCm projects. Rolta firmly believes that an efficient and intelligent project management is of utmost importance in the success of the project it undertakes. Rolta has a large project management team with extensive industry and implementation experience. The team is well equipped with some of the latest project management tools and information systems to perform project management, scheduling, monitoring and cost control etc. The execution team is fully geared up for co-ordinating the activities of design,

World Class Engineering Services
Deploying Cutting Edge Technologies
using a strong IT backbone as a
Force Multiplies

engineering, procurement, inspection & expediting, stores management, construction, pre-commissioning & commissioning by means of an integrated system for schedule, cost and quality control.

Rolta has deployed some of the best tools project scheduling and planning with an on-line monitoring & reporting system which tracks and corrects the slippages in schedule and resources in time. The tools provide an extensive management reporting system for details of planning, monitoring and progress.

Procurement Services

Procurement Services is vital milestone in achieving success in any project. Rolta provides Procurement support services starting from vendor identification, Vendor development, evaluation of offers, Assistance in order placement and assistance in all other post order activities like inspection & expediting, Materials planning, etc. The procurement support services from Rolta offers a constant vigil over procurement cycle in order to meet project schedules.

Engineering information management services

Organizations are fast discovering that they need effective Information Technology solutions and software tools for the management of their engineering information. Only then a proper tracking of the evolving configuration of their plants from conception through construction, operation maintenance and revamps to eventual decommissioning can be made possible. The potential benefits arising from the effective management of engineering information are enormous, and competitive pressures are such that companies today recognize the compelling need to invest in this area to survive and prosper.

Rolta with its over a decade long experience leverages its support experience to hundreds of Plant owners. Rolta offers a range of Plant IT enabled engineering data management services for its customers in India and across the world.

These services include supply and installation of the latest hardware and software tools for engineering data management for the Process & Power industries. The services also include extensive training and hand holding for users and plant maintenance staff.

As-Built Plant Information & Modeling Services

As-built Plant modeling and Intelligent P&IDs using lasergrammetry and Walkthrough techniques

Translation of paper and digital P&IDs to intelligent P&IDs

3D Modeling and Legacy Data Migration

Standard Reference Plant Creation

External data Import and Database Upgrade /migration

Merging of SmartPlant Databases

Legacy data migration-PDS to SP3D, IDM to SPI

Training

Rolta offers Training Services to its Customers in India on state-of-the-art Plant Design software from Intergraph Process Power & Marine/3DS Net, Products on latest version of the software. Our experienced instructors conduct training through a combination of theory and hands-on training. The training covers all product features and functionalities and is tuned to address specific needs of the Customer. This training helps in successful deployment and usage of the software tools for enterprise services.

Rolta Engineering Technology Services

Increasing usage and / or adoption of 'state-of-the-art' Plant Design and Engineering Software tools and solutions by EPCs as well as Owner-Operators has led to an approach of integrating engineering data throughout the enterprise and also over life cycle of a project including data handover from the EPCs. This approach of integration has enormous advantages which promotes 'interoperability. Using this approach, we can make engineering data available even for non-engineer users and better interact with the Owner-Operator IT architecture.

Data / Information Handover on a capital project is an activity that has traditionally been low on the priorities of both the Owner-Operator *(O/O)* and the EPCs company alike. Often O/O's believe the ownership of consolidation and integrity of the content to be the responsibility of the EPC and then wonder why the data / information handed over is organized by project codes and structures and not plant codes and structures, or that data is duplicated, mis-indexed or just missing. Equally, EPC's typically do not allocate key engineering resources or impact their existing processes to provide the co-ordination tasks.

It is not just for handover of Greenfield projects either, Brown field turnarounds are equally affected by inefficient information. Process of closing the gap between EPCs and O/Os, so win-win is Smart Handover. In efficient engineering information in the operating facility is resulting in extended turnaround times, causing lost production/revenue opportunity and higher capital expenses, up to 30% of the costs for modifications are involved in verifying and correcting the 'As-built' plant data. Smart Handover during the development phase of a project and continual verification can reduce handover costs practically to zero.

We have realized that business model of companies who create the engineering design basis (for eg. EPCs) must be improved in the process. Besides providing automation tools to EPCs, Rolta will create a path for EPC to begin packaging their intellectual property (IPs) and realizing value from it. We can help EPCs to protect and package their IPs and Owner-Operators to create and own automation rules on top of plant design software, which serves all parties in the value chain ie EPCs can realize increasing margins, Owner-Operators can realize decreasing project costs, and we can realize increasing revenue as we bring more value. The business of packing engineering rules for automation is complex and here's where Rolta provides its expertise thru their Technology Services.

The challenges that are faced for implementation of such complex yet state-of-the-art engineering solutions are

- Adoption of new workflow process
- Getting the right implementation partner
- Development of functional requirements specifications
- Experienced resources

To meet and overcome the above challenges, Rolta has created an apex group, called "Smart Plant Center of Excellence" in the Technology Center which provides following services:

Consulting & SmartPlant Enterprise (SPE) Implementation Assistance

- Requirement analysis for SmartPlant deployment
- SmartPlant configuration & automation
- Custom training & handholding
- Helpdesk assistance
- SmartPlant Implementation & administration support
- Onsite/offshore implementation

EPC Data Handover support to O/Os

- Creation of project specific data handover spec for *O/O*
- Audit of EPC provided SmartPlant data for ensuring total compliance to *O/O* standards
- To make EPC data compliant to *O/O* standards
- Assistance for EPC data publishing to SPF
- Bulk data load utilities

SmartPlant Content Customization

- SmartPlant tools Seed template configuration
- SP3D Reference data creation for Piping, Equipment, Electrical, HVAC & Structural from paper spec to SP3D or paper spec to SPRD to SP3D
- SP3D Symbol creation for Piping components, Instruments, HVAC, Electrical, Pipe Supports
- PDS Eden for piping and equipment
- SP3D/PDS Drawing &Report content creation
- SP2D Report content creation

SmartPlant Foundation implementation Services

- SPF configuration
- Tool Schema Mapping
- Work flow configuration for Management of change
- Workflow configuration
- Transmittals configuration
- Publishing TEF and Non-TEF data
- Datasheet template configuration
- Help desk support for SmartPlant suite

Automation Services

- Developing Automation routines for Quality checking of SP tool databases
- Creating utilities to enhance basic functionality of SP tools
- SP3D and SPF programming
- Other software development

Portfolio of SmartPlant® Enterprise Solutions

Engineering & Schematics

artPlant[9] P&ID artPlant[9] Process Safety artPlant Instrumentation
lartPlant Electrical
lartSketch[9] SmartPlant Explorer

3D Modeling & Visualization

SmartPlant Layout
SmartPlant[9] 3D
lartMarine[9] 3D
lartPlant 3D Materials Handling Edition

lartPlant[9] Review, SmartPlant[9] Review Publisher & lartPlant[9] Free View™ SmartPlant Isometrics

1 Procurement, Fabrication & Construction

- SmartPlant[9] Spoolgen[9]

- SmartPlant Reference Data • Standard Database for SmartPlant[9] Reference Data
- SmartPlant[9] Materials
- SmartPlant Construction

Information Management

SmartPlant Foundation
SmartPlant[9] Enterprise for Owner Operators
• SPO Core
>PO Operating Plant
!PO Project Execution
/alidation, Transformation, and Loading
!PO Handover

Business Drivers

Company Best Practice

Knowledge-based Engineering

International Standards

Logic
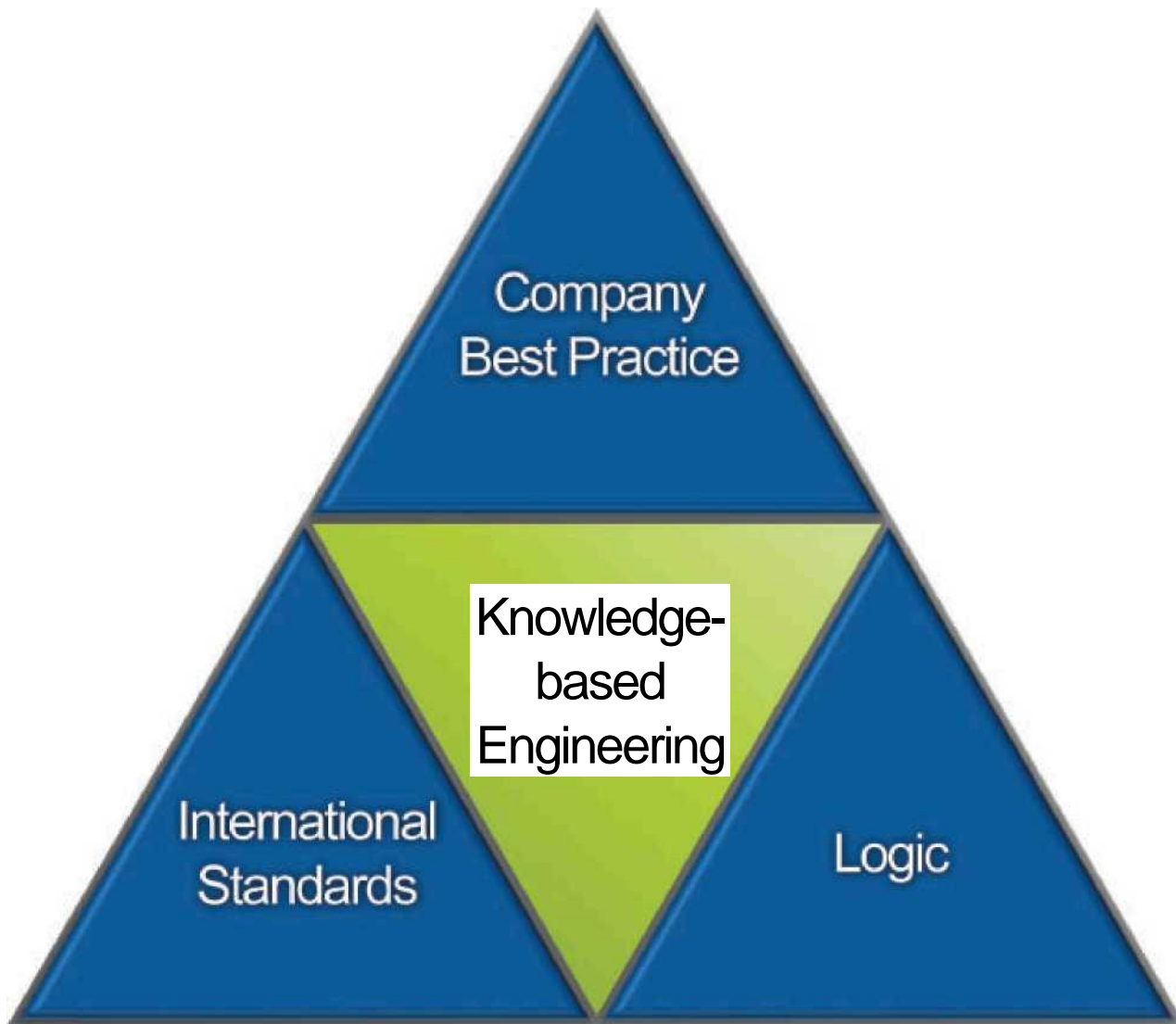
DATA RULES AUTOMATION

Create and Manage your Plant Configuration from Concept to Operations

A key part of Intergraph® SmartPlant® Enterprise, SmartPlant P&dD is an asset-centric, rule-driven engineering solution that can help to efficiently create, maintain, and improve plant configurations. SmartPlant P&dD helps you design and configure your plant processes using design rules that enforce engineering and customer standards. It enables you to configure the plant accurately and make the right decision early in the design cycle, increasing the efficiency of downstream design activities such as control system design and piping. Engineering decisions made in five minutes impact the 40-year life of a plant. So, early, accurate decisions are important. SmartPlant P&dD plays a key role in design, construction, commissioning, and operations, enabling plant owners to better plan for maintenance, operational tasks, and expansions or modifications. In addition, the SmartPlant P&ID data can be leveraged to plant operation-critical systems, such as control systems (SmartPlant Instrumentation) and safety with HAZOP analysis (SmartPlant Process Safety).

Add Value across the Enterprise

SmartPlant P&dD offers value for all plant operations teams, such as engineering, technical services, research, environment, and inspection. It helps improve the value of your existing P&IDs by being focused on data and derived deliverables. SmartPlant P&ID streamlines data entry, identifies and resolves inconsistencies, consolidates data that may reside in various files/spreadsheets/databases, and helps you present your data in the format that best meets the needs of your specific task, lowering costs and operational risks. This is made possible by functions such as system editing, plant data editing (non-graphical interface to edit data across all P&dDs in the plant), automation, the ability to import data from spreadsheets, and the display set function, which basically queries the data and presents it in a graphical view. SmartPlanrt P & ID is a task-driven software, which means that depending on your login, the software will display different properties and access rights to add or change data. This greatly improves user efficiency. SmartPlant P&dD enables conversion of P&IDs created in AutoCAD, MicroStation, and other formats via

SmartPlant Import Assistant and technical support services to SmartPlant P&ID.

Streamline Engineering Tasks throughout the Workflow

The design rules that are built into SmartPlant P&ID streamline engineering tasks throughout the workflow. Automation enables application integration and provides the ability to import data from other tasks such as equipment data from the mechanical group, process data from process engineers, etc. SmartPlant P&ID provides workshare capabilities to support multi-office project execution and allows you to compare versions for effective management of change. SmartPlant P&ID's built-in design rules and system editing capabilities also allow fast and consistent data entry throughout a complete piping system. The rules (e.g. checking against piping specifications) enable design validation across the project and allow automatic updating of the design when the design basis changes, saving a significant amount of design checking time and increasing the design quality.

Benefits for EPC Companies

EPC contractors can use SmartPlant P&ID to efficiently deliver a high-quality design with a competitive edge by streamlining project execution. SmartPlant P&ID helps to:

• Facilitate global worksharing for multi-office project execution and concurrent engineering, reducing hours and cost and increasing design quality (on- and off-line modes).

• Drive substantial savings during front-end engineering design, ensure accurate data and deliverables, and optimize design and review scenarios.

• Create consistent design driven by the built-in rules, streamlining the entire data checking process. Perform system editing.

• Shorten the commissioning cycle, speed time to plant startup, and provide as-built P&IDs for operations.

• Automate deliverables and automate design actions.

• Take advantage of typicals.

SmartPlant P&ID helps you take advantage of your P&ID data because it is easier to access from a single, up-to-date source. Managing your plant asset more efficiently helps you better meet the challenges affecting your plant's productivity, your project's success and your company's bottom line every day.

- Use pipe specification access and rules.

- Edit data efficiently using Plant Editing in a non-graphic environment across all P&IDs in the plant.

- Take advantage of HAZOP, logic diagrams, and action management.

- Support a hosted environment.

Create A High-quality Plant Configuration

SmartPlant P&ID offers unique capabilities to create the plant configuration with all equipment, pipelines and instruments and to create a connectivity and relationship between these assets that will help better verify and use the design throughout the complete plant life cycle. SmartPlant P&ID helps you create, access and manage your data. The software focuses on the plant data instead of on drafting, with all P&ID information stored in the data model including connectivity throughout the plant.

Benefits for Plant Owners

SmartPlant P&ID helps O/Os better plan for maintenance, expansions, and modifications; manage risk-based inspection (RBI) processes; enhance plant safety; and more. You can:

- Use P&ID data in complementary operational and engineering critical activities such as safety analysis, hydraulic analysis optimization, managing LDAR, and process optimizations.

- Automate HAZOP identifications with SmartPlant Process Safety, reducing the effort and improving the quality of the safety analysis using the corporate knowledge base.

- Facilitate better planning for maintenance and plant shutdowns.

- Support the as-built project by executing projects in running plants, keeping new and existing situations separate, and consolidating them after project execution.

- Find first block valves to safely exchange assets using the connectivity and relationships in SmartPlant P&ID through automatic tagouts, supporting lockout/tagout capabilities.

- Use display sets to create deliverables to execute specific tasks such as maintenance, inspection, etc.

- Make data available via SmartPlant Explorer in an easy-to-use, safe environment.

- Conduct "What if" production scenarios to access project capabilities.

- Check for engineering and safety practices using rules.

- Access related information for the "roadmap of the plant" with SmartPlant Enterprise for Owner Operators.

- Conduct maintenance planning and identify critical dependence of systems through the connectivity model.

- Meet regulatory agency demands and prove compliance with governmental regulations, such as OSHA, EPA, and FDA.
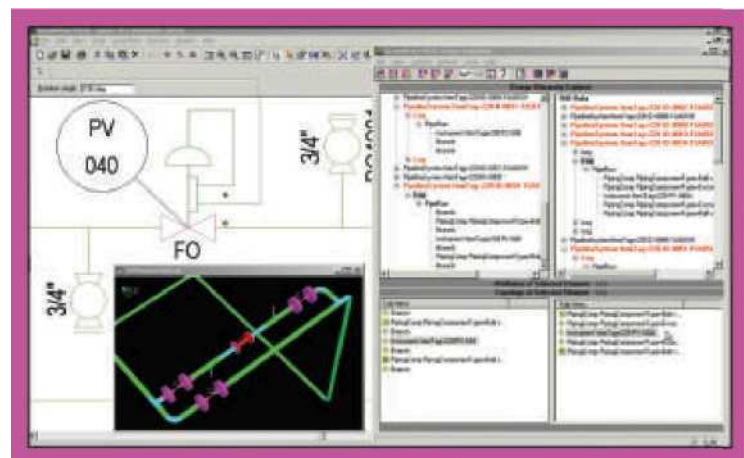
SmartPlant P&ID Design Validation

Intergraph SmartPlant® P&ID Design Validation provides an iterative workflow for verifying piping system drawings at the data attributes & topology levels.

Design Validation streamlines comparisons between SmartPlant P&ID and:

- SmartPlant Isometrics (PCFs, PODs)

- ISOGEN® -generated isometrics/drawings (IDFs, PCFs)

- PDMS models (DATAL)

Benefits of using SmartPlant P&ID Design Validation include:

- Prevention of downstream errors due to easy comparison of P&IDs, isometrics, and 3D models at the data and topology levels

- Increased reliability through rule-driven, intelligent, graphical comparison

- Improved data accuracy through better resolution of design inconsistencies

- Reduced risk in maintenance and modification through a synchronized engineering data set for P&IDs, isometrics, and 3D models

SmartPlant P&ID Design Validation allows navigation of the logical (2D) P&ID and provides graphical detailed views of the (3D) model data to examine the topology of related plant items.

SmartPlant Safety Solutions offer next-generation software packages that streamline process safety review and build your corporate safety knowledge base, leading to considerable benefits for capital projects and your operating plant.

SmartPlant Safety Solutions not only apply to HAZOP execution, but also deals with challenges in checking design against safety practices and engineering rules to avoid repeated and time consuming HAZOP study requirements.

To deal with these challenges, Intergraph offers the SmartPlant Safety Solutions. Purchase the products which fit your workflow — each is available separately:

- SmartPlant Process Safety
- SmartPlant P&ID Engineering Integrity
- SmartPlant Action Management

SMARTPLANT PROCESS SAFETY

Improve Safety by reducing risk in Capital Projects and Plant Operations

Intergraph® SmartPlant® Process Safety streamlines process safety review and builds your corporate safety knowledge base, leading to considerable benefits for capital projects and your operating plant. By automatically identifying hazards from the plant's schematic drawings using SmartPlant P&ID, Intergraph SmartPlant Process Safety enables companies to:

- Produce consistent, high-quality HAZOP study reports for much less time and cost across the complete design
- Identify and eliminate hazards early in the design process, before change becomes limited and expensive
- Quickly and easily assess the effect of change on the safety of the entire plant
- Take advantage of action management to execute risk reductions

For capital projects, SmartPlant Process Safety leads to lower risk, improved design quality, and reduced schedules. For the operating plant, it means that through better Management of Change

(MOC) processes, you can achieve improved and much faster re-HAZOPs and also increase plant safety. Powered by HAZID, SmartPlant Process Safety is an integral part of Intergraph's world-leading SmartPlant Enterprise process design and asset management suite.

Real-world Benefits from a Process Performance Solution

- Substantially Reduce HAZOP Study Time and Cost
- Gain a Powerful Visual Aid to Understanding
- Enhance Action Management with Comprehensive Change Validation
- See Thorough, Consistent, Auditable Results
- Enable Better Quality Designs and Reduced Cost of Change
- Build and Retain Corporate Safety Memory
- Improve MOC Processes
- Check the Safety of your Plants against Recently Reported Incidents
- Support Mergers and Acquisitions
- Gain ROI within two Studies

Business Benefits

- Identifies and eliminates hazard and operability issues much earlier in the design - before change becomes limited and expensive
- Substantially shortens the time and cost of HAZOP studies and critical path activities - enabling new projects to come to market and achieve payback
- Reduces the cost of HAZOPs
- Improves the management of change processes - helping to save costly plant down time
- Supports mergers and acquisitions — provides a fast process for analyzing the newly acquired plant against corporate standards for process safety
- Ensures HAZOPs are consistent — producing a full, auditable record of the team's decisions

- Captures and reapplies expert's safety and operability knowledge — making it consistently available across the corporation

- Integrates safety into a project's electronic workflow - provides a mechanism to integrate hazard identification, analysis of likelihood versus severity, and risk reduction through the standardized manner in which information is entered

SMARTPLANT P&ID ENGINEERING INTEGRITY

Make the Right Decisions Early

The next step in engineering leads to rule-based or knowledge-based designs. The majority of an engineer's time is spent looking for data and checking for correctness and consistency. These tasks can now be automated with SmartPlant P&ID Engineering Integrity.

The out-of-the-box product delivers more than 3,000 rules based on API 14C. These rules can be plugged into SmartPlant P&ID. No programming skills are needed to add or modify the rules.

SmartPlant P&ID Engineering Integrity will check the P&ID against these safety and engineering practices and project standards. The product then automatically reports any areas of inconsistency. The rules engine can be extended with customers' rules on safety or any other engineering checks that are normally performed manually. This powerful solution helps you make the right decisions early in the process, producing significant savings in checking and late changes.

Return On Investment

SmartPlant P&ID Engineering Integrity delivers consistency. The solution offers an excellent return on investment in comparison to the manual approach. In addition to these cost savings, the solution delivers the significant benefit of leveraging intelligent P&ID capabilities beyond reports and integration.

Customizable rules

A customizable rules set can be easily extended to automatically validate the P&ID for safety and engineering practices before a HAZOP will be performed or before it is released for client review or construction. You can extend and/or customize the rules and check for any engineering practice, not just safety practices.

SMARTPLANT ACTION MANAGEMENT

Enhance Productivity, Quality, and Consistency by tracking actions and completions

SmartPlant Action Management transmits the required actions produced by the HAZOP and engineering checks to the appropriate disciplines. The software tracks the actions process and completions.

The solution helps ensure on-time, high-quality delivery. You can also check before you release the P&ID or perform another check or HAZOP to ensure that all corrections have been completed, and if not, determine who needs to complete the actions.

Actions to make design modifications are assigned and managed for follow-up and approvals to ensure that the final design meets your safety standards and engineering practices. You can manage design activities across disciplines. SmartPlant Action Management helps you check design against safety and engineering practices early in the design and during all the design phases, reducing the risk of late and costly changes.

Streamline the action management process. After reported issues have been actioned, users can rerun SmartPlant Action Management and produce a comparison report that outlines all eliminated issues and highlights new issues that may have been introduced by the action.

A Single Source of Plant Instrumentation

Intergraph® SmartPlant® Instrumentation — the industry-leading instrumentation solution - helps EPCs execute projects with high efficiency and design quality. Owner operators can lower their operational risks by better managing and storing the history of their instrumentation and control systems, as well as prevent unscheduled shutdowns by improved planning maintenance. SmartPlant Instrumentation also helps EPCs and O/Os plan plant expansions or control system modernizations.

SmartPlant Instrumentation provides a single source of instrumentation information that can be easily accessed and updated. It ensures consistency across the different instrument tasks and deliverables, which are automatically created as a "view" of the design data. The software pays for itself by providing information quickly and accurately. Since there is a single data source, it eliminates the need to search for information in multiple locations. Its External Function allows for on-the-fly data validation and data entry-based custom rules which can access external data sources.

Why Choose SmartPlant Instrumentation?

SmartPlant Instrumentation helps you shorten time to market, improve compliance with safety and environmental regulations, and reduce instrumentation expenses. It provides an efficient way to engineer and manage your instrumentation and control system adding value to your company's work processes and bottom line. SmartPlantlnstrumentation supports distributed projects in hosting or thin-client environments, which has been proven to yield large benefits on largescale projects, such as LNG plants.

Benefits for Owner/Operators

- Streamline data handover from design to operations and maintenance
- Enforce engineering standards with design rules and validation
- Streamline assembly of instrument construction and commissioning packages during commissioning and enjoy accurate, up-to-date test status for planning and reporting
- Promote rapid input of as-built data, providing a platform for safe, compliant startup and operations

- Enable all users plant operations, maintenance and management to access consistent, current information from a single source (Supported by SmartPlant Explorer)
- Exchange data with vendors, saving time and increasing data quality
- Improve plant uptime, safety and compliance through effective change management
- Integrate with business systems to provide access to instrumentation data across the entire life cycle through the SAP R/3 interface
- Better schedule plant shutdowns with accurate, current data and a long-range view of instrument behavior
- Maintain instrument performance through capture and analysis of calibration, as-found and as-left, through the Fluke interface
- Keep plant information up-to-date with as-built functionality and allow multi-project execution on an existing facility
- Add multiple process cases for production scenarios
- Support new control system technology, such as Fieldbus
- Integrate with SmartPlant Electrical, SmartPlant P&ID, and SmartPlant 3D through SmartPlant Enterprise
- Benefit from the Dimensional Data for Piping (DDP) module

Benefits for EPCs

- Enforce engineering standards with design rules and validation
- Facilitate faster, concurrent engineering reducing hours and cost — because all instrumentation data is consolidated, managed and revised in one database
- Support distributed inter-office and inter-company engineering using thin client technology
- Support Fieldbus designs with rules and flexibility to mix-and-match the best instrument components
- Design automation with wiring, connectivity validation, cross wiring, etc.
- Interface with up-and down-stream engineering, procurement, and construction tasks
- Use template design to increase productivity and data consistency and take advantage of established best practices

SmartPlant Instrumentation addresses instrument-related work processes throughout the plant life cycle. Reduce asset management costs, increase return on assets (ROA), and improve your return on investment (ROI) through shorter project execution and operational efficiencies.

- Create deliverables quickly, accurately and automatically directly from the database, including instrument loop diagrams
- Exchange data with vendors such as Emerson, Honeywell, ABB, and E&H, saving time and increasing data quality
- Streamline procurement, helping to avoid surplus material or Material shortages, protect schedule and eliminate costs
- Use revision tracking to manage engineering changes
- Enable specific plant views to be extracted from the database, supporting construction
- Enjoy the support of engineering standards, such as KKS, for power industry intelligent data sheets to ensure accurate and correct designs

Gain Value Across the Workflow

SmartPlant Instrumentation addresses instrument-related work processes throughout the plant life cycle - from process cases through the design construction and operational tasks like calibration.

Engineering

Use SmartPlant Instrumentation to create and manage instrumentation data in a single database, facilitating faster, concurrent engineering and reducing work hours and cost.

Fieldbus Device Dara Snew

Automated generation of Intelligent deliverables using SmartPlant Instrumentation

The software ensures accurate data and consistent deliverables, effectively manages change, and optimizes design and review scenarios. To ensure data integrity, the software offers the powerful capability to create engineering rules.

Design

SmartPlant Instrumentation flexibly adapts to your design process. Conceptual data can be entered and refined and documents can be created at any time during the project cycle to review or use the data. It can interface with DCS component vendors such as Emerson Process Management, Yokogawa, ABB, and Honeywell, to reduce design time and increase data quality. Interfaces with the up-stream tasks (SmartPlant P&dD) and down-stream tasks (SmartPlant Electrical, SmartPlant 3D) help to drive productivity and design quality.

Procurement

Used with SmartPlant Materials, powered by MARIAN —Intergraph's material procurement and management system — SmartPlant Instrumentation eliminates handover of instrument design data to procurement, shortening the procurement and delivery cycle and supporting downstream change control. You can minimize materials surplus/shortages, reducing project cost and schedule. SmartPlant Instrumentation also provides a solid basis for other procurement methods in easily extractable specialty instrument and bulk material information.

Construction

SmartPlant Instrumentation lets you extract views of the control system from the database to create work packages, assign them to subcontractors, and then track progress/completion. The solution will be integrated with SmartPlant Construction.

Commissioning

SmartPlant Instrumentation allows you to create test packages during commissioning. It streamlines instrument test package assembly and provides accurate, current data for planning and reporting. SmartPlant Explorer and SmartPlant Markup add value by providing data access and red-lining capability across the Web.
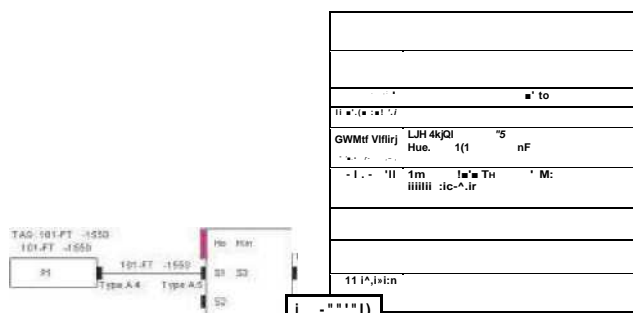
Operations & Maintenance

Along with the P&dD, instrumentation data is the most critical to access during plant operations. SmartPlant Instrumentation provides a single source of current, accurate and consistent data that all plant personnel can quickly access to perform their duties and improve plant uptime, safety and compliance.

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SmartPlant Electrical helps you increase efficiency in electrical system design, construction, operation and maintenance. SmartPlant Electrical stands up to today's rigorous demands of compressed schedules and operating budgets, fixed price contracts and concurrent engineering. SmartPlant Electrical delivers clear benefits by:

- Offering a life cycle solution — from conceptualization to detailed design to operations, maintenance and decommissioning

- Saving time and cost through automation, such as improved load modeling, automatic drawings and diagrams, and report generation

- Maintaining and enforcing standards, such as corporate rules and plant-specific dictates including stringent distinct KKS naming conventions

SmartPlant Electrical is made up of two modules that offer life cycle coverage for both engineering companies as well as plant owners. The two modules can be used separately or together as an integrated total electrical solution based on your project scope:

- SmartPlant Electrical Basic - Power distribution network engineering and design, including a bi-directional interface with ETAP for comprehensive electrical analysis and simulation

- SmartPlant Electrical Detailed (powered by SIGRAPH.CAE®) — Detailed scope with three-line schematics, wiring, panel designs and PLC configuration

SmartPlant Electrical Basic

SmartPlant Electrical Basic helps you increase quality, reliability, and efficiency in electrical design, construction, operation, and maintenance. It delivers clear benefits by:

- Saving time and cost through batch profile-based creation of electrical data, automation, batch load balancing, cable management, automatic drawings and diagrams, report generation, and change management

- Maintaining and enforcing standards, such as corporate rules and plant-specific dictates, to help you make the right decisions early with the rules enforcing engineering practices and best practices

- Integrating with the advanced analysis solution from ETAP to validate the design

Automatically generated deliverables as "view" of the design data

Automatic generation of diagrams and schematics provides engineers with a new freedom to expand and optimize the electrical system using "what-if" scenarios without worrying about the high cost of drawing generation or which CAD package the

project uses. Expensive last-minute redraws due to equipment changes or vendor updates are things of the past. Simply update the data; the drawings will take care of themselves.

SmartPlant Electrical provides provision to accommodate large scale single line diagram through improved off-page connectors and the ability to make custom connection within same diagram

Standards and data reuse

SmartPlant Electrical actually helps your company make the best use of assets the company already possesses. Features within SmartPlant Electrical provide defaults that you can use to increase quality and efficiency during Plant Design, Operations, and Maintenance. Default data and values can be entered to maintain design integrity.

Flexible operations

SmartPlant Electrical supports quantity operations for a timesaving workflow process. SmartPlant Electrical can create, organize and maintain large quantities of data or entities, or manipulate data on a "one-by-one" basis, improves data entry through select set behavior. The Apply Options feature adds tremendous flexibility, such as dynamically associating and creating power cables & control stations and their control cables (implied components) along with their default data for selected electrical equipment. Additionally, you can accommodate project changes by replacing any equipment, including implied components, with new sets.

Report generation

SmartPlant Electrical provides two different types of reports: graphical reports and tabular reports. Graphical reports include schematic drawings and single-line diagrams; once the design is complete, these graphical reports can be generated and saved to any of the major commercial CAD formats (SmartSketch®, AutoCAD and MicroStation®). Tabular reports using the standard Microsoft Excel report mechanism link to the project database.
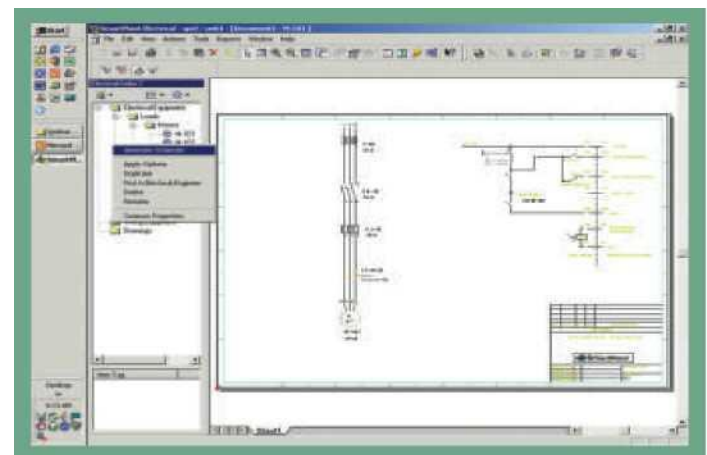
Automatic schematic generation gives you the capability to generate schematics in any of several formats, or generate your own template.

SmartPlant Electrical provides you with standard reports that can be customized or used as a baseline for new custom reports, such as:

- Electrical equipment indices

- Cable schedules

. Cable take-offs (BOM)

- Electrical load lists

- Load per MCC

- Power Distribution Board (PDB) schedules

SmartPlant Electrical Detailed

SmartPlant Electrical Detailed, powered by SIGRAPH.CAE, helps you fast-track your electrical engineering with knowledge-based engineering and documentation from concept to detailed design for electrical engineering.

Create all the design and deliverables required for the electrical system, such as three-line diagrams, schematics, PLC loading, and cabinet design. The software's workflow-based design helps the designer step through various tasks to ensure that all aspects are addressed.

Updated deliverables

SmartPlant Electrical Detailed ensures consistency between deliverables. Take advantage of change management by identifying the changes made during the design cycle. This helps you save time and reduce risk. The solution offers up-to-date documentation so

you can reuse your design data, datasheets, and documentation to support various work processes. With the automatic creation of each electrical item, a relationship is created to ensure consistency, check for the optimal design solution, and enable fast navigation through the design and deliverables.

Consistency and productivity

Electrical equipment is often shown on many types of documents, so it is essential to drive consistency through the deliverables. Maintain all project data in one place. This helps you ensure that reports and drawings provide correct, consistent data, avoiding duplications and reflecting changes throughout the design. Easy navigation and cross references across multiple documents minimize downtime and increase productivity.

Open flexibility

Project setup is simple. All data is contained in one place to make it easy to transport to the site or other offices. SmartPlant Electrical Detailed interfaces with various vendor datasets, and can import and export to a variety of file formats. The modular offering and various licensing options (concurrent or moving) makes possible a flexible deployment. You can support the complete workflow from basic to detailed engineering, integrating various disciplines, offices, and vendors.

The Detailed module is also a perfect fit for the plant engineering team to create and maintain all details for the electrical system and have easy access to all the data and documents using navigation capabilities through relationships which will facilitate fast and accurate decision-making, essential in an operating plant.
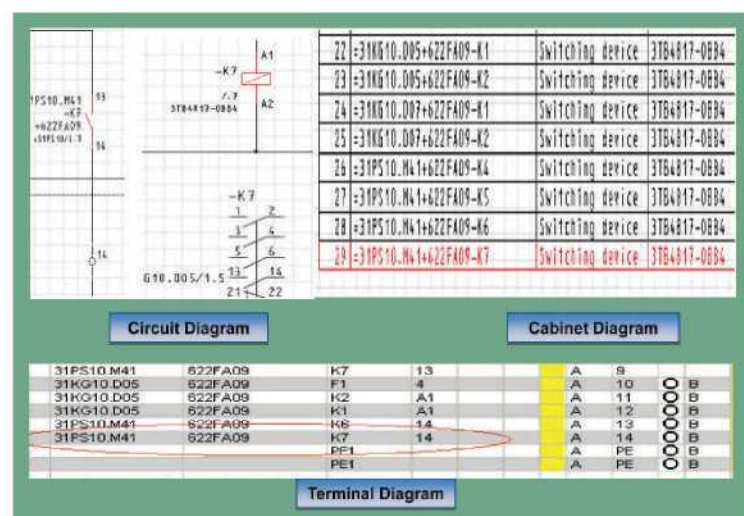
Parametric updating of all the interlinked documents is possible.

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SmartSketch[0]

Intergraph® SmartSketch® is a versatile and cost-effective precision engineering and drafting product. It gives EPCs and O/Os a competitive edge throughout the plant life cycle by speeding productivity, cutting costs, and offering a sophisticated degree of automation for detail work. As an interlocking piece of Intergraph's best-in-class life-cycle solution, SmartSketch is a premium tool for the drawing generation tasks inherent in your work process. You can also use SmartSketch to support Smart 3D drawing production and editing.

SmartSketch supply task- and application-specific templates that set up appropriate units, drawing scales, borders, title blocks, toolbars, and more than 7,500 symbols specific to your discipline's work environment.

SmartSketch's Save As PDF functionality converts drawings to PDF format for quick publication to your corporate intranet or extranet.

The Value Proposition

Save design time, increase accuracy, and enjoy cost savings.

Parametric design: Enter variables to save time and increase consistency when creating new designs

Precision drawing: Use real coordinates and dimensions to create high- quality designs for construction and maintenance.

Ability to leverage legacy data: Read and write traditional CAD formats such as AutoCAD and MicroStation.

Complements data-centric engineering suite: Realize benefits in all phases of engineering, from front- end preliminary P&IDs to back- end drawing production. The solution powers the drawing creation functionality of SmartPlant 3D.

Extends to fit your work process: Easily configure to interface or perform specific tasks that will enhance your work process.

Microsoft Office-compatible: Insert and combine graphics with Microsoft Office files.

Engineering task templates: Take advantage of symbol libraries and templates used by the various engineering disciplines, such as HVAC, architectural, and piping.

Relationships: Create and maintain relationships that ensure data connectivity and consistency.

Report results: Report symbol attributes in Microsoft Excel format.

Platform for custom or third-party tool: Build your own tools on top of SmartSketch.

Other functionalities: Take advantage of coordinate readout, revision cloud, and SmartSelect.

SmartSketch Viewer

The SmartSketch Viewer is a free tool that enables the viewing and printing of 2D graphics files created from the Intergraph SmartPlant suite of products. This tool will display files from SmartSketch, SmartPlant 3D Drawing Editor, SPP&ID, SPEL, and SPI.

SmartPlant® Explorer

Engineers spend the majority of their time trying to find data — more specifically, in an effort to find the latest data. SmartPlant Explorer can help reduce that time by giving you easy access to your data from the SmartPlant Enterprise Engineering & Schematics solution suite.

SmartPlant Explorer is your solution for viewing, querying, and reporting on data generated by SmartPlant P&ID, SmartPlant Electrical, and SmartPlant Instrumentation (powered by INtools®) design applications in the familiar Web browser. SmartPlant Explorer enables you to set roles to make only specific data available to certain groups of people. Plus, it is possible to define shortcuts or favorites to access data in a single step.

SmartPlant Explorer gathers live data from SmartPlant Enterprise Engineering & Schematics solutions and ensures access to the latest data to enable faster, more accurate decision-making.

In addition, the user can navigate across tasks. For example, users can select a control valve on the P&ID and view the specification sheet which comes from the SmartPlant Instrumentation environment without having to open SmartPlant Instrumentation.

Using a familiar Microsoft® Windows interface, SmartPlant Explorer will also allow you to link to and view related documents, such as maintenance work orders; vendor specifications; CAD drawings created with AutoCAD, MicroStation®, or SmartSketch®, and more.

SmartPlant Explorer also enables a user-defined Web call. This enables you to link to other software allocations that have Web capabilities.

Microsoft Internet Explorer is the only client requirement for complete use of SmartPlant Explorer. With no need for special training, you can enjoy immediate productivity with the familiar Internet Explorer interface.

SmartPlant Layout

SmartPlant® Layout is a new solution for preliminary 3D plant layout, including proposal development, early design estimates, and plant layout optimization from Intergraph®. Based on Intergraph's next-generation 3D design solution, SmartPlant 3D, SmartPlant Layout is a standalone product extending the SmartPlant Enterprise suite through the addition of tools for automatic pipe routing, layout case management, and cost estimation.

SmartPlant Layout enables preliminary designs to be reused by carrying forward initial layouts into detailed design without additional remodeling — saving time and improving design quality. Because SmartPlant Layout is built on SmartPlant 3D architecture, software administrative burden is significantly diminished in comparison to using standalone early design software.

Streamlining Preliminary Design

SmartPlant Layout significantly streamlines the preliminary layout design process. The interface is simple to learn and use — all application commands are available in a single, consistent environment. We have optimized the resulting plant layout workflow to ensure you achieve high-quality layout options with minimal design modifications by the designer. You can initially define the location of major equipment, pipe racks, and other important space reservation zones used by the integrated pipe autorouter, such as attraction, avoidance, and obstruction areas. Supporting this stage, you can define and apply rules that monitor and enforce your design standards to ensure consistency, including layout of pipes inside pipe rack volumes, and minimum nozzle standout distances.

Following initial zone definition, pipe runs are either directly input by the user, imported from an externally created line-list spreadsheet, or derived from P&IDs. The integrated SmartPlant Layout pipe autorouter then calculates and displays the lowest possible cost pipe routes for a given plant layout and applied rules.

Case management enables the display and comparison of results from various layouts. At any point in the preliminary design
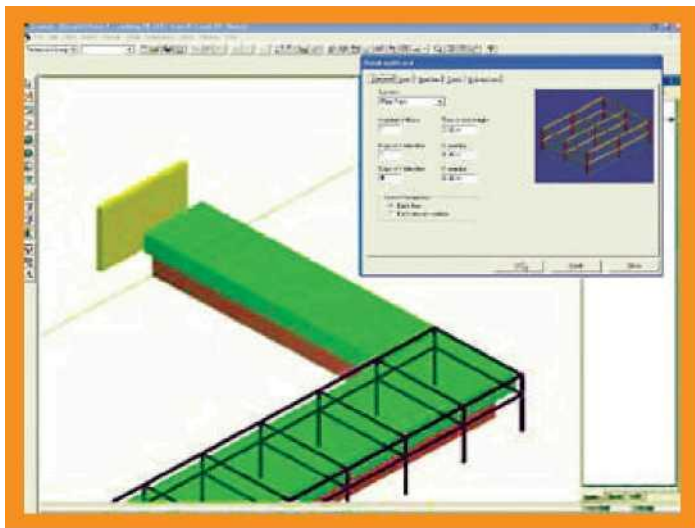
process, you can generate preliminary layout drawings and review models. Similarly, SmartPlant Layout's advanced reporting capabilities help you create a wide variety of standard and user-defined reports, including summary bulk materials quantities for cost estimation purposes.

Benefits of using SmartPlant Layout

SmartPlant Layout offers powerful tools for preliminary plant layout and design, including:

- Comprehensive SmartPlant 3D equipment, piping, structure and space management commands

- User-definable design layout rules used to monitor and where necessary, enforce industry or project design standards for equipment and rack spacing, piping configuration and object placement

- Available pipe-run interface options:

  - Direct user input

  - Import from line list spreadsheet (s)

  - P&IDs

- SmartPlant Layout-integrated pipe autorouter to calculate and display the lowest possible cost pipe routes for a given plant layout and applied design standards

- Automated definition of SmartPlant 3D drawings and reports, including bulk materials quantities reports for cost estimation purposes

- Ability to publish a SmartPlant Review visualization model(s) of the preliminary layout

- Case management enabling the display and comparison of results from various layouts

- When used with SmartPlant 3D, elimination of up to 90 percent of the remodeling normally required when transitioning from preliminary design applications and formats to detailed design

Interface with Detailed Design

All of the equipment, pipe racks, piping and other plant objects created as part of the preliminary design process in SmartPlant Layout are intelligent, SmartPlant 3D objects. SmartPlant Layout customers already using SmartPlant 3D for detailed design enjoy the benefits of eliminating up to 90 percent of the remodeling normally required when transitioning from preliminary design applications and formats to detailed design.

By using SmartPlant Layout in conjunction with SmartPlant 3D, the preliminary design simply evolves into a more comprehensive, detailed design.

A better way to Design a Plant

Today's global, fast-track projects require engineering, procurement and construction (EPC) contractors to successfully manage and perform projects involving concurrent participation of multiple design centers worldwide, while still keeping a handle on project schedule and costs. They also have the need to preserve their "best practice" design information for re-use on future projects, to increase productivity and preserve their corporate knowledge.

Likewise, plant owner/operators (O/Os) must employ concurrent in-house and off-site contract design resources for greenfield, major revamp and maintenance projects. They also need the ability to re-use the as-built models of their plants to shorten project design cycles, while continuing to preserve the as-built plant model to support operations and maintenance activities.

SmartPlant 3D, the most advanced plant design software offered in two decades, is Intergraph's next generation, data-centric, rule-driven solution for streamlining engineering design processes while preserving existing data and making it more usable/re-usable. A fundamental component of Intergraph's SmartPlant Enterprise, SmartPlant 3D is a complementary, full-suite solution that provides all the capabilities needed to design a plant and then keep it as-built throughout its life cycle.

SmartPlant 3D is a forward-looking product that is changing the way plants are engineered and designed. It breaks through the constraints imposed by traditional design technology. Rather than focusing on simply achieving design, SmartPlant 3D effectively enables optimized design, increasing productivity and shortening project schedules.

SmartPlant 3D provides both EPCs and O/Os with a competitive edge by:

- Integrating plant engineering data enterprisewide: SmartPlant 3D integrates with complementary tools such as other SmartPlant Enterprise Products — SmartPlant Instrumentation, SmartPlant P&ID or SmartPlant Materials creating an optimal workflow throughout your enterprise
- Providing unparalleled ease of use, which reduces the learning curve and increases productivity

- Shortening project schedules by enabling streamlined design processes
- Enabling global, concurrent engineering, allowing contractors to manage and execute projects worldwide
- Preserving the value of plant engineering information and enabling its reuse for future projects
- Capturing new and existing engineering knowledge so that it can be saved and reused in the future, which is the key to success in today's competitive global economy

Ease of use boosts productivity

SmartPlant 3D's ease of use reduces the learning curve, widens the user base and increases productivity-you don't have to be a CAD specialist to use SmartPlant 3D. SmartPlant 3D speeds up the design process by reducing the number of keystrokes and mouse-clicks required to perform design tasks.

Proactive tools for managing change

SmartPlant 3D provides tools for the continuous monitoring of design rules and notification of the impacts of change throughout the design process. It keeps track of drawings that have been updated due to changes in the engineering model.

Design rules increase data quality and ensure design Integrity

SmartPlant 3D ensures design accuracy and consistency through enforcement of design rules. SmartPlant 3D reduces design errors, engineering changes and rework. Enforcement of the design rules results in increased product quality and reliability by enabling faster and more efficient creation, transfer and review of design iterations. This allows users to make more informed decisions.

Automated drawing generation reduces Engineering costs

SmartPlant 3D provides fully automated generation of piping isometric and scaled orthographic drawings, with associated reports-dramatically reducing Production time.

Global, concurrent engineering capability enhances project execution

SmartPlant 3D's global engineering and data reuse capabilities substantially reduce engineering costs and shorten project schedules. Project databases may be replicated anywhere in the world to facilitate sharing of the work or to transfer work to a remote location. Other sites are kept up-to-date automatically.

Preserving the value of Plant Engineering Information

SmartPlant 3D provides plant owners with the opportunity to preserve the value of the data generated by engineering

SmartPlant 3D eliminates numerous productivity barriers imposed by current generation technology. Data is entered once and then flows throughout the entire work process.

contractors. It enables the reuse of data generated during design to facilitate making changes to the plant after plant startup.

Integrating Plant Engineering data throughout your Enterprise

SmartPlant 3D facilitates the physical design and arrangement of all the systems that make up a plant, including civil/structural, equipment, HVAC and piping.

Support for Oracle and Microsoft Database platforms

SmartPlant 3D supports both Oracle and Microsoft® commercial database platforms; enabling clients to deploy SmartPlant 3D in full conformance with their corporate database platform standards while eliminating administrative costs of nonconforming or proprietary databases.

Extending the capabilities of Intergraph's PDS

Even without translation of PDS data, SmartPlant 3D leverages existing designs by complementing and extending the capabilities of PDS. By enabling PDS design data to be referenced from the SmartPlant 3D model, SmartPlant 3D is immediately useful for revamp projects with no translation effort necessary. SmartPlant 3D provides for intelligent referencing of PDS, enabling functions such as interference detection, drawing generation, display filters and queries and access to property data. If you do require translation of PDS data to a SmartPlant 3D format, Intergraph now offers the capability to translate specifications, projects/models and other data from PDS to SmartPlant 3D.

SmartPlant 3D transfers 3D data to design analysis tools like STAAD.Pro, CAESAR II and detailing applications like TEKLA/StruCad. SmartPlant 3D can reference the existing plant as a 3D point cloud by using applications like Leica, Z&F, Quantapoint and Trimble for need based 3D modeling. SmartPlant 3D interfaces with Lisega-LICAD for support modeling.

Reference 3D

SmartPlant 3D continues to bolster its ability to bring external 3D data into projects through enhancements to its powerful Reference 3D (R3D) functionality. Integrating the proven SmartPlant Review engine, this technology continues to expand its support for a wide array of 3D formats, including multiple versions of SmartMarine 3D and SmartPlant 3D, PDS 3D,

PDMS, SAT, MicroStation, and AutoCAD®. New features in Reference 3D include the ability to clash externally-generated 3D datasets against one another in a single project. With this capability, datasets generated from multiple sites can be checked for interferences against one another in a single SmartPlant 3D project. The latest version of SmartPlant 3D also offers the ability to create and persist intelligent connections to referenced datasets. For example, designers can connect piping to equipment nozzles referenced from another 3D application so that the proper bolt sets and gaskets are assigned and reported via the appropriate MTO deliverables.

Design Reuse

SmartPlant 3D's one-of-a-kind associative, data-centric architecture affords the ability to offer a unique value proposition with respect to design reuse. The latest version further leverages this technology to enable projects and RFPs to be delivered on time, at lowered cost, and with a high level of accuracy.

The Model Data Reuse command offers:

• Inclusion of assemblies such as spools

• Automated expansion to include WBS hierarchy and assignments

The Copy to Catalog command has been enhanced to provide additional capabilities:

• Portability of "copied" assemblies across catalog databases

• Increased compatibility with route solver while "pasting" data into the model.
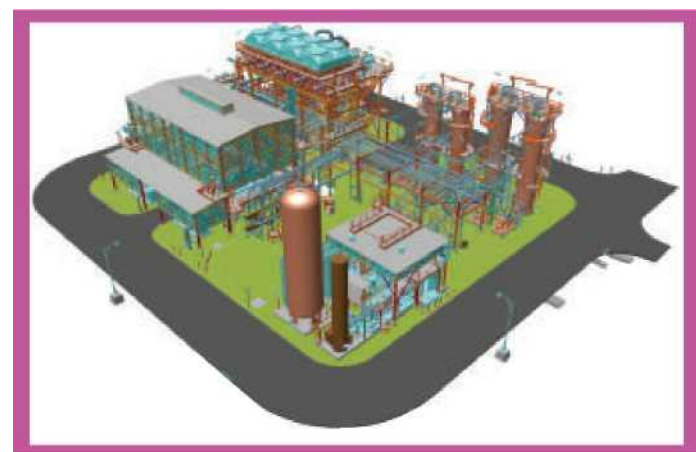
Proactive interference checking capabilities provide continuous, consistent management of change.

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## Changing the way Marine Structures are Engineered and Designed

Intergraph® SmartMarine® 3D is the most advanced marine structure design software offered in two decades. It is the next-generation, data-centric, rule-driven solution for streamlining design processes while preserving existing data and making it more usable/reusable. SmartMarine 3D is a complementary, full-suite solution that provides all the capabilities needed to design and build many different types of marine assets: semi-submersible, fixed, and other types of platforms; naval and commercial ships; floating production, storage, and offloading (FPSO) systems; as well as other types of drilling vessels.

SmartMarine 3D comprehensively addresses the marine structure life cycle. The solution provides a full range of flexible design, production, and life cycle management capabilities within a single integrated environment. It offers better decision support capabilities to facilitate global design, production, and life cycle optimization — ultimately making your company more competitive.

SmartMarine 3D, formerly IntelliShip®, is a forward-looking product that will forever change the way marine structures are engineered and designed. It breaks through the constraints imposed by traditional design technology. Rather than focusing on simply achieving design, SmartMarine 3D effectively enables optimized design, increasing productivity and shortening project schedules.

Providing A Competitive Edge

SmartMarine 3D's advanced scalability and modular design enables organizations of any size to configure the exact type of system that meets their workflow and workload requirements. SmartMarine 3D will:
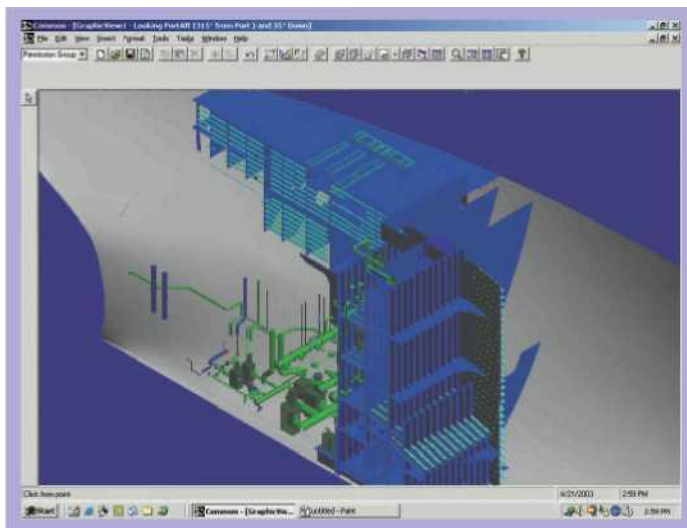
SmartMarine 3D provides a full range of flexible ship design, production, and life cycle management capabilities within a single integrated environment. All disciplines' designs are fully visible to all parties at any one time since all data is stored in a single database.

- Streamline building processes
- Lower manpower and material costs
- Reduce the time to design and construct world-class vessels
- Introduce production flexibility features yet unknown in traditional 3D design systems
- Meet the challenge faced by more and more companies - distributed, multi-site design and production of marine structures
- Provide for better integration with complementary work processes and computer systems
- Bridge early design with detailed design and production

Projected to become the cornerstone for next-generation practices in design, construction, and management, SmartMarine 3D will render traditional marine structure software technologies obsolete. It will provide companies with the capabilities they need to gain and maintain an edge in a highly competitive industry. SmartMarine 3D offers organizations a competitive advantage by providing:

- **A full multidiscipline design environment.** SmartMarine 3D provides a true multidiscipline design environment where all designs are fully visible to all parties at any one time.

- **Unparalleled ease of use.** SmartMarine 3D's ease of use reduces the learning curve for new users, widens the user base, and increases productivity. It speeds up the design process by reducing the number of keystrokes and mouse-clicks required to perform design tasks.

- **Shortened project schedules.** SmartMarine 3D is capable of both early and detailed design. It enables streamlined design processes. These eliminate rework and time-intensive manual checking. They also shorten project schedules.

- **Global, concurrent engineering.** SmartMarine 3D allows designers, yards, subcontractors/suppliers, authorities, and others to easily and effectively manage and execute projects across company borders. Its global engineering and data reuse capabilities substantially reduce cost and shorten project schedules, while providing a wider range of users with valuable product model information.

- **Management of deliverables.** Automated drawings and reports reduce the cost of design and provide accurate, up-to-date documentation of the design at any time.

- **Integrated solutions.** SmartMarine 3D integrates with complementary Intergraph products such as SmartPlant® Instrumentation and SmartPlant P&ID via SmartMarine Enterprise, creating an optimal workflow throughout your enterprise. Your own legacy systems may be integrated by means of SmartPlant adapters.

- **Knowledge management.** Capturing new and existing design knowledge so it can be saved and reused in the future is

SmartMarine 3D drawings are as complete as possible, requiring little or no user involvement. Additionally, because SmartMarine 3D drawings are a rule-based, graphical depiction of objects, users can generate documentation that is best suited for their current communication needs.

the key to success in today's competitive global economy. SmartMarine 3D preserves your corporate knowledge, and provides for continuity and design innovation. It preserves the integrity of design data and enables reuse for future projects based on existing designs. Across disciplines or across the world, SmartMarine 3D provides all the tools you need to prosper in a highly competitive, dynamic, and concurrent marine asset design and manufacturing environment.

Ease Of Use Boosts Productivity

SmartMarine 3D helps boost productivity because it is easy to use — you don't have to be a CAD specialist to use SmartMarine 3D. Its familiar Microsoft Windows interface encourages users to "test and explore" the software and reduces the learning curve. SmartMarine 3D reduces the number of keystrokes and mouse-clicks required to perform a task, speeding up the design process. It includes "mini-wizards" that easily guide the user through design steps. Because similar tasks are performed in similar ways across all applications, users can easily use the tools of multiple disciplines. This invites organizations to introduce more innovative work processes and makes SmartMarine 3D efficient and cost-effective to use, even on smaller projects where small teams are performing all the work.

SmartMarine 3D's patented Relationship Management System uses relationships between objects to make applications behave intelligently whenever data is modified. For example, if the location of a pipe is changed, penetrations through bulkheads as well as pipe supports and all associated objects are changed automatically and notification is given to the designer in charge of the design of affected systems, as he may choose to reject the relocation. This eliminates the need for time-intensive manual checking, dramatically shortening design time and increasing productivity.

Shortens Project Schedules

SmartMarine 3D is the ideal tool for the contractor and yard to use on projects of all sizes and complexities — it reduces design costs and shortens project schedules (accomplishing distributed design and manufacturing, and supporting a transformation of the project team) to allow more multidiscipline work by a single engineer. The capabilities provided by SmartMarine 3D streamline and compress the entire design process, which, in turn, reduces project schedules. These capabilities include:

Design rules, which increase data quality, ensure design integrity, and contribute to a level of automation for design and production unmatched by any other available marine structure design and production system.

Hull and outfitting interference checking, which provides consistent management of change and enables interferences to be resolved at the most cost-effective time - the moment they are created.

Improved offshore capabilities, such as enhanced modeling, detailing, and manufacturing of jacket legs and truss assemblies.

Advanced component and detailing catalogs, which allow pre-configuration of manufacturing equipment characteristics to the particular detail, thus enabling full freedom in choosing shop fabrication lines for hull and outfitting without redesign.

Automation of routine tasks, i.e., customized rules drive the detailing of structural plates and profiles; placing of stiffener endcuts; definition of stiffener penetrations, seam cutouts, notches, etc.; and the determination of weld details, based on the geometry of the connection.

Automated drawing generation capabilities, which reduce the cost of design and provide accurate, up-to-date documentation of the design at any time.
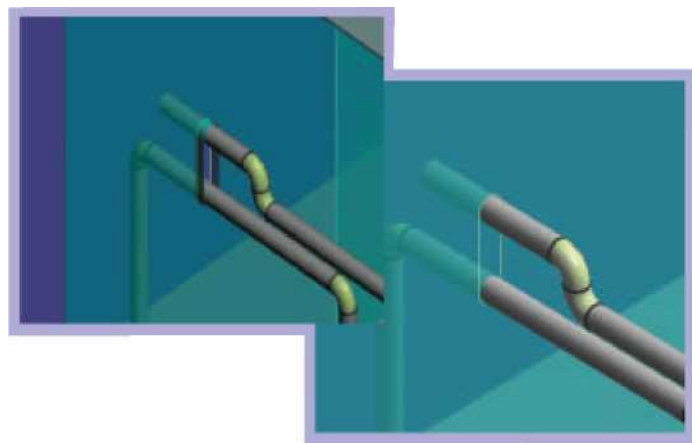
SmartMarine 3D *has real-world workflows built into the design process. For example, a piping designer routes pipe through the structure and creates proposed hole traces. Upon approval by the structural engineer, the hole and associated rules are automatically applied and placed according to specifications.*

Intelligent 3D Design for the Bulk Materials Handling Industry

The production and transportation of raw materials around the world continue to increase in line with global market expansion. The bulk materials handling industry is becoming more visible and integral than ever before. SmartPlant 3D Materials Handling Edition is the Intergraph- specific solution targeted at this segment in a variety of global industries. Intergraph created this focused solution to address industry requirements for system design in 3D. Intergraph developed the solution with direct feedback and engagement from some of the leading materials handling system design companies from around the world.

Intelligent 3D Design

The forecast raw materials demand curve continues to outpace the market's ability to supply it. The industry must identify and pursue all available methods to close this gap. Traditionally, materials handling system designs are 2D document centric and the industry has typically been conservative in adopting new technologies of intelligent 3D design systems. SmartPlant 3D Materials Handling Edition introduces new technology to the industry, with enhancements in:

- Engineering data and design reuse

- Automation of component placement

- Improved management of change across disciplines

- Component cataloging

The solution takes advantage of Intergraph's proven technology adopted from other successes in parallel industries. This technology and track record of success will help shift the bulk materials handling industry toward best practices seen throughout the plant design world.

Business Benefits

Cost and Schedule Reduction

With SmartPlant 3D Materials Handling Edition, you can complete better and more accurate design reviews using 3D technology with comments and feedback at earlier stages in the project. You can consult all involved parties from the owners during initial design. This is when you can implement changes at a lower cost and with limited schedule impact compared to traditional 2D design systems.

System Improvements

You can make early and informed decisions about system design by reviewing the model with the owner at various design stages. Quickly and easily change the model and BOM based on a variety of scenarios across multiple disciplines. This ensures both the designer and the owner can make the best decisions.

Safety

Having an accurate and representative 3D model very early in design enables you to conduct safety and operator training much sooner. This is particularly important with the industry's aging workforce. Secondly, but equally important, is the ability to review constructability and modularity in design as it relates to project execution. This not only promotes cost control, but also enables safety reviews of the construction phase to be performed in advance. This gives you a safer, more secure project site.

Data Reuse

Intergraph's solution gives you the ability to design and model in 3D and save this information. This means your data can be reused on other projects - benefiting both the owner and the designer. Smart Plant 3D Materials Handling Edition not only does this impact future project costs, but it also greatly reduces project timelines through better engineering data management. The opportunity to "learn" from other projects and apply this knowledge in the future is a marked improvement over existing design systems.

Process Changes

Improved technology enables improved business processes. Previously, the creation of drawings was the driver to create the 3D model, if one was actually ever created. With the change in technology, the 3D model is the source for drawing creation. Drawings become an output from the model, specifically fabrication-level drawings for engineered objects, such as transfer chutes and truss sections, without the need to use third-party software for design. This is a significant improvement over existing work processes where drawings are created and modified prior to handing them to a detailer to create a 3D model. Any changes must go through this process multiple times until an agreed-upon system is completed. SmartPlant Materials Handling Edition allows you to make and review changes faster in the 3D model before you generate any drawings. This saves significant time, money and effort throughout the design process.

Plant Design System (PDS)

Intergraph's Plant Design System (PDS) is a comprehensive, intelligent computer-aided design/engineering (CAD/CAE) application. Production-driven, PDS delivers the best design possible — and does it more efficiently to reduce the total installed cost of the project. It reduces costs, enhances value, and minimizes risk while preserving the value of data.

PDS is the market leader, chosen by owner/operators (O/Os); engineering, procurement and construction (EPC) firms; and their vendors to design projects around the world since the mid-1980s. Due to its capability and commitment to the industry, many leading EPCs and O/Os have selected PDS as their corporate standard.

The software perfectly fits into your corporate strategy, whether you're operating on a global scale or at the project level. PDS projects range from small plant revamps to multibillion-dollar offshore platform construction.

PDS helps companies achieve more with fewer resources by providing:

- Automation that improves productivity

- Three-dimensional modeling that helps designers create a better design

- Dynamic walkthroughs that allow operations and maintenance personnel to interactively view the plant before it is constructed

- Interference checking to reduce or eliminate field rework

- Accurate material take-offs that cut costs

- Specification-driven design and checking that improve accuracy

PDS is Integrated with Industry Standard Plant Design Tools, including:

PDS integrates with Intergraph's SmartPlant P&ID, a data-centric, rule-based engineering solution that creates intelligent P&IDs while building a comprehensive data model. It also integrates with SmartPlant Instrumentation - the industry standard PDS® for instrumentation - which drives deliverables for different phases of the life cycle, enforcing data consistency and eliminating duplicate data entry.

PDS can also be used in conjunction with SmartPlant Electrical, an electrical schematics and wiring diagram application that interfaces with the instrument application to generate wiring diagrams.

SmartPlant Isometric - Automatically produce design or as-built isometrics with bills of material from a simple pipeline sketch.

SmartPlant Spoolgen — Automatically produces fabrication, erection spooldrawings with complete bill of material.

COADE CAESAR II - The PD Stress feature in PDS speeds up your analysis process by exporting pipeline information for use as input to this popular pipe stress analysis program. AutoPipe, TriFlex and ADLPipe are also supported by this feature.

DST PipeStress2000 - This nuclear-certified pipe stress product uses a powerful interface to rich data in the Material Data Publisher database to rapidly and easily build input decks by pipeline, by area, or by project.

Leica Geosystems HDS (Cyra), MENSI and Quantapoint — These laser scanning solution providers have interfaces with PDS which allow as-built point clouds to be viewed along with the PDS model and also imported into PDS as intelligent models via PDS ModelBuilder and Frame Works Plus FPL programming.

Frameworks Plus Integration With Third-party Analysis And Steel Detailing Software

Analysis and integration capabilities promote completeness and accuracy of data exchange with integrated, third-party analysis packages such as TEKLA, STAAD-III, GT STRUDL, LARSA, SAP2000, and RAM Steel. FrameWorks Plus has a two-way link to STAAD-III and GT STRUDL that makes it an ideal preprocessor for analysis.

Sharing Data with SmartPlant 3D

As part of the smooth migration from PDS to SmartPlant 3D, Intergraph's next-generation plant design system, you will be able to combine SmartPlant technology with PDS for immediate productivity gains. SmartPlant 3D is designed to bring forward legacy PDS data, first by accessing and using PDS specs, graphics and related data, then ultimately by direct import and translation. SmartPlant 3D lets users import PDS and other MicroStation graphics data into the SmartPlant 3D database as "reference graphics" which are viewable, locatable and can be included in interference detection and drawing generation.

PDS OrthoDraw

Automatic Orthographic Drawing Generation Solution For PDS
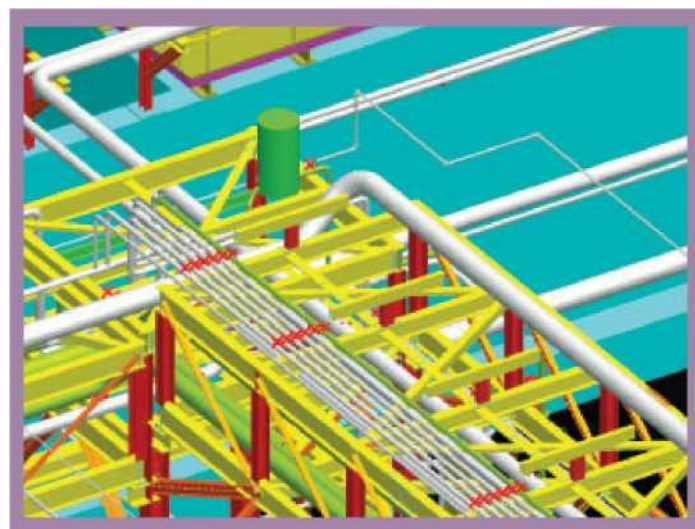
Intergraph SmartPlant® Review is your problem-solving 3D visualization tool. It is a member of Intergraph's SmartPlant family of life cycle engineering solutions for the process, power and marine industries. SmartPlant Review is ideal for the visualization and engineering animation specialist who uses the software daily or the occasional user who needs to review designs and use the 3D model as a graphical interface to access project data linked to the model. For additional functionality, SmartPlant Review offers seven optional modules for construction and schedule review, simulation and visual effects, photo-realistic rendering, customization resources, enterprise wide collaborative review and on- site drawing generation, SmartPlant Review Publisher

Visualize across your Workflow

SmartPlant Review is at home in the design center, on the road, in the plant office, and on the plant floor. SmartPlant Review provides value throughout the entire plant life cycle, including HAZOPS (hazardous operations) reviews, accessibility studies and downstream projects, including retrofits and upgrades.

Extend your Functionality

For even more visualization capabilities, SmartPlant Review offers seven optional modules that expand product functionality, including modules for construction and schedule review, simulation and visual effects, photo-realistic rendering, customization resources, enterprisewide collaborative review, point cloud intergration and onsite drawing generation.

Collaboration Module

The SmartPlant Review Collaboration module allows multiple users in different locations to view and interrogate the model at the same time. The Collaboration module also allows enterprise wide coordination of design reviews for more effective communication and improved efficiency, while reducing travel time and expenses. This module is built on top of Microsoft NetMeeting, which ensures security and enhances connectivity for your project team.
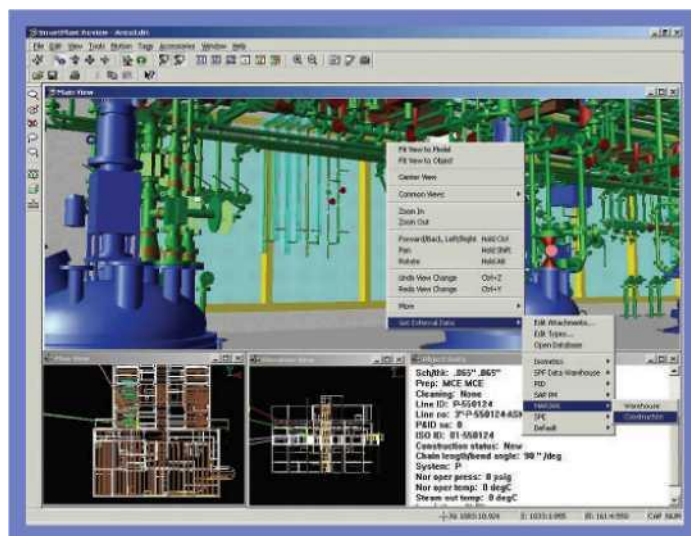
You can use multiple views for precise positioning and viewing of specific areas and objects.

Simulation and Visual Effects Module

The SmartPlant Review Simulation and Visual Effects module brings life to your 3D model. It simulates the placement or removal of equipment to review physical clearances, as well as performs motion studies and develops complex motion scenarios. Used in conjunction with the SmartPlant Review Construction module, you can visually simulate the construction process, review the simulation on- screen, or create animations for output to video. *and reported back*
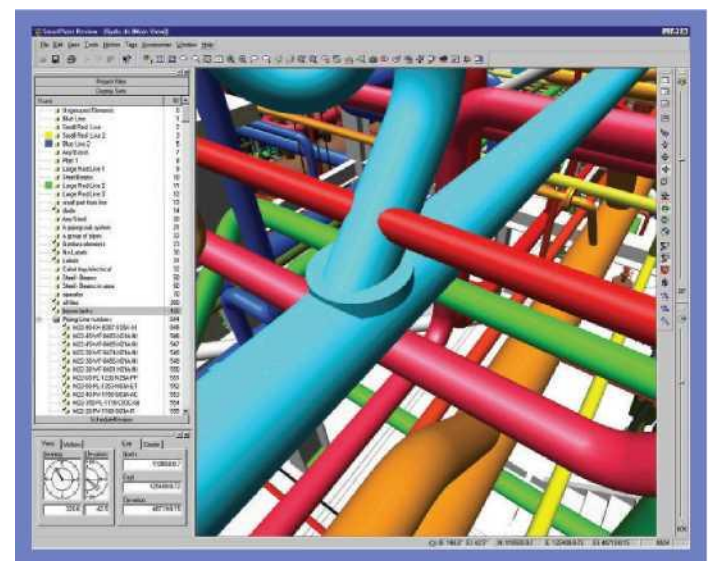
Interferences are easily detected, which can then be ta to the appropriate discipline for cleanup. *oged*

Photo-Realism Module

The SmartPlant Review Photo-Realism module will take your still images to a new level of quality. Raytracing a 3D model creates depth and realism. You control lighting and display attributes for a realistic image with textures, patterns, shadows and reflections, improving communication to clients and managers. Visualize designs during each stage of the development process and create powerful presentations that communicate and sell your ideas.

On-site Drawing Generation Module

The On-Site Drawing Generation module allows you to bring design and drawing capabilities from the office to your project site. This module features fast, intelligent hidden line display capability — your drawing maintains intelligence even when displayed in hidden line mode. The module also improves communication, because you control the way the drawing will appear to others. Additionally, by reducing the time required to process and display hidden line removal from hours to a fraction of a second, the On Site Drawing Generation module saves time and money.

Point Cloud Integrator Module

The Point Cloud Integrator module offers vendor-neutral point cloud data integration with the plant modeling software environment. An interface is provided to products like those

SmartPlant Review is your problem-solving 3D visualization tool. SmartPlant Review is ideal for the visualization and engineering animation specialist who uses the software daily or the occasional user who needs to review designs and use the 3D model as a graphical interface to access project data linked to the model.

offered by FARO, Leica Geosystems HDS, Trimble and Z+F, allowing you to manage existing-condition data by enabling the display of laser scanning data within SmartPlant Review. This helps lower the time, effort and cost of process plant retrofit engineering and construction projects. It extends the use of 3D CAD to more projects. Point cloud integration also helps in the planning of existing plant remodeling by coupling existing plant configuration provided by point cloud scans with 3D model displays.

Construction module

The SmartPlant Review Construction module provides integrated project scheduling and collision detection functionality. As a construction sequencing tool, SmartPlant Review includes Schedule Review, which turns data from your project planning software, such as Primavera Project Planner and Microsoft® Project, into a visual display of the construction or demolition progress. Plan safe and appropriately timed equipment installation with the collision detection function as you move equipment through the plant with sound effects and highlights.

API Module

The SmartPlant Review API module includes programming libraries that enable developers to create programs that run on SmartPlant Review. The API module is not required to run the custom applications, merely to create them. The API module also provides the ability to create a VUE file interactively while inside SmartPlant Review.

Accessible

Think about where you need 3D visualization and data access, especially in construction. With SmartPlant Review, you are no longer limited in your access to the design by the constraints of your computer network. SmartPlant Review enables you to display the entire plant model and associated data at any remote location, totally independent of the office network. You can display the true plant coordinates at any time, execute searches automatically and perform accurate, repeatable measurements that can be labeled in the view. SmartPlant Review gives you this kind of access to data and the independence to do your j ob.

Usable

SmartPlant Review is a modular, scaleable, flexible visualization environment. SmartPlant Review offers users the opportunity to customize the product to meet their individual needs. Windows-

compatible, familiar menus and navigation tools help lower training costs.

Scaleable

SmartPlant Review provides a core product loaded with functionality that can then be supplemented with additional modules for the specific functionality required. Buy what you need — no more, no less. SmartPlant Review is hardware-scaleable, too! Once you've chosen your software configuration, you can run it on standard desktop PCs, ruggedized notebook computers on the construction site, or on high-end multimedia workstations with multiple processors.

SmartPlant Review Publishe

SmartPlant Review Publisher supports the conversion of common plant formats for reviewing in the SmartPlant Review. This separately available product adds versatility to SmartPlant Review by enabling to compress and distribute project file to a network server or a user's machine for viewing. Because SmartPlant Review Publisher server-based, it needs only one copy to schedule the conversion and distribution of projects.

SmartPlant® FreeView

Smart Plant
VFreeVtew

SmartPlant FreeView is a free viewer to open Intergraph's 3D models (VUE files) for display and navigation of process, power, and marine projects. Users can walk through the plant and select any object in the view to see its associated plant properties (MDB2 file). Easy-to-use, on-screen motion controls allow even the most casual user to walk through complex 3D plants with no training. Industry-standard, gaming-style keyboard navigation is also simple to use and learn.

Automatic Piping Isometrics from Sketches

SmartPlant® Isometrics, powered by ISOGEN®, is a simple-to-use yet powerful Microsoft® Windows-based, pipe-sketching application. Formerly known as I-Sketch™, SmartPlant Isometrics is fast becoming the first choice of piping engineers and designers for producing industry standard isometric drawings quickly and cost-effectively.

Key Features

- Enables sketching of individual pipelines or piping systems in only minutes and generation of isometric drawings in seconds

- Includes templates for production of check, fabrication and erection type drawings

- Generate single MTO for multiple lines

- Automatic generation of system Isometric

- Integrates with all of the leading 3D plant design systems

- Interface with CAESAR-II for stress analysis

- Interface with TRIBON

- Includes time-saving pipe editing capabilities featuring automatic insertion of gaskets, flanges and bolts

- Includes standard ANSI and DIN catalogs

- Facilitates the import of reference data held in 3D plant design systems

- Supports multiple output formats, including DXF, DWG, DGN and IGR (SmartSketch®)

- Generates a variety of reports, including bills of materials, welding and cut pipe length lists

- Produces industry- standard ISOGEN isometric drawings to the user's company standards

- Offers SmartPlant License Management

Designed to meet the design and documentation challenges of EPCs, fabricators, and owner operators, SmartPlant Isometrics is a versatile 2D design product playing an important role in the production and transfer of piping data along the Digital Isometric Value Chain.

Produce Piping Isometrics in Minutes

Design time equals money. Why spend hours producing isometric drawings using paper and pencil or 2D CAD systems when you can use SmartPlant Isometrics and do it in minutes? SmartPlant Isometrics is simple to use and easy to learn, requiring minimal training. You simply sketch the pipe; add any desired components such as flanges, valves, gaskets and bolts; dimension the pipe; and then let SmartPlant Isometrics do the rest.

Isometric drawing templates provided with SmartPlant Isometrics include check, final, fabrication only, erection only, final weld information, final with cutting list information, and overview. SmartPlant Isometrics is also available in all major languages, including English, German, French, Spanish, Italian, Czech, Korean, Japanese and Chinese.

Produce Piping System Isometrics

SmartPlant Isometrics enables the piping engineer to design and produce isometrics for individual pipelines, several pipelines designed together in one session, or complete piping systems, providing piping data input to stress analysis applications, or aiding the inspection, testing and commissioning of installed pipelines. Additionally, IDFs or PCFs from any ISOGEN-compliant system can be merged together to produce complete piping system isometrics.

Realize A Rapid Return On Investment

SmartPlant Isometrics provides dramatic productivity gains for piping isometric production. It takes only minutes to sketch a piping system in SmartPlant Isometrics, and the isometric drawings with full bills of materials are then produced in seconds. Using 2D CAD packages or paper and pencil to draw isometrics usually takes between four and eight hours. Considerable cost savings and a rapid return on investment can be realized when using SmartPlant Isometrics for either new design or as-building projects.

Mark up as-designed Isometrics

Checking the accuracy of existing piping data is easy with SmartPlant Isometrics. Using the Import feature, as-designed

SmartPlant Isometrics a new solution for generating industry-standard pipeline isometric drawings for greenfield and brownfield design projects.

pipes from any ISOGEN-compliant plant design system can be imported. Using SmartPlant Isometrics on a ruggedized tablet PC device, you can walk-down the pipelines in the field, marking up the original as-designed piping data to reflect the real-world, as built status of the pipes. Finally, new isometrics documenting plant conditions can be produced.

Document as-built Piping Systems

When isometric documents do not exist, SmartPlant Isometrics can be used to capture as-built piping systems electronically — it's no longer necessary to use pencil and paper. You can simply sketch the piping system directly into SmartPlant Isometrics on a rugged tablet device in the field, and the application produces all of the required as-built isometric drawings and bills of materials.

Integrate With Leading Plant Design Systems

SmartPlant Isometrics automates the conversion of reference data from a variety of plant design systems. Following a brief implementation period during which the specific structure of the data is described to the software, the conversion process takes only minutes. SmartPlant Isometrics' ability to receive reference data in this way allows it to work closely with leading 3D plant design systems.

Reference data held in Intergraph's SmartPlant Reference Data application can also be transferred to SmartPlant Isometrics, ensuring consistency of design and control of the materials and piping specifications used by engineers on projects.

Visualize Piping Data In 3D

Using its integral 3D view, interactively visualize pipelines designed in SmartPlant Isometrics, or IDF or PCF files from any other ISOGEN-compliant system, as scaled 3D models. Any

number of files can be visualized simultaneously to create a 3D model of the entire piping system, enabling pipes designed in close proximity to one another to be visually inspected to detect clash problems between new and existing pipework.

Interface Piping data with Downstream IT Systems

Interface SmartPlant Isometrics-generated piping report data with almost any downstream IT system, such as material control, procurement, workshop and weld management systems, SmartPlant Materials, Oracle, SAP , Microsoft Excel or Access based systems, or other legacy systems.

SmartPlant Isometrics integrates with all of the leading 3D plant design systems and contains all the key features of I-Sketch while adding the following functionality:

• Allows the design of several pipelines within one session

• Creates an instant 3D scaled view of pipelines, provided by embedded I-View

• Provides simultaneous 3D view of multiple pipelines-allows for design of several pipelines in a confined location and visual clash checks with new or existing pipelines

• Allows the design of complete piping systems

• Creates ISOGEN industry-standard piping system isometric drawings

With the addition of this new functionality, SmartPlant Isometrics meets the broader design and documentation challenges faced by EPCs, pipe fabricators and owner operators. And, as with I-Sketch, it requires no prerequisite CAD or drafting skills and is easy to learn and use. For existing I-Sketch users, upgrading to SmartPlant Isometrics is seamless and will be at no charge to maintenance paying customers.
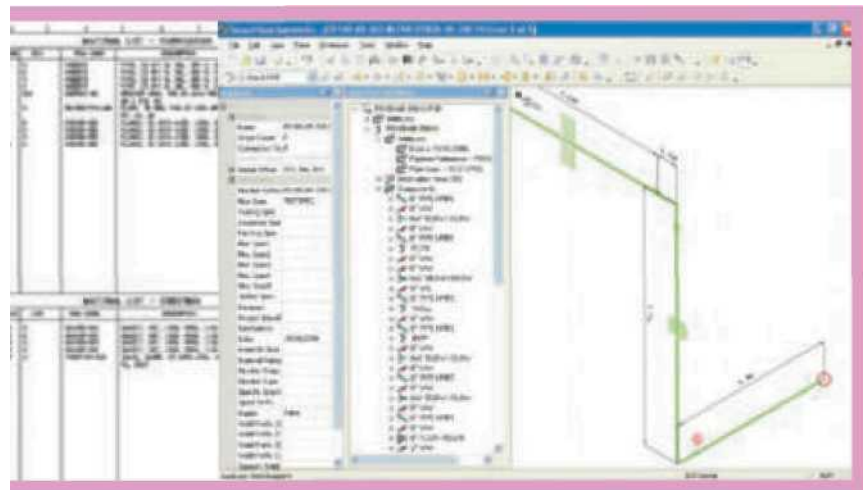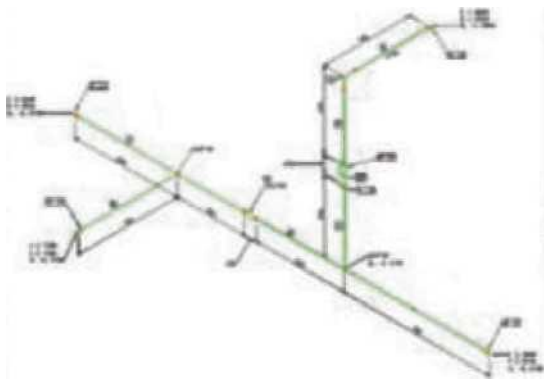
SmartPlant® Reference Data

Intergraph® SmartPlant® Reference Data provides materials libraries at the corporate and project levels and enables better standardization and change management. SmartPlant Reference Data is the software tool for maintaining catalog and pipe specifications for SmartPlant 3D, SmartPlant Materials, and other SmartPlant Enterprise solutions.

Enjoy Web access to a common database located at a single location from any other location around the world. Enable global workshare of reference data along with centralized control. Take advantage of integrated change management and exception handling for an optimized workflow.

Interfaces

Interfaces enable data to be fed into design systems with relevant, standardized project data, eliminating duplicated effort. Several interfaces are included with SmartPlant Reference Data, such as:
- SmartPlant 3D - Export comprehensive data to the SmartPlant 3 D proj ect database
- PDS® - Export comprehensive data to the PDS project database
- PDMS - Export comprehensive data to the AVEVA PDMS project database
- SAP® R/3 - Export standardized data to the SAP R/3 Material Management Module
- Open Ident - Import unstructured material data, including material descriptions and definitions and geometrical and dimensional data

Benefits

Choose SmartPlant Reference Data, the proven and professional solution for comprehensive materials management, to:
- Standardize materials use by different users
- Deploy company best practices
- Benefit from rule -based intelligence of reference data
- Implement organizational specification control
- Eliminate " recreating the wheel"

Manage SmartPlant 3D Piping Specifications
- Reduce development time of specification content
- Take advantage of revision control, change management, and reporting
- Enable permission-based database access instead of locked spreadsheets
- Minimize labor hours in specification development and management
- Maximize productivity with graphical user interface featuring .NET instead of spreadsheets

Integrate with SmartPlant Materials and SmartPlant Enterprise and gain:
- Consistency of data across disciplines and tasks - specifications, models, isometrics, procurement, and fabrication
- Downstream data integrity

Standard Database for SmartPlant® Reference Data

New database delivers wide range of unique commodity codes for project materials

With millions of individual parts to describe, each part having to be described differently for each phase of a project, the complexity in standardizing material descriptions is significant. Companies devote significant effort to define commodity codes that satisfy requirements throughout various phases of a project.

To reduce this effort, Intergraph® has built a Standard Database (SDB) for SmartPlant® Reference Data (SPRD) that delivers a comprehensive range of commodity codes you can use to uniquely describe materials throughout a project life cycle. Within SmartPlant® Reference Data, the Standard Database employs sophisticated and exhaustive rules to maintain material descriptions.

Standard Database for SmartPlant Reference Data is a preconfigured, recommended best practice solution to enable rapid implementation of enterprise reference data management and/or materials management in general. The SDB incorporates a comprehensive catalog of industry-standard material parts, organized and described for out-of-the-box use by owner operators, engineering, procurement, fabrication, and construction.

Benefits
- Depending on the scope of the implementation, you can typically save 3 to 12 months on the initial implementation and corresponding consulting and training fees.
- Training is minimized, reducing implementation time and cost.
- High- quality production startup is ensured by eliminating the need foryou to re-enter the same standard reference data.

Interfaces

SDB is delivered with a pre- configured interface to PDS & SmartPlant 3D, PDMS

Available Content

The latest release of SDB for SPRD is delivered with U.S. Standards (ASME, ASTM, MSS, API), DIN Standards (DIN, DIN-EN), 18 PAS 1057 piping specs and part data for the petrochemical industry, 40 Process Industry Practices (PIP) specifications, Migration tool that enables Standard Database users to load new content into their existing database, GB (Chinese Standards), JIS (Japanese Standards), 18,000 commodity codes and Structural Data (AISC)

Total Materials Management and Subcontract Management for Plants and Projects

SmartPlant® Materials is the Intergraph® integrated life-cycle material and supply chain and subcontracting management solution. It provides a common collaboration platform and project workbench for all partners in any engineering, procurement, and construction (EPC) project supply chain.

SmartPlant Materials helps to lower project costs, compress schedules, improve risk management, and enable companies to act globally to maintain advantage in a highly complex, international, and competitive market. From initial cost estimation through the supply chain to on-site management, SmartPlant Materials handles materials standardization, bills of materials and requisitions, procurement functions, fabrication tracking, and site functions, such as warehousing and disposition. New comprehensive subcontracting functionality that covers all the way from planning to progress management is now available.

The only complete, commercially available materials management and subcontracting solution, SmartPlant Materials is a real project workbench for all material and subcontract-related activities. It spans the entire project life cycle, and enables you to focus on corporate project objectives rather than departmental or discipline-specific goals. SmartPlant Materials uses the latest information technology to provide you with a high degree of flexibility, scalability, and easy integration into existing systems and workflows. Each department or function can simply access whatever materials data is needed for a specific material-related task, in the format most appropriate to that task.

Responding to Business Drivers

Modular, open, and fully Web-enabled, SmartPlant Materials responds to owner operator *(O/O)* and EPC business drivers by:
- Lowering total project and installed costs by reducing labor hours and eliminating materials surpluses and shortages
- Reducing plant schedule through integration with design and cost systems

- Increasing competitiveness through minimized project bidding time, compressed schedules, and reduced labor hours - including administration, engineering, procurement, supply chain management, and construction
- Improving risk management through better overall project performance, project cash flow management, and true management by exception
- Enabling global project worksharing and execution, using correct, complete, and consistent data
- Enabling data reuse throughout the plant life cycle, including plant operations and maintenance, and refurbishment
- Managing subcontracts via eSupplier functionality from the planning phase to tracking each progress step of a subcontract

Quantification

SmartPlant Materials supports materials quantification for bulk or itemized materials from estimate and basic (front-end) design, through detailed design, to the as-built plant.

Supplier management

SmartPlant Materials offers a Supplier Management solution, an integral part of the Material Supply Chain Management Module. You can access historical information on supplier performance during previous projects, define and assign criteria for selecting suppliers based on predetermined qualifications and past performance, and maintain supplier history/details/products and vendor history/ratings.

The supplier can register and maintain information via the eSupplier Module. This reduces the amount of EPC or contractor effort required for this kind of maintenance work.

Inquiry Cycle and Purchasing

SmartPlant Materials provides a central location for the storage of all inquiry and procurement data, and enables effective management of the data throughout the inquiry cycle and all procurement activities. You can greatly reduce the inquiry cycle

SmartPlant Materials benefits the EPC in many ways. Project teams can access information online during all project phases. Knowledge gained from previous projects can be re-used to address the industry's business drivers. Deliveries can be effectively tracked and traced for just-in-time delivery and efficient warehousing.

time by involving the suppliers directly in the process by giving them secure online access via SmartPlant Materials' eSupplier Module.

Expediting, Inspection & Logistics

SmartPlant Materials enables continual reuse of data from one department to another, and ensures that data are reliably maintained as subsequent revisions are issued. The Expediting, Inspection & Logistics Module can be accessed remotely through the Internet by third parties such as suppliers, freight forwarders, or inspectors.

Progress Measurement

SmartPlant Materials has the ability to track account codes or control accounts to the material line item level. This enables you to capture and report procurement activities performed at the line item by control account or account code.

Inventory and Warehouse Management

Data created during SmartPlant Materials Expediting simplifies and shortens the materials receiving process, whether in geographically distributed job sites or warehouses. You can easily create over, short, and damage (OSD) reports. Reviewing materials issued to sub-contractors, based on drawings or work packages, saves you time and money.

Construction Planning

SmartPlant Materials enables site management to optimize capacity planning for construction personnel versus predicted material availability at any given point in time. This creates a massive reduction in risk for the contractor, as well as dramatically improved competitiveness.

Subcontract Management

Subcontracting functionality is completely embedded into SmartPlant Materials. It covers planning, an eSupplier portal, Request for Quotation (RFQ) to award, and all post-agreement activities, as well as progress control for each subcontract. Using the subcontract strategy enables you to seamlessly continue with requisitions and inquiry, with the solution providing all features required for subcontracting. All subcontracts are handled in a single place which fully integrates all disciplines and departments. This enables teams to collaborate more effectively across the engineering, procurement, and construction life cycle.

Modules that fit your workflow

The new eSupplier Module can be used by subcontractors and other interested parties, such as material suppliers. Any supplier can register remotely into the system. eSupplier covers everything required for the registration and approval of companies, including RFQ, bid and document submittals, awarding, and day-to-day subcontract administration. The module also covers progress and applications for payment.

The SmartPlant Reference Data Module is the tool for easily Defining (and Maintaining) the scope of materials / supplies for project or enterprise use.

The Engineering & Procurement Integration Module presents the most recent status of any material item being used within the project, allowing the elimination of surplus materials and delays due to materials shortages.

The Material Supply Chain Management Module seamlessly integrates interchanges with commodity suppliers, subcontractors, manufacturers, fabricators, and freight forwarders.

The Site Management Module balances on-site personnel with material availability, assigning material to site inventories in the shortest possible time.

Part of the total Plant Enterprise Solutions

Part of Intergraph's overall aim is to provide an integrated life cycle solution for plant design, construction and operation. SmartPlant Materials creates, captures, and manages materials management data as part of the plant information asset. Based on Oracle, it is a flexible materials management solution that provides an open system architecture, modules for greater scalability and workflows and menus that mirror the EPC project workflow.
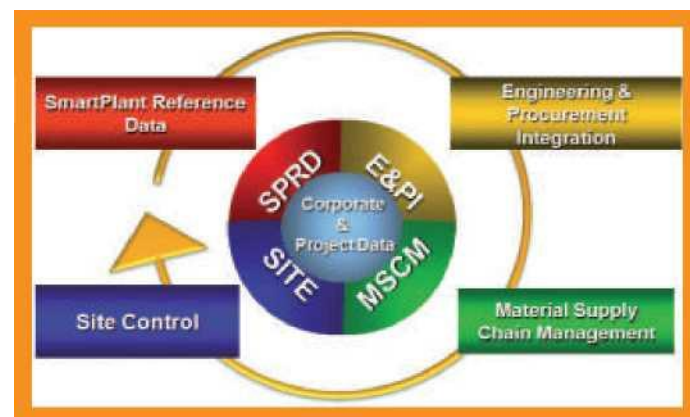
Four Modules of SmartPlant Materials

SmartPlant® Construction

Proven Technology to Streamline Construction and Integrate Engineering

Intergraph SmartPlant Construction is the innovative solution for construction planners, designed to meet the specific needs of construction companies, project management offices, fabricators and owners in managing construction resources, materials and schedules. The intuitive, configurable interfaces enable work package planners to create effective work packages using industry-proven work processes. Real-time material integration availability reports provide dynamic re-planning capabilities and a configurable planning window enables planners to make economical modifications before problems grow.

SmartPlant Construction offers dynamic work package planning, construction sequencing and reporting to streamline and integrate engineering for improved CAPEX efficiency and maximum construction readiness. It enables even the most complex construction projects stay on budget and schedule.

4D Visualization

With the solution's 4D technology, planners can sequence construction to optimize the project and visualize complex schedule information. SmartPlant Construction helps companies to identify project-critical paths and re-sequence work packages to eliminate costly delays and achieve project deadlines.

Construction Progress Management

SmartPlant Construction provides a platform to record field construction status based on configured rules of credit and report on this status. By using the 3D model, you can easily view progress in all stages of construction.

Multidisciplinary Solution

SmartPlant Construction can be used in a variety of roles, including: Construction Planners, Workface Planners, Construction Managers, Project Managers, Project Director, Material Coordinators, Field Superintendents, Field Foreman, Engineering Managers, Engineers, Field Engineers, Expeditors, Site Manager, Safety Coordinators, Quality Control Manager, Financial Planners, Cost Engineers, Schedulers, Construction Executives, Integration Coordinators, Resource Coordinators, Equipment Managers, Field Accountant,
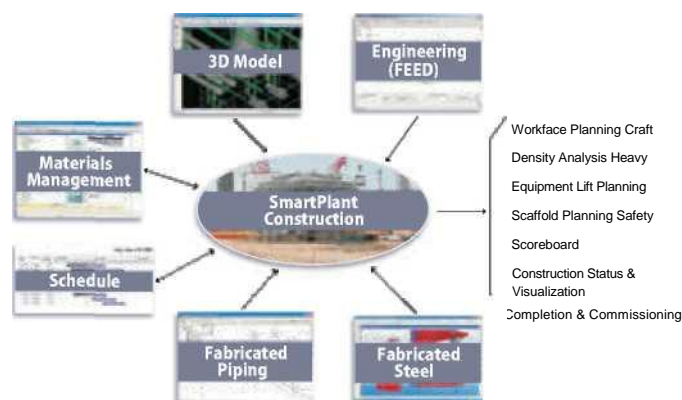
Material Controls, Field Procurement, Weld Inspector, Shop Superintendent, Shop Foreman

Open API: Integrate with Your Engineering Enterprise

SmartPlant Construction promotes better planning and management by incorporating the dynamic inputs from engineering, scheduling, procurement, fabrication and materials management into a solution specifically developed for construction by industry-leading construction companies. To enhance flexibility and interoperability, SmartPlant Construction offers full integration with the industry-leading SmartPlant Enterprise suite of products.

Enterprise Solution

SmartPlant Construction benefits the entire engineering, procurement and operations value chain:

- Owner operators can improve CAPEX efficiency by consistently managing engineering information from concept planning, detailed engineering, procurement and construction into operations and maintenance
- Fabricators can provide direct input to facilitate real-world construction plans
- Constructors can reduce project cost with improved visibility on project plans, accelerate their ability to re-plan dynamically in response to real-world changes and take advantage of enhanced integration with engineering, procurement and fabrication to optimize both engineering and construction decisions
- Engineering firms can improve decision-making based on "real time" construction status and vice versa

Business Benefits

- Reduce risk and improve transparency of construction
- Save construction time with better planning and tracking
- Improve decision-making capabilities through ad-hoc reporting on construction progress, risks and change costs
- Take advantage of integration with industry-leading SmartPlant Enterprise, as well as an open API
- Improve productivity and reduce training costs with simple user interface

Automatic Piping Isometrics for Fabrication and Construction

SmartPlant® Spoolgen® is specifically designed for piping fabricators who need to add fabrication and construction information to design isometrics delivered by EPCs, generated from 3D models held in plant design systems. Fabricators can use SmartPlant Spoolgen to easily split complete pipeline isometric drawings into spool drawings, which are then used to fabricate pipe spools in the workshop. The system automatically generates all necessary drawings and reports.

SmartPlant Spoolgen provides a fast return on investment, is simple to use and requires minimal training. SmartPlant Spoolgen significantly reduces:

• Man-hours

• Fabrication costs

• Project schedules

• Rework

• Construction errors

. Waste

Eliminate errors and rework through data Consistency

Piping data is typically delivered from the engineering contractor to the pipe fabricator via IDF or PCF files. Using SmartPlant Spoolgen ensures total data consistency with the original design of the piping system. This accurate flow of electronic data significantly reduces the chances of piping data errors and the need for expensive and time-consuming rework, saving time and associated cost.

Add Fabrication and Erection Information to Isometrics

Using simple functionality, piping fabricators can add fabrication and construction information to electronic pipeline data files (IDF or PCF) without the need for re-drafting or re-entry of material data. Spools are defined by the addition of field weld positions on

the isometric drawing on-screen. SmartPlant Spoolgen then automatically produces the required number of spool isometrics for pipe fabrication in the workshop. Erection isometrics for the complete pipe can also be produced, aiding on-site construction activities when the spools are finally erected in- situ.

Provide a Rapid Return on Investment

SmartPlant Spoolgen is widely used by the world's leading pipe fabricators. Extensive global project use has identified quantifiable savings in terms of man-hours, manufacturing costs, project schedules, rework and erection errors. SmartPlant Spoolgen generates significant financial savings and provides a very quick return on investment.

Integrate with all Leading Plant Design Systems

Piping fabricators can use SmartPlant Spoolgen in conjunction with all leading 3D plant design systems. This ensures that whatever system an EPC uses, SmartPlant Spoolgen will be able to deliver the isometric drawings required for fabrication and erection.

Create Electronic Pipes from Paper Documents

When you purchase a license of SmartPlant Spoolgen, you also receive a license of SmartPlant Isometrics, formerly I-Sketch™. Piping specifications and materials catalogs from a variety of plant design systems can be converted automatically to SmartPlant Isometrics format, thus enabling piping isometrics available in paper copy only to be sketched and an electronic PCF produced. The PCF is then submitted to SmartPlant Spoolgen for automatic spool drawing production.

Modify As-designed Pipes to reflect As-Builtsite Conditions

During erection, when a piping spool does not fit and needs to be reworked to reflect the as-built conditions at the construction site, SmartPlant Isometrics enables the quick updating of the original as-designed piping data to as-built status based on information received from construction. The revised PCF data file produced by
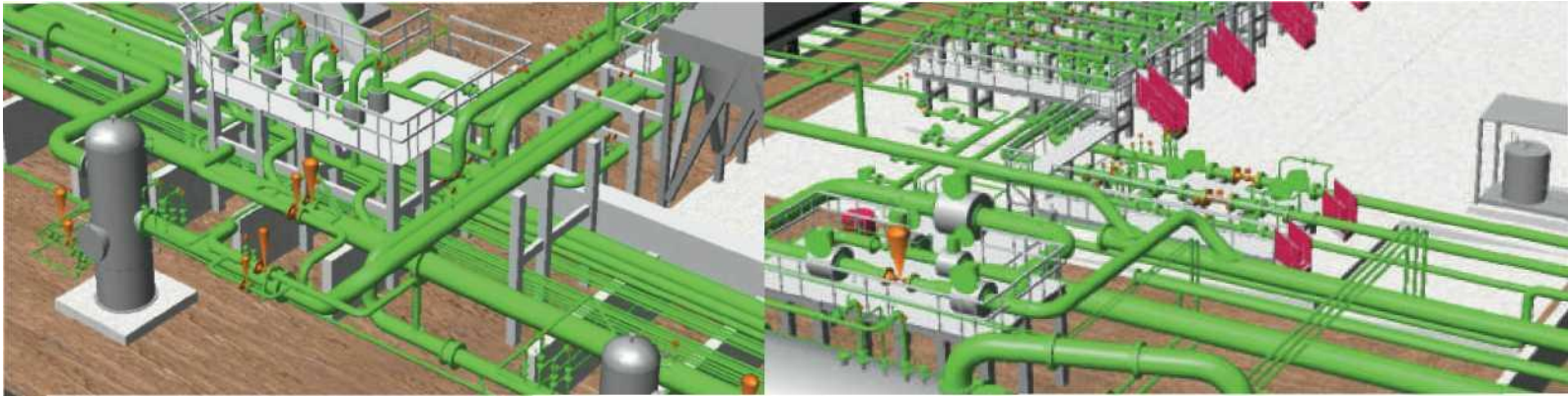
SmartPlant Isometrics can then be submitted to SmartPlant Spoolgen to produce the spool sheet isometric required to fabricate either a completely new piping spool, or to make a modification to the existing spool piece.

Visualize Piping data in 3D

Interactively display the contents of pipeline data files imported into SmartPlant Spoolgen as scaled 3D models. Any number of files can be visualized simultaneously to create a 3D model of the entire piping system.

Interface piping data with downstream IT systems

Interface SmartPlant Spoolgen generated piping report data with almost any downstream IT system, such as material control, procurement, workshop and weld management systems and SmartPlant Materials, Oracle, Sap, Microsoft Excel or Access-based or other legacy systems.

Produce piping system isometrics

Merge several pipeline data files to create complete piping system isometrics, useful for pipe stress analysis, or to aid in the inspection, testing and commissioning of installed piping systems.

Key features

- Enables the addition of fabrication and erection information to piping isometrics (IDFs and PCFs)

- Generates all necessary isometric, Spool drawings and reports automatically

- Defines spools by the addition of field weld positions onscreen

- Enables users to add their own pipeline attribute data

- Enables the importing of piping data from leading plant design systems such as SmartPlant® 3D and PDS[S]

- Delivers drawing output files in Autocad, Microstation, or SmartSketch format

- Allows users to use their own backing sheets

- Provides a range of dimensioning options   string, composite, overall and to center or end of valves

- Supports optional output files, including material control, weld summary, spool information, cutting list, printed bill of materials, component traceability, bending control, drawing cross reference, and bulk material list

- Supports industry-standard drawing sizes that conform to ANSI, "A" series, or a user's custom size

- Enables the importing of design data from Microsoft Excel and Access

Special value'added features

- Automatic elbow-to-bend conversion

- Additional materials output on the bill of materials

- Weights and center-of-gravity calculations

- Addition of pipe supports, including material and welding details

- Addition of detail sketches and information notes

- Definition of loose flanges and field-fit welds

- Automatic straight splitting

- Transposition of component codes and descriptions

- Bar-coding identification of drawing IDs

- Output of flat spool isometrics

- Alternative text allows a user's own text definitions to be output on the isometric, including multi-language support

- Output of user's own component symbol shapes

- Option to read'in pipeline attributes and heat/non-destructive examination (NDE) data

- Revision management

- Weight, surface area and INCH DIA of pipe can be automatically calculated

- Weld and part number management

- Weld gap control
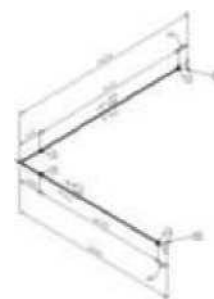
Intergraph's information management solution, SmartPlant® Foundation, is the "e-Engineering integration hub" for the SmartPlant Enterprise. This collaborative conduit ensures that valid, consistent and high-quality engineering data is shared between applications and users whenever and wherever they need it. This engineering information is consistent and highly accurate on three fronts:

1) The physical asset information (what is there)
2) Logical and functional information (what was designed to be there)
3) Regulatory and safety imperatives (what is required to be there).

These are the pivotal tenets of engineering integrity.

SmartPlant Foundation is multi-dimensional in its usage and deployment capabilities. These include:

- Application integration to manage inconsistencies and reduce errors
- Engineering and technical data handover from execution into operations
- "Engineering companion" between operations, maintenance, and ERP systems for rapid decision support in time-critical situations
- Client and Regulator remote review portal to minimizez plant startup and ensure continued operations
- Engineering Content Management (EngCM) including document and drawing management and control, list and sheet development, and exchange with suppliers and contractors
- Plant configuration control and concurrent engineering to manage the evolving engineering design basi

The solution supports global collaboration between clients, contractors, and suppliers. It helps streamline business processes that share common information. These overarching and collaborative workflows through the internal and external value-chains deliver quality information to the desktop regardless of the source application; audit activities and signatories to ensure

completion and support regulatory review; and enhance decisions with cross-discipline, cross-referenced data and indices.

It reduces the cost and errors associated with multiple tools by eliminating the boundaries between them. SmartPlant Foundation is the single source of access to the engineering truth about a plant — its structure, tags, equipment, data and documents. No other product on the market today supports such a wide scope and yet is deployable in a modular, incremental fashion.

The Goal: Engineering Information Integrity

Information is the basis upon which real-time decisions are made. Engineering information is abundant, dynamic and complex. Keeping this information current, synchronized and readily accessible is the challenge — whether it is used concurrently by multiple companies during plant design, by engineers during plant construction and commissioning, or by maintenance workers on the plant floor.

SmartPlant Foundation — Intergraph's total solution for plant information management — ensures secure access to plant information whenever and wherever it is needed. It is a complementary offering to Intergraph's industry-leading design tools - PDS^S, SmartPlant Instrumentation, SmartPlant Electrical, SmartPlant P&ID, SmartPlant 3D and SmartPlant Materials. SmartPlant Foundation provides:

- **Common integration architecture:** Features all five tiers of integration
  - □ **Presentation integration:** Unified interface and information presentation ensure rapid assimilation and understanding in order to provide a portal - a "single point of access to the truth"
  - □ **Data integration:** Consolidation and aggregation of data from multiple heterogeneous sources to provide the single reliable source of truth — the data repository
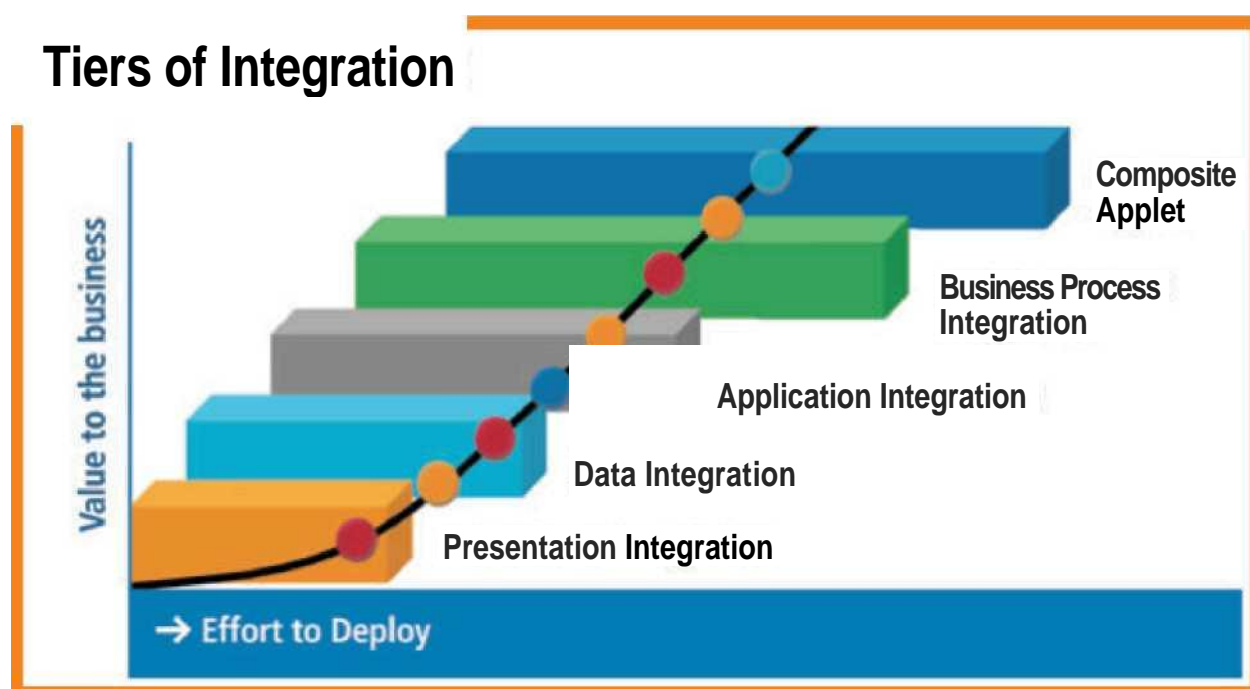
SmartPlant Foundation is the single source of access to complete plant information which helps support real-time business decisions that, in turn, reduce cost, improve quality and reliability, shorten project schedules and plant shutdowns and address safety and environmental issues throughout the plant life cycle.

- **Application integration:** Adaptors to move the consolidated information between applications
- **Business process integration:** Overarching delivery, collaboration and execution, enhancing the workflow
- **Extensible composite applications (applets):** New applications that make use of the high integrity repository

Plant/project configuration

Models and audits the evolving plant configuration, including all plant components (i.e., structure, tags and assets) and associated characteristics, logical function, physical location and inter-relationships. Houses all plant information — tag/asset data and associated plant documentation — against the familiar plant structure, delivering relevant, timely and accurate information to authorized personnel. The data-centricity of the solution enables management of data to a very granular level. The system tracks revisions and changes, assuring data accuracy and integrity.

Change management

Enables effective management of change by providing an overview of engineering changes, tracking the details and status of each change, and highlighting plant items subject to change. It enables early visibility of changes, including "what's in the pipeline," manages the electronic delivery of work items to pre-defined

workflows and manages the revisions of both plant objects and documents, while keeping an audit history of activities.

Information access

Enables flexible search and retrieval of information. Engineers can access information via familiar plant terminology.

e-Engineering access

A user-configurable view of engineering information delivered remotely over the Internet via a single, consistent browser interface — secure, intuitive access to information eliminates the need for the authoring application at the remote desktop, thereby reducing cost and training requirements.

Streamlined work processes

Provides electronic definition of processes, enforcing mandatory procedures such as required approvals and sign-offs, while remaining flexible for ad-hoc workflows. Delivers tasks to authorized personnel, recording the tasks and resulting actions performed.

Collaborative engineering

Supports collaborative engineering between companies and supply chains, controlling shared information access and updates, notifying interested parties of changes and retaining a complete history of all actions taken. SmartPlant Foundation builds a comprehensive repository of information about a plant, including its structure, tags, equipment and documents.
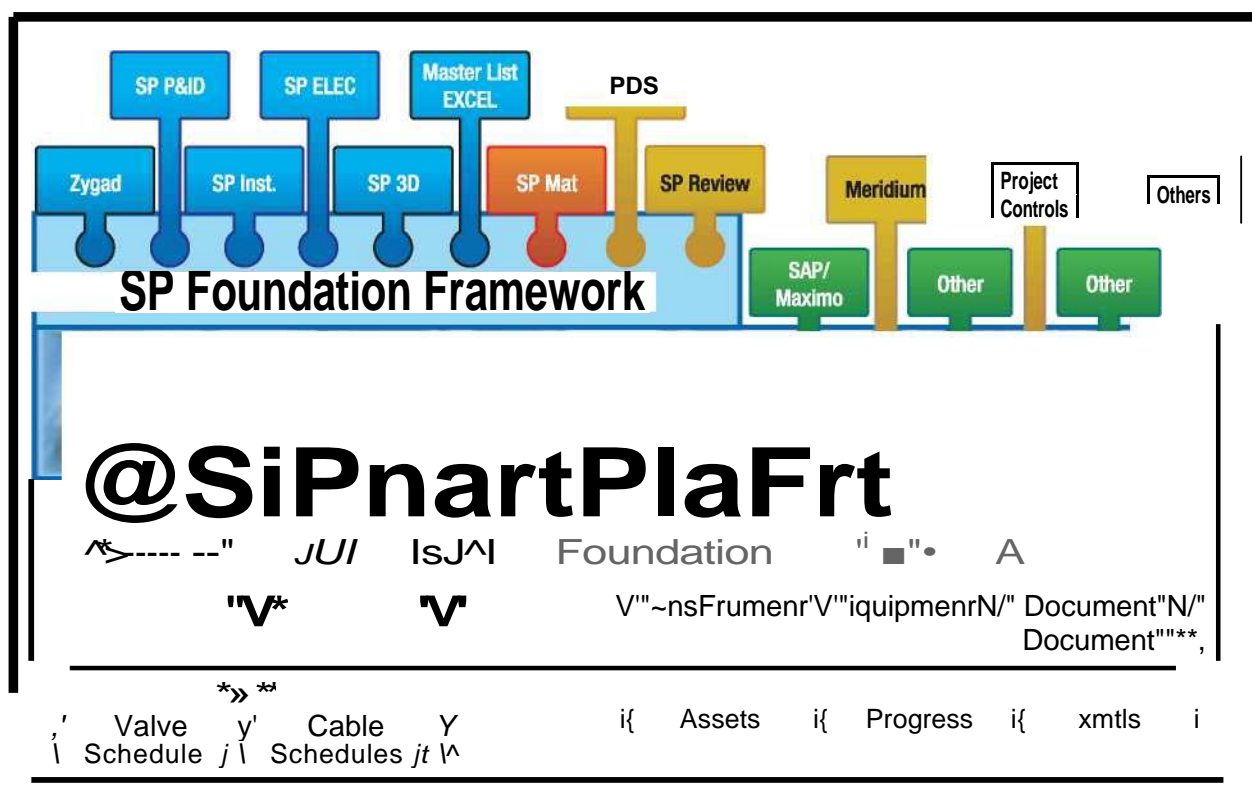
Integration, Data and Document Information Storage, Change Management and Workflow

Smart Plant" Enterprise for Owner Operators Core Solution

The SmartPlant Enterprise for Owner Operators Core Solution includes key work processes that are relevant throughout the complete plant life cycle. To help you manage the engineering design basis, this solution provides common core work processes and is a prerequisite for the other SmartPlant Enterprise for Owner Operators (SPO) solutions. The following SPO core solution business packages are available:

On-plant Engineering & Design

Maintaining the dynamic design basis in-line with plant modifications during the plant life cycle is a critical, demanding activity. A bundle of pre-configured, well-proven Intergraph's SmartPlant Enterprise applications like, SmartPlant Reference Data, SmartPlant Isometrics (formerly I-Sketch™) &SmartSketch[s] is offered on a plant site basis to support maintenance of the engineering design basis and to perform small on-site projects.

In addition, SmartPlant Foundation is included as the common information hub to support data exchange between tools and provides the workflow engine to power the preconfigured SPO work processes. SmartPlant Foundation also serves as a flexible information management repository.

Plant & Work Breakdown Structure

Establishing the plant breakdown structure is a fundamental activity required to manage the design basis of any plant. Managing the work breakdown structure by definition of work packages is a critical part of managing activities such as engineering, construction, and procurement both in greenfield / brownfield developments and turnarounds.

Tag Management

The consistent and accurate allocations of tag numbers in accordance with the plant engineering numbering system — in addition to the capture and maintenance of design properties in the tag index — are essential activities during all phases of the plant life cycle.

Document &Transmittal Management

These business packages ensure effective and consistent management of documents with auditable traceability for operations to demonstrate regulatory compliance and to manage the vast numbers of documents that describe a complex process facility. During development projects, revamp projects, and turnarounds, the allocation of document numbers and workflows to review and distribute necessary documentation to relevant stakeholders are critical processes. This business package addresses the needs of both projects and operations for document management.

This business package will feature a comprehensive set of work processes for document management, including: Central allocation of document numbers, capture of document metadata, file archiving, distribution and review, subscription,

check-in and check-out, on-line approval, transmittal of documentation internally and externally.

Plant Data Loading

Bulk loading of data into SPO via pre-configured, template Microsoft Excel® Load Files is provided by SPO Core. A more comprehensive solution for loading and validation is also available with Intergraph's SPO Validation, Transformation, and Loading Solution.

Conceptual Engineering

The commercial and technical evaluation of alternative plant layouts is an essential part of the conceptual engineering process for both greenfield and brownfield projects. The Conceptual Engineering business package exploits SmartPlant layout (based on SmartPlant 3D) for the conceptual layout of plants.Various plant layout concepts can be quickly generated and compared. The results of any layout can be exported to estimating tools to facilitate cost comparison.

Engineering Data Browsing

The SPO Core Solution provides rapid access to key information within the engineering design basis via multiple search mechanisms and navigation paths. This reduces the time taken to gather necessary information and ensures that all relevant information is made available to facilitate quicker and better decision making.

Fast Track Implementation

Intergraph offers an optional Fast Track implementation approach for the SPO Core solution. Fast Track is based on completing a fixed implementation scope to configure SPO Core for a plant and meeting customer needs within 60 days from the beginning of implementation. Fast Track avoids lengthy initial analysis workshops and specification preparation and can potentially satisfy the complete needs of a customer with basic requirements or can be used to achieve the first implementation milestone for a customer with more extensive needs.

Smart Plant" Enterprise for Owner Operators Operating Plant Solution

The SmartPlant Enterprise for Owner Operators (SPO) Operating Plant Solution builds upon the SPO Core Solution and provides business packages supporting common, critical work processes for the operating plant. To help you manage the engineering design basis and ensure seamless interoperability with the maintenance system in operating plants, SPO Operating Plant Solution's business packages available currently are:

- Management of Change for Operations
- Plant Information Browser
- Inspections Assistant

Management of Change for Operations

Maintaining the accuracy of essential plant engineering, maintenance, and operations information is crucial to safe and efficient plant operations. Traceability of plant changes and auditability of the management of change (MOC) process is essential to demonstrate compliance with regulatory requirements. We've designed the Management of Change for Operations business package to provide rigorous MOC of engineering information with full traceability and audit trail.

This solution supports the synchronization of information between the engineering design basis in SPO and other third-party systems such as computerized maintenance management systems (CMMS) to provide ensured consistency. This is important to ensure all maintainable equipment is captured and has an appropriate maintenance plan and that change in the design basis for equipment is reflected in the CMMS to ensure correct purchase of replacement equipment and parts.

Tags created, updated, or terminated in the design basis will trigger an automated update of the corresponding functional location in the CMMS such as SAP® EAM using SAP NetWeaver® PI. Similarly, when you install or replace equipment against a functional location in SAP EAM, you'll receive an update of the corresponding data in SmartPlant Foundation that holds the

links between tag, functional location, and equipment. Outof-the box, end-to-end integration is available for SAP The synchronization process in SPO is generic and can potentially be extended to other third-party systems, including parallel synchronization with multiple systems if needed.

The MOC process includes the review, authorization, design, engineering, approval, and confirmation of implementation and incorporation of as-built updates. It also addresses the process of notifying maintenance to perform changes by optionally creating notification records in the plant maintenance system. You can also perform the impact assessment of engineering change. During the planning of engineering change, plant engineering must anticipate the MOC implications of planned plant change. The Web portal will assist you in assessing the plant items affected. The linking of affected plant items to changes also facilitates the assessment of change impacts with other ongoing or pending changes.

Plant Information Browser

The Plant Information Browser business package provides seamless access to plant design data and documentation via a common, intuitive, role-based Web portal. Data is available via drill-down of the plant structure, structured queries, or from 2D/3D graphical navigation of the plant. Enjoy access to engineering data and selected data in SAP EAM.

Intergraph recognizes that many different roles are required to achieve successful plant operations. Each role has its own need to access information. The SPO portal supports these various roles and their needs to quickly and easily access information to efficiently perform their tasks. A maintenance engineer can seamlessly access data in the SAP maintenance system and engineering design basis and then interrogate the system by functional location or equipment number. A plant engineer can use a tag number to access design data, data from SAP, data from the DCS, and plant historian.
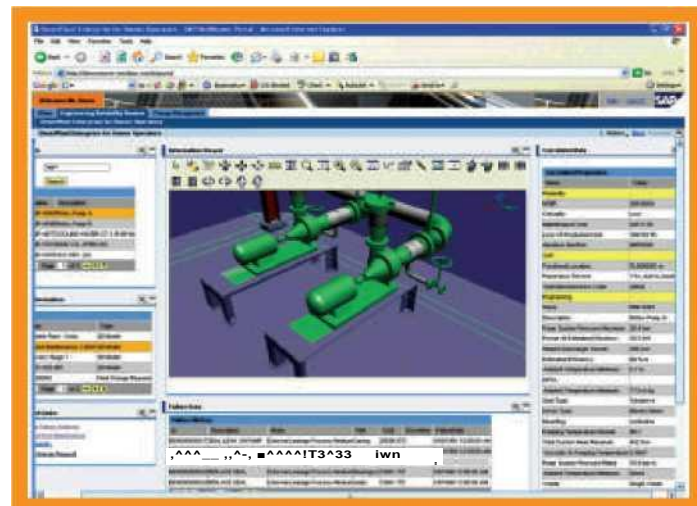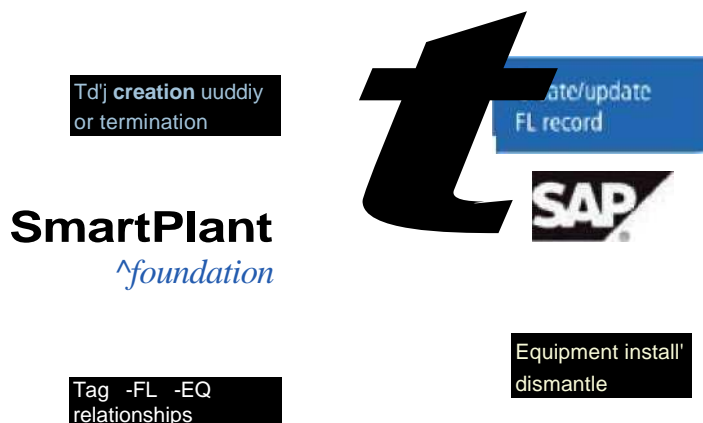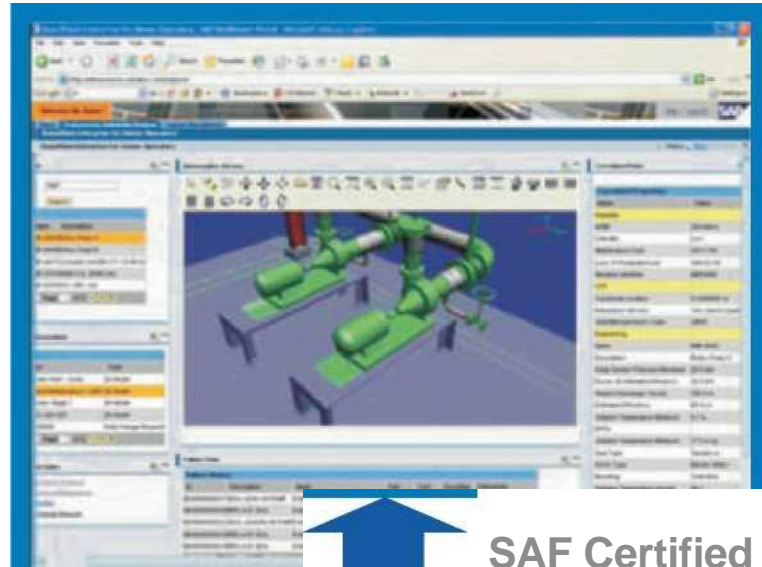
SmartPlant Enterprise for Owner Operators is designed to enable asset owners to fully exploit engineering design data to manage asset performance and to give them a means to ensure proper maintenance of information integrity across the owner operator system landscape.
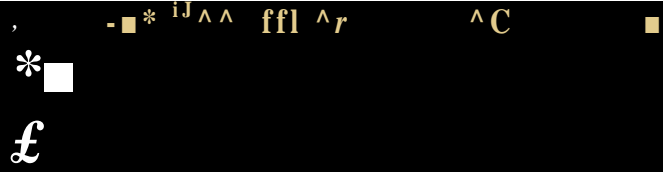
Inspections Assistant

The Inspection Assistant business package is designed to assist plant owners meet increasing regulatory demands for demonstrable compliance with requirements for equipment inspection. The business package manages the scheduling of equipment inspections, capture of inspection results, and follow-up of punch items. The process is aided by the workflow to provide auditable traceability of the entire process. For each inspection, multiple inspection check sheets are generated, one for each inspection point. These inspection check sheets can be completed in the field on hand-held Pcs, then uploaded to SPO when returning to the office.

SAF Certified
Pamrarmd by **SAP** P^BlWeavsr

Common Web Portal

Project Data Exchange

Eng I neenng Dynamics
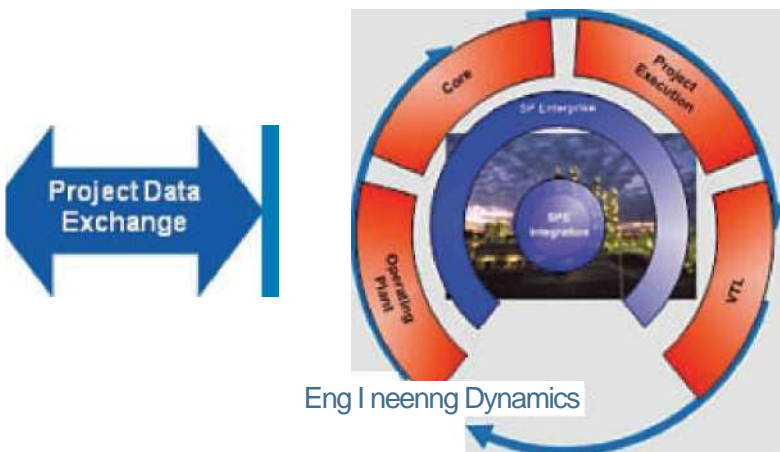
(SAP, Maximo, Ventyx. Oracle EAM]

DCS/ Automation   Reliability

Safety Content

Management

Integrated O/O Environment

Smart Plant® Enterprise for Owner Operators Project Execution Solution

Managing projects to ensure delivery on schedule, to specification, and within budget is a major challenge for owner operators and project managing contractors (PMCs). The SmartPlant Enterprise for Owner Operators (SPO) Project Execution Solution builds upon the SPO Core Solution and provides pre-configured processes supporting key work processes for successfully managing the execution of greenfield and brownfield projects. These processes include:

- Management of change
- Management of non-conformities
- Management of technical/site queries
- Interface Management

Management of Change In Projects

Changes to the approved project design basis are the single greatest factor to influence project cost and schedule. Any major CAPEX project will be subject to thousands of changes and hundreds may be under consideration at any one time. The process of evaluating changes is complex, involving many technical and administrative stakeholders in the project, and the complexity is compounded by overlapping scopes between changes.

The SPO management of change process provides a unique level of change control within projects, and provides management with increased visibility through management reporting. This includes the critical distinction between development within existing project scope (commercial and design development) and changes to existing project scope (commercial and design changes). Changes are referenced to the underlying engineering design basis items affected: tags, documents, and parts of the Plant Breakdown Structure. This enables analysis of what other changes either already approved for implementation or under review may be impacted by the change under consideration and which interface items would potentially be affected if the change should be implemented. The SPO management of change process ensures

auditable traceability through the review, approval, and implementation cycle for changes using automated workflows to demonstrate compliance and adherence with project authorization matrices and procedures.

Management of Non-conformities

Non-conformities to applicable laws, regulations, corporate governing documents, and project specifications all need to be closely managed on projects. Traditional electronic archive or paper-based systems suffer from poor process management and reporting. The associated history of review and approvals can be difficult to find, especially during operations. When an incident does occur on a plant with such a system, it can take a long time to gather the necessary information for the investigatory team and receive permission from the regulatory authorities to resume production.

The SPO non-conformity process is closely linked and integrated with other SPO project execution processes, such as technical queries or management of change, and demonstrates compliance with regulatory requirements for managing non-conformities. SPO offers a process to manage non-conformity requests from all parties and the granting of temporary and permanent waivers or deviations. The SPO non-conformity process provides an automated workflow to track the process of receiving, reviewing, and approving non-conformities.

The SPO non-conformity process includes the linking of non-conformities to affected plant areas, systems, tags, documents, etc. which are affected. This helps make non-conformities highly visible for the operations readiness team so corrective steps can be taken, such as increasing the frequency of planned inspection or maintenance. Where incidents do occur, SPO reduces downtime impact on the plant and facilitates a quicker restart of production by enabling all documentation and information related to the waiver process to be presented without delay, including a complete, auditable traceability.

The SmartPlant Enterprise for Owner Operators project extention solution expands the vision & control of Management of change, Management of change non-conformities, Management of technical/site queries & Interface Management.

Management of Technical and Site Queries

On any major project, thousands of technical and site queries (also known as Requests for Information) need to be addressed and answered within a tight schedule to avoid impacting project schedule and potential variation orders. Traditional paper-based or electronic archive-based solutions demand a high level of administration and manual effort between all of the parties involved in resolving queries. The technical/site query process in SPO greatly simplifies the administration and processing of queries. Flexible, templated workflows and management reports ensure consistent handling. Bottlenecks can be identified early to enable management to implement remedial action before claims arise

Interface Management

Interface management provides technical interface control between project stakeholders such as the owner operator project team, the owner operator corporate organization, any PMC, EPC, contractors, package suppliers, authorities, and many others. A typical CAPEX project will have 20 to 100 separate interfaces that need to be managed, each with hundreds of interface issues that need to be resolved. The traditional use of spreadsheets is insufficient for managing the complexity of interfaces and reporting. SPO's templated process offers hierarchical structuring of interface needs and manages the identification, responsibility, planning, and status of both physical and soft interface items. Interface issues and information needs can be linked to the affected parts of the plant.

Tags, areas, systems, and more provide multiple access routes to interface information. Management reporting highlights where interface issues are not being addressed as planned. This enables management to take remedial measures before consequences become serious and reduce the risk of claims and disputes.

Key Features

- Out-of-the-box, user-friendly processes that can be rapidly adjusted and deployed at low risk.
- Capture, retrieval, and analysis across the project life cycle for key project management processes.
- Tight integration with affected plant objects of the plant design basis in the SPO Core Solution that enables the potential impact of these processes to be analyzed.
- Powerful management reporting for overall visibility, enabling proactive intervention and better decision-making.
- Automated and flexible workflows ensuring consistent adherence to project procedures, demonstrable compliance, and complete auditable traceability.
- The ability to link project execution processes to each other. For example, a technical query arising from a site can result in a temporary or permanent non-conformity or a project change that could impact an interface item. The ability to link these project execution work processes provides complete control and traceability.
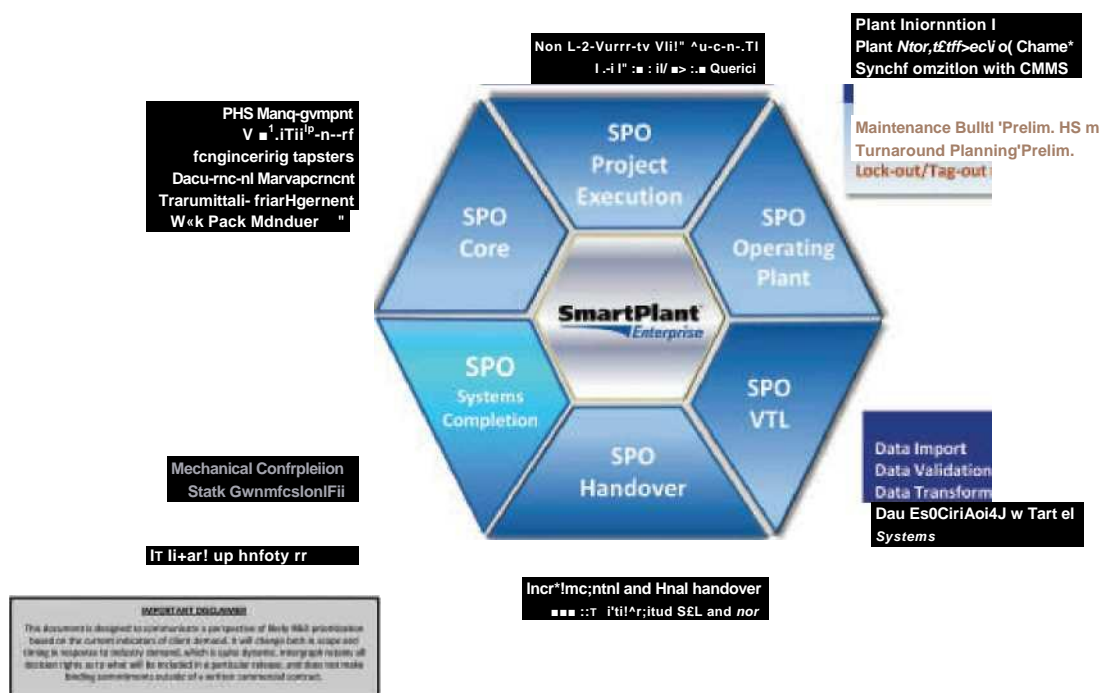
Smart Plant" Enterprise For Owner Operators Validation, Transformation, and Loading (VTL) Solution

Intergraph VTL is a comprehensive solution capable of managing Data import from multiple sources.

Streamline Data Handover from Projects and Brownfield Data Take-on

The handover of data from CAPEX projects and plant turnarounds is a formidable task. It can involve the transfer of thousands of documents and millions of individual data items from suppliers and contractors to the owner operator. The challenge is how to quickly and efficiently perform the following tasks:

- Check the quality of information being transferred
- Keep records of which checks have been performed and the results obtained
- Load approved information into target systems for operations

The Solution

Intergraph VTL is a comprehensive solution capable of managing data import from multiple sources. VTL submits imported data to rigorous quality control before data extraction fzor loading into targetsystems. These systems can include Intergraph's SmartPlant Enterprise information management and engineering design tools or third party applications.

Advanced Import Capabilities

VTL empowers you to choose your preferred mapping and transformation tool. You can use any mapping tool capable of generating XSLT, such as MapForce from Altova, to map incoming data or export data to be loaded into target systems.

The import module reads incoming files and transforms these using the XSLT generated from a mapping tool. The import module'sadvanced features can prompt you for input, automatically calculate values based on incoming data where needed, check .CSV files for defined valid and invalid characters and RFC4180 compliance.

Advanced Import Capabilities

VTL allows you to quickly and easily define your own rules. It support an extensive range of rule types, including:
- Syntax rules
- Uniqueness validation
- Relationship cardinality
- Date and time validation
- Integer/float validation
- String and pick list validation
- PL/SQL and DLL rule definitions for more complex rules
- Unit of measure validation
- Mandatory fields validation
- Cascading errors — Errors on one object can create errors on associated objects

You can add your pre-defined rules to rule sets that are run against future data submissions.

Flexible Staging Area

VTL provides a highly flexible staging area into which you can map and load incoming data submissions from contractors, suppliers, or a legacy data system. Once in the staging area, you can validate data against your pre-defined rule sets. The results from testing are retained in the staging area. Reports then list the results.

Generic Export Module

The VTL export module facilitates data filtration and export. The module also supports the initiation of loading programs to load data into Intergraph SmartPlant Enterprise software or third-party applications.

Building on Proven Experience and Technology

Intergraph has extensive, in-depth experience in helping customers manage the handover of data from complex projects to operations, as well as helping successfully migrate data from legacy systems. We use this rich legacy of experience as the basis for the design of our comprehensive VTL tool set. VTL is based on Intergraph's industry-leading SmartPlant Foundation information management technology to ensure a highly robust and flexible platform for data staging and validation.

Enjoy the Benefits

The "Smart Tag editor" feature provides automated touch-up services for post-drawing generation editing.
- Reduced time and cost of data handover from CAPEX projects and turnarounds
- Improved range, quality, and consistency of validation performed
- Fully configurable staging area
- Extensive range of user-definable validation rule types
- Simple form-assisted validation rule definition
- Comprehensive management of user roles
- Comparison of data in the staging area with data in the SmartPlant® Foundation target system
- Fully auditable traceability of data submissions, validation performed, and results
- Automated capture of test results
- Microsoft Windows Workflow Foundation for managing work processes
- Powerful export mechanism to load data into target systems
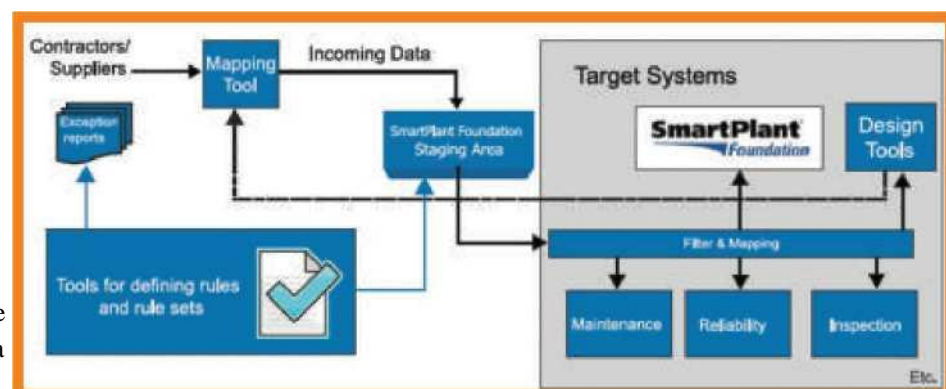
Smart Plant® Enterprise For Owner Operators Handover Solution

The handover of data and documentation occurs many times during the life of a facility. The costs, resources, and time required for handover are considerable. The increasing adoption of SmartPlant® Foundation (SPF) -based systems by contractors and owner operators has led to increasing demand for a solution to make the process of handover of data and documentation between these systems simpler.

Intergraph® meets this need with the SmartPlant Enterprise for Owner Operators (SPO) Handover Solution, enabling data and documentation to be quickly and easily moved between SPF-based systems. This includes standalone SPF systems, SmartPlant Enterprise-based systems with integrated SmartPlant design tools, SmartPlant Construction, and SPO.

The solution supports the handover of intelligent 3D models and schematics that have been published from SmartPlant design tools into SPF. The Handover Solution preserves the inherent intelligence so that intelligent navigation in the source SPF system is available on target SPF systems as if it had been published locally. The Handover Solution supports both data and documentation that has been published from SmartPlant design tools as well as non-published data that has been authored in SPF or loaded into SPF, such as vendor data and registers.

Auditable Traceability

Managing handover requires that records are maintained of what data and documentation has been handed over from SPF, to whom, and when. All these records are maintained as part of the Handover Solution, including support for hand-over to multiple parties. For example, a project management contractor (PMC) may hand data and documentation over to fabrication yards, a completion contractor, and the owner operator.

Handover Throughout the Facility Life- cycle

The Handover Solution can be applied to a variety of typical handover scenarios, including:

From	To
FEED Contractor	Owner Operator
Owner Operator	Detail design and procurement contractors
Engineering contractor	Fabrication contractors
	Owner operator or PMC
	Completions contractors
Owner Operator	Maintenance & modification contractors
Maintenance & modification contractors	Owner Operator
Owner Operator	Decommissioning contractors

In each case, handover may be incremental or a final handover

Incremental Handover

There are many instances where information and documentation are not handed over at one final instance. Instead, hand-over may occur at several milestones during a project or as a continual "drip feed" on a daily or weekly basis. For example, owner operators typically require information and documentation to be handed over incrementally to support a variety of activities, such as Review of key deliverables, Progress updates, Familiarization, Preparation of training materials, Development of maintenance plans & Spare parts planning.

The Handover Solution supports incremental handover from SPF without disturbing data entered into the target SPF system. Even where handovers have omitted intermediate revisions of published documents, the Handover Solution will ensure that any tag deletions are rolled-up intelligently across revisions to preserve the consistency between source and target systems.

Handover Of SmartPlant Design Tools

There is an increasing demand from owner operators to take over integrated SmartPlant design tool databases from contractors at the end of a project and maintain them during operations. The Handover Solution supports the re-registration of integrated SmartPlant design tool databases from a source system against the target SPF system so that tools can work together on the target SPF.

Protecting Intellectual Property

The Handover Solution can be configured to filter the data to be handed over from the source SPF system. This enables the providing party to protect data that they do not wish to be included in the handover to the target system. For example, filtering could ensure only the latest signed-off version of documents is sent. This enhances the control of what SPF data is handed over and ensures that intellectual property is not compromised by the handover process. Filtration of data in SmartPlant design tools is handled separately.

Mapping Between SPF Implementations

Data can be handed over between two SPF installations that are configured differently. For example, handover can occur between a custom SmartPlant Enterprise implementation at a contractor and SPO at an owner operator. Mappings using XSLT are required to map between the data models. Any com-mercially available tool can be used. The level of effort required for mapping is dependent on the extent of the difference between schemas. Intergraph advises to align on a common base schema between stakeholders as much as possible.

Handover And VTL - Complementary Tools

The SPO Validation, Transformation, and Loading (VTL) Solution and the Handover Solution play important but different roles in managing the handover of data and documentation. The Handover Solution is designed to move selected data and documentation "as-is" between two SPF-based systems with no validation but preserving intelligence in 2D and 3D published deliverables.

The VTL Solution is designed to manage the take-on of data from any source system (Intergraph or third party) by placing the data into a quarantine area for it to be validated against sets of business rules, after which data is exported and loaded into either Intergraph or third-party systems, such as CMMS reliability systems, and inspection systems.

About Rolta

Rolta is a leading provider of innovative IT solutions for many vertical segments, including Utilities, Governments, Transportation, Process, Power, Banking and Insurance. These enterprise level solutions are built around Rolta's intellectual property and domain expertise to offer unique business intelligence for impactful insights for effective decision making. Rolta's solutions framework includes Geospatial Fusion™, a suite to integrate disparate spatial and business data; Rolta OneView™, a BI solution for operational excellence; and Rolta iPerspective™, a unique platform for SOA and "Cloud" enablement. Rolta's intellectual property repository contains cutting-edge software for mapping and earth sciences, providing the foundation for Defense and Homeland Security solutions including C4ISTAR information systems, Military Communications, Digital Soldier, and Vehicle Systems. Rolta is a multinational organization headquartered in India, which has executed projects in over 40 countries. Rolta has a countrywide infrastructure and international subsidiaries across the globe. Forbes Global ranked Rolta amongst the "Best 200 under a Billion" four times in six years. The Company is listed on the Bombay Stock Exchange and National Stock Exchange in cash and F&O segment, and forms part of various indices on BSE/NSE. The Company's GDRs are listed on the Main Board of London Stock Exchange and its FCCBs are listed on the Singapore Stock Exchange.

RECOGNITION

8 Oracle Titan Awards for excellence in solving real-world customer challenges and for development and deployment of Oracle technology

Ranked at the 2nd position in overall ranking in the 2011 DATAQUEST survey of Best Employers in the IT sector

1st Company in the world to be assessed 'Level 5' certification under Certified Practice in Usability™ from 'Human Factors International'-

Won the award for 'Excellence in Science, Technology and Technological Innovation' for the year 2009-10 from the Federation of Indian Chambers of Commerce and Industry

"The Great Mind Challenge for Business 2010" award by IBM for building the most innovative solution using IBM's Rational Suite

Microsoft Partner Network IMPACT Award for Data Management Solution of the Year category

Oracle Platinum Partner (DB, EBS, BI, Fusion, SOA)

Rolta ranked 26th among the 500 best performing midsize firms in India by Inc. magazine

Rolta has been included in the S&P Global Challengers List™ 2008 by Standard & Poor's **(S&P)**

"Geospatial Award of the Year" by Geospatial Today

"GeoSpatial Leadership in India" award by Map World Forum

"Technology Leadership Award in the Hydro carbon Industry" by Chemtech Foundation

"Amity Corporate Excellence" award by Amity International Business School

Rolta was ranked 11th amongst "India's most investor-friendly companies" by Business Today

Forbes Global "200 Best Companies" outside US -4 times in 6 years

Amongst the 500 fastest growing technology companies in Asia Pacific - Deloitte Touche Tohmatsu

Listed amongst the 'Top 10 Wealth Creators' in the mid-cap segment, in India, by Hindustan Times

"25 Fastest Growing Companies" - Business World

"Most Valuable Companies" - Business Today

Thought leaders - Authors of 23 Oracle Best sellers

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