

Simulation

Smart 3D Solutions Increase Safety in the Engineering Enterprise

David Joffrion

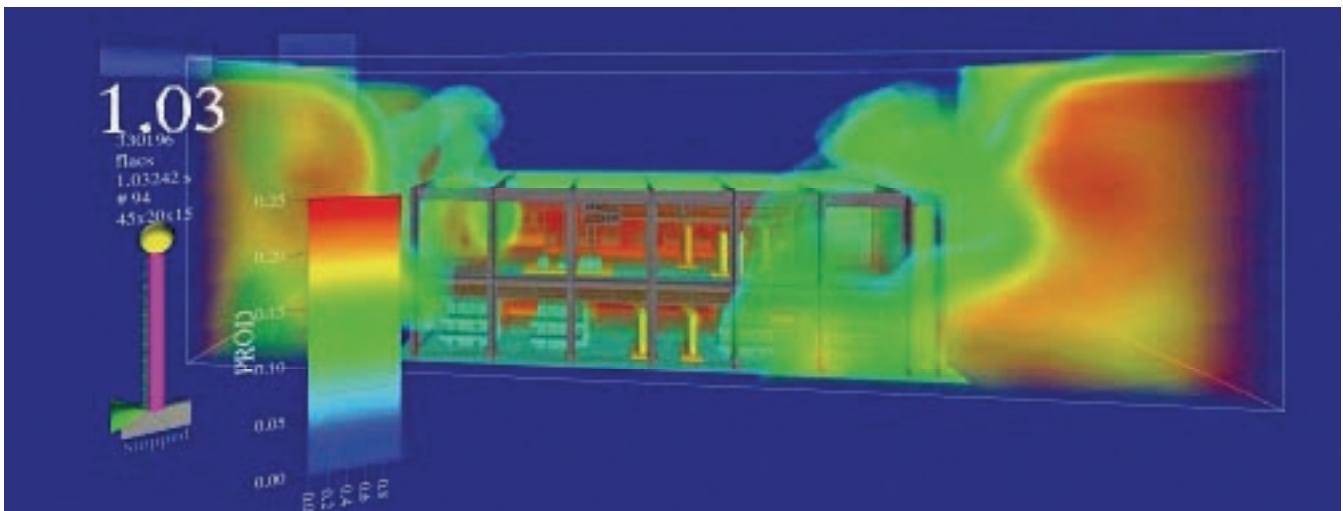
As recent events have indelibly illustrated, lapses in plant safety can result in the loss of life and property, unimaginable environmental damage as well as corporate financial and reputation ruin, and intense governmental scrutiny. SmartPlant Enterprise and its ship and offshore counterpart, SmartMarine Enterprise, inherently promote safer plant design and construction with their rules-based Smart 3D engineering design solution.

The software helps users to build safety into plants early in the design process and enforce regulation and engineering standards to reduce rework, increase productivity and quality and lower costs. The rules can be nominally configured to ensure compliance with many of the world's industry and safety standards organizations bodies.

For example, with Smart 3D, the design and modeling of cans, tubular structures added to nodal connections on the jackets of offshore platforms to provide reinforcement, is compliant with American Petroleum Institute (API) standards.

Users can also create their own methods/rules of flagging or containing questionable or hazardous construction designs that could result in compromising the safety of the plant, equipment or employees.

Rules-based design impacts safety early in the area classification of the 3D model. The software identifies the locations of equipment that could be unsafe if located near each other and will flag or disallow the placement of that equipment in the 3D model design. This helps to better manage the hazardous locations of equipment and activities in those areas to ensure safe operations.



GexCon FLACS

Now, to meet the growing safety demands of today's design engineers and plant owners, Intergraph has interfaced its Smart 3D and design software with GexCon's FLACS explosion analysis software to enable users to visualize impacts and ensure that equipment is placed correctly and that structures are able to withstand an incident such as an explosion. FLACS has been the leading tool for explosion consequence prediction on offshore oil and gas installations for more than a decade.

Ideal for chemical, metals, oil and gas, pulp, power and other plants involved in the handling or manufacturing of explosive or flammable materials or pressurized liquids and gases, the safety management software configuration reduces design and component placement errors that later must be corrected during construction.

With the interface between Intergraph design software and FLACS, Smart 3D models can be imported for analysis and validation in as little as an hour or a couple of days. This capability favorably compares to the typical workflow of creating the model within FLACS or revising the project models which can take from one week to three months to complete.

The interfaced 3D design and explosion analysis software enables users to more easily produce reports showing explosion impacts gas dispersion and then incorporate changes while still in the design process to minimize costly late changes.

Using the rules, FLACS validates design and rework is cut to a minimum due to the fact that rules have enforced the

right engineering decisions from the beginning.

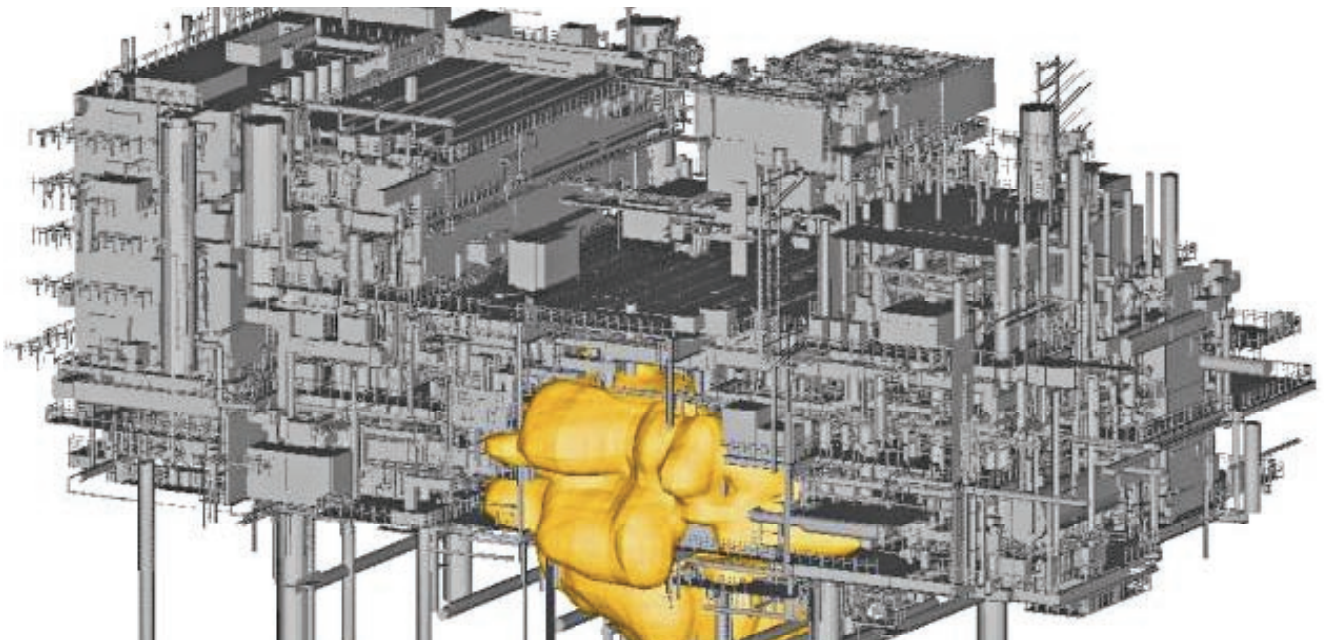
More Smart 3D Features

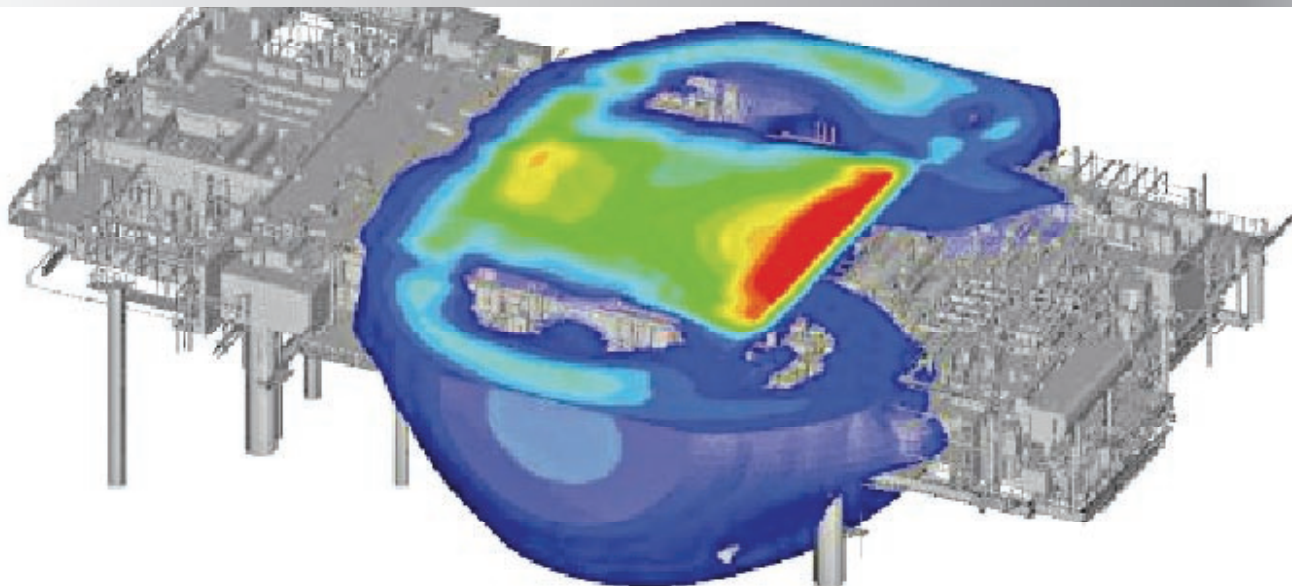
Smart 3D can also model intelligent fireproofing for both structural steel and concrete. The process is specification-driven. Reference data are preconfigured to enable automatic determination of key design aspects such as material, grade, rating, segmentation and setback lengths.

Additional safety management capabilities of the SmartPlant Enterprise and SmartMarine Enterprise suites include Leak Detection and Repair (LDAR). By integrating SmartPlant P&ID together with SmartPlant Foundation, users are able to find all critical process connection points inside a plant that are susceptible to leaks and need regular inspection. Inspections can be better managed by using SmartPlant P&ID as the plant roadmap to identify all critical connections. SmartPlant P&ID then links to inspection documentation and reporting, which can be managed in SmartPlant Foundation. Smart 3D locates connections to help plan inspections. For example, the user can click on the connection in SmartPlant P&ID, open the 3D model and zoom in on the connection point.

SmartPlant Process Safety Improves Safety in Capital Projects and Plant Operations

Intergraph SmartPlant Process Safety software streamlines process safety review and builds the corporate safety knowledge base, leading to considerable benefits for capital projects and operating plants in lowering operational risks. By automatically identifying hazards (causes and consequences





with the associated risk factors) from the plant's schematic drawings using SmartPlant P&ID, 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 by comparing several HAZOP studies
- Take advantage of action management to execute risk reductions
- Pre-verify the P&ID before the HAZOP to ensure safety devices are in place.

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, users can achieve improved and much faster re-HAZOPs and also increase plant safety. Powered by HAZID, SmartPlant Process Safety is an integral part of SmartPlant Enterprise. Benefits include

Substantially reduce HAZOP study time and cost – By largely automating hazard and risk identification, SmartPlant Process Safety can easily cut the time and cost of HAZOP studies in half. SmartPlant Process Safety integrates with SmartPlant P&ID and automatically traces hazard and operability issues and potential safeguards across multiple P&IDs.

Gain a powerful visual aid to understanding – Information such as nodes, fault-consequence paths, and potential safeguards may be highlighted at any time to help the HAZOP study team evaluate risks and brainstorm for any other fault-consequence pairs.

Enhance action management with comprehensive change validation – Changes resulting from the action management process can be validated before acceptance, even though the

HAZOP team may have dispersed.

See thorough, consistent, auditable results– Unlike conventional HAZOPs in which two teams may produce different results, hazard identification with SmartPlant Process Safety will always be thorough and consistent from HAZOP to HAZOP.

Enable better quality designs and reduced cost of change– Process engineers can check for safety at any stage of the design, even to verify the P&ID on safety practices before physical design. This improves design quality and eliminates hazards and operability issues before change becomes limited and costly.

Build and retain corporate safety knowledge base– Companies can capture the safety knowledge of their most experienced engineers, operations staff and safety people into a corporate safety knowledge base for consistent reuse throughout the organization.

Improve MOC processes– SmartPlant Process Safety may be incorporated into MOC processes to ensure that safety of any plant modification is assessed across the whole plant before work permits are issued.

Check the safety of your plants against recently reported incidents– All of a company's plants can be quickly audited to ensure they are not susceptible to recently reported incidents in similar plants.

Support mergers and acquisitions– New acquisitions can be quickly checked against the corporate safety knowledge base as soon as the P&IDs are available. ■

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