



ESKOM CREATES INTELLIGENT ENGINEERING INFORMATION ASSETS WITH HEXAGON PPM TECHNOLOGY

Key Facts

Company: Eskom

Website: www.eskom.co.za

Description: Eskom was established in South Africa as the Electricity Supply Commission in 1923. In July 2002, it was converted to a public, limited liability company, wholly owned by the South African government.

Eskom generates approximately 95% of the electricity used in South Africa and 45% of the electricity used in Africa. Eskom directly provides electricity to about 45% of all end-users in South Africa. The other 55% is resold by redistributors.

Industry: Energy

Products Used:

SmartPlant for Owner Operators and add-on modules
SAP Connector
SmartPlant Fusion
SmartPlant Foundation
Intergraph Smart Data Validator
Intergraph Smart 3D
SmartPlant P&ID
SmartPlant Instrumentation
SmartPlant Electrical

IDENTIFYING GOALS

Eskom, one of the top 20 energy utilities in the world by generation capacity, operates and constructs assets in South Africa. Back in 2011, Eskom chose the Intergraph Smart® and SmartPlant® suite of tools by Hexagon PPM to standardise engineering information management.

Ever since, Eskom has been using Hexagon PPM solutions for power station fleet-wide design base and engineering requirements management. The original decision to implement Hexagon PPM's solutions was based on an enterprise-wide evaluation of Eskom's information management needs. This included an assessment of what exactly was needed for detailed design and capturing design base management.

The first solution to be implemented was SmartPlant Foundation (SPF), originally to be used for documentation management for projects. These projects included a design, construction, and commissioning project of a new coal-fired power plant (Medupi), as well as a brownfield refurbishment project for a mothballed coal-fired power station.

Currently, Eskom is in the process of adding more power generation capacity to its fleet, with one of these additions being the design, construction, and commissioning of six power generation units for the Kusile coal-fired power station.

When operational, the Kusile Power Station will have 4,800 MW power generation capability, making it one of the largest coal-fired power stations in the world. The first unit was synchronised in December 2016; the other units are planned to be commissioned at nine-month intervals. The remaining units are expected to be in full commercial production by 2021.

Eskom appointed an implementation partner for the project and made use of the partner's systems and infrastructure. To decrease reliance and expedite handover, Eskom decided to implement several Hexagon PPM solutions for the project and migrate from using the execution partner's tools to using Eskom's in-house



solutions. These included Intergraph Smart 3D, SmartPlant P&ID, and SmartPlant Electrical.

Eskom also recently deployed SmartPlant Enterprise for Owner Operators (SPO) on local infrastructure to enable all engineers to access and review contractor information.

The decision to standardise to Hexagon PPM technology was made to:

- better manage integration among various systems and packages;
- enable review of contractor design submissions and provide an audit trail; and
- empower a central repository for the plant design base as per the plant breakdown structure.

The use of Hexagon PPM’s information management and design tools enables Eskom and its implementation partner to create truly integrated project execution capabilities and maximise the use of an integrated plant information systems and delivery of an integrated engineering design basis. This allows delivery of an intelligent integrated information asset of the highest value and integrity across the entire plant life cycle.

Creating this information asset was a challenge, as it meant the migration of more than 180,000 technical legacy documents and nearly one million project documents to the Eskom SPO and EDMS (Engineering Document Management System) platforms.

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OVERCOMING CHALLENGES

Figure 1 visually shows the new implementation of Hexagon PPM solutions for the Kusile Project. It depicts how Eskom created two environments to decrease business risk. The first environment (SPO design) is integrated with SmartPlant design tools and allows approved users to make changes (create, read, update, terminate) to designs during the design/modification phase of a project.

CENTRALISED ENGINEERING INFORMATION

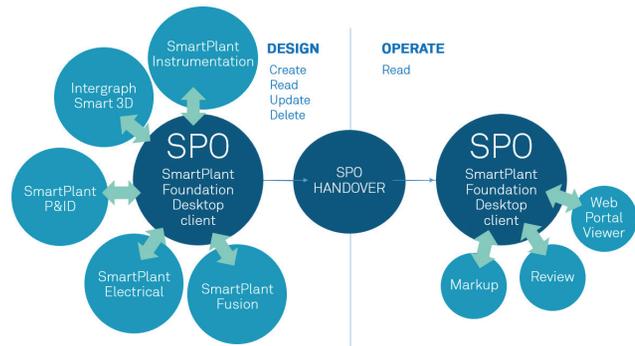


Figure 1: Eskom's implementation of SmartPlant Enterprise for Owner Operators.

Any modifications and changes to the design base occur in the “SPO Design” environment on the left-hand side. Engineers working in this space are provided with appropriate access to the 2D and 3D design tools, allowing them to make any required changes to design base design drawings and data.

The second environment is a read-only environment where the design base is hosted and contains all the information required to operate and maintain the plant, known as “SPO O&M”, on the right-hand side. As such, users will not have access to the Smart 2D/3D design tools. Access to the design base information is enabled via a portal environment or directly in the SPO software platform itself.

In addition to this basic configuration, productivity enhancement tools such as Intergraph Smart Data Validator and SmartPlant Fusion were implemented to assist in the validation of engineering data and information. These tools were also used to enable high-quality bulk migration of documentation to the SPO platform.

REALISING RESULTS

The integrated asset information management solution is currently being used by Eskom's Engineering Department, project users, and EPC contractor staff. The implemented workflows support many of the day-to-day key business activities, including the following:

- **Documents and records management (DRM)** – search for documentation, document creation and registration, including numbering, linking documentation to the plant breakdown structure (PBS) and document review and approval with SPO workflows.
- **Transmittal management** – internal, incoming and outgoing transmittals. Creation and management of handover dossiers, which are populated with information required by Eskom, using the SPO Handover workflow. This formalises the process of handover between the EPC and the O&M phase. Eskom and the EPC are currently packaging completion and commissioning data for sign-off in preparation for handover.
- **Plant configuration management & management of tags** – plant codification and management against the KKS codification standard, which is also enabled in the 2D/3D design tools.
- **Project execution activities** – project change management, interface management, managing non-conforming products and handling technical queries.
- **Data validation** – managing data take-on from third-party contractors and validation using the required Eskom templates.
- **Engineering design using integrated SmartPlant 2D/3D tools:** 2D tools such as SmartPlant P&ID (SPP&ID), SmartPlant Electrical (SPEL), SmartPlant Instrumentation (SPI); and Smart 3D (including Reference Data – SPRD) as well as laser scanning. This enables integration of 3D models with the schedule (4D) to check that constructability is in progress.
- **Operating plant** – functionality to manage that changes (the engineering change management process) to a commissioned plant have been implemented.

KEY BENEFITS

One of the key benefits Eskom has achieved by using Intergraph Smart and SmartPlant tools is the ability to identify design inconsistencies between models provided by the EPC contractor. The integration capability of Hexagon PPM solutions enables design inconsistencies to be rectified and resolved before installation starts, allowing major savings by avoiding rework and lowering construction costs. This was especially crucial for the Kusile Project, as even one day of standing time or delay would produce a cost of approximately R48 million /€32 000.

Further benefits included:

- improved data quality and management of meta-data in the system;
- enhanced control of the EDMS process;
- better design base management as all data and information are now managed in one integrated system;
- construction optimisation using 3D-4D integration; and
- collaboration on the Smart Enterprise platform with the contractors to speed up project execution and minimise rework.

In addition, the latest SmartPlant Foundation version is currently integrated with the SAP Enterprise Resource Planning (ERP) system. This allows improved synchronisation of tags (FLOC's) between SPO and SAP, as shown in figure 2. This integration with the SAP change management module enables engineering change management with changes triggered in SAP and executed in SPO. Close-out of engineering changes also happens in SAP once completed as shown in figure 3.

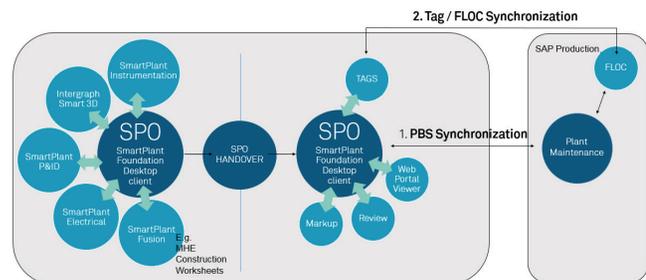


Figure 2: Eskom SPO integration with SAP PM module.

MOVING FORWARD

During the Kusile Project, Eskom has experienced the benefits of using Hexagon PPM information management and design tools. Eskom will continue to use Hexagon PPM tools to further improve engineering information management for both greenfield and brownfield projects; in addition to the Kusile Project, the SPO solution has been rolled out to 14 production sites across Eskom's fleet.

Eskom's general manager of engineering, Danie Odendaal, said, "Eskom requires an integrated asset information and data management system and selected the Hexagon PPM tools for the management of design base information and to improve project delivery".

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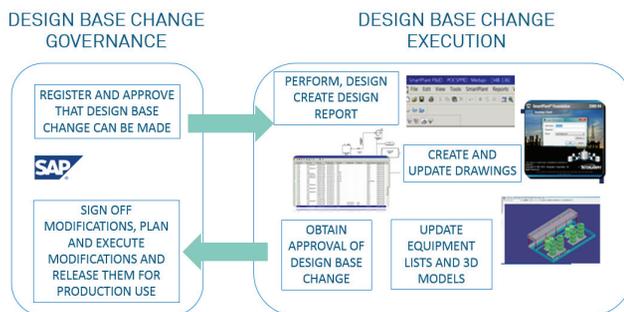


Figure 3. Eskom SPO integration with SAP ECM module.

ABOUT HEXAGON PPM

Hexagon PPM (formerly Intergraph Process, Power & Marine) is the leading global provider of engineering software and project control solutions. We transform unstructured information into a smart digital asset, empowering our clients to visualize, create, and manage the life cycle of facilities and structures of all complexities. For more information visit HexagonPPM.com.

Hexagon PPM is part of Hexagon (Nasdaq Stockholm: HEXA B; Hexagon.com), a leading global provider of information technology solutions that drive productivity and quality across geospatial and industrial landscapes.