OSART Good Practices
MAINTENANCE
Work control

Ignalina, Lithuania

Mission Date; 5-21 Jun., 2006

The plant has implemented an on-line monitoring application for the management and work control of maintenance tasks in all areas (mechanic, I&C, electrical, welding, etc).

A deep detailed programme of continuous management and work control was developed at the plant. Within the frame of this programme an intranet computer system was developed. The on-line system tracks all daily and weekly activities and monitors them in the aspect of maintenance management, planning and control.

Such system allows management staff to perform an effective and efficient control of activities in the following maintenance directions:

- weekly and daily tasks;
- weekly reports on the results and performance indicators of the work fulfillment;
- minutes and protocols of all meetings, plans and schedules of maintenance and repair works;
- on-line monitoring of contractors' work arrangement;
- on-line monitoring of quality evaluation of activities of all maintenance departments including contractors;
- authorized access and review of plans and schedules of maintenance and repair works by means of 'PRIMAVERA 5.0' Programme.
- informing and announcements for the maintenance personnel;
- on-line control of works fulfillment stages by means of intranet computer programme 'FOBOS'.

The results of on-line monitoring are applied effectively for implementation of corrective actions. The maintenance personnel are well informed. The implementation of on-line monitoring programme allowed to reducing the number of log-books and other records, filled manually. The monitoring history is used in annual reports, what helps to improve feed-back. The on-line monitoring programme is actively applied in improvement of targets and performance indicators. The monitoring programme is reviewed periodically. The existence of comprehensive on-line monitoring system allows effectively manage and control the maintenance activities of all the plant departments and may be considered as good practice.

Loviisa, Finland

Mission Date; 5-21 Mar., 2007

The plant has introduced a computerized work control system (LOMAX) which efficiently provides support in several aspects of work planning.

LOMAX has the following attributes:

- Fault orders related to safety systems are automatically routed to the shift supervisor for a safety inspection and approval according to the Technical Specifications
- Automatic updating of safety system related work in plant logbooks as well as manual update of work in any logbook.
- Real-time plant status viewable in all system applications.
- Both plant units have their own colour code, which is on the printed matter delivered from LOMAX.
- Cross-fault check before work order is approved and again before work is started.
- In addition to the process and room hierarchy, the system has an electrical hierarchy, simplifying the planning and management of electrical isolations by displaying power supply for the location. The system checks safety system electricity feeds during cross-fault check.
- All isolations are managed in a single system, and clearance plans can be designed and inspected using a graphical navigation tool. The graphical navigation tool shows the isolation area as a coloured process image. The navigation software is utilized in daily work planning.
- Isolations are connected with work, and the system prevents restoring the isolation in case unfinished work. The isolations are printed on the work order papers.
- Standard job plans are always used for preventive maintenance, and used in fault repair works. A protocol or procedure may be directly attached to the standard job plan.
- Electrical work circulation from work request to completion allows for real-time work monitoring. The electrical circulation includes related work permits, such as radiation, Quality Control, fire protection, Environment, Health and Safety and Technical Specification permits.
- If the related permissions to start work do not exist, a red text saying"work has no permission to begin" is printed on the work order paper print, so the work order cannot be used to perform work. Previously, the plant had several events where work was carried out without all necessary permissions. Since the LOMAX system was introduced, there have been no similar events.
- Ability to carry out work using mobile application.
- The work order printout required for work performance includes all related work permits, work phases, pre-job briefing, equipment technical information, electricity feed information and hazards and precautions related to location. The work order prints out a barcode simplifying signing work into the system.
- The Documentum system documents may be attached to all LOMAX system applications. This ensures that the user always has access to the latest approved version.
- On a work-specific basis, other procedures, protocols, photographs and web links may be attached to the work order. An automatic printing request may be defined for work. It is automatically printed along with the work order.
- The application specific user manuals may be opened directly from the application. Most fields in the system have a Help field, providing information on the operation of the field to the user.
- The system incorporates hierarchies for observations, failures and root causes, guiding users to give correct feedback. The system allows for feedback to be sent to selected users.
- Spare parts, materials and labor hours are directly linked to the work.
- The LOMAX system is connected to the measurement calibration system, which takes over the calibration work. After calibration, the calibration information is transferred back to the

work.

- The system includes versatile search and reporting possibilities. The reports and derived benchmarks are used to monitor maintenance costs and effectiveness. The studied items include amounts of delayed repairs and preventive maintenance, unhandled work orders per responsible work planners, planned vs. actual costs per work classes, equipment condition reports, monitoring of work in safety systems, completion state of maintenance work and organizations, etc.

Dukovany, Czech

Mission Date; 6-23 Jun., 2011

Work control - use of MNT-GRAF software.

The plant has a comprehensive information system which includes MNT-GRAF. The system serves as a dynamic integrator of all interconnected applications and databases as well as their data imaging facility. It serves as a source application for the Specified Equipment lists' updating;

The following are noted as strengths and advantages for this programme:

- Complete process of plant equipment data registration.
- 23,000 P&IDs (Technical Systems Pipe and Instrument Drawings) containing 500,000 equipment/part items identification.
- Ability to transfer data into Passport (AS6) Equipment Register.
- Complete P&ID change-control process, complete change-control process history.
- Animation of immediate, past and future equipment states on P&IDs to perform checks of conflict with Isolation and Manipulation Orders. Approximately 14000 Model Isolation Orders and 4500 Model Manipulation Orders.
- Complete process of equipment ID-tags, manufacturing control and equipment labelling.
- Integration of a number of applications in one complex application; access to maintenance history (Maintenance Evaluation System), work scheduling (Koordinace), current equipment operation data (N-LAN), sealing program, Furmanite (on-line sealing), equipment related documents, material inspection program, current material inventory stock, work procedures, systems operability testing, plant allowable configuration checking (Safety Monitor) – PSA based.
- The system is on-line and available to all plant and contractor staff, including remote access through the company intranet.

Temelin, Czech

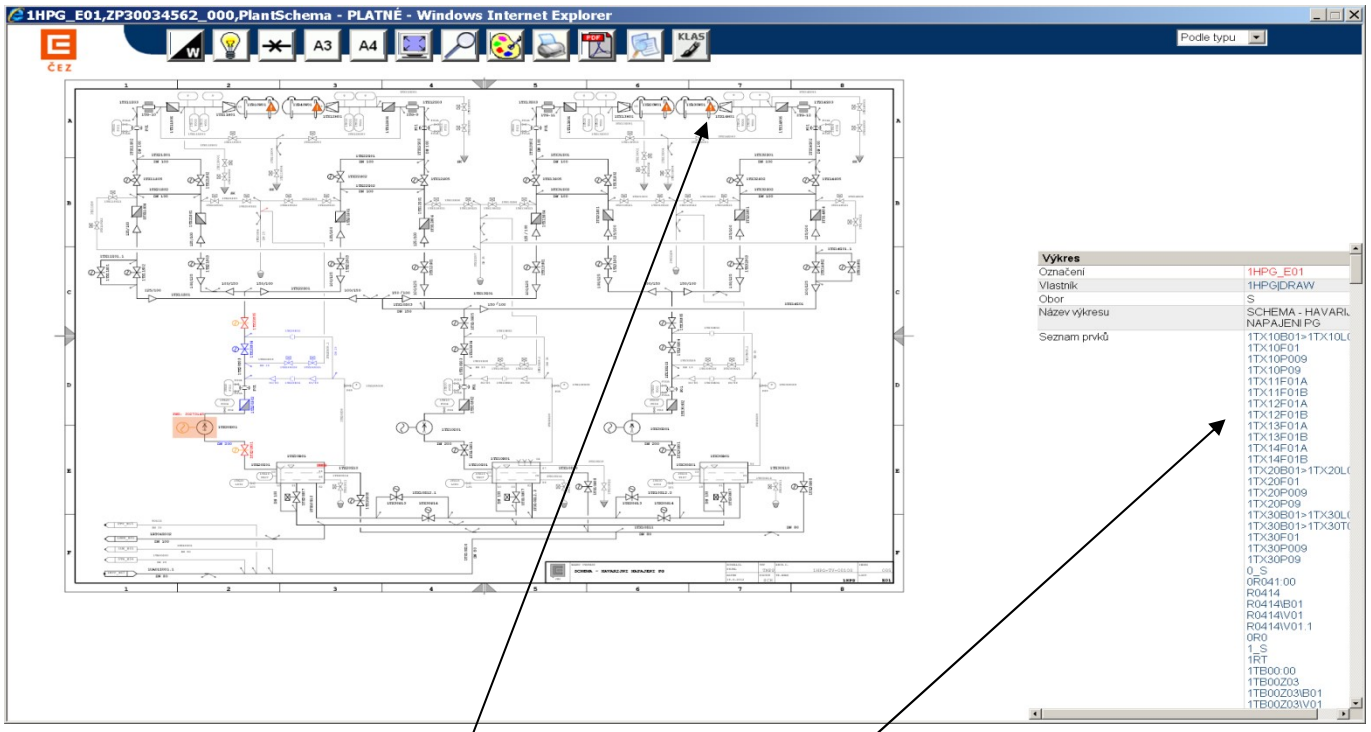
Mission Date; 5-22 Nov., 2012

Tag-out Preparation Software (GPZ).

Description:

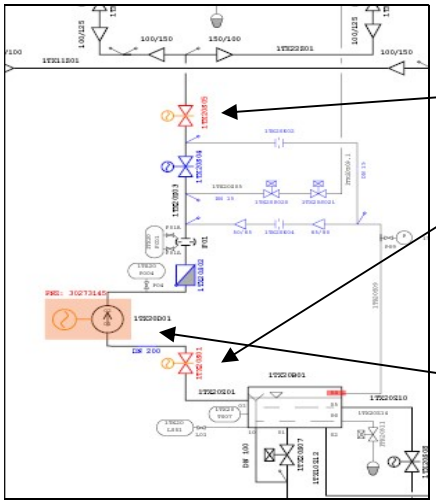
This tool is an electronic aid to improve the efficient preparation for applying tag-out isolation of plant equipment.

It identifies the equipment being isolated on the schematic plant diagram and suggests isolation points and provides detailed information regarding operational restrictions associated with the isolation points and the equipment. Once isolation is finalized the list of isolation points is transferred into the KSK software that produces the Tag-out labels for applying to plant.



Potential Equipment Conflict points

Information for selected equipment



Recommended Isolation points shown in red

Motor and Pump to be isolated highlighted in Schematic and also in 3D model (Blue). Selecting isolation points will highlight them in blue.

Once the isolation has been planned using schematic to provide the safest and most effective isolation, it is possible to switch over to a 3D view to move around the equipment virtually to identify the physical location of the isolation and take account for any physical restrictions and raise awareness of any operationally sensitive equipment in the vicinity of the isolation. All this information can be incorporated into the pre-job briefing for both the operator performing the isolation and for the maintenance team, who will perform the maintenance of the isolated equipment.

Benefits:

- It provides schematic view to allow the isolation to be developed during the preparation.
- Allows the planner to identify the isolation boundaries.
- Allows displaying the function and characteristics of the equipment on the schematic by simply clicking on the corresponding item.
- By opening another window it is possible to display the 3D view of the equipment to be isolated.
- It serves as aid for isolating equipment in the containment without entering when it is inaccessible during normal unit operation.
- It enables visual check of ability equipment to be isolated and drained or vented on the 3D model.
- It provides overview of possible residual media in the system that cannot be completely drained.
- It enables to check the physical arrangement of the equipment to be isolated in space in rooms with increased radiation load without the necessity of physical presence.
- For example it enables the creation of the lay-down plan in the reactor hall prior to starting the outage – individual components may be captured in the model and displaced, and thus effectively create the lay-down plan.

Results:

The tool has been used during the preparation for outages in 2011 and 2012, in 2012 outages the lay-down plan creation was first used. In 2012 both unit outages were reduced to under 50 days. This tool allows the timely resolution of conflicts, which contributes to the elimination of possible risks of extending the duration of outage.

Pickering, Canada

Mission Date; 19 Sep. -6 Oct, 2016

Use of electronic flow sheets with a visual status of plant work control and equipment configuration.

Equipment Status Monitoring system is the officially approved information management system used for plant status control and work protection by maintenance and operations. It has many functions including the ability to electronically link work orders, deficiencies, different tags and others on the flow sheets.

Once the flow sheet has been retrieved and shown on the computer screen, information such as work orders, work requests and station control tags are documented in red on components in the flow sheet to stand-out.

The interconnection of plant maintenance management system and Equipment Status Monitoring system ensures station staff has the most information of what can be seen on the flow sheet. Detailed notes can be retrieved, by clicking on the objects, to obtain a more detailed description of the mark-up.

The main benefits of the program:

- Provides station staff a visual status of plant equipment and its equipment configuration electronically.
- Electronically link forms, tags and flow sheets for plant status control and work protection to get an overall picture.
- Interconnects with other programs to display work requests, work orders and master equipment list items associated with the flow sheet.

Almaraz 2, Spain

Mission Date; 5-22 Feb., 2018

Design Modification implementation improvements

The plant Maintenance Technical Office has implemented a new process using a unique project management software tool to improve Design Modification (DM) management. The new process has improved engagement and coordination between Engineering (who plan the DM), Operations (who will be the future owner of the DM) and Maintenance (who implement the DM).
Using the software as the main tool, a so-called Full-Kit Report is written prior to implementation. This tool helps the team to double-check all requirements before the DM implementation is begun. Some items covered are:

- DM drafting
- Implementation analysis
- DM approval
- Scheduling and planning
- Spare part requirements
- Work-orders and tag-outs
- Additional services, scaffolding, cleaning ...

During the implementation phase, the Work-in-Progress tool of the software is used to better coordinate the execution of the DM to manage work activities and resources.

This new cross-functional approach of DM planning has improved planners' and workers' soft skills which contribute to better alignment between the departments involved in the modification. As a result, 93% of the scheduled DMs were implemented in 2017.