

Maintenance

Maintenance is the first step to quality assurance of a producing company. QA element 4.9 (process control) of DIN/ISO 9001 basically mainly describes requirements to the maintenance. It is the first-mentioned QA element of the supplier's operative actions.

Goals exceeding DIN/ISO are based on the merging of TQM (Total Quality Management) with TPM (Total Productive Maintenance) and therefore make completely new demands on maintenance systems. The module iQ-INST implements these demands.

Workflow

The concept of the iQ-INST module is based on three fundamental units. The first unit are monitoring installations that identify problems with devices and thus initiate *maintenance demands* that aim at identifying necessary improvements. One essential element of the monitoring is the so-called shift book where the operators of devices can enter many incidents and document the initiated actions. The demands themselves are basis of the second fundamental unit, the *maintenance orders*. These are created by the maintenance management and make up the actual placing of inspection and maintenance orders with the maintaining party. The concept's third fundamental unit are the numerous master data that have to be administered for a working maintenance.

The important master data for iQ-INST are those data of the device to be maintained and the effective maintenance and work plans. Each device can be made up of an arbitrary deep convoluted hierarchy of device components in form of a bill of materials. One or more maintenance plans are assigned to the device components. These plans describe the maintenance cycles, and each of them can be assigned to an independent work plan.

Overview of important functions

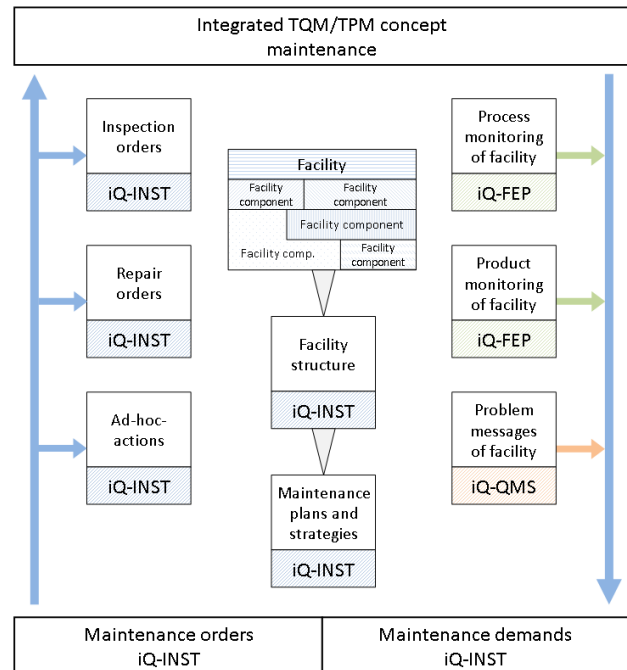
Master data

Installations

- Concise partition of installation in any number of hierarchical levels as in a bill of materials
- Every part of the installation can be looked at individually.
- A lot of fields for describing the installation like e.g. identification, manufacturer, model, first mounting, commissioning, cost centre or shift model, in many cases selection from catalogues possible
- Arbitrary categorisation of installation components by means of the class system of iQ-BASIS
- Maintaining a history for all important changes to the installation data and for possible shift book entries
- Assignment of any number of synchronisable maintenance plans and process steps
- Indication of acquisition and spare part information for every installation component

Maintenance plans

- Repetition intervals either depending on uptime or activity unit



- Indication of limits for overstepping/shortfall of due dates
- Dynamic sampling of maintenance dates
- Fixing the number of consecutive or skippable maintenance cycles
- Indication of work plan to be used

Work plan

- Any number of versions for each work plan is possible.
- Various fields for description of each version
- Any number of operations per version which can be assigned e.g. tools, spare parts or safety precautions.
- Assignment of a drawings folder with any number of drawings
- Copy function for work plans and work actions
- Complete overview of the work plan
- Print function

Shift book

- One shift book per installation
- Recording of various types of installation stoppages and failures (e.g. breaks, retooling)

- Various (mostly catalogue based) fields for recording stoppage/failure circumstances and important administrative data
- Possibility to initiate maintenance demands, orders and actions
- Assigning a drawings folder with any number of drawings
- Indication of damage estimation
- Error analysis

Maintenance demands

- Setting up demands with different triggers like e.g. periodical analyses for all maintenance plans of installations and installation components, from the shift book or because of a quality announcement
- Indication of desired and actual period for carrying out the maintenance action
- Various fields for describing the demand with catalogue-based choice of contents
- Function for automatic generation of demands depending on the maintenance plan assigned to an installation
- Function for automatic generation of maintenance orders or collective orders which integrate several maintenance demands

Maintenance orders

- Support for different order types like e.g. inspection and maintenance, repair, immediate order or support order
- Planning of execution with Microsoft Project
- Mainly catalogue-based indication of various fields for describing the details which are necessary for the personnel to carry out the workings.
- Assigning one or several suborders to an installation
- Indication of a mercantile and a technical evaluation of each (sub-)order
- Assigning any number of work actions and spare parts – even without work plan
- Overview of all completed and non-completed orders
- Expenditure feedback from workman groups

Analyses

- Analysis of stoppages and disruptions (e.g. with pareto display of the installations and the cost centres)
- Analysis of utilisation rates compared with stoppage periods
- Analysis of error frequencies
- Analyses for revision of maintenance requirements and actions

The image shows two overlapping software windows from a maintenance management system. The background window, titled 'Anlagenkopf bearbeiten (DEMO 2.2 I)', displays data for plant 'AA001' (Rundloch-Schleifanlage). It includes fields for 'WerkBereich' (0001/FERTZENT), 'Kostenstelle' (5008), 'Status' (BET in Betrieb), 'Gebäude' (Halle 1), 'Inventarnummer' (3467233), 'Material Id.' (SCHLEIF), 'Schichtmodell' (STANDARD), 'Leistungseinheit' (STK), 'Zählerstand' (200), 'Zeichnungsmappe' (MAP35002), and 'Gefahrstoff' (ÖL). The foreground window, titled 'Schichtbucheintrag pflegen (DEMO 2.2 SCHREIBER/SCHREIBER)', shows a shift entry for plant 'AA001'. It details the 'Eintragsgrund' (Störung mechanisch), 'Status' (OFF), 'Zeitraum von' (21.10.2005 15:04), 'Stillstand von' (21.10.2005 15:04), 'Dauer' (4 Tag), and 'Stillstand Dauer' (17 Stunde). It also lists 'Störungsgrund' (ELEKT, SICHERUNG defekt), 'Schicht' (SCHICHT1), 'meldend Person' (0619 Schmidt), and 'verantwortw Person' (0621 Jannsen). Buttons at the bottom include 'Ereignisse / Maßnahmen', 'Fehleranalyse', 'Projekt bearbeiten', 'Bedarfe', and 'Auftrag erzeugen'.

Interfaces to other modules

- *iQ-LOGISTIK* for administrating inventories and reserving materials for planned orders
- *iQ-PROJEKTE* for inclusion and tracing of actions
- *iQ-GL* for centralised maintenance of master data relevant for all modules
- *iQ-FEP* for integration of maintenance and production, i.e. for reaction on process and product properties
- *iQ-QMS* for generation of maintenance demands from quality announcements