DNA ERP – Manufacturing Execution System

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Description of main features of Manufacturing Execution System product (MES below) by DNA Manufacturing Solutions. The license ratio is one-off for the whole module. The MES product is a component of the broader and organic solution of Warehouse Management System (Logistics Management), native product contained in DNA Manufacturing Solutions.

Architecture

MES is a product developed by ITACME with the same functional and structural features of DNA. Sharing the database with DNA, MES data are stored in real time both for input and output ones; therefore no interfaces for import or export data are required. The user interface (UI) is developed to run both on mobile devices and on normal PC / WINDOWS TABLET / INDUSTRIAL TOUCH PC. The used device should only be able to establish a RDP connection (remote desktop), solution that allows you to break free from installing any software as the application runs on the application server, and support a code bar reader.

Main functional features

Summarizing they are:

Environment parameterization. MES can be configured for different production areas. MES can support instruments both manned and not by human resources; it is also possible to manage multi-activity resources (involving both man and machine). Obviously MES has no need to be populated with DNA MS ERP data, because it is part of it. The parameterization is done by defining:

Causal. They are used to guide the user during the job with the device. The causal attributes can be used to trigger, or inhibit, the user requests, also allowing to decide actions, such as to define that a change of a user's job automatically concludes the previous activity. Using the causal you can enable a user to multiple

tasks of different resources or a resource can perform multiple tasks simultaneously. The causal can be set to suspend activities.

Causal inhibition. The causals upon described must be enabled to MES users, in order to restrict or not their activities.

Unproductive orders. It is possible to define, linking them to different levels of the production hierarchy (department or work center), special unproductive orders feeded by direct activities. Unproductive orders can be linked to suspension causal, too.

Unproductive orders for time rounding. These are unproductive orders used by MES during time rounding operations, comparing user's working time with direct or unproductive activities.

Man and machine resources. The users table can be used to define and parameterize the users recognized by MES. The resources table can be used to define and parameterize resources for plants and company departments recognized by MES.

Production picking management (optional). Taking data from production orders issued on DNA, MES creates picking lists; these lists can be dispatched to mobiles devices or automatic warehouses according to parameters associated with the item. The picking confirmations come from pickers jobs or automatic warehouses results. It is possible that a picking list refers to a single manufacturing operation as well as to several operations even of different orders. The picking confirmation is made by filling the loading units.

Timekeeping of users and resources. Direct timekeeping can be done on two different paths:

Not human resource. For these resources the timekeeping can be performed without the user's supervision. The timekeeping occurs based on events recorded and charged directly to the not human resource, that is simply based on the bar code reading with the associated operation. MES can accept the coexistence of multiple resources simultaneously active on the same production operation. The time calculation criteria can be parameterized. MES manages the "machine status", which means is possible to put the resource on standby, this way is possible automatically assigning the suspension time to a indirect manufactory order, even without explicit statements; the machine status can affect the human resources timekeeping.

Human resource. For these resources the timekeeping is done regardless the company entrance detection. The user has only to read a barcode that identifies the resource which he is working for. If the user works with a new resource has just to decide if the second one replaces the first or if they are both active at the same time. The system automatically knows how to split time between the resources.

Summarizing, each resource can:

• Link to a machine resource at any time; in this case the charge of user's time is affected by the machine status, and then the human resource is automatically associated with the activity or operation that the plant is processing.

• Link to a machine resource which is in standby; the user's time goes to a indirect manufactory order.

• Link directly to an indirect activity.

• For the human resources that are not directly involved in production activities (supervisors) there is a special mode to obtain the time spent in direct or indirect activities.

Sequencer. By using the picking lists of components you can query, through a device, the production orders for which the material is available. However it is always possible starting orders activities regardless of the lists prepared.

Machine status. The application lets you know the machine status (setup, work, standby), the production orders on work and the workers linked to the machines.

Gantt. All activities of man and machine resources can be represented by a GANTT graphic. The representation of the data carried out with the GANTT instrument makes it very simple and intuitive understanding all involved activities and resources and any issue like overlapping and missing activities.

Correction of time workers and resources. The correction are carried out separately for the two types of resource. This means, for example, that if a user statement is wrong or missing, you just need to insert/change the user statement without doing any other statements on the machine resource. The same step to change machine statements. These corrections are also possible after bookings consolidation in DNA (see "Consolidation").

Bookings consolidation. It is possible importing data from a time attendance tracking system, through an automatic driver, scheduling the frequency of this job. It is available a procedure to perform the check between the human resources timekeeping of MES and the time imported from external procedure, with discrepancies reporting. After this the consolidation performs the advancement bookings in DNA. Any following changes to MES data will lead to a similar action in DNA.

Presence detection. The procedure includes the following functions:

Entry/exit detection. The system automatically recognize if the user is entering or exiting, according to the previous detection. A parameter can be set to arrange an automatic rounding up to 5,10,15 minutes, depending on whether it is input or output.

Entry/exit detection check. The system adjust the detections according to vacation, leave, sickness etc... So if the user is on vacation the system cannot receipt entry/exit detections until its holiday period ends.

Guest attendance management. This management allows dynamic registration of visitors, tracking in a specific table all describing data of the visitor (name, company name, visitor type [customer, supplier, other]). The validity of detection is based according to the scheduled time of stay and the system automatically detects if the visitor is enabled to enter/exit. The detection procedure is the same for all the circumstances: simply reading the assigned visitor code with a barcode reader or a company badge. All entry/exit detections create an appropriate message and they can be enabled on dedicated devices or devices used for advancement procedures, too. The entry/exit detection can activate the job of the machine manned by user (entry) or stop the machine manned by user (exit).

Production deposit management. It can be done in two different way:

Deposits entered without using the loading units. In this mode each user, enabled to deposit function, can make compliant and non- compliant statements, in the latter case using specific causals. The deposit declaration may be identified as "Certified" or "To be Certified" depending on the causal used; certified statements are immediately booked in DNA, the others can be certified in a specific window. The advancements bookings are made by a special batch procedure which can be scheduled. It is always possible handling changes to correct any mistake made. The deposit causals can also be

parameterized to handle decrementing adjustments of deposits and forced closure of the order.

Deposits entered by using the loading units. In this mode each user, enabled to deposit function, can perform production deposit bookings, regardless timekeeping tracking activities, typically handled by mobile devices. It is possible setting the product with deposit in real and virtual loading units, for those who do not want to run the loading units immediately. The described function performs automatic bookings. The features allow you to:

Fill the deposit loading units. The user opens a deposit list after the production order release and can fill the deposit loading units. During this activity you can define non-compliance deposits in a specific loading unit.

Close the deposit loading units. Upon completion of the loading unit or the deposit list, the user can release and put it in a special transit area. If this is an activation area of a loading list in an automatic warehouse, the list is created by MES.

Declare consumption. On the basis of parameters associated with the list of payment and the material it is possible to predetermine the recording mode of consumption of components:

At the beginning of the order. When you enable for the first time the deposit list, all components prepared in the picking phase are counted as consumption of the order.

Backflush. Consumption is counted proportionally to deposit declaration.

At the end of order. The consumption is booked with a specific transaction when the order is completed. It is possible counting different consumption compared to the quantity prepared during the picking.

From the edge line. The edge line components declared do not belong to picking phase and are consumed with backflush method proportionally to deposit declaration.

Serial number management. If the finished or semi-finished products are managed by serial number, all components must be traced with

their serial numbers and linked to the serial numbers of products. The serial numbers can contain other info collected during the tests made.