Lean Enterprise Extensions

Enhanced capability leveraging Microsoft Dynamics AX 2012

Solution Overview
LEAN ENTERPRISE EXTENSIONS

eBECS Lean Enterprise Extensions enhance the ability of companies to manage tightly coupled supply chains. In many industry sectors, end-to-end supply chain visibility is required from raw material suppliers, through components, finished goods and on to distributors and retailers or installers. These extensions deliver that visibility and integrated communication that supports those efforts.

Lean Enterprise Extensions provide this ability through enhancement of the already comprehensive Lean functions supplied with Microsoft Dynamics AX 2012.

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MRP ENHANCEMENTS

IGNORE SAFETY STOCK

Another addition to the coverage group is a flag to ignore safety stock. When this flag is set to yes on the coverage group, the safety stock of that item is ignored. This function provides flexibility for the user to control whether they would like to dip into the safety stock for consumption and not have recurring futures or actions messages. This is used with the CTP functionality so that dates are not pushed out to customer’s based on safety stock requirements.

LONG TERM CAPACITY PLANNING

Lean in AX2012 does not allow long term capacity planning with activities. When an item is under Kanban control in AX2012, there is no longer the use of a route with operations and work centers for planning or execution. Thus, MRP does not load these requirements against a work center for capacity planning. Kanbans are loaded instead against a work cell that has a short term planning period based on throughput/hours capacity and the activities that the Kanban goes through as part of the production flow.

This enhancement provides a view of infinite capacity loading by activity, in daily, weekly, or monthly periods. The long-term capacity planning simulation process runs the desired forecast plan, identifies activity constraints, and allows action to be made by changing the forecast/build plan to accommodate or by looking to add capacity where required (no true what-if simulations).

After running master planning, the user will generate the long-term forecast by inputting capacity period, plan, and resource group if needed.
Then a long-term forecast can show the efficiency, effective capacity, load, and ratio of load versus capacity. Constraints are identified with a red color.
Functionalities like exporting to excel and creating a Load vs. Capacity graph with this data exist. Below you can see this data exported to Excel, and a graph created.
LEAN KANBAN ENHANCEMENTS

LEAN NAVIGATION

Navigating between boards and pegging tree overview can waste time. This enhancement allows for ease of navigation between the different Kanban boards directly from the pegging tree that can be accessed from a number of places. It is also extended on the Kanban to navigate further if there are multiple activities or if the Kanban was viewed from the rule.

ENHANCED PICKLIST

A modified pick list report has added information useful to users: sales order information, worker, parent Kanban information, and a section for comments.
DOCUMENT HANDLING FOR PRODUCTION INSTRUCTIONS

This enhancement adds functionality to allow the user to attach production instructions per item, group, or all via the work cell. A new parameter on the work cell must be set to yes to allow this. A new button for production instructions has been added to the action pane where the user will attach the instructions.

This parameter then allows the user to enter the attachment. The item code can be setup to show the attachment per item, per item group or for all items in that work cell.
KANBAN DOCUMENT HANDLING

This enhancement is a parameter on the Engineer Fast Tab of each item details form that, when checked, enables Kanban documents to be enabled and accessible from the Kanban board for process jobs and from the Kanban details form.

SCRAP COMPONENT

Standard AX does not allow the scrapping of both purchase and Kanban type components. This extension adds a button on the Kanban board for process jobs that will allow the user to enter the quantity to scrap and defect code.

Upon scrapping any item with planned order type of purchase order, a pick list is generated to compensate for the scrapped quantity. This would change the print status of the Kanban to “Printed with scrap”

FORCE FORWARD PLAN

Standard AX plan pegging tree allows a Kanban to be planned backwards from that activity, which can be limiting if the bottleneck is in the middle of the process. The forward planning functionality allows for Kanbans to be scheduled forward from the Kanban schedule board. This plans the activities of a production flow forward starting from whichever activity or work cell this button is used from. This functionality takes into account the production flow model of subsequent activities, activity queue times, and activity relation constraints.
KANBAN SPLIT

This enhancement allows Kanbans to be split via batch sequence numbers. One new parameter on the work cell will determine if split is allowed.

When this parameters are set to yes, one new buttons are enabled from the completed (details) button on the Kanban board for process jobs. Kanban split is only active if error quantity is zero. When Kanban split is selected, the user will be prompted to enter the quantity to split and the Kanban rule to follow for the split quantity.
A new field on the form will indicate which batch sequence to split. This will mean there will be two Kanban references for the same sequence. The Kanban will generate using the new Kanban rule selected.

When viewing the batch details in the Update registration, the split sequence numbers will be displayed.
ACTIVATE PRODUCTION FLOW MODIFICATION

This Lean extension allows the user to edit active production flows in ways that were previously blocked while the flow is active. Now users can add and delete process activities without having to deactivate and reactivate the production flow.
**KANBAN ON KANBAN CARD NUMBER**

This functionality allows the number sequence on the Kanban card number to have the Kanban id as a prefix. The only exception is when the card is set as a circulating, the number would differ.

```
Kanban : 000522_1018
Card number: 000522_1018-1
```

**BATCH SEQUENCE NUMBERS**

When information regarding specific units must be tracked, but serialization is not ideal, batch sequence is a good alternative. This enhancement allows for the creation of sequence numbers behind the batch table. These sequence numbers are created based on Kanban quantity with an auto-generated sequential number setup in your Lean enterprise parameters.

This dimension is also added to the tracking dimension group.
A link to the sequences has been added to the batch table. This sequence table will track the status, reason code if scrapped, and work cell per sequence number within the batch.

The aforementioned error codes are setup on the work cell.

When scrapping a unit via complete (details) on the Kanban board for process jobs, the user will be prompted to choose the sequence and the error code.
The batch sequence table is updated with that information.

**PROCESS ID**

In some work cells, different sub processes are performed to achieve one manufacturing process activity. In this lean extension, these sub processes can be specified per each work cell. In addition, these sub processes can be integrated with activity timings to provide a more granular view of the manufacturing process.
To activate the work cell processes button, the resource group must be a Lean work cell. From this new window, process ids and descriptions can be entered for the work cell. The integration with activity timings is discussed in the next section.

**ACTIVITY TIMINGS**

Shop floor control is essential for manufacturing as it gives companies a more precise and responsible overview of their production process. Activity timings for Kanban jobs allow users to record Start/clock in and Stop/clock out for each Kanban job.

Under Lean Medical Device section, check Require Activity timings and Require Sub Process Activity timings if needed. Note that Require Sub Process Activity timings checkbox is greyed out unless Require activity timings is checked. Require Sub Process Activity timings allows user to record timings for sub processes and blocks completion of Kanban until the timing has been started and stopped.
To start and stop timing, there are two new buttons on the Manufacture tab of the action pane.

When you start a timing, the user will be prompted to enter their user ID.

When you stop a timing, again user ID is entered, as well as the quantity completed. This quantity will be tracked as part of the timing history, but is not used to transact the Kanban.
Open timings can be viewed by clicking My open timings button under Activity timings in the action pane.

**ACTIVITY DATA COLLECTION**

A new parameter in the Lean enterprise module will allow the use of data collection per activity on the Kanban board for process jobs.
After the parameter is set to yes, the activity’s data collection requirements are setup on the activity within the production flow. These requirements can be setup for all items, a specific item, or a product family. The types of data that can be collected are shown below. There is a mandatory flag to ensure the activity cannot be completed without the activity data collected.
The data is collected on the Kanban board for process jobs. A red activity data button indicates no data has been entered yet.

Upon selecting the activity data button, the user will be prompted to enter the data in a new window.
The color of the button will then change to green to indicate to the user that he or she can now proceed.

All of this data will be stored against the Kanban job and accessible from there.
SHORTCUT TO ACTIVITIES

A new button on the Kanban board for process jobs will serve as a shortcut to any open action activities assigned to that user.
ALL KANBANS REPORT

A new inquiry screen provides all the Kanbans and the jobs in the system with their statuses.

ENGINEERING TRIAL KANBAN

Standard AX 2012 does not support engineering trials visualizations for execution or planning. Engineering trials need to be properly managed from a planning and manufacturing point of view. Engineering trials need to be seen differently while planning on the Kanban schedule board and while manufacturing on the Kanban board for process jobs. This extension allows the user to view historical information, including when the trials were completed and how many trials were needed to qualify the product. This extension allows the attachment of documents to unique Kanbans to provide the correct manufacturing instructions, attainable from the Kanban board for process jobs. Finally, this extension will allow the exclusion of engineering trial Kanbans from the subcontracting payment process.

Engineering trials are defined on the Kanban rule:
LEAN SUPPLY CHAIN ENHANCEMENTS

VENDOR MANAGED INVENTORY

The entire solution for VMI through Kanbans is captured through this functionality. It also supports the enterprise portal where the vendors can update their current level of stock. The solution offers two modes, Invoice PO on receiving or bulk invoicing where when you receive it just posts into a journal.
PURCHASE KANBAN MANAGEMENT

Purchase Kanban are based upon a trade agreement between the customer and their supplier for the delivery of a specific part or material. The units, prices, destination etc. are noted in the agreement and future management of the deliveries is undertaken by the rules associated with the Kanban.
Thereafter, Purchase Kanbans are managed through the Kanban Board for Purchase Jobs.

**PURCHASE KANBAN SUPPLIER PORTAL**

The Lean Extensions add Purchase Kanban (and Purchase Schedules) to the Suppliers access portal, allowing suppliers to confirm deliveries and dates online, and to print the Kanban Card for attachment to the consignment for easy goods receipt.
PURCHASE SCHEDULES

The Purchase Schedule enhancement is a component of the eBECS Lean Enterprise for Microsoft Dynamics AX, and has been designed to remove waste from procurement activities by web enabling the process used by enterprises to communicate with their suppliers. The Purchase Schedules module collates requirement into a time-phased schedule, which is presented to the buyer in a single view. The buyer has full control over the schedule, allowing detailed changes to be made and is then released electronically to the supplier as a series of alerts. Electronic demands are transmitted to suppliers as a schedule of dates and quantities via the web using email, EDI, XML or simple files with full support for international recognized standards e.g. Odette, VDA and X12. Using powerful two-way assured communication processes, Suppliers have the capability to review and accept or modify demand within the overall schedule. This includes functionality giving the supplier the ability to flag their ability to supply parts of an order. Upon receipt of a supplier update, the module provides automatic notification to buyer and supply chain manager, confirming acceptance or providing notification of exception conditions which will require intervention. The Purchase Schedules module integrates with front-end customer scheduling, Kanban or flow manufacturing and internal replenishment.

In addition, eBECS Purchase Schedules supports full Skip Lot inspection processes. In such an environment inspections will be skipped for a predetermined number of receipts provided a series of qualifying receipts have passed inspection without error.

- Transmit requirements to suppliers electronically as a schedule of dates and quantities using email, EDI, XML or simple files with support for internationally recognized standards e.g. Odette, VDA and X12.
- Control schedule receipts to automotive standards; manage the schedule and goods in transit by “last 3 deliveries” or cumulative quantities comparing incoming against current schedule.
- Collate total demand against suppliers into a demand schedule, with full control by the buyer based on planned orders, placed in firm, tentative and forecast periods.
- Automate supplier confirmation and or modification to establish capability to supply.
- Action schedule receipts electronically and process against the schedule, with exception visibility.
Skip lot inspection capability, automating the inspection process based upon predefined sampling rules.

### REASON CODE FOR SALES ORDER DATE CHANGES

Once a confirmation is generated through a journal, any changes to any of the dates on the sales line requires a reason code for making the change. This will allow tracking and Pareto analysis of the number of times a date was missed from the initial confirmation.

There are four main additions in this Subcontracting simplification extensions:

1. **Subcontracting Document**: The subcontracting process in AX2012 does not combine the different pieces of paperwork needed for shipping a product to a subcontractor; instead it has separate documents that do not reference each other. These documents are the Kanban ticket, Pick list (for components), and purchase order (for payment). These are now combined into one sheet of paper in order to send the needed information to the vendor quickly. This document can be configured to be generated automatically, or created manually. There is a link to the subcontracting document on the Kanban board for process jobs.
2. **Setups for Subcontracting Document**: In order to reduce transactions and streamline the subcontracting process in AX2012, the Prepare, Start and Complete buttons on the Kanban board for process jobs are tied to the stored setups for each status such that the Kanbans highlighted automatically go through the ‘Subcontracting document’ form process. This also now automatically prints the subcontracting document depending on these parameter setups.

   ![Subcontracting Document Parameters](image)

   **Prepared**
   - Activate Subcontracting Documentation (Prepared): 
   - Release purchase orders: 
   - Aggregate purchase lines by: 
   - Exclude Engineering Trials: 
   - Print Subcontract Document: 

   **In progress**
   - Active Subcontracting Documentation (In Progress): 
   - Release purchase orders: 
   - Aggregate purchase lines by: 
   - Exclude Engineering Trials: 
   - Print Subcontract Document: 

   **Completed**
   - Active Subcontracting Documentation (Completed): 
   - Release purchase orders: 
   - Aggregate purchase lines by: 
   - Receipt advices: 
   - Exclude Engineering Trials: 
   - Print Subcontract Document: 

3. **Picking List**: The Subcontracting paperwork pulls the materials from the picking list behind a Kanban job that are being sent to the subcontractor. This picking list shows the original quantity of material required from the upper level subcontracting Kanban. The warehouse may replenish withdrawal Kanbans for material quantities that are over or under the original requirements and these needs to be represented on the subcontract order paperwork as these is what gets shipped to the subcontractor. The purpose of this enhancement is to display the actual quantities of materials sent to the subcontractor on the subcontract order paperwork.
SUBCONTRACTING SIMPLIFICATION II

This modification allows for the grouping of Kanbans into a shipment that can then be transacted to prepare, start and complete Kanbans on a subcontracting work cell. It will also provide for the ability to calculate the cost per boxes instead of pieces.

A new parameter on the work cell allows for grouping of Kanbans. Although this is an option for every work cell, it should only be used for subcontracted work cells.
The resource also has new parameters that become available for resources of type vendor. When the user decides to use box as service rate, the box prices are to be used instead of the pcs equation on the service term. The user will then enter the full box service rate and the half box service rate.

These costs will be used for calculating per piece price used on the Purchase order generated for the subcontracting service. There is a validation that the service unit is set to Pcs.
The parameter on the work cell then will enable a new Shipment ribbon on the Kanban board for process jobs. From here, the user will create shipment. A shipment ID will be generated, and the user will enter the number of full boxes and/or number of half boxes. The status of the shipment will be updated based on the status of the Kanbans. From here all Kanbans in the shipment can be prepared (required), started, and completed. A new label for shipments has been created and can be printed from this window.
LEAN COSTING REPORTS

WIP REPORT

Standard AX2012 does not have a Lean WIP report, only WIP report for production orders. This enhancement will allow the user to compare WIP in and WIP out on a specific production flow.

LABOR COST REPORT

It is often cumbersome to find the labor timings for an item as multiple sources must be used to find the end result. This enhancement allows the users to see the labor time on each item so that it can be easily validated. There is an added select criteria to filter by the item number. An example of the report is shown below.
QUALITY INTEGRATION WITH KANBAN

While quality should be built into the process, where it is necessary to perform inspections and capture quality information, this lean extension provides the link of Kanbans to quality orders using the standard quality association structure in AX2012. For in process quality orders, the flexibility exists to trigger the quality order automatically based on the status change of the Kanban job as well as to restrict Kanbans from continuing on in the process before the quality order has been completed. This can be done per work cell or activity. For quality inspection at the end of production, the quality order can be generated automatically and block inventory before proceeding to the next process or hitting stock.
AD HOC QUALITY CREATION FROM KANBAN

During Kanban processing, ad hoc quality orders may be required to perform inspections and capture quality information. With this lean extension, creating and viewing quality orders linked to a specific Kanban job are readily accessible from the Kanban board for process jobs. From there, quality orders can be completed through standard AX2012 functionality.

A new button on the Kanban board for process jobs has been added for ad hoc quality orders on Kanbans. Another new button will show any quality orders that are linked to the selected Kanban.
Pressing this button will open the create quality order form. Note the card number is the reference number on the quality order for traceability.

A customized quality assurance skip lot information table is required to enable skip lot inspection performed for all purchase orders. Skip lot functionality will determine if a quality order is generated. In cases where inspection is required, a quality order will be generated automatically. Parameters have been added to the inventory and warehouse management to enable this functionality, and to define skip lot information.

**SKIP LOT**
A record is generated in the quality assurance skip lot information window. A user can then go to this window and edit the radial buttons. This will update the status from ON HOLD, CERTIFIED, and NON CONFORMING. The status of the skip lot is shown on the product receipt of a purchase order. This will indicate where the material handler needs to place the received units. Non-inspected items will have a status of STOCK and be placed directly in inventory.
After the user edits the radial fields, an inquiry provides historical data for skip lot.

<table>
<thead>
<tr>
<th>Item number</th>
<th>Vendor account</th>
<th>Skip lot frequency</th>
<th>Certified</th>
<th>On hold</th>
<th>Non conformance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10003</td>
<td>1103</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**QUARANTINE MANAGEMENT**

Internal quarantine management is used for various processes throughout the production process, based on the disposition of these quarantine order different outcomes are required. This enhancement enables disposition codes for all quarantine orders and expands on the functionality of these disposition codes. Additionally, the functionality enables the user to enter a reason code on the quarantine order to represent the reason for opening/creating the order. Further, the functionality adds a field on the quarantine order for hours.
The chart below shows a list of disposition codes that have been added for this enhancement, and how AX responds to the selection of each disposition code.

<table>
<thead>
<tr>
<th>Action</th>
<th>Desired outcome upon end</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Complete order as normal</td>
</tr>
<tr>
<td>Scrap as Co-product</td>
<td>Create a P&amp;L journal writing off the good product writing on the co-product to the same stillage etc. The default co-product</td>
</tr>
<tr>
<td>Scrap Internal</td>
<td>Scrap product using standard mechanism</td>
</tr>
<tr>
<td>Return to Vendor</td>
<td>End the Quarantine order and create a PO for vendor return</td>
</tr>
<tr>
<td>Split</td>
<td>End the Quarantine order, write off some quantity of product, write on remaining quantity of co-product</td>
</tr>
</tbody>
</table>

The user can enter up to three reason codes for the quarantine reason.

For the hour field, the user has the ability to modify this quantity up until the quarantine order is ended. This is just a data field so that clients are able to run "cost of quality" reports off of quarantine reasons.
QUALITY ORDER ENHANCEMENTS

Enhancements to the quality order form to improve test results entry includes modifications to the quarantine order parameters, test setup forms, quarantine order form, and quarantine order line results form. An added unit column to the quality order form that allows the user more visibility into the quarantine order line.

Within the results of a quality order, it is often the case that the quality user could enter results per individual item. A new function has been created to explode the tests within a quality order to the number of results the user should record. In standard AX, results are also only stored per test. These have been changed to show all results per quality order within one screen to ease the transaction entry.
When the user selects the Results button to view the line results or to enter test data, the test lines for all tests will be combined on one form and according the number of lines defined by the user.
SPC CHART GENERATION

An SPC Chart or Statistical Process Control chart can be generated directly from AX. This is an added functionality to the quality order enhancements. The inputs for the SPC chart are the quality order results, and the output is a graphical chart that can be generated from AX, and can be printed out for review. The upper and lower limits control limits will be defined from the test results.

An example of the SPC chart generated using quality test results.

CASE MANAGEMENT

Case management is integrated with production orders, Kanbans, quarantine orders, quality orders, resources and resource groups. This integration allows ad hoc creation of cases from the aforementioned functionalities, and the cases will be associated with the correct information accordingly. This enhancement is in the form of a new button labeled “Create Case” found on the view tab of the action pane of each of these forms, to the right of the Open cases button (if available). Depending on which form the case is created from, certain case categories will not be available. For example, if the case is created from a Kanban, only the Production and General case categories will be available.
ABOUT EBECS

eBECS is a specialist in the design and delivery of solutions for manufacturing, distribution, oil & gas, general heavy industry and all aspects of the service industry.

eBECS offers in-depth industry experience and detailed technical knowledge of Microsoft Dynamics enterprise resource planning (ERP), customer relationship management (CRM) and business intelligence (BI) solutions, which are implemented across a broad range of independent yet related industries and their extended supply chains.

For more information about the Lean Enterprise Extensions in Microsoft Dynamics AX, please email customer@ebecs.com visit www.ebecs.com call UK and Worldwide + 44 (0) 8455 441 441 call U.S. and Canada (1) 678-701-5856.