



Navigating Uncertainty: The Power of ‘Just in Time’ SAP for Supply Chain Dynamics

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Abstract:

The Covid-19 pandemic and other recent disruptions in the early 2020s led to sections in the business press blaming just-in-time (JIT) practices for operational failings. Consequently, there are calls for moving away from JIT toward holding more inventory as preparation against future disruptions, which is referred to as just-in-case. The academic community is also divided. Some scholars argue that JIT is not resilient, while others maintain that JIT can continue providing superior performance even with disruptions. Motivated by this debate, we discuss various misconceptions about JIT that S4 Hana addresses the solution to problems effectively and enables that underlie this debate. Furthermore, we present different ways to adapt JIT for turbulent environments with SAP S4 Hana and other ERP segments and argue that companies can improve their supply chain performance if JIT supply chain submodules are implemented effectively during disruptions.

Keywords: SAP, S4Hana Disruptions, inventory, JIT, just-in-time, supply chain resilience

1. Introduction

FIGURE 1. Overview of JIT Supply chain



Disrupted supply chains have been a hot topic in the early 2020s, with shortages resulting from Covid-19 and related lockdowns. Then came the post-pandemic consumer demand surge. At the same time, the supply of commodities and gas was disrupted by the Russian invasion of Ukraine and western countries' sanctions on Russia. Popular media have blamed just-in-time (JIT) practices in various sectors for these disruptions. Example, the business press has singled out JIT for the

semiconductor chip shortages in the auto industry along with disruptions to other sectors. Worldwide auto production losses were estimated to be \$210 billion for the year ending in September 2021. Therefore, there is movement in the industry to retreat from JIT to just-in-case, with Toyota's pre-pandemic stockpile of chips often cited as an example.

In this article we will discuss the next generation of just-in-time processing in SAP S/4HANA which will help to enable smaller quantities of parts to be delivered directly to the production supply area of the line at the right time several times a day. This includes, among other things, the processing of quantity (JIT) and sequence (JIS) calls from both the outbound and inbound perspectives.

Background

Just-in-Time (JIT) processing is a common practice in manufacturing industries for efficient demand driven and consumption driven production and logistics across the supply chains. In the context of Next

Generation Just-in-Time Supply to Production, a JIT call is sent from the production supply area to the warehouse or external supplier, requesting replenishment of materials. The sequenced JIT call can be sent for vehicle planned order. The JIT call specifies the quantity, date, time, destination production supply area, destination storage location, material and partner information, scheduling agreement for each requested material, and so on. The Next Generation Just-In-Time Supply to Production scenario includes applications that cover the following broad areas of operation: Manage JIT Control Cycles - Create, modify, view, and filter Just-In-Time (JIT) control cycles that are required to create JIT calls for material replenishment in production supply areas (PSAs). Using this application, the Production Planner - Lean Manufacturing creates and maintains a control cycle for each material used in the production supply area. For more information, refer Manage JIT Control Cycles.

Request Replenishments for JIT Control Cycles - In a production line, there are storage hubs known as production supply areas (PSAs), where materials required for product assembly are stored. When we need material replenishment in a PSA, Just-In-Time (JIT) calls need to

be raised. With this application, the Production Operator – Lean Manufacturing can raise these JIT calls using new JIT control cycles to request replenishments from the warehouse or external supplier. The control cycles have barcode that be read using a scanner. You can also use this application to trigger JIT calls whenever materials need to be replenished in the production supply areas. For more information, refer Request Replenishments for JIT Control Cycles.

Transfer Stock for JIT Supply to Production - Supports transfer of material stock from an inventory-managed (IM) source storage location to an inventory managed (IM) or Extended Warehouse Managed (EWM) production supply area (PSA). The quantity of stock that can be transferred is based on conditions such as the requested quantity, delivered quantity, available quantity, replenishment strategy, and the minimum replenishment quantity that can be transferred. For more information, refer Transfer Stock for JIT Supply to Production.

Change JIT Control Cycle Status - Schedule jobs for changing the lifecycle status of control cycles. For

more information, refer Change Status of JIT Control Cycles.

Manage JIT Calls - View, edit, and cancel Just-In-Time (JIT) calls that are either created manually or through automatic planning. Also, possible to change the priority of JIT calls, add supply date and time, edit reference texts at three levels, update requested quantity, monitor status of JIT calls, and navigate to view the application logs. For more information, refer Manage JIT Calls.

Monitor JIT Calls - Component Materials - As a Production Supervisor - Lean Manufacturing, you can get an overview of all JIT calls, at a component level in your responsible area. In addition, using this analytical application, you can navigate to view the application logs. For more information, refer Monitor JIT Calls - Component Materials.

Monitor JIT Calls - Component Group Materials - As a Production Supervisor – Lean Manufacturing, you can get an overview of all JIT calls, at a component group level in your responsible area. For more information, refer Monitor JIT Calls - Component Group Materials.

Plan Supply to Production - Plan for the replenishment of materials that are required in a production supply area (PSA). You can easily identify those materials that are in short supply by checking the missing quantity values displayed for control cycles and can either create JIT call manually or trigger automatic planning and by scheduling background jobs. Possible to create proposals to simulate the stock situation. The JIT calls are created based on demands such as planned or production orders and based on safety stocks for consumption driven scenarios. For more information, refer Plan Supply to Production.

Manage Communication Groups - Create communication group that is a combination of supplier and subsequent message partners with whom the supplier is working with for supplying the materials to production line needs. These communications groups are assigned to control cycles and the application is relevant for external replenishments. When a JIT call is created, the information is sent to responsible persons according to the definition of communication group. For more information, refer Manage Communication Groups.

Manage JIS Calls and Reorder - Manage just in sequence (JIS) calls and reorder the component

materials for a same or different production supply area (PSA). A JIS call is created based on the planned order for a vehicle or as a trigger as soon as a planned order is generated. In addition, provides sequence and vehicle information, for example, sequence number, vehicle planned order, and so on. For more information, refer Manage JIS Calls and Reorder.

Posts Goods Receipt - Generate and post receipts for the goods that are received for external replenishment from a supplier to an inventory managed (IM) destination production supply area (PSA) by updating the stock at PSA along with scheduling agreement and schedule line update of goods receipt. For more information, refer Post Goods Receipt.

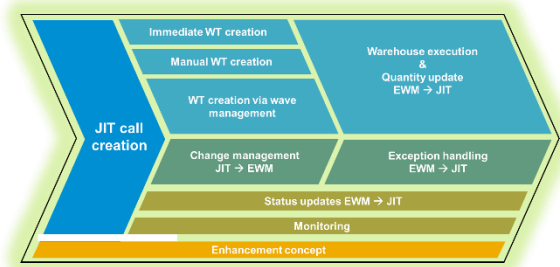


FIGURE 2: Supply Chain JIT digital Transformation

Manage JIT Control Cycles

With this application, you can create, modify, view and filter Just-In-Time (JIT) control cycles that are required to raise requests for material replenishment in production supply areas. Control cycle (for sequenced JIT calls or summarized JIT calls) is the master data used to control replenishment of materials. It determines the replenishment method to be used between the supply and demand source, and the quantity required. In the control cycle, you also determine the replenishment strategy you want to use to procure materials, the supply source that is to provide and demand source that requires the material. In case of control cycles with external replenishments, scheduling agreement is mandatory. Using this application, the Production Planner - Lean Manufacturing creates and maintains a control cycle for each material used in the production supply area. Each control cycle goes through various status over its lifecycle:

§ In Preparation: When a control cycle is not yet saved and is in draft stage

§ Locked: When the control cycle is locked manually and cannot be used to send replenishment requests anymore. Any open

replenishments requests can be processed normally.

§ Ready for Release: When the control cycle is saved manually with all consistency checks.

§ Released: When the control cycle is released manually and is ready for productive use. In other words, it can be used to send replenishment requests.

Control cycles can be created or modified, for example, when a new material is introduced to production. The Production Planner - Lean Manufacturing may also need to align with the warehouse manager or production operator to verify stock availability before modifying (or changing the lifecycle status of) a control cycle. Using a migration tool, it is also possible to create multiple control cycles and migrate the data. For more information, refer Migrate Control Cycle Data.

Supply to Production with External Replenishment

Just-in-Time (JIT) is suited for repetitive manufacturing and discrete manufacturing scenario's where the variations in configurations are less, but volumes of production are high. The production process requires very tight alignment between external and internal suppliers and especially with production warehouses that often operate the last mile of replenishment to the production line.

- JIT internal replenishments are handled by extended warehouse managed (EWM) or inventory managed (IM) managed source and destination locations based on the available stock in warehouse.
- JIT external replenishments are handled by making JIT calls to suppliers (generally who are in few hours of distance) and by involving EWM processes to fulfil the production needs.

In case of external replenishments, a scheduling agreement (SA) is maintained in the control cycle for a particular material. A SA has a material, target quantity, and price and validity of the agreement. As information to suppliers on the quantities of materials that must be delivered and expected dates, the scheduling agreement enables to record the current

status of the lines of delivery schedule in the system. This status is then transferred to suppliers.

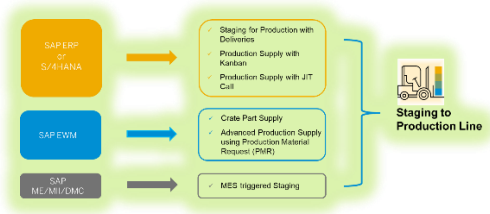


FIGURE 3: Supply chain JIT in SAP S4 Hana Cloud

2. Plan Supply to Production

With this application, you can plan for the replenishment of materials that are required in a production supply area (PSA). You can easily identify those materials that are in short supply by checking the missing quantity values displayed for control cycles and can either create JIT call manually or trigger automatic planning. This ensures that the required quantity of the materials is available in the PSA at the required time.

The planning procedure associated with a control cycle determines if a component material is relevant for automatic planning or not. You can directly create a just in time (JIT) call for all control cycles listed irrespective of the planning procedure. However, automatic planning is relevant only for those control cycles for which the planning procedure is demand-driven or consumption-based. With automatic planning, you can get a time-specific overview of the stock availability of a material in a PSA. If the stock level is less, you can create a proposal and simulate the impact of the proposal on the overall stock levels. If satisfied, you can save the proposal as an actual JIT call, Key Features of SAP S4 Hana for JIT include.

- View a list of all control cycles
- Filter control cycles based on the component material, production supply area, person responsible, destination storage location, planning procedure, missing stock at source, planning horizon, supply date/time, priority type, creation date and time of control cycles, replenishment strategy, JIT call creation date/time, JIT call supply date/time, destination warehouse number, and supplier ID. You can also choose Adapt Filters to select additional filters, if required
- Track the stock availability of materials in a production supply area by monitoring the available quantity and the missing quantity
- View planning elements, planning summary and the proposals associated with each control cycle
- Trigger automatic planning for materials for which the planning procedure is demand-driven or consumption-based
- Create JIT calls manually from control cycles irrespective of the planning procedure associated with a control cycle
- Create proposals to simulate the impact of planning.
- Create JIT calls from proposals.
- The external replenishment from external suppliers using SAP transportation management and logistics execution for inbound goods or materials processing, is supported. It is possible to view the Advanced Shipping Notification (ASN), which is considered as a supply element while calculating the stock.
- Possible to do demand-driven replenishment planning for primary and secondary control cycles considering planning elements and planning parameters of control cycles using the primary and secondary storage bins as source. The secondary control cycles can be for demand driven or consumption-based planning procedure. The primary control cycles can be of any planning procedure.
- Possible to consider the contents of buffer in the assembly production line. A new field titled Buffer Indicator available for JIT calls with takt based planning procedure.
- Assess the demand for control cycles with takt based planning procedure using the Automatic Planning option.
- Ability to retrieve physical stock for control cycles with takt-based planning procedure based on actual consumption at the assembly production line. The following information is available:
 - Current stock at the destination bin for a material
 - Actual physical stock at the destination bin for a material
 - For control cycles with takt based planning procedure, possible to determine the future demands based on the planning horizon duration for both vehicle assemblies and complex component assemblies. The

planning horizon is converted to number of tasks.

- Possible to calculate and display demand date and time by considering shifts and production breaks (Shift Grouping) configured for complex component assemblies. The demand date and time for production demands within this application are calculated and displayed based on the shift sequences configuration such as the demand date and time do not fall within the non-working hours.

Post Goods Receipt

Using the Post Goods Receipt (PGR) application, you can post good receipts for component materials in reference to external replenishment scenario, to an inventory managed (IM) destination production supply area (PSA). When a goods receipt is posted, the stock at PSA is updated and life cycle status of a JIT call is set to Completed once GR is posted for all component materials within that component group.

When this SAP application is used, all aspects of integration with SAP Transportation Management (TM) and Logistics Execution (LE) in the inbound process are skipped (bypassed) and direct GR is carried out for the component material at the destination PSA.

Key Features

- Filter goods receipt based on JIT/JIS calls, supplier, plant, lifecycle status etc
- View a list of all component materials associated with post goods receipt
- This application uses the C_JITOutbGoodsPosting CDS view.



FIGURE 6. JIT (Plan to GR)

3. Just-In-Time (JIT) Supply to Customer

- Just-in-Time (JIT) processing is a common practice in manufacturing industries for efficient demand-driven production and logistics across supply chains. Just-In-Time Supply to Customer covers JIT processes from the perspective of a supplier. Though there are various ways how JIT supply is implemented, there are several commonalities:
- Long-term supply relationships must be in place between supplier and customer, with outline agreements upon target quantities per component for a contract period.
- The customer sends forecast data for expected requirements, in line with the planned production program, intended for production planning by the supplier.
- The customer sends JIT calls to transfer dedicated requirements for delivery within a short-term horizon.
- A framework contract must exist which, in addition to the quantity agreements, generally must also cover the requirements on JIT supply.

There are different types of JIT calls in use in SAP S4:

- JIT calls requesting individual components without reference to a production order. The quantity normally is based on container sizes of the agreed packaging material. This type of JIT call is referred to as summarized JIT call or Kanban call-off.

Summarized JIT calls are often used where several containers of a component could be placed at the production, and its consumption is

usually constant or quite frequent. The request for a JIT call is either consumption-based (by replacing an empty container with a full one) or demand-based (by projecting the short-term stock at the production).

- JIT calls requesting multiple components without reference to a production order, to be all delivered together. The quantities of components are based on container sizes of the agreed packaging materials, whereas the volume of the JIT call in total represents the overall transportation volume and meets the

capacity of the planned transportation unit (For example, a truck). This type of JIT call is referred to as delivery order or delivery instruction. In case the customer organizes the transportation, the delivery order is also called pickup sheet.

The delivery order plans the transportation of components needed for discrete delivery, daily or even more frequently, often in conjunction with regular tours planned to optimize the supply from a transportation perspective. It collects and schedules demand from multiple places at the production.

- JIT calls requesting multiple components needed for a specific production order. A production order often has a lot size of 1, like in vehicle or engine production. This type of JIT call is referred to as order-based JIT call.

Order-based JIT calls are in use when the customer produces configurable products and components that have a high number of variants due to the configuration options, or are bulky so that space in production is a limiting factor.

- JIT calls requesting multiple components needed for a specific production order, to be delivered in the sequence of the scheduled production. This type of JIT call is referred to as sequenced JIT call or Just-in-Sequence (JIS) call.

Sequenced JIT calls are used for the same reasons as order-based JIT calls, but in repetitive production, where individual products are manufactured one after the other. For example, as done in production of vehicles and their complex components like engines. With sequenced JIT calls, the customer expects the delivery in exactly the production sequence provided.

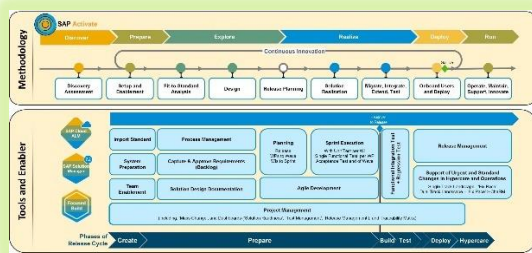


FIGURE 7: S4 Hana Tools and enablers

4. Product features of JIT S4 Hana supply chain

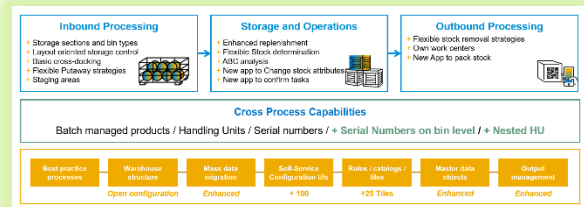


FIGURE 9: S4 Hana JIT product features

- With this application, you, as a Production Supervisor - Lean Manufacturing, can get an overview of all JIT calls (at a component material level) in your responsible area.
- The application, by default, displays a hybrid view in which both the chart and the table are displayed. It is also possible to switch to the chart-only view or table-only view based on your needs.
- In the table view, you can view a list of JIT calls based on the filter criteria that you specify. For each component material, you can view details such as the associated JIT call number, JIT call status, logs, plant, source storage location, requirement date and time, internal processing status, production supply area, requested quantity, control cycle, and so on.
- In the chart view, the application, by default displays the Number of Component Materials and Number of JIT Calls as the measures and the Production Supply Area as the dimension. The chart view helps you analyze data step by step from different perspectives and makes it easy for you to figure out the deviations and the abnormalities more quickly and to take appropriate action right away. For example, if the chart indicates that the number of active JIT calls for a specific component material is running low, the production supervisor can take necessary steps, as required, Key Features
- View JIT calls (component material level) in both chart and tabular format.
- Filter JIT calls based on fields such as the component material, requirement date/time, lifecycle status, plant, person responsible, source storage location, internal processing status, control cycle, production supply area, stock transfer status, external replenishment,

and supplier. Here, plant is a mandatory filter field. You can also choose Adapt Filters to select additional filters, if required.

- Switch between the compact filter and the visual filter. The values that you choose in these filters impact the values displayed in the chart view and the table view.
- For example, in the visual filter chart Number of JIT Calls by Lifecycle Status, if you select the filter value Active, then the chart view and the table view changes to reflect this newly selected filter value.
- View detailed information for any dimension displayed in the chart through drilldown.
- In the chart view, for example, Number of Component Materials and Number of JIT Calls are the measures, while the Production Supply Area is the dimension. The dimension can be further narrowed down to different levels in the parent dimension. For example, inside a production supply area, details of each component material can be made available, by adding component material as an additional dimension. The columns in the chart represents the smallest dimension of the drill down.
- Save your preferred filter settings as a variant (both compact and visual filter values).
- Download the list of JIT calls to a spreadsheet
- Calculate deviation quantity in case of external replenishment and internal replenishment of goods.
- In case of internal replenishment, the deviation quantity is calculated as the difference between the picked quantity of goods and requested quantity. If the picked quantity is less than the requested quantity, the goods are under picked or less picked. Whereas, if the picked quantity is more than the requested quantity, it is over picked.
- In external replenishment of goods, the deviation quantity is the difference between the Advanced Shipping Notification (ASN) quantity or delivered quantity and the requested quantity.
- You can also view the number of picked quantity and requested quantity within the detail page of JIT calls in the Manage JIT Calls application.

6. Conclusion

Just-In-Time supply chain manufacturing was designed to help manufacturers reduce inventory-

related costs by receiving materials and producing goods only when they are needed. Just-In-Time scheduling is used to accommodate last-minute changes to orders and prevent damage or spoilage of inventory by preventing jobs from starting too early. There are many benefits associated with Just-In-Time production, but the main goals of this method are to increase the efficiency of production while decreasing waste to ultimately lower the production costs and increase profits. On the flip side, implementing JIT SAP S4 Hana solution methodology requires producers to be able to accurately forecast their demand to avoid running into material shortages. The advantages of Just-In-Time (JIT) manufacturing include the following:

· *Reduced Space Needed* - With JIT you have a faster turnaround of stock, which means that you do not need a lot of warehouse or storage space to store goods or materials. Ultimately, this will reduce the amount of storage space your organization will need to rent or buy, which will free up funds for other parts of the business.

· *Smaller Investments* - JIT inventory management is an ideal methodology for small production facilities that do not have the funds needed in order to purchase huge amounts of stock at once. Ordering stock materials only when they are needed enables you to maintain a healthy and smooth cash flow.

· *Waste Elimination/Reduction*- A quicker turnaround of stock prevents goods that have become damaged or obsolete while sitting in storage, reducing waste. This again saves money through preventing investment in any unnecessary stock and reducing the need to replace old stock.

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