BW - Industrial DashBoard Value Stream (Core Workbook)

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Level 2 indicators - Value Tree

Variable Unit Cost

Objective

Measure the variable unit cost per ton.

Definition

$$Variableunitcost = \frac{VariableCosts(CP))}{ProductionOfTheVS}$$

See in relevant sections for a definition of those 2 elements.
In EUR or legal entity currency

Calculation

Calculation formula in the EXCEL spreadsheet

Comments

The full variable cost includes Upstream CNP & Depreciation.
FULL VARIABLE COST = CP at origin ("pure CP") + CNP Upstream + DEP Upstream

Variable cost (CP)

Objective

Measure the total variable cost per Value Stream.

Definition

The VS variable costs are composed by the variable costs elements from RCS which are:

- The material variable elements: Raw material at a VS perimeter (incl. raw mat. supplied by other Rhodia VS) + packaging
- The activities variable elements
- Tolling and other manufacturing outsourcing.
- In EUR or legal entity currency

Calculation

The variable costs are coming from the process orders or purchase orders (MM tolling) of the materials produced in the VS:

- Stock movement (raw mat & packaging)
- Tolling P/O
- Cost elements associated to the process orders (utilities)

The consumption are obtained from:

- RM & Pack: Consumption confirmation in the relevant process order (which generates a stock movement)
- Utilities & waste: Consumption confirmation in the relevant process order
- Tolling: related Purchasing Orders (MM or spot tolling) or process orders (PP or recurrent tolling)

The prices are obtained from:

- RM, Pack & utilities: monthly semi-standard price (cf related procedure in intranet finance)
- Tolling: Invoiced amount (or receipt amount if not yet invoiced)

Good practice to obtain accurate actual costs

In order to obtain the more accurate actual costs and therefore the minimum variance, the following key principles must be applied:

- Productions & Consumptions: weekly analysis of production costs and variances (ZWPP40A) and relevant corrections of process orders.
- Utilities : monthly analysis and updating of at least one process order
- Utility & waste Prices: The semi-standard prices must updated on a regular basis and especially in case of important variance

Comments

The full variable cost includes Upstream CNP & Depreciation.
FULL VARIABLE COST = CP at origin ("pure CP") + CNP Upstream + DEP Upstream

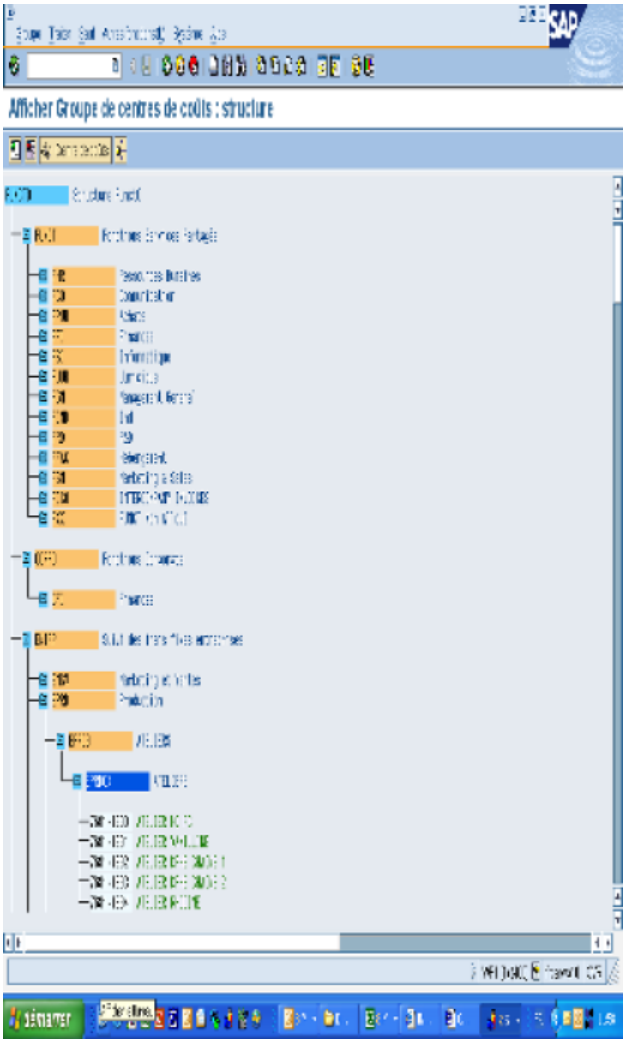
Fixed costs (CNP)

Objective

Measure the non-proportional costs of the value Stream

Definition

Fixed costs from **direct production costs centers**, with possible allocation to several Value Streams.
The actual CNP are identified through a cost element belonging to the element group ZRCS-AC (highest level in CNP element hierarchy).
The **direct production costs centers** are defined in the FUNCT0 hierarchy of the controlling area according to RHODIA costing rules.



In EUR or legal entity currency

Calculation

The sites direct production costs centers are labeled or not "multivs":

- Direct production costs centers not labeled as « multivs »: Total cost center amount is allocated to the relevant VS through the associated profit center.
- Direct production costs centers labeled as « multivs »: Total monthly cost center amount is allocated to the relevant VS according to the process order absorption (allocation key).

Allocation key calculation:
The fixed costs distribution per VS is based on the absorption by the materials produced (process orders). The reference is the cumulated end of period cost centers amount per VS (total costs x % allocated to VS).
The monthly amount allocated to the VS is equal to the difference between last month cumulated amount vs. current month cumulated amount.

Comments

- See Appendix 1 for detailed analysis.
- This way of calculating the key, based on the end of period cumulated amount, might generate negative amount for a VS for a given month.

Absorbed fixed costs

Objective

Measure the fixed costs absorption

Definition

Fixed costs are absorbed through:

- Process orders (for activities included in the recipe)
- Maintenance orders
- Allocation key (for CSU & other secondary cost centers)

In EUR or legal entity currency

Calculation

The absorbed actual CNP are identified through a cost element belonging to the element group ZRCS-ABCNP.
Same calculation as for fixed costs with same VS allocation key.

Depreciation (AMO)

Objective

Measure the depreciation associated to the Value Stream

Definition

The depreciation costs (AMO) are identified through a cost element belonging to the element group ZRCS-ACAMO (highest level in AMO element hierarchy).
In EUR or legal entity currency

Calculation

Same calculation as for fixed costs with same VS allocation key.

Absorbed depreciation

Objective

Measure the absorption of the depreciation associated to the Value Stream

Definition

The absorbed depreciation (AMO) are identified through a cost element belonging to the element group ZRCS-ACAMO (highest level in AMO element hierarchy).
In EUR or legal entity currency

Calculation

Same calculation as for fixed costs with same allocation key.

Manufacturing cost

Objective

Measure the manufacturing costs

Definition

Manufacturing costs **=** variable costs - Full + fixed costs + depreciation
In EUR or legal entity currency

Calculation

Calculation formula in EXCEL spreadsheet

Freight cost

Objective

Measure the delivery costs to the final customer from the manufacturing site.

Definition

Amount of the relevant freight cost issued with the order (to final or to distribution center). In EUR or legal entity currency

Calculation

The allocation of freight costs to the relevant VS is made through the articles associated to the freight order (all distribution costs not included in freight order are not taken into account in the current calculation).
The transfer orders from RHODIA to RHODIA are not considered (as the corresponding amount is included in the CP of the relevant plant)

Comments

The detailed analysis is to be done in BW TRANSPORT.
To be added : transport types taken into account.

Delivered costs

Objective

Measure the delivered product costs

Definition

Delivered costs = Manufacturing costs + freight costs
In EUR or legal entity currency

Calculation

EXCEL Spreadsheet

Production of the VS

Objective

Measure the tonnage produced by the Value Stream.

Definition

The Value Stream production is the total amount of all its constituent articles produced minus what is consumed inside the VS (which is called "neutralization of the productions at the VS perimeter).
By default, all the articles for which there are **production movements** (including sub-product, waste) are taken into account to calculate total volume produced by the VS.
If some of them should not be considered in this ratio, they need to be marked specifically (in BW) to be excluded from the calculation base.
A User Request must be created by the relevant site key user.

Calculation

Based on inventory movements linked to process orders.
See detailed calculation in Appendix 3.

Comments

Detailed analysis is to be done with the workbook "BW – Production by material" in "BW – Monitoring value stream" ("End user analysis" folder).

Neutralisation process

This document is an example of the neutralization process and is not representative of all movement codes.
Need to add neutralisation document

Unit Manufacturing cost

Objective

measure the unit manufacturing cost **per ton** of the VS mix.

Definition

Unit Manufacturing cost = Manufacturing costs / Production
In EUR / Ton or legal entity currency / Ton

Calculation

EXCEL Spreadsheet.

Unit delivered cost

Objective

Measure the unit delivered cost per ton of the VS mix.

Definition

UDC = Delivered costs / Production
In EUR / Ton or legal entity currency / Ton

Calculation

EXCEL spreadsheet.

Productivity Improvement Ratio (IPROD*)

Objective

Measure the productivity improvement in terms of unit manufacturing cost.

Definition

IPROD* is the current Month Unit Manufacturing Cost divided by last year Unit Manufacturing Cost.

Calculation

Monthly calculation

$$IPROD* = \frac{CurrentMonthUnitManufacturingCost(Eur/T)}{Lastyearunitmanufacturingcost(Eur/T)}$$

YTD calculation

$$IPROD* = \frac{YTDUnitManufacturingCost(Eur/T)}{Lastyearunitmanufacturingcost(Eur/T)}$$

Where

$$UnitManufacturingCostYTD = \frac{FixedCostYTD+VariableCostYTD+DepreciationYTD}{VolumeYTD}$$

Data Source

Excel formula in level 2 datasheet

Comments

IPROD < 100% is positive (unit manufacturing cost has decreased).

Productivity Gains *

Objective

Measure savings of productivity program in terms of manufacturing costs.

Definition

Difference **of Unit Manufacturing Costs between last year and current month.**

Calculation

<u>Monthly</u> GAINPROD = (Last year Unit Manufacturing Cost - Current Month unit Manufacturing Cost) x Production of the Month
Unit Manufacturing Cost = (Fixed Cost + Variable Cost + Depreciation) / Volume
<u>Yearly</u> GAINPROD = (Last year Unit Manufacturing Cost - Current YTD Unit Manufacturing Cost) x (Current YTD Volume)
= Sum of monthly GAINPROD
Unit Manufacturing Cost YTD = (Fixed Cost YTD + Variable Cost YTD + Depreciation YTD) / Volume YTD

Comments

Calculation formula in excel spreadsheet at level 2.
Fixed Cost + Variable Cost + Depreciation & volume are defined in the herein relevant sections.

Inventory

Objective

Measure the valuated stock of the VS

Definition

Valuated stock: Last day of the month accounting value.
The stock material valuation is the same as in RCS, it is measured at the end of the period (last day of the month at 24h) including updates made until the uploading date (D+10). Updates, if any, after D+10, will be taken into account for the considered month at next upload (at each upload, all the previous months are updated).
The valuated stock of a Value Stream is the total valuation of its constituent articled (through the profit centers) on all the controlling areas.

Calculation

Sum of each articles value.
The level 4 of the stock is taken from the JNI dashboard allocated to the relevant VS, except the "achieved" line which is identical to the level 2 one.

Data source

- RCS for level 2 (using the BW Stocks application data(
- JNI Dashboard located in the eRoom INVENTORY STEP CHANGE for level 4.

See the OEE & JNI Value Stream dashboard upload process.

Comments

The stock value for a given plant is equal to the sum of all this plant's Value Stream stock amount for the same articles perimeter.
Nevertheless, because Value Stream can also include allocated articles from other divisions, the total stock value of a given VS can be superior to its relevant plant total one.

Level 3 - WCM Indicators

Customer complaint rate (CCR)

Objective

Measure the degree of dissatisfaction expressed by customers.

Definition

Number of customer complaints per 1000 deliveries. Notes:

- A customer is any entity receiving a delivery in response to a formal order for a given quantity of a product due on a certain date.
- A delivery is a product receipt by a customer in response to a formal order from that customer (or in response to a call-off in the case of an open order)
- A complaint is a formally registered dissatisfaction expressed by a customer which requires a response, or any returns or rejected goods

Calculation

$$CCR = \frac{Number\ of\ complaints\ received}{Number\ of\ deliveries\ made} * 1000$$

in a given period of time
The complaints are extracted from SMART CORE tool.
The complaints are assigned to the relevant VS through the couple plant x material code, as mentioned in the complaints. The number of monthly deliveries is obtained from the Business Objects Premier Sales application.

Comments

- The detailed analysis of those complaints is to be done in SMART
- The complaints which are entered in QM are transferred in SMART
- No historical data for 2007
- When input the CCR in SMART, the zone for the material code is not always filled, therefore they can't be associated to a value stream. Up to date, the quality of the result depends of the good practice consisting in filling the material code zone in SMART and QM.
- Claims for products coming from distribution plants are assigned to the right VS (the VS that produced the material) if those products have been assigned to the right producing VS.
- General claims, that are not directly concerning a material, are not counted in the VS perimeter
- Of course CCR calculation is only possible if relevant claims were in SMART. (i.e. Brazilian claims entered in RCS are not transferred to SMART).
- CCR at the VS perimeter can be different from CCR at the plant perimeter : for a VS, the perimeter of claims can include products delivered from distribution plants to final customers.

Forecast accuracy rate (FA and FA*)

Objective

Identify and evaluate:

- our visibility on the markets (customer collaboration)
- our capacity to manage the customer demand
- our flow smoothing
- our OTIF improvement opportunity

Definition

Value, expressed as a percentage, measuring for a given period (month) gaps between sales forecasts and registered orders.

Calculation

$$FA = 100\frac{\sum MonthSalesForecast - \sum (MonthSalesForecast - MonthSales)}{\sum MonthSalesForecast}$$

FA calculation is made in APO at the VS perimeter. Only the monthly percentage value is uploaded in the dashboard.
Assumptions : For both FA & FA:*

- The forecast vs actual orders variances are made at article level x plant.
- The reference date is the sending date (based on the last customer request)
- The actual quantity ordered is based on the last customer request.

FA
The forecast figures are the ones from the sales collaborative forecast from SMART.
FA*
The forecast figures are the ones from POST SOIP COMMITED PLAN in APO DP.

Comments

The detailed analysis of the FA / FA* ratios is to be done in BW APO, thanks to the query "ZRCS_FA_VALUE_STREAM_CORE".

Customer On Time In Full (OTIF-C)

Objective

Measure the delivery performance with respect to customer demand and engagement of Rhodia.

Definition

Proportion of deliveries from Rhodia received by customer with the confirmed quantity and quality, at the confirmed date and time.

- A customer is any entity receiving a delivery in response to a formal order for a given quantity/quality of a product or service due on a certain date.
- A delivery is a receipt by a customer in response to a formal order from that customer (or in response to a call-off for products or services in the case of an open order)
- On time corresponds to the **last confirmed date to the customer**. Deliveries before the date or after the date are not on time.Delivery dates can be defined with time interval (date mini, date maxi, delivery planned on a week…). Nevertheless, our practice until now in RCS is not to use the time interval.
- Requested quantity is the quantity of product confirmed to the customers.

Calculation

$$OTIF\text{-}C = \frac{NbOf DeliveriesOTIF}{Nbof DeliveriesRequested} * 100$$

in a given period of time;

With:

- Number of deliveries requested: It corresponds to the number of order lines with a *Requested Date by Customer (max)* (as in BO) within the period considered.
- Number of deliveries "On Time In Full": It corresponds to the number of order lines ranked On Time and In Full.
    - In Full: An order line is in full if the *Despatch quantity (BUQ)* (as in BO) is equal to the *Confirmed quantity line (BUQ) -EST-* (as in BO) +/- *Quantity tolerances min/max* defined in the order.The quantity tolerance used corresponds to the tolerances specified in the order. By default these tolerances correspond to the tolerances defined for the material.
    - On Time: An order line is on time if the *Exec. date for end of Shipment* (as in BO) (which corresponds to the actual date of delivery at customers' plant) is equal to the *Requested Date by Customer (max)*. If the *Exec. Datefor end of shipment* is not available, the *Planned date for end of Shipment* (as in BO) is used. These dates come from the Transport documents/files. No tolerances are considered. A tolerance of +/- 3 days exists for maritime shipments only. ZOR orders are considered on time.

The calculations detailed above are applied with the following criteria:

- The following commercial documents are not considered in the OTIF-C calculations:

ZL3;G2;ZG3;ZG2;L2;ZL2;B4;B3;B2;ZL4;ZG4;B1;RE;KA;KR;REB;ROB;ZDAG;ZFAC;ZKA;ZRAG;ZREB;ZROB

- Only the orders with an order flow code = C are considered.
- Orders with an order system equals to BSP400 (Bluestar system) are excluded.
- Order lines with a type code equals to ZZZZ are excluded as well.
- About the exclusions on Commercial document types, here are the details:

B1	REB.CREDIT MEMO REQ.
B4	REB.REQ.F.MAN.ACCRLS
G2	CREDIT MEMO REQ.
KA	CONSIGNMENT PICK-UP
KR	CONSIGNMENT RETURNS
L2	DEBIT MEMO REQ.
RE	RETURNS
REB	BR DEVOL_CUST'S NF
ROB	BR RETURN_RHOD'S NF
ZDAG	BR DEVOL_CUST'S NF
ZFAC	BR STANDARD ORDER
ZG2	CREDIT M. REQ. WO RE
ZG3	CREDIT MR WO RE.SERV
ZKA	BR CONSIG DELIVDEVOL
ZL2	DEBIT M. REQ. WO REF
ZRAG	BR RETURN_RHOD'S NF
ZREB	BR DEV CUST NF N\REF
ZROB	BR RET RHOD NF N\REF

B2	REBATE CORRECTN.RQST
B3	PARTREBSETTL.REQUEST
ZL3	DDE NOTE DE DEBIT
ZL4	SOLIC.RECTIF.FCA(+)
ZG4	SOLILC.RECTIF.FCA(-)

The OTIF-C results per value stream and material are extracted from BO Sales (CORE application). A monthly table, read by BW, is generated with the number of delivery OTIF and non OTIF by article.
The calculation at VS perimeter is done through the matching of each article to a VS.

Comments

- This indicator can be applied at different levels, e.g. for all products, for a family of products, for one particular product or for key customers. Tolerances for delivery dates and/or quantities may be integrated into the definition only if they are negotiated as part of the contract. Orders for samples should be treated in exactly the same manner as orders for products.
- No historical data for 2007

Supplier On Time in Full (OTIF-S)

Objective

Measure the delivery performance of our suppliers.

Definition

Proportion of deliveries from suppliers received by Rhodia with the requested quantity and quality, at the requested date and time

- Rhodia is an entity receiving a delivery in response to a formal order for a given quantity/quality of a product or service due on a certain date.
- A delivery is a receipt by a customer in response to a formal order from that customer (or in response to a call-off for products or services in the case of an open order)

- On time is delivery inside the time interval accepted by both customer and supplier and registered. That time interval can't be modified afterwards and should be measured with the same precision (week, day, hour…) as the order time interval.
- Requested quantity is the quantity of product that Rhodia demands.

Calculation

$$OTIF\text{-}S = \frac{NbOfDeliveriesOTIF}{NbofDeliveriesRequested} * 100$$

in a given period of time

The calculation is done in the purchasing CORE application GSV.
The deliveries considered are the one attached to an article matched to a VS. Consequently, the deliveries corresponding to purchasing orders on costs centers & on projects are excluded.

Comments

The detailed analysis is to be done in GSV.
The following types of Purchase orders are not taken into account in order to have a reliable ratio:

- Open Orders: BSTYP=L
- Services orders: PSTYP=9
- Global frame agreement orders= FO & ZFO

Only standard vendors are considered, as in GSV Cores queries (Info object 0ACCNT_GRPV <> Z010, supplier characteristics C_VENDOR)

Scheduling Adherence Rate (SA)

Objective

Measure the internal respect of production schedules achieved during scheduling.

Definition

Value in percentage measuring, for a given period (month), gaps between scheduled production and actual production.

Calculation

A schedule:

- Is defined by material x work-center,
- Gives for all the materials the quantities to manufacture by day,
- Should have a horizon of 7 days (Monday – Sunday)
- Should not be modified: the 7-day horizon must be fixed.

SA by week and work center

$$SAweek = \frac{\sum_{Products} PlannedProduction - \sum_{Products}( )PlannedProduction - AchievedProduction)}{\sum_{Products} PlannedProduction}$$

SA by month and Value Stream

$$SAMonth/VS = \frac{\sum_{Week}\sum_{WorkCenter}\sum_{Products} PlannedProduction - \sum_{Week}\sum_{WorkCenter}\sum_{Products}(PlannedProduction - AchievedProduction)}{\sum_{Week}\sum_{WorkCenter}\sum_{Products} PlannedProduction}$$

Where:

- Planned production sum = sum of planned production for each material x workcenter weekly scheduled from preceding week generated schedule (process orders & fixed planned orders)
- Achieved production = Quantities reported in PP for the week considered (data input could take place during the week or after the week, backdate possible)
- Deviations between Planned/Achieved quantities is done by week, by product and by work-center.
- Variances sum = sum of absolute values of differences between weekly scheduled production and actual production of the same week.
- SA is calculated only for workcenters without a schedule change. Any time there is a schedule change for one article x workcenter, the complete workcenter is excluded from SA calculation for the week considered.

Comments

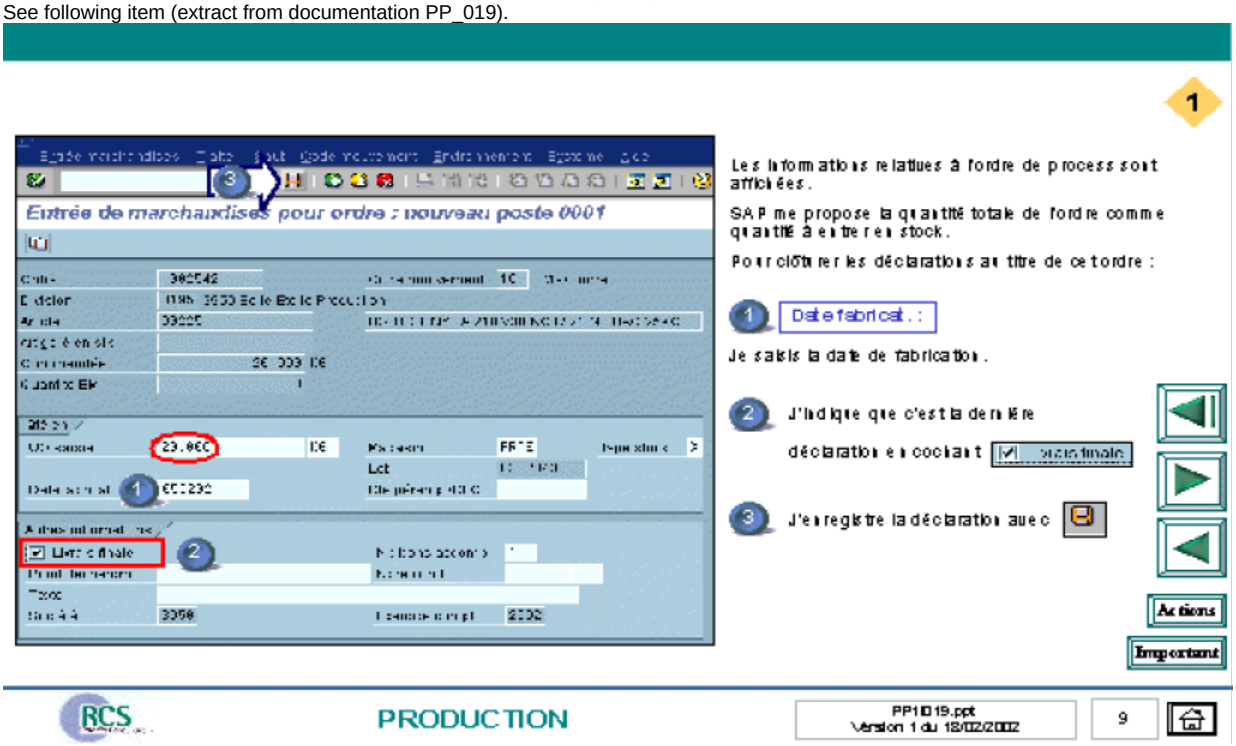
- The production forecasts are stored every Sunday at midnight.
- Analysis of SA is to be done in the « Production Planning » BW application.
- Workbook calculating KPI SA with planned production fixed and work centers with fixed schedules, as explained in the definition above : **RCS – Schedule Adherence (Core Workbook**).
- Workbook with additional information such as excluded workcenters, exclusion cause, total plan production Other workbook: RCS – Schedule Adherence Detailed Analysis

Exclusion code : changes realized on the schedules are ranked into 4 families :

1. Date and qty initially scheduled modified
2. Qty initially scheduled modified
3. Date initially scheduled modified
4. New initially scheduled order

Good practices to obtain an actual weekly production

Weekly Production is calculated from Monday 0h to Sunday 24h.
In particular, production of the week-end has to be declared with a posting date included in the WE.
See following item (extract from documentation PP_019).



Inventory TURN*

Objective

Measure the effective use of working capital (also an indicator of the efficiency of a combination of several core processes).

Definition

Inventory turns is the ratio of "annualized cost of goods sold", to the value of "total inventory on hand" for the current month. The ratio is measured in annual frequency ("X times per year")
It can be expressed in annual frequency ("x times per year").

- Cost of goods sold is defined as variable and non-variable cost of production, including depreciation
- Total inventory on hand is the value of inventory on hand which includes finished product valued at full manufacturing cost including depreciation, work in progress valued at estimated production cost, raw materials valued at purchase cost, and MRO's (spare parts) at purchase cost

Calculation

$$TURN = \frac{Annualized\,Cost\,of\,Goods\,Sold\,(Eur)}{Value\,Of\,Total\,Inventory\,On\,Hand}$$

$$TURN^{*} = \frac{12^{*}\,Monthly\,Valued\,Outflow\,(EUR)}{Value\,Of\,Total\,Inventory\,On\,Hand\,(EUR)}$$

Annualized cost of goods sold is calculated every month: monthly value x 12.
Formula of YTD Turn to be added

Comments

- The manufacturing direction has validated that, contrary to what is specified on the WCM documentation, the numerator must be equal to the Value stream valued outflow

- Denominator: Values inventory of the VS

Overall Equipment Effectiveness (OEE)

Objective

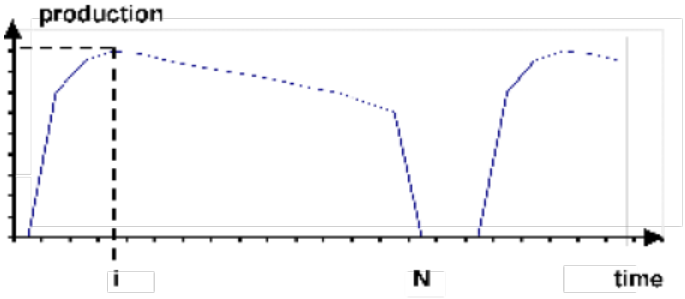
Measure the technical performance and capacity utilization of a manufacturing asset and hence to judge the effectiveness with which an asset is being used to add value. It allows the analysis of all the sources of capacity losses, whatever their origin may be.

Definition

Overall Equipment Effectiveness is the ratio of actual good production (on grade products) over the production that could have been achieved in the same time period.

- Maximum production is at bottleneck.
- The total time is based on 365 days.
- It is the product of the availability, performance rate, and quality rate. It is a comprehensive indicator of a plant's condition that takes into account operating time, performance and quality. The performance rate is determined against a maximum daily capacity (MDC) in order to express all losses in terms of either "time" or "capacity".
- Maximum Daily Capacity monoproduct can be calculated or measured
    - Continuous production: when production rate is constant over time, then MDC is the best production achieved on a 24h basis.
    - Semi-continuous production: when production rate is variable over a period of N days (between stops to change catalyst, between cleanings…), MDC corresponds to the best average daily production achieved during what we called the "golden batch".

Comment: This hypothesis could lead to daily OEE > 100% (for example, at the beginning of the batch, when the catalyst has just been changed). However, this methodology should be used to avoid weak OEE by using a MDC reference that can only be reached 1 or 2 days over a period of N days.



- Batch production: average production over the 3 best consecutive batches respecting standard operation procedures, brought back on a 24h basis. In a case without any sequence of 3 consecutive batches, only 2 or 1 batch(es) can be considered.
- Maximum Daily Capacity multiproducts can be calculated or measured :

Sum of proportional part of the MDC of each monoproduct. Proportional part is the fraction of the day (theoretical time) allocated to the production of the monoproduct.
Example: 8/24 on product A, 10/24 on product B, 6/24 on product C. The MDC of A-B-C mix is equal to: MDC(A)*8/24+MDC(B)*10/24+MDC(C)*6/24.

Calculation

$$OEE = \frac{Total\,Production\,Of\,OnGrade\,Products}{Maximal\,Theoretical\,Production}$$

in the same given period of time

$$OEE = \frac{Maximal\,Theoretical\,Production - Q1 - Q2 - Q3 - Q4 - Q5 - Q6}{Maximal\,Theoretical\,Production}$$

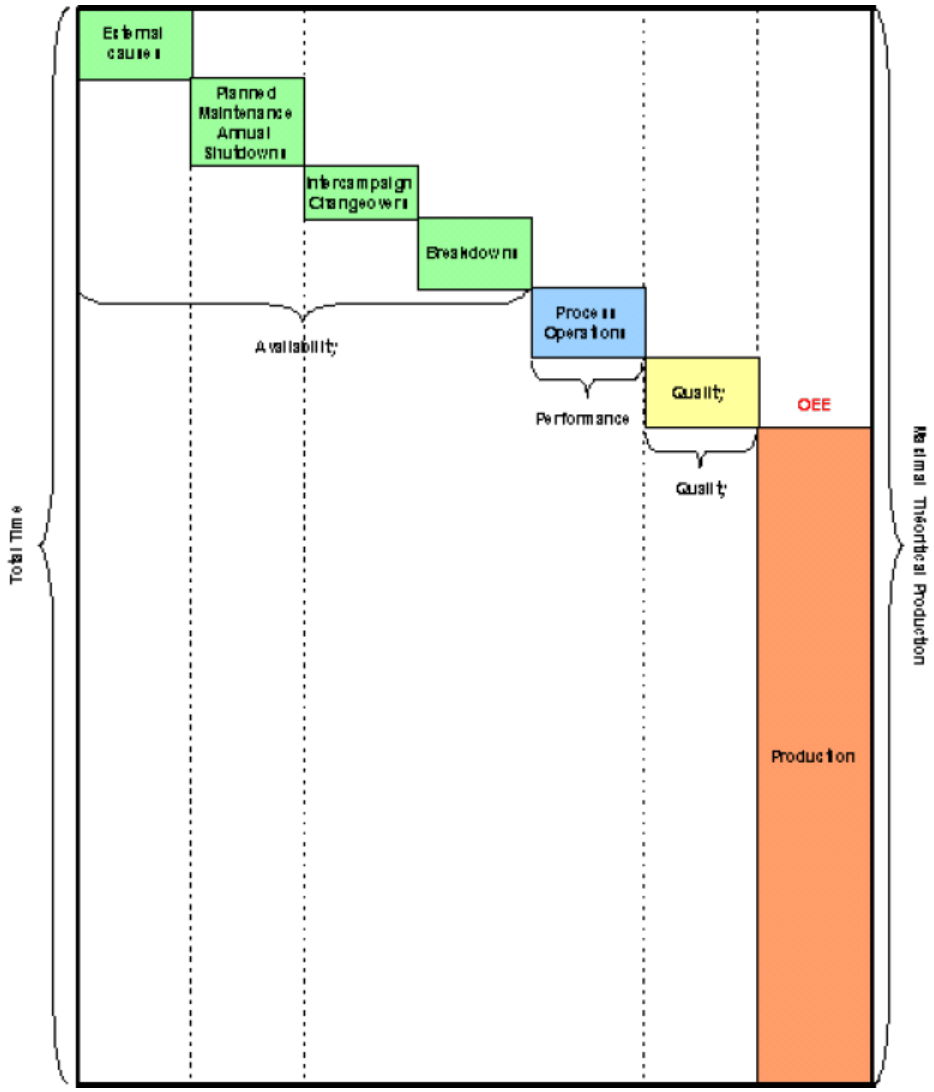
in the same given period of time and with following definitions:

3 Family	6 production losses types	Quantity	Time
Availability	1. External causes stoppages: lack of sales, lack of supplies due to suppliers or carriers' failures (material and energy), force majeure, general strike (i.e. not specific to the site like national strike).	Q1	t1
	2. Planned Maintenance and annual shutdowns.	Q2	t2
	3. Intercampaign changeovers[1]	Q3	t3
	4. Breakdowns	Q4	t4
Performance	5. Process / Operations[2]: low speed / cycle time not respected, lack of supplies due to internal failures (missing orders, wrong planning…), local strike (i.e. specific to the site or to the workshop)	Q5	t5
Quality[3]	6. Quality : scrap, and non-sellable without rework or recycling product	Q6	t6

It is equivalent to:

$$OEE = \frac{TotalTime - t1 - t2 - t3 - t4 - t5 - t6}{Totaltime}$$

in the same given period of time.



OEE can be broken into three factors:
OEE = AVAILIBILITY x PERFORMANCE x QUALITY x 100 %
with

$$Availibility = \frac{Totaltime - (t1+t2+t3+t4)}{Totaltime} * 100$$

$$Performance = \frac{Totaltime - (t1+t2+t3+t4) - t5}{Totaltime - (t1+t2+t3+t4)} * 100$$

$$Quality = \frac{Totaltime - (t1+t2+t3+t4+t5) - t6}{Totaltime - (t1+t2+t3+t4+t5)} * 100$$

Comments

- The OEE ratio is taken from the OEE Dashboard associated to the VS
- The production values of the OEE dashboard are calculated at bottleneck; therefore they are different from the VS production values reported at level 2.

- Rules & recommendations concerning e-room files are in page ...

Need to add link to OEE recommendation page

Material and Energy Yield (MATY)

Objective

Measure the performance of a Value Stream through the consumption of raw materials and utilities.

Definition

Ratio of best performance of raw material and utility usage (in currency) for a process compared to actual raw material and utility usage (in currency) for the same process.

Calculation

$$MATY = \frac{BestPerformance\,RawMaterial/Utility\,Usage(inCurrency)}{Actual\,RawMaterials/Utility\,Usage(inCurrency)}$$

In the same given period.

$$MATY = \frac{\sum_i \sum_j (cus_{i,j} * price_i * T_j)}{\sum_i \sum_j (cus_{i,j} * price_i * T_j)} * 100$$

Where :
cus $_{i,\,j}$ = standard specific unit consumption of raw material and utility j to produce one ton of finished good i (units of j / ton of i).
cur $_{i,\,j}$ = actual specific unit consumption of raw material and utility j to produce one ton of finished good i (units of j / ton of i).
price$_j$ = unit price of raw material and utility j (€/unit of j).
T$_i$ = tons of finished good i (tons of i)
Utilities = steam, gas, nitrogen, water & electricity (RCS cost element 120)

Comments

$$CUSorCUR = \frac{ConsumtionOfRawMaterialsUtilities(InQty))}{RightProduction(FirstTimeOrReworkInQty)}$$

in the same given period of time

The Standard specific unit consumption is the minimum consumption achieved = historical monthly best performance for each raw material or utility. The historical period starts in Jan 2007, or the first month in RCS if the RCS Go Live occurred after Jan 2007. If a material is not consumed during one month (i. e. in case of optional components or raw mat substitution), it does have an impact on its best performance consumption.

In case of a new built process, we can use theoretical consumption given by the supplier or the developer. This must be done by manual calculation

Right first time (RTF)

Objective

Measure the first time conform rate of a production entity.

Definition

Percentage of first time conform produced tons over total produced tons.

- A product is *conform* when all characteristics (viscosity, density, color…) are within specification limits known and required by customer standards.
- RFT measures *first time conformity* rate: non conform units becoming conform after rework are not considered.
- When conformity is measured by production lots: conform lots are converted into conform tons for the indicator calculation.

Calculation

$$RTF = \frac{FirstTimeConformProductionTons}{TotalProductionTons} * 100$$

Comments

RCS model don't allow RFT calculation for the time being.

1. ^ Intracampaign changeovers time are included in cycle time and are therefore not taken into consideration as an OEE Loss. If those intracampaign changeovers time are longer than expected, the gap should be reported in the process/operations category.
2. ^ Includes the loss of rate due to activity of catalyst, poisoning, aging for semicontinuous production.
3. ^ Second choice product with identified market is not considered as production loss. If it needs to be reworked to be sold, than it is Quality OEE loss.

APPENDICES – DETAILED SPECIFICATIONS

Appendix 1: Detailed spec. => Fixed cost allocation per VS

Objective:
The objective is to allocate the actual fixed costs to the VS. In case, the cost center is "multiVS", the fixed costs are distributed by VS pro-rated to the absorbed costs.
Hypothesis:
In order to smooth the seasonality & production shutdowns effect, the monthly fixed costs are calculated by comparing the end of period cumulated amount of current month vs. previous month.
There are 4 types of fixed costs:

- The actual CNP distributed to the different groups of costs (labor, supply & services, maintenance & Auxiliary expenses)
- The Absorbed CNP
- The actual AMO
- The absorbed AMO

The accounting elements groups are available in the ZRCS-FC hierarchy
6 types of cost to be collected:

- Actual CNP :

The actual CNP corresponds to CO documents with a cost element from the element groups ZRCS-AC. They are taken from the ODS_CCA9.

- Absorbed CNP :

The absorbed CNP corresponds to CO documents with a cost element from the element groups ZRCS-ABCNP. The article x division available in the production order of this document is used to identify the VS corresponding to those absorbed CNP.
In some cases, the article is not available in this type of CO document but there is another cost center or an OTP.
The allocation key calculation is based on the VS absorption

For multi VS cost centers, the costs are allocated to the different VS through the actual costs distribution key based on the CNP absorption.

- Actual depreciation (AMO = DEP):

The actual depreciation (AMO) corresponds to CO documents with a cost element from the element groups ZRCS-ACAMO. They are taken from the ODS_CCA9.

- AMO absorbed :

The absorbed depreciation (AMO) corresponds to CO documents with a cost element from the element groups ZRCS-ACAMO. The article x division available in the production order of this document is used to identify the VS corresponding to those absorbed AMO.

In some cases, the article is not available in this type of CO document but there is another cost center or an OTP.
The allocation key calculation is based on the VS absorption

Group of cost element:
We need to have 2 characteristics "group of fixed costs elements" to calculate the fixed costs :

- 1st characteristic: 4 possible values => Actual CNP, Absorption CNP, Actual AMO, Absorption AMO.
- 2nd characteristic: level below the 1st characteristic => To add : detail for « Actual CNP ».
  Intermediate storage:
  These 6 types of amounts will be extracted and stored in an intermediate ODS (ODS_CCVS) which will aggregate them (sum of items till the end of period) on the following key:

- Fiscal period- Cost center - Material - VS - Cost element group
- And the following ratios: - CNP Actual (Non proportional costs) - CNP target - CNP absorbed - CNP actual for VS - CNP target for VS - Real AMO (depreciation)- AMO target - AMO absorbed - AMO actual for VS - AMO target for VS

Stages of loading:
1/ Extraction from ODS_CCA9 to ODS_CCVS => Load key + CNP actual + CNP absorbed + DEP actual + DEP absorbed. (Update rule between ODS_CCA9 and ODS_CCVS).
We take into account in the ODS only monthly data with cost element belonging to fixed cost cost element group.
2/ Extraction from CUB_CCA02 to ODS_CCVS => Load key + CNP Target + DEP Target. (Update rule between CUB_CCA02 and ODS_CCVS)
We take into account in the ODS only monthly data with cost element belonging to fixed cost cost element group, and type of data (0VTYPE) = 30 (target).
3/ Calculation within this ODS_CCVS of actual CNP for the VS (in proportion to the absorbed CNP) and the actual DEP for VS. (Update rule between ODS_CCVS and itself) The key is based on the cumulated amounts from the beginning of the year until the current period. That key, calculated on actual data, is used for target and actual data.
4/ Extraction from ODS_CCVS to ODS target for Value Streams _CCVS => Load key + CNP Target + DEP Target. (Update rule between CUB_CCA02 and ODS_CCVS)
We calculate monthly amount by the difference (total cumulated amount of the year minus previous total cumulated previous amount)

Appendix 2: Detailed Spec. => Variables costs (CP)

Objective :
The target is to split actual variable costs between each value stream. Variable costs are made up of several elements detailed below.
All CP elements coming from a "Z100" process order are not taken into account (info object in BW 0COORD_TYPE=Z100 for the process order); the CP individual line isn't taken into account.
Non proportional Costs of a VS:

- **Components consumption** :

They are coming from BW Stocks cube (CUB_IC01).
Algorithm used to define component consumption or production
Movement code selection in ODS Stock movements (BIC/AODS_IC0100) :
Only movement code next :
• 261/262 --> consumption in a process order
• 543/544 --> consumption for sub-contracting
• 531/532 --> production of by-product or co-product
• 101/102 --> delivery in stock from a process order or a client order
Filter done on C_MAT <> empty (material is mandatory)
Filter done on stock movements: only those linked to a process order or a sub contracting order (purchase item category = 3)
Movement codes 101/102, 261/262, 543/544 & 531**/**532 are associated with a VS with either:

- Material of the process order
- Material of sub-contracting order (MM sub-contracting) : zone Account Assignment is empty (C_KNTTP = vide)
- Material of the process order (PP sub-contracting) : zone Account Assignment = F (C_KNTTP = F)

Movements 531**/**532 (co-product) are associated with the Value Stream of the Profit Center of the material of the stock movement. Co-products are defined (MRP1 vue in material master data).
To define the consumptions of a VS, an algorithm is running on all the movements linked to it.
The algorithm is precised below.
Definition: We name "**VS produced material**" a material that will be select in Value stream production calculation (see appendix 3).
This list "VS produced material" is a subset of the "regular" material that are included in VS production. These "regular" material have one of the following property:

- Procurement type = "E" (In house production) or
- Procurement type = "X" (Mixed Make or buy) **and** with Production version or
- Procurement type = "F" (purchased) **and** Spec proc type = "30" (MM subcontracted)

Filter done to exclude some movements:

- movements 101/102 & 531/532: we keep only mvts for materials not « VS produced materials » (the others are attached to production).
- movements 261/262, 543/544 : we keep only mvts for materials not « VS produced materials » or if material is « VS produced materials » , the profit center must be linked to another Value stream.

Comment : for the production of the VS, the movements are these which are not consumption movements :

- mvts attached to the VS and :

- movements 101/102 & 531/532: only those for materials « VS produced materials » (the others are attached to consumption)
- movements 261/262, 543/544 : mvts for materials « VS produced materials » and with profit center in the same VS.

In theory, all the selected stock movements should be classified in 2 categories : consumption or production.
Consumption mvts codes for MM sub-contracting (543/544) : we exclude mvts for material type =ZHIB (general expenditures), ZERS (industrial supplies), and ZGEN (purchasing generic code): these lignes will not be in proportional costs in the dashboard.

- **Activities consumption**:

Consumptions for activities come from production costs BW cubes (CUB_PC001 & CUB_PC002). There is a filter on component cost group (0CCOMPGRP_1 = 1) and activity type (0ACTTYPE <> empty).
There is also a filter on « reporting value type » (0VTYPE) in order to have actual and forecast data.

MM & PP Subcontracting: The rest is Proportional costs for services.
These amounts will be extracted from purchasing orders ODS (ODS_SCL1) because these lines are subcontracting services.
Purchasing orders have a item category = subcontracting (0ITEM_CATEG = 3).

- MM subcontracting orders with material x plant (C_MATPLNT) : the profit center of the material defines the VS. Account Assignment zone is empty (C_KNTTP = vide)

- PP subcontracting orders don't have a material but a process order (C_KSTRG) and Account Assignment zone = F « process order charging » (C_KNTTP = F). In this case, the profit center (and the VS) will be defined by the material produced in the process order. (Attribute C_MATNR + 0PLANT of C_PRODORD) -> Profit center -> VS

The amount for each item will be calculated with the following rules :

- Amount in local currency (legal entity currency)
- Total amount = Amount + return amount

- If there is not yet an invoice, the amount is « amount linked to deliveries on the order " (Delivery of good).
  - Amount EM (good entry) = K_VEMDI
  - Amount return EM = K_VEMDIR
  - Amount EF (invoice) = K_VFACDI
  - Amount return EF Retour = K_VFACDIR

- If there is an amount (EM,good delivery) **and** an amount (EF,good invoiced):
  - Same period => amount of EF
  - Different periods => amount: EF – EM.

Each line linked to a sub-contracting purchasing order is stored with category "MM production subcontracting" or "PP production subcontracting".

"**Pure proportional costs" from CCR**
For each movement linked to production calculation, we take only the part (cost component group = CP (0CCOMPGRP_1 = ?) of material in CCR.
CNP & AMO of upstream stages:

- movements 101/102 & 531/532. --> 100% Proportional Cost.

Movements for intermediate produced materials (101/102) or by products (531/532) which are consumed in the same value stream will lead to minus Proportional costs.

- movements 261/262, 543/544 :
  - materials supplied from another plant in the same legal entity --> we keep the part CNP & DEP (cost component group = CNP & DEP (0CCOMPGRP_1 = ?) of material in CCR of providing plant:

these materials have a special procurement type = « U » (transfer) and providing plant is in the same legal entity.
To find special procurement type, we look first CCR 1 view and if not found in a second time MRP2 view.

- Materials in the same VS: --> 100% Proportional costs
- Materials in another VS in the same plant --> we keep the part CNP & DEP (cost component group = CNP & DEP (0CCOMPGRP_1 = ?) of material in CCR of the plant
- Materials in a VS of other legal entity --> 100% Proportional costs

« Pure Proportional costs » worked out
= CP from VS – CNP & DEP upstream stages

Appendix 3: Detailed spec. => Production

Functional description
The purpose of this FFS is to describe how to calculate key figures for production, in B/W at **Value Stream** level
In the first part, we will describe how to identify material that should be taken into account in the calculation of neutralized key figures for production, in B /W at **Value Stream** level.
In a second step, we will describe the rules production/consumption neutralisation at value stream level.
Definition: We name "**VS produced material**" a material that will be select in Value stream production calculation.
This list "VS produced material" is a subset of the "regular" material that are included in VS production. These "regular" material have one of the following property:

- Procurement type = "E" (In house production)
- or
- Procurement type = "X" (Mixed Make or buy) **and** with Production version
- or
- Procurement type = "F" (purchased) **and** Spec proc type = "30" (MM subcontracted)

A transaction in BW will enable to mark the "irregular" material. Need to be excluded from this list.
This transaction is only available for Corporate Manufacturing Department.
This transaction updates a master data:
Characteristic: **C_EXCLVS**
Description: **Material excluded for VS production.**
This master data have an attribute:
Characteristic: **C_EXCVSF**
Description: **Flag: exclude from Value Stream Production**
This attribute is updated in the master data Material Plant (C_MATPLNT).
Production key figures calculation in B/W
Neutralisation at value stream level
The purpose of neutralisation is to discount from production/consumption key figures, the movement in which component and produced material belong to the same Value Stream
We will calculate a key figure : K_CONSNEU_VS = VS Neutralised consumption
Calculation is as follow :

Neutralized key figure	Condition	Description (FR)	Description (EN)
K_CONSNEU_VS = K_MOVEQTY	C_MOVETYP = (261/262/543 /544) And VS-Prod <> VS-Comp	Consommation neutralisée réelle VS	Actual VS Neutralized consumption

Where:

- VS-Prod = Value stream associated to C_BAUGR
- VS-Cons = Value stream associated to C_MATPLNT

Production key figures to calculate
We will calculate the following key figures, for VS production
The key figure which are in Blue, already exist in the structure "Movement type query - STR_MPR_IC001_0002
The key figures in black, should be added to the structure STR_MPR_IC001_0002 , in order to be able to have the same results in the Core Stock movement query.
For all the key figures below, the restriction for the materials should be:

- Material is linked to the VS (ie , the characteristics of its profit center = VS)

And

- Material is produced in the value stream (C_MATPVS = "X")
  - A material is produced in a value stream if it is produced in at least one of the plant of the value stream.

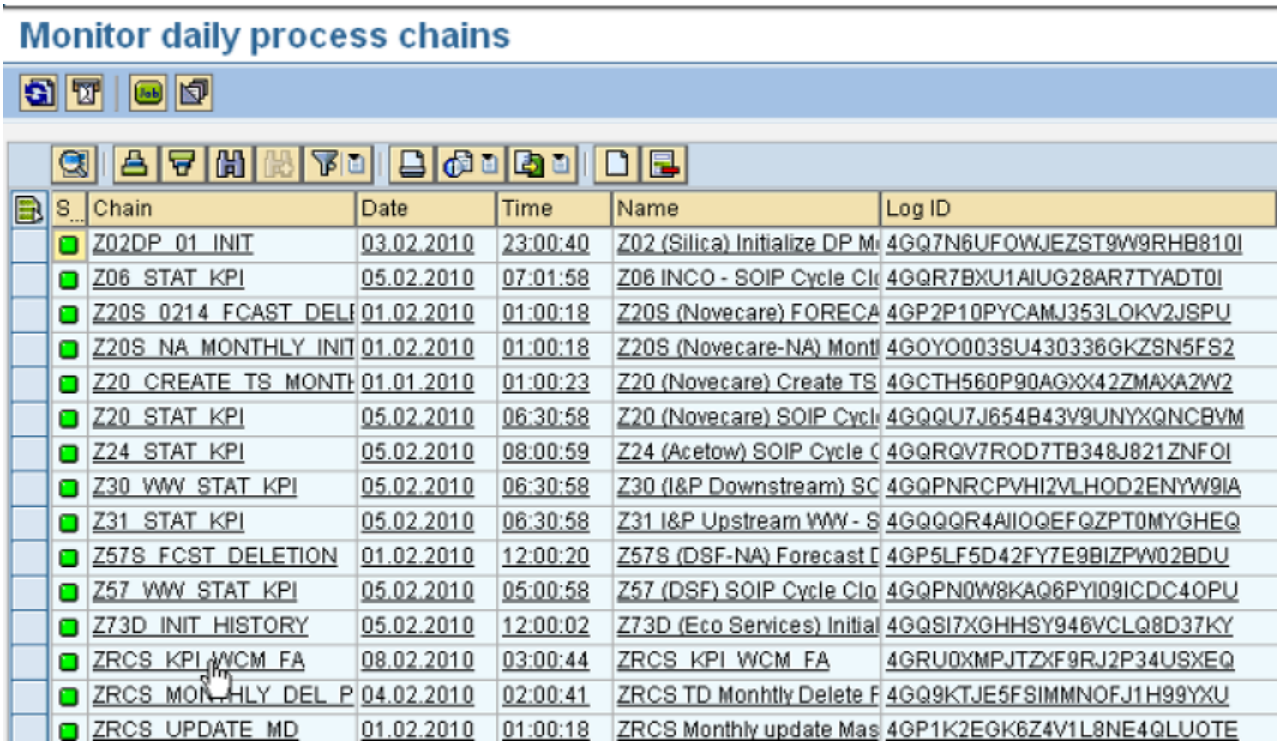
And

- C_MATPLNT__C_EXCVSF <> "X" (material not excluded from VS production).

APPENDIX 4: FA DETAILED SPECIFICATION

For the Helpdesk: Technical documentation of the FA calculated in APO.
Every 5th of each month, the FA is calculated into APO at material x plant level.
At this stage, it is not yet published to the dashboard.
Every 8th of each month, at 03:00, the result of this calculation is transferred into APO into the ZRCS_FA cube which is the cube sourced by BW dashboard.
1- To check if the calculation of the 5th was successful, log into APO WAP.
T-code : ZWFP01
Variant : ZRCS_MONTHLY
There is one process chain per enterprise.
Check that the following process chains are green:

- Z20_STAT_KPI : for Novecare
- Z24_STAT_KPI : for Acetow
- Z30_WW_STAT_KPI : for Engineering plastics, technical fibers, Fibras
- Z31_STAT_KPI : for I&P, Solvents
- Z57_WW_STAT_KPI : for Silcea (diphenol, silica, E&C) and Salycilics.



2- To check if the calculation of the 5th was successful, log into APO WAP. T-code : ZWFP01
Variant : ZRCS_MONTHLY - Check that the process chain ZRCS_KPI_WCM_FA is green.

APPENDIX 5 - TURN* DETAILED SPECIFICATIONS

TURN = TURN - Consumption for production + TURN - External Sales + TURN - Sales consignment + TURN - Sales Inter company + TURN - Sales inter plant + TURN - Other issues.

1 - TURN - Consumption for production: Calculated on movement codes 261, 262, 543, 544.
2 - TURN - External Sales: Calculated on movement codes 601, 602, 453, 454.
3 - TURN - Sales Consignment:
Calculated on movement codes 633, 634.
4 - TURN - Sales Inter Company: Calculated on movement codes 643, 644, 645, 646, 675, 676, 673, 674 .
We have to include only movements where the value streams are differents (origin and destination).
Value stream are being compared between 2 plants

- Value Stream from the plant of origin of the article
  - Value Stream from the plant of destination of the article If the Value Streams are not the same, the movement amount is allocated to this indicator. 5 - TURN - Sales Inter Plant:

- Calculated on movement codes 301, 302, 303, 304, 641, 642, 647, 648, 351, 352, 671, 672, 677, 678.

We have to include only movements where the value streams are differents (origin and destination).
Comparison between 2 value streams with same process than for TURN - Sales inter company. If Value Streams are not the same the movement amount is allocated to this indicator.
6 - TURN Other Issues: Calculated on movement codes from 551 to 556, 201, 202, 309, 310.

- For movements from 551 to 556 : it is the Scrapping.
- For movements 201 & 202 : Consumption on cost center

If the Value Stream of the movement article (Article C_MATNR, plant 0PLANT – Search Value Stream on /BIC/PC_MATPLNT) is different from the Value Stream of the movement profit center (profit center 0PROFIT_CTR and analytical perimeter 0CO_AREA – Read the Value Stream on /BI0 /PPROFIT_CTR) , the movement is allocated to this indicator.
Movement amount is from info object 0CPPVLC.

- For movement 309,310 : Transfer of article : the Value Stream of the stock movement article is compared to the one of the transferred article (stock movement type 309 given by the ODS_IC01 key + MM batch (0BATCH) + movement code – 309 ou 310). If they are not the same, we take the stock movement amount info object 0CPPVLC
  Value of each movement:
- time scale : 0PSTNG_DATE – accounting date
- Value Stream: C_MATPLNT attribute
- Value type: 10.
- Version: 0.
  In the Value Stream Dashboard TURN in % = Sum of TURN (see above) / Stock value per Value Stream (0VALSTCKVAL). Per value Stream and per month