A Materials Strategy for Fabrication and Assembly Shops Using SAP

A SubmitAndPray Publication by the Bearded One

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Introduction

This book is intended for planners and inventory analysts who work in SAP. It is not intended for information system architects or designers.

In this eBook, I walk through materials strategies that I learned while working in fabrication and assembly businesses, and I will show you how to follow those strategies in SAP.

The specific strategies we will go through are built around nine-block inventory segmentation and the concept of inventory entitlement. Most of the things I will show you are correct, but there is a chance some of the things I think are happening in SAP are not correctly understood by me. The point here is that you should test everything, simulate everything in your own SAP system. Do not trust me at all. Always run simulations.

As we walk through nine-blocks and entitlement, we will build a planning and materials workbook. This will have both forward and backwards looking views at the detailed part number level, and at the nine-block level. This is a valuable tool, but a warning: A Fool with a Tool is still a Fool. It will get you started on the analysis of your inventory and supply plans, but you still must understand what the tool is telling you and make decisions based on the information you have at hand.

In addition, we will walk through standard SAP transactions that will enable a detailed understanding of a part number's behavior. We will also look at tips and tricks that will help you navigate SAP faster and more effectively.

Strap yourselves in and prepare to be bedazzled!

Chapter 1 Nine Block Segmentation

In this section we will learn about nine-blocks. Nine blocks are a way of dividing inventory into segments that we can apply rules to. It can be used to group parts into sets based on attributes, such as valuation combined with a second attribute such as usage frequency, variation, lead times, price, margin, etc.

For this paper, we will focus on fabrication and assembly industries where there are potential dependencies between parts in different segments.

An example of dependency is when you build a brand-new car, and have the engine and the body all complete, but you cannot ship the car because you are missing the tires. The shipment of the car depends on the tires being available. The engine and the car body are "trapped" by the tire shortage.

Nine blocks will always have a financial valuation axis (ABC), and the second axis that shows a key attribute, such as variation in usage, or frequency of usage, or some other attribute (price, lead time, margin, etc.).

Nine-blocks look like the figures below.

	X	Y	Z
A	AX	AY	AZ
B	BX	BY	BZ
C	CX	CY	CZ

	H	I	J
A	AH	AI	AJ
B	BH	BI	BJ
C	CH	CI	CJ

ABC - The first way to segment materials is to segment them based on their usage valuation. Some people use only historical consumption, some use only forecast, and others will blend history and forecast. I do not care what you do.

- "A" Items typically represent 80% of the consumption or forecast value.
- "B" items represent 15% of the usage or forecast value.
- "C" items represent 5% of usage or forecast value.

XYZ -A common second attribute to use in in the nine block is around variation in demand ore consumption. SAP's MRP Monitor assigns this as the "XYZ" segment.

- "X" materials have relatively low levels of variation. A coefficient of variation (COV) of .5 or less may be the measure.
- "Y" Materials have medium levels of variation and may have a COV between .5 and 1.0.
- "Z" Materials are highly variable and may have a COV of more than 1.0 or even 2.0.

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IMPORTANT NOTE: You need to run your data and see where things land. These numbers around COV etc., are just starting points in the conversation and you do need to run your own data to see if they work or need to be changed.

Bell curves can help illustrate "XYZ".

- The Red curve has the smallest variation around the average (let's say the average value is 1). Here we would say the COV is .5/1=.5 COV.
- The Green Curve has a wider distribution. It has more variation, and we see that by observing the curve is flatter than the red curve. With a standard deviation of 2, and an average value of one, we say the COV is 2.0.
- Visually, the more peaked the curve, the less variation, and the "X" like the population. The flatter the curve, the more "Z". And in between the two is your set of "Y" parts.
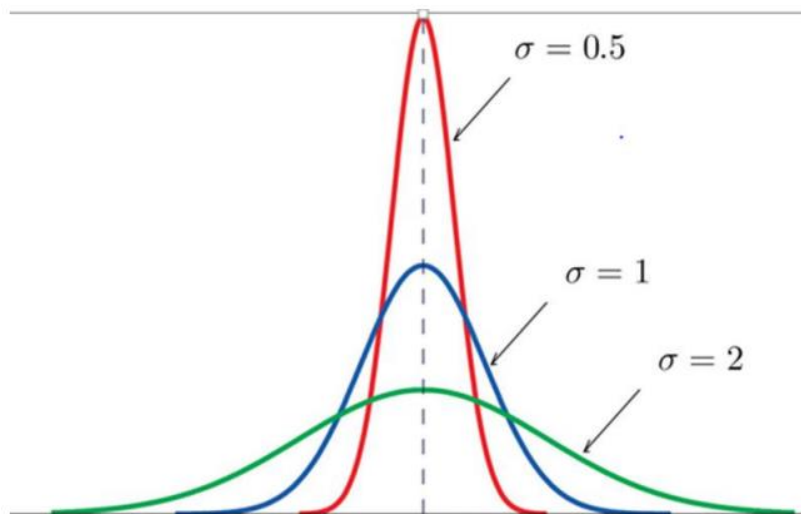
HIJ - Frequency of usage or picks (HIJ) is another method. "H" Items are the high runners, "I" are the repeaters, and "J" are the strangers. When you use parts, the number of times you pick the part (not the number of pieces picked) is the attribute we are focusing on.

- "H" materials will be 80% of your picks.
- "I" Materials will be 15% of your picks.
- "J" Materials are 5% of your picks.

This is how I learned segmentation, with XYZ originally meaning frequency of usage and our lexicon being "Runners, Repeaters and Strangers". Later some companies assigned "XYZ" to variation, and SAP eventually followed that for their MRP Monitor tool, and frequency of usage became "HIJ".

I have listened to some very boring people debate the relative merits of using variation vs. frequency of usage as the second set of attributes, and all I can say is it is easier to explain frequency of usage to planners. Once the bell curve shows up, half the audience is lost. But both can have value, and often there is strong overlap between, for example "H" and "X" parts as we often have the lowest usage variation between parts we use all the time.

Parts we use with very low frequency (Strangers) will typically have the highest COV.

Let us take a moment and recap a bit. What is segmentation?

- Nine block segmentation groups parts into logical buckets to develop common solutions to sets of parts that have similar attributes and behaviors.
- ABC financial segmentation is the most basic and guides us to treat expensive parts (A Items), like engines, differently than common commodity parts, like fasteners (C items).
- Variation in demand (XYZ) is also a common method of segmenting, treating low variation demand (X) materials differently than high variation materials (Z).
- Frequency of usage or picks (HIJ) is another method (Runners, Repeaters, Strangers).

A nine-block side by side comparison of how an "XYZ" model compares to a "HIJ" model shows some segment differences in this example. Look at how the "H" segments compare to "X" segment. What do you notice?

History	% of Material Numbers	Frequency of Usages	Total Usage Value
No Usage	42%	0%	0%
AH	1%	25%	15%
AI	2%	5%	35%
AJ	3%	2%	34%
BH	1%	11%	1%
BI	1%	4%	2%
BJ	5%	2%	7%
CH	1%	30%	0.4%
CI	5%	13%	2%
CJ	39%	8%	4%
Grand Total	100%	100%	100%

History	% of Material Numbers	Frequency of Usages	Total Usage Value
No Usage	42%	0%	0%
AX	2%	27%	35%
AY	4%	5%	46%
AZ	0.5%	0.2%	4%
BX	1%	13%	2%
BY	5%	4%	7%
BZ	1%	0.4%	1%
CX	4%	34%	1%
CY	24%	15%	3%
CZ	18%	1%	1%
Grand Total	102%	100%	100%

When looking at nine blocks the very first thing I look for is the number of times used, followed closely by the Usage Value.

CH and CX segments both capture the part numbers with the most transactional usage. CH captures 30% of the usages, CX captures 34%. CH usage value is less than ½ of one percent, while CX is at 1% usage value. Frequently used and cheap are the takeaways from both segmentations, and this should affect how you place buffers and set lot size.

You do not want to stock out on the CH or CX, especially in an assembly environment where you might be delaying shipment of an expensive "A" item that depends on the "C" being available to finish the assembly both the "A" and the "C" parts go into (think of an aircraft engine assembly waiting on a fastener to complete the product for shipment).

Knowing you do not want to trap inventory waiting on cheap parts, you might decide to carry high buffer levels on the cheap parts. You can carry higher levels because they are cheap and likely will not really impact your overall inventory.

You might also decide to order cheap parts with bigger lot sizes. On a "A" item, which might cost $100,000 a week in usage, you might want to have only 5 days of buffer. On a "C" with $5 a week in usage, you might opt for 20 days of buffer (or more). When thinking about this, remember writing a purchase order, receiving a part, putting it into inventory and managing the invoice are all costs and waste that should be minimized. Reducing transactions can reduce this waste, and larger lot sizes can help.

You can extend these rules across the segments. A rule might be that no "A" should have more than 5 days buffer, and no "C" item should have less than 20 days of buffer. But like all rules, you need to model them out and project what the ending inventory profile should look like. A fool with a rule is still a fool so do the work and know what to expect.

The SAP bolt on tool MRP Monitor produces nine blocks like the one below.

Classification

	X	Y	Z	Sum	Key figure
	38	57	11	106	Materials
A	18,846,110.80	20,519,675.55	1,608,254.38	40,974,040.73	Sum consum
	1,398,700.02	1,884,648.19	586,263.72	3,869,611.93	Sum invent
	0.9	1.1	3.5	1.3	ø RoC
	30	77	22	129	Materials
B	1,172,116.19	2,808,425.68	801,374.29	4,781,916.16	Sum consum
	179,247.12	418,432.45	286,994.04	884,673.61	Sum invent
	2.0	1.9	4.2	2.3	ø RoC
	129	335	229	693	Materials
C	840,926.05	1,083,348.83	471,790.42	2,396,065.30	Sum consum
	138,670.84	316,978.05	292,698.33	748,347.22	Sum invent
	4.0	10.1	40.3	19.0	ø RoC
	197	469	262	928	Materials
	20,859,153.04	24,411,450.06	2,881,419.09	48,152,022.19	Sum consum
	1,716,617.98	2,620,058.69	1,165,956.09	5,502,632.76	Sum invent
	3.1	7.7	35.7	14.6	ø RoC

In this nine-block, the AX segment has 38-part numbers, with a total consumption value during the period of $18,846,110. Our current inventory is $1,398,700, and RoC (range of coverage in Days) indicated we have 0.9 days of supply on hand.

If you do not have the MRP Monitor, I will show you how to build one with frequency of usage (HIJ) using standard SAP in the workbook section of this eBook.

When introducing nine blocks, the conversation should include buffers, replenishment strategies, and lot sizes, as they will determine your inventory optimization plan. We will review these later.

The below table should be considered a "conversation starter", not an absolute rule.

	X (or H)	Y (or I)	Z (or J)
A	Buffer conversation should start at one week. Lot sizes should also be considered and held at a lower level than a C item. For example, one week of supply of an A item may be reasonable. AX items converted to pull replenishment methods allows you to select the few items with the highest value impact for your lean	Buffer conversation should start at one to two weeks. If an item has a coefficient of variation that is near X you may want to treat it like an X.	Needs to be investigated but in general I would use Forecast as a guideline. The hazard of consumption is that as an item dies, it becomes more variable, and will "want" higher buffers. Z items maybe best left with no buffer and run off straight MRP. Or if MRP says it is more stable going forward, perhaps

	initiatives, so that can be one part of the conversation.		it should be an X or a Y. HIJ may help here as well.
B	Buffer conversation should start at two weeks. A lot size of two weeks of supply may also be appropriate. At some sites, B items look and act a lot like C items so you may decide to treat them the same.	Buffer conversation should start at two to four weeks.	Needs to be investigated but in general I would use Forecast as a guideline.
C	Buffer conversation should start at two weeks. A lot size of two weeks of supply may also be appropriate. At some sites, B items look and act a lot like C items so you may decide to treat them the same. 60 days of supply, maybe appropriate on inexpensive items. Inexpensive items are also candidates to make expense items and 3rd party replenishment.	Buffer conversation should start at 2 to 4 weeks. Note lead time can change this considerably. Larger lot sizes, for example 20 to 60 days of supply, may be appropriate for inexpensive items. Inexpensive items are also candidates to make expense items and 3rd party replenishment.	Needs to be investigated but in general I would use Forecast as a guideline. Note some MOQs will be so high you effectively have buffer built in. You may still want to add a time-based buffer as if you rarely buy something, you may need to resource it next time you need it. HIJ can be helpful. If it is a "H" you probably want some buffer.

Once you have your nine-block built, start looking at the detailed data. Build it out and then start documenting in detail your rules. Try not to bog down on exceptions and focus on rules that cover most of the parts.

Again, if you don't have the MRP Monitor or are operating in a different system such as Oracle, you should still be able to do this at least for frequency usage (HIJ).

When building a "from scratch" segmentation, and making up the rules to drive the segments, it will be important to make sure your nine blocks show differentiation. The core idea is that different segments need different strategies, and that results in you adopting different buffer and lot sizing strategies to achieve more optimal results.

Examples

For an industrial company with a high degree of dependency between parts, i.e. you cannot consume one without the other, your "X" item strategy may look like the below matrix. The key is to understand this is basic. When you buffer high on the many, inexpensive parts, you can focus on managing the more expensive parts more closely.

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Distribution	# of Part Numbers	X/H value	X/H Lot size	X/H Buffer	X/H Replenishment
A	5% of Part numbers	80% of Usage Value	5 days of supply	5 days	Pull, Supplier Ship from Stock
B	15% of Part Numbers	15% of Usage Value	10 days of supply	10 to 20 days	Your guess is as good as mine
C	80% of Part Numbers	5% of Usage Value	20 days of supply	20 to 60 days	3rd party replenishment, min max, etc.

Let us look at some different ways to understand a nine-block.

Looking at just the "AX" segment, I can see that 4% of my total part umbers account the 28.1% of my usages, and 40% of my usage value. With a total population of 12,478 parts, it is worth knowing that there are 450 driving 40% of my usage value. We need to watch these parts closely.

Row Labels	January 2020 Inv Value	Number of Parts with Classification	Turns	% of classified parts	% of Usages	% of Usage Value
AX	$14,563,453	450	5.07	4%	28.1%	40%
AY	$30,691,676	773	2.40	6%	3.8%	40%
AZ	$2,717,612	62	2.32	0.5%	0.07%	3%
BX	$1,332,911	297	3.00	2%	11.0%	2.2%
BY	$8,629,250	966	1.42	8%	3.6%	7%
BZ	$5,801,911	199	0.40	2%	0.1%	1.3%
CX	$1,001,711	916	1.71	7%	36.6%	0.9%
CY	$7,482,736	5046	0.81	40%	15.4%	3.3%
CZ	$10,001,162	3769	0.25	30%	1.2%	1.4%
Grand Total	$82,222,422	12,478	2.22		100.0%	100.0%

Looking at the "CX" segment we can see 7% of the parts drive 37% of my usages, but less than 1% of my usage value. On these parts, I would add high buffers. These are low-cost parts with high frequency of usage. I do not want to halt production on an engine block (Probably an "A" item) because I stocked out of fasteners.

Would this strategy work on the "CY" segment?

In this real-life example, look at the Inventory value by segment, and the annual inventory turns by segment. What does this information tell you?

Row Labels	January 2020 Inv Value	Number of Parts with Classification	Turns	% of classified parts	% of Usages	% of Usage Value
AX	$ 14,563,453	450	5.07	4%	28%	40%
AY	$ 30,691,676	773	2.40	6%	4%	40%
AZ	$ 2,717,612	62	2.32	0.5%	0%	3%
BX	$ 1,332,911	297	3.00	2%	11%	2.2%
BY	$ 8,629,250	966	1.42	8%	4%	7%
BZ	$ 5,801,911	199	0.40	2%	0%	1.3%
CX	$ 1,001,711	916	1.71	7%	37%	0.9%
CY	$ 7,482,736	5046	0.81	40%	15%	3.3%
CZ	$ 10,001,162	3769	0.25	30%	1%	1.4%
Grand Tot	$ 82,222,422	12,478	2.22		100.0%	100.0%

Here is another nine-block. What can you see about your inventory in this view?

30% of the parts have no usage

All	Count of Material Number	Sum of Jan 6 2019 Future 12 Month Demand $	Sum of 12 Month Usage $	Sum of NoTotUsage	% of Part Numbers	% of Usages	% of 2019 Forecast	% of 2019 Consumption	Forecast Bias
'--	1,882	$ 6,499,374	$ 4,806,606	7,207	30%	1%	2%	2%	74%
AX	401	$ 198,450,001	$ 183,170,262	152,675	6%	19%	72%	74%	92%
AY	63	$ 21,156,203	$ 14,137,653	5,971	1%	1%	8%	6%	67%
AZ	5	$ 424,592	$ 396,684	49	0%	0%	0%	0%	93%
BX	472	$ 25,224,096	$ 22,920,929	142,182	7%	18%	9%	9%	91%
BY	116	$ 5,420,254	$ 4,586,453	8,886	2%	1%	2%	2%	85%
BZ	25	$ 1,535,632	$ 1,531,411	383	0%	0%	1%	1%	100%
CX	1,342	$ 8,718,789	$ 7,799,545	401,760	21%	51%	3%	3%	89%
CY	1,052	$ 4,450,072	$ 4,060,408	65,167	17%	8%	2%	2%	91%
CZ	877	$ 2,999,725	$ 3,474,750	9,953	14%	1%	1%	1%	116%
(blank)	65	$ 15,045	$ 13,349	624	1%	0%	0%	0%	89%
Grand Total	6,300	$ 274,893,782	$ 246,898,051	794,857					90%

There are 6,300 parts, how many do you need to manage well?

21% of the parts are CX parts

51% of the time we are using CX parts. Can I cheat here and Just smother them with Inventory?

We are consuming 90% of forecast

Below is another Nine-block.

- When we look at BY, BZ, CY, and CZ we see they are the lowest turning segments, and account for 40% of our current inventory value.
- What can we infer about lot sizes in these segments?

Row Labels	January 2020 Inv Value	Total Usage Value	Turns	% of classified parts	% of Current Inv	% of Usage Value
AX	$ 14,563,453	$ 73,834,829	5.1	4%	18%	40%
AY	$ 30,691,676	$ 73,597,124	2.4	6%	37%	40%
AZ	$ 2,717,612	$ 6,298,148	2.3	0.5%	3%	3%
BX	$ 1,332,911	$ 4,000,571	3.0	2%	2%	2.2%
BY	$ 8,629,250	$ 12,276,493	1.4	8%	10%	7%
BZ	$ 5,801,911	$ 2,297,291	0.4	2%	7%	1.3%
CX	$ 1,001,711	$ 1,709,923	1.7	7%	1%	0.9%
CY	$ 7,482,736	$ 6,042,373	0.8	40%	9%	3.3%
CZ	$ 10,001,162	$ 2,536,051	0.3	30%	12%	1.4%
Grand Tot	$ 82,222,422	$ 182,592,802	2.22		100%	100.0%

While I personally find nine-blocks a powerful tool for analyzing inventory, we need to remember a "Fool with a Tool is still a Fool". At the end of the day, we still must make decisions.

One size does NOT fit all. Different industries will look at different attributes when building their nine-blocks. You are the subject matter experts and understand your business better than I do, so choose wisely.

Understand the intent:

- Why/how are we making our segments?
- Do they make sense?
- Do they help us in our analysis?
- Does the data "look" correct?
- Can you explain why we did the segmentation in the first place?

And remember …. A Fool with a Tool is Still a Fool. You do still have to think.

Chapter 2 Inventory Entitlement

Inventory Entitlement is the concept that based on some key parameters, specifically lot size and buffers, we should be able to calculate an expected inventory level, a level we are entitled to hold.

In supply planning there is a theoretical saw tooth pattern in terms of inventory level. When we get a lot in, inventory peaks at the lot size. Over time, we draw down to zero just as the next lot appears to take us back up. The idea is that on average, you should have an inventory level of ½ lot size. If you have buffer, on average it should be (½ lot size + buffer).

Here your lot size is 400, buffer is 100.
Your average inventory (entitlement) is 300.
Your upper control limit is 500 (LS + Buffer.
Your lower control is 100 (buffer).
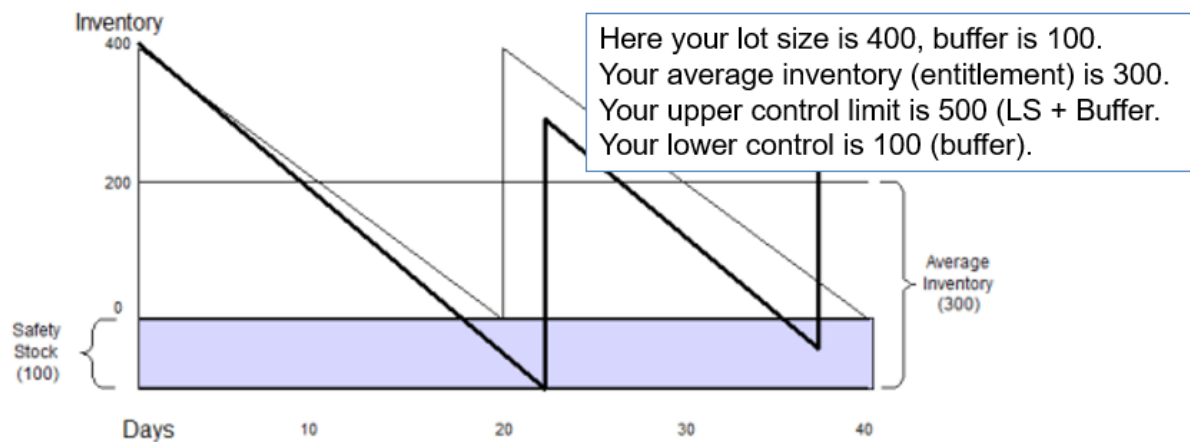
Once we have an expected value on what our inventory should be, we can compare it to where our inventory is. We do this at the aggregate level with our nine-block, and at the part number level.

Our entitlement is ½ lot size plus buffer. In situations where we are over or under that level we say we have a variance to entitlement.

Below is an example of output of an excellent tool that is ever so slightly complicated in terms of being an excel sheet on steroids, but it can illustrate a key point....

We have 3,401 parts, and that is a lot (1).

We are $12.18 million over entitlement (2).

We have 118 parts in AX and 403 in AY segments for a total of 521 parts (3) (15% of total Parts) with $7.1 million above entitlement (4) (AX and AY =58% of the $ over entitled). When we dig into the segments, we will likely discover that we have a similar 80-20 rule inside the segments.

Code	Count of Items	Items planned with order period compliance	Inv Entitlement $	On hand $	Above Entitlement	Below Entitlement
AX	118	112	$ 1,353,255	$ 2,917,510	$ 1,719,378	$ (155,122)
AY	403	403	$ 2,491,648	$ 7,630,790	$ 5,637,534	$ (498,393)
AZ	45	44	$ 163,419	$ 1,022,368	$ 943,871	$ (84,922)
BX	89	77	$ 108,378	$ 246,804	$ 146,106	$ (7,681)
BY	376	332	$ 459,291	$ 1,370,553	$ 985,001	$ (73,739)
BZ	79	62	$ 122,366	$ 674,495	$ 570,619	$ (18,490)
CX	624	333	$ 319,494	$ 746,308	$ 564,186	$ (137,372)
CY	1017	886	$ 387,727	$ 936,699	$ 595,909	$ (46,937)
CZ	650	419	$ 220,679	$ 1,212,128	$ 1,017,439	$ (25,989)
	3401	2668	$ 5,626,256	$ 16,757,654	$ 12,180,043	$ (1,048,645)

In my experience, we will likely spend all our time in AX AY (or AH and AI).

We will likely never spend too much time working on "Z" items, and not on CZ items.

Segmentation guides us in all actions all the time without exception unless the building is on fire, then just get out.

When we look at the variances to entitlement, we should focus on CAUSES. Variances are almost always a result of a process gap, rarely just a "one off". Causes can include past due, or large minimum order quantities, or over forecasting.

The nine-block guides us to the segments that have the greatest opportunity, then we go into it at the part number level.

Chapter 3 MARC Table and SAP Planning Parameters

Now that we have been introduced to the concept of nine-blocks, we need to understand how to build them. In this section we will look at the SAP parameters needed and how to extract them from SAP. We will also demonstrate how to audit your materials master in order to ensure proper data governance, which most of you absolutely do not do.

The MARC table is a standard SAP R/3 system. It defines plant level materials master data used in the plant for production, purchasing, maintenance and planning purposes. For this section, we will focus on specific data found in the MRP1 and MRP2 tabs, that impact inventory optimization.

Typically, very few people will have direct access to the table. At all the companies I have worked at we did have access to a copy of the MARC table, a display extract that does not interact with the table itself after being extracted. It looks like the below screen when run and can be extracted to excel. If you are using more than one MRP Area you need to run it for each area.

Material	Plnt	Maint. status	Pl	ValCat	B	MS	Valid from	ABC	Cri	PGr	UoI	MRPpr	Typ	MRPC	M=B	PDT	ΣGRT	PI	ΣA.scrap	LS	ProcType
1000988-1	2732	DEALBVPQG					00/00/0000	C		5YX			PD	5XX		91	2	M	0.00	YY	F
1703116		DEALBVPQG					00/00/0000	A		5YX			PD	2VC		112	2	M	0.00	YE	F
1703373		DEALBVPQG					00/00/0000	C		5YX			PD	2VC		112	2	M	0.00	Y3	F
1708505-2		DEALBVPQG					00/00/0000	C		5YX			PD	2VC		70	2	M	0.00	YK	F
1708505-3		DEALBVPQG					00/00/0000	C		5YX			PD	4AU		70	2	M	0.00	Y3	F
1708505-4		DEALBVPQG					00/00/0000	C		5YX			PD	4AU		70	2	M	0.00	Y3	F
1708598		DEALBVPQG					00/00/0000	C		5YX			PD	2VC		84	2	M	0.00	Y3	F
1708762-10		DEALBVPQG					00/00/0000	C		5YX			PD	2VC		90	2	M	0.00	YK	F
1708762-11		DEALBVPQG					00/00/0000	C		5YX			PD	2VC		90	2	M	0.00	EX	F
1708762-6		DEALBVPQG				B1	00/00/0000	B		5YX			PD	INB		80	2	M	0.00	EX	F
1712398		DEALBVPQG					00/00/0000	A		5YX			PD	2VC		126	2	M	0.00	YE	F
1712400		DEALBVPQG					00/00/0000	B		5YX			PD	2VC		112	2	M	0.00	YK	F
1712402		DEALBVPQG					00/00/0000	B		5YX			PD	2VC		112	2	M	0.00	YK	F
1712405		DEALBVPQG					00/00/0000	A		4B2			PD	5XX		147	2	M	0.00	YK	F
1714124		DEALBVPQG					00/00/0000	A		5YX			PD	2VA		84	2	M	0.00	YE	F
1715024		DEALBVPQG					00/00/0000	C		4B2			PD	2VC		84	2	M	0.00	YY	F
1715032		DEALBVPQG					00/00/0000	C		5YX			PD	2VC		84	2	M	0.00	Y3	F
1715874		DEALBVPQG					00/00/0000	A		5YX			PD	2VC		89	2	M	0.00	EX	F
1722021		DEALBVPQG					00/00/0000	A		4B2			PD	2VC		112	2	M	0.00	YE	F
1722464-1		DEALBVPQG					00/00/0000	C		5YX			PD	4B2		70	2	M	0.00	Y3	F
1722464-10		DEALBVPQG					00/00/0000	C		4B2			PD	INB		70	2	M	0.00	EX	F
1722464-11		VEDPALQBG					00/00/0000	C		5YX			PD	4AU		100	2	M	0.00	Y3	F

The following fields are important and need to be maintained, and audited, if we intend to have a standard for planning.

MRP1 MRP 1 has the following relevant parameters.

Display Material 1722470 (Separable Asm; Semi-Fnshd)
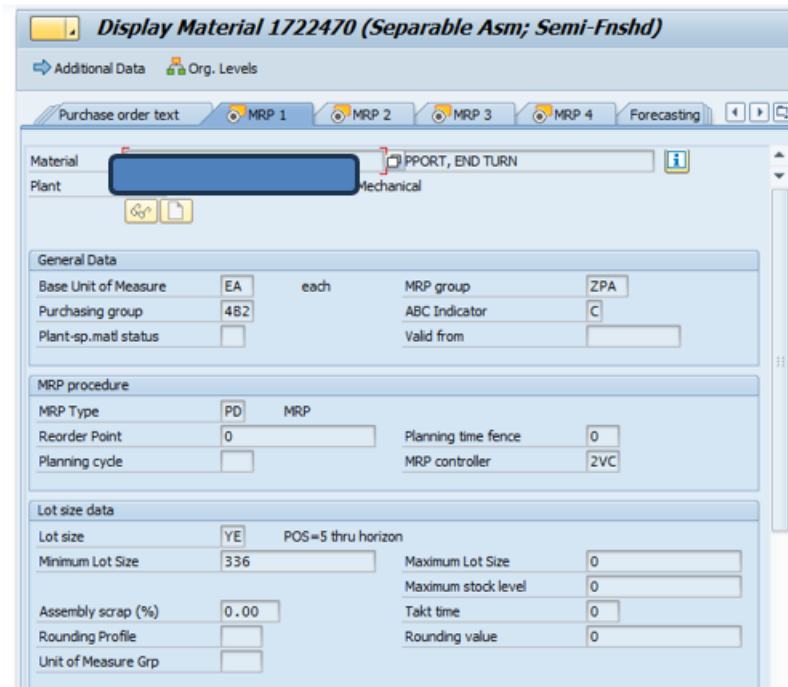
MRP Type – This filed directs SAP to do certain things around replenishment, such as run MRP, or run to a consumption-based reorder point, or to use time fences.

Reorder Point – when inventory reaches this point you will order more.

Planning time Fence this helps stabilize schedules by placing new supply at a time fence, for example 5 days. This is widely abused.

Lot Size – There are many different lot sizing techniques in SAP. They can indicate fixed quantities, quantities to cover a range of days, or other groupings.

Minimum Lot Size- the minimum you will order when ordering a part.

Maximum Lot Size – The maximum you will place on any order.

Rounding value – it always rounds up to a specific value, like beer rounds up in quantities of six.

Common MRP Types include the following:

- PD is a straight MRP plan type. The orders will change based on changes in MRP.
- P1 to P4 are MRP with a time fence. Time fences determine where new supply orders land. Where supply goes, and how Demand is recognized, depends on the time fence used.
- V1 and others that start with V are basically reorder points and vendor managed. There are some nuances, such as whether you let the system calculate or whether

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you do a manual calculation, and there is a loss to forecast visibility for suppliers typically.

- Ones that start with Y are master scheduled, so talk to your APO people if you have questions.
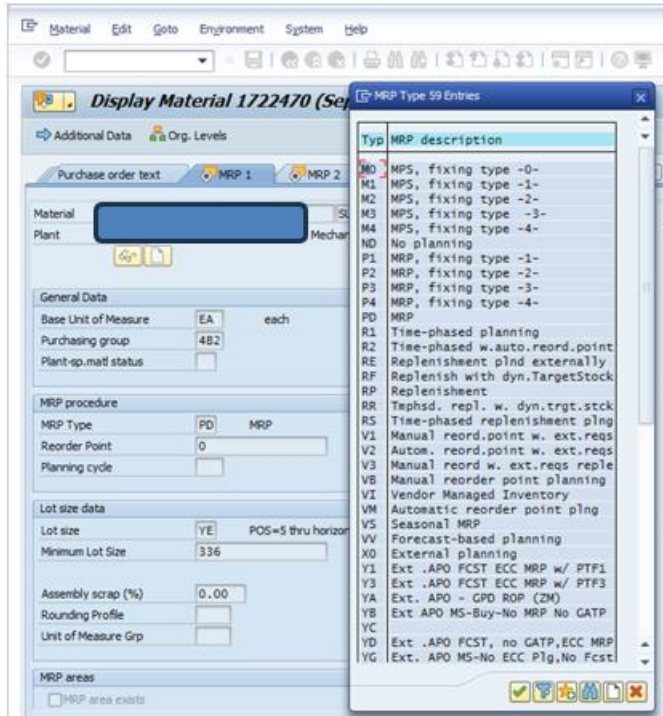
Common lot sizes include:

- EX is a lot for lot setting. If you have no minimums and no rounding values, it will place an order for each demand, which means you can get multiple orders in any given week. If you put in a minimum and/or a rounding value, you will get different results. Test it and see it.
- FX is a fixed lot size, where you will always run a fixed quantity.
- Lot sizes that start with Y are also variable/dynamic. They will order the Period of Supply in days based on an average over the time horizon, however far out your SAP looks.
- SAP almost always looks at a 5-day work week, not a 7-day week. If a setting like YG, which is based on a POS of 7, is used it will order one week and two days as the lot size. Usually this is not correct, and you will want to switch them to YE if you want to order in weekly quantities.

Lot size (materials planning) 108 Entries

LS	LS	LI	Pds	LLP	LLI	LPer	Description
EX	S	E	0	P	M	1	Lot-for-lot order quantity
FS	S	S	0			0	Fixing and splitting
FW	S	F	0	P	T	20	Fixed qty 14 Months
FX	S	F	0	P	M	1	Fixed order quantity
GR	O	G	0			0	Groff reorder procedure
HB	S	H	0			0	Replenish to maximum stock level
KP	P	K	1	P	M	4	Period lot size Plng Calendar E Interpr
M0	P	T	20			0	POS=20
M1	P	T	21			0	POS=21
M2	P	T	22			0	POS=22
M3	P	T	23			0	POS=23
M4	P	T	24			0	POS=24
M5	P	T	25			0	POS=25
M6	P	T	26			0	POS=26
M7	P	T	27			0	POS=27
M8	P	T	28			0	POS=28
M9	P	T	29			0	POS=29
MB	P	M	1			0	Monthly lot size
P0	P	M	10			0	10 Month POS
P1	P	M	11			0	11 Month POS
P2	P	M	2			0	2 Month POS
P3	P	M	3			0	3 Month POS
P4	P	M	4			0	4 Month POS
P5	P	M	5			0	5 Month POS
P6	P	M	6			0	6 Month POS
P7	P	M	7			0	7 Month POS
P8	P	M	8			0	8 Month POS
P9	P	M	9			0	9 Month POS
PA	P	M	12			0	12 Month POS
PB	P	P	1			0	Period lot size = posting period
PK	P	K	1			0	Period lot size acc. to plng calendar

We make a LOT of mistakes here.

MRP2 MRP2 has the following parameters that are relevant for what we will walk through in this document:

Procurement Type This field tells you if a part is a make item, a purchased material or whether you can make or buy it both.

Planned Delivery Time I have seen planned delivery time set to equal transit time from a supplier, and also seen it sued as a total replenishment/cold start lead time. This does matter if you want to use some standard SAP tools like the Inventory Optimization tool. For those tools to work correctly you need to set it up to be just transit time from the supplier.

Goods Receipt Time This is the time it takes for you to receive and put away material.

Safety Stock A fixed quantity of inventory buffer in pieces.

Safety Lead Time The number of days you want to receive material ahead of the actual MRP requirement. This is useful for new suppliers who you have no history with. It also is useful when you have a supplier who is habitually late. It gives them a target supply date you can measure while at the same time avoiding line shutdowns.

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<u>Coverage Profile</u> This is an inventory buffer based on forecast going forward, usually expressed in days.

Materials Master Changes (DISP_ALL) Materials Master Data Changes are visible in several ways, but the most useful way to see changes is as follows:

- Go to the MD04 and double click the part number to bring you to the Material Master Screens.
- Select "Environment" and then "Display Changes".
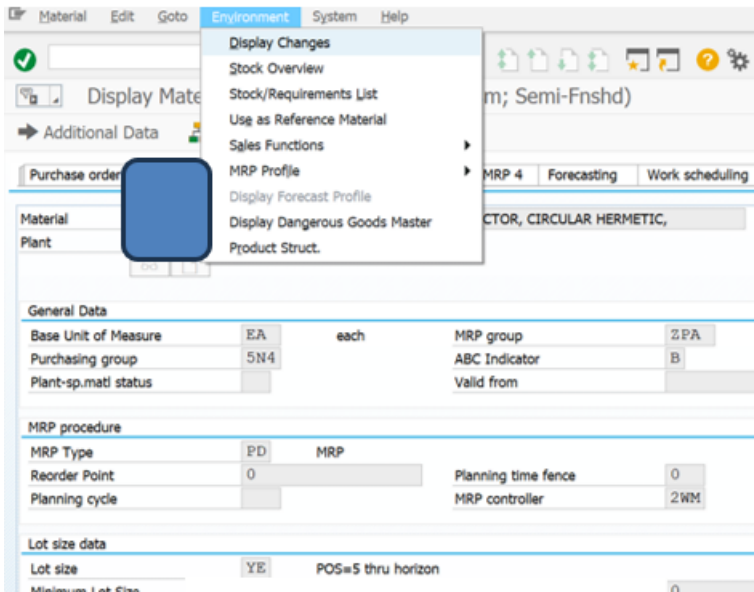
Then type "disp_all" in the Tcode field.

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Display Changes: Material Overview
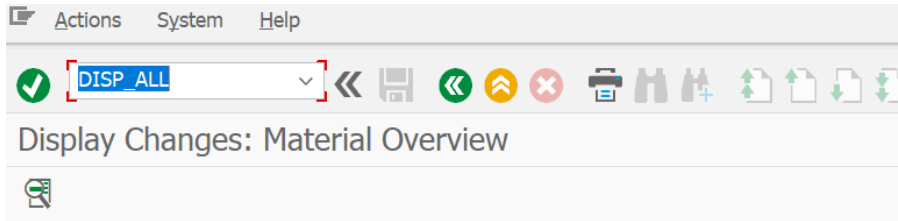
List of all change documents for material 1000203-52

Selected	Date	Time	Changed by	Change no.	Transaction Code
☐	07/07/2021	07:54:15	8173378		MM02(BAPI)
☐	05/12/2021	07:02:59	8173378		MM02(BAPI)
☐	01/06/2021	16:05:52	6809303		MM02(BAPI)
☐	01/01/2021	11:22:55	6809303		
☐	12/24/2020	18:33:19	7549076		ZMM02
☐	12/24/2020	18:33:19	7549076		ZMM02
☐	12/24/2020	18:33:18	7549076		ZMM02
☐	12/24/2020	18:33:18	7549076		ZMM02
☐	12/24/2020	18:33:17	7549076		ZMM02
☐	12/24/2020	18:33:17	7549076		ZMM02
☐	12/24/2020	18:33:16	7549076		ZMM02
☐	12/24/2020	18:33:15	7549076		ZMM02
☐	12/24/2020	18:33:15	7549076		ZMM02
☐	12/24/2020	18:33:14	7549076		ZMM02

All the materials changes should show up like below.
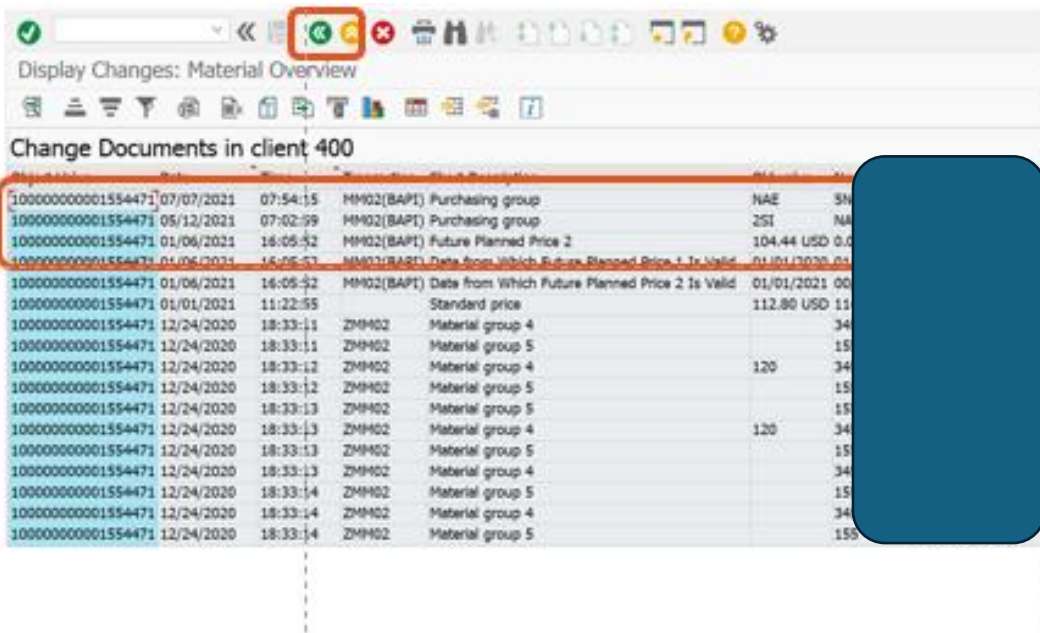
Be careful if you see a lot of changes. If you must change your materials master often, you are either not good at Materials Management, SAP, or most likely both. Here is an example of the issue of being bad at both. There are just too many changes happening and your MRP will get very "nervous".

Material	Date	Time	Transaction	Short Description	Old value	New value
1708056	03/11/2020	08:50:51	MM02(BAPI)	Purchasing group	5D9	4JS
1708056	02/07/2020	13:08:38	MM02	Range of coverage profile	324	302
1708056	01/24/2020	04:23:19	MM02(MASS)	Purchasing group	6JC	5D9
1708056	11/27/2019	09:35:58	ZMM02	Range of coverage profile	114	324
1708056	11/15/2019	12:06:15	MM02(BAPI)	Purchasing group	5XH	6JC
1708056	05/31/2019	20:45:10	MM02	Range of coverage profile	111	114
1708056	03/28/2019	09:05:44	MM02(BAPI)	Purchasing group	210	5XH
1708056	12/19/2018	12:02:51	MM02(BAPI)	Purchasing group	6JC	210
1708056	10/29/2018	13:59:10	MM02(BAPI)	Purchasing group	5XH	6JC
1708056	09/12/2018	09:55:55	MM02(BAPI)	Lot size (materials planning)	YE	YK
1708056	09/12/2018	09:55:55	MM02(BAPI)	Range of coverage profile	125	111
1708056	05/24/2018	12:22:34	MM02(BAPI)	MRP Group	2P6	2PA
1708056	05/04/2018	10:29:29	MM02(BAPI)	MRP Group	7P7	7P8
1708056	04/26/2018	09:37:16	MM02(BAPI)	Lot size (materials planning)	YK	YE
1708056	04/26/2018	09:37:16	MM02(BAPI)	Range of coverage profile	111	125
1708056	04/13/2018	07:33:08	MM02(BAPI)	Purchasing group	5Y6	5XH

It has been four hours, let's change SAP and see if it improves anything. NOT A GOOD PLAN.

Chapter 4 Data Governance

Ask yourself these questions: How Clean is your SAP Data? Can you prove it?

Some companies, none of which I have ever worked at, do a good job keeping their SAP data master clean and helpful. For the rest of us, this section will help show how bad we are at it, and to discuss some options for being less bad at it.

I am going to use the MRP Monitor to demonstrate this, but much of it could also be done with an extract of the MARC table. If you are not familiar with segmentation and nine blocks, it would be helpful if you reviewed my articles on segmentation before doing this.

I will show you a few things, but keep in mind you can do a lot with this. Of course, everything always starts with segmentation, but right now I am a little hung up on lot sizes and buffers so we will look at them as well.

I run the MRP Monitor for buy parts and select for review the following fields. For simplicity's sake, I will start with the segment that is AXH – high value, low variation, and frequent usage. Keep in mind one of the core principles of segmentation is that parts with similar attributes should be approached with a similar strategy. This does not mean there are not exceptions but be wary of a segment where everything is an exception. If things start to look random, they probably are.

In my AXH segment I have 420-part numbers. The first thing I want to check is the lot size field. When I click my filter on lot size, I see 11 different lot sizes are being deployed. I must admit I am suspicious already….
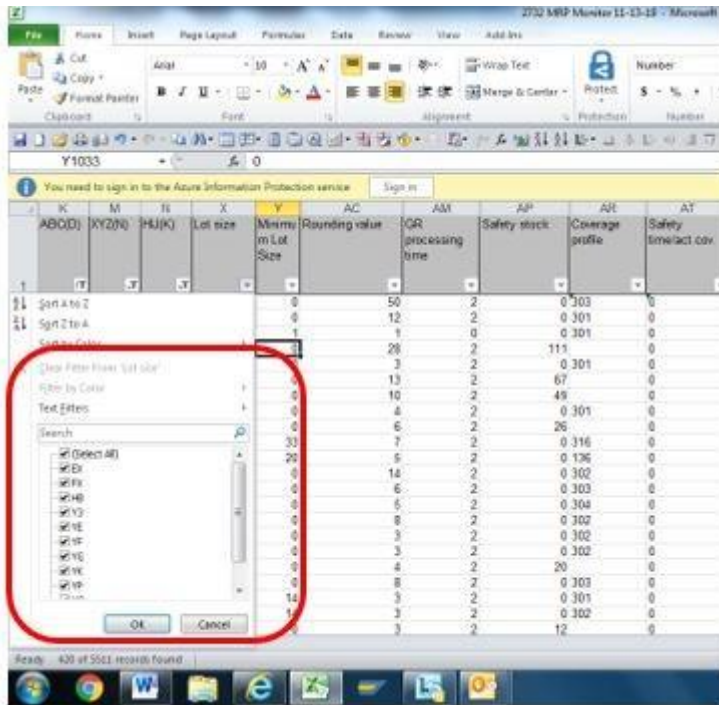
When I go in to MRP to look at the definitions I go to MRP1 (1), then click on the drop down for lot size (2), then review the pop up (3).
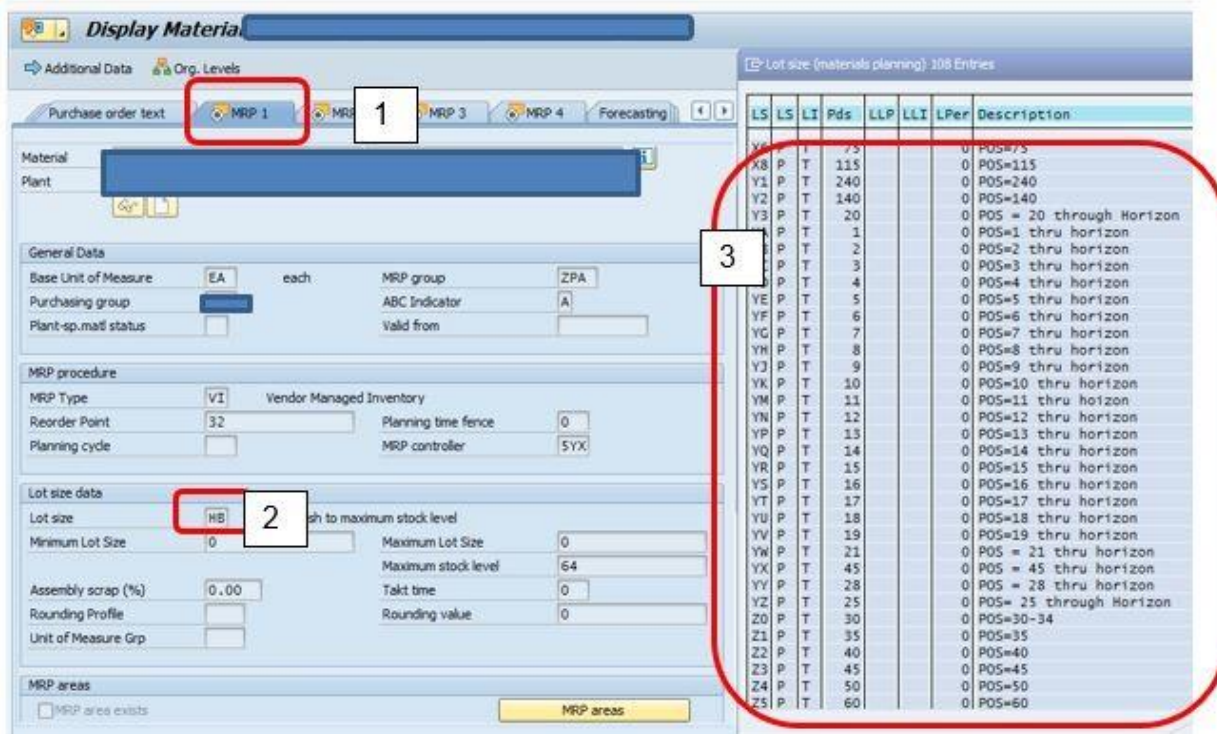
When I export it and match it with what is in the MRP monitor/MARC, I see the lot sizes are set like below.

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Lot size	Definition
YE	Period of Supply of 5 days
EX	Lot-for-lot order quantity
YG	Period of Supply of 7 days
HB	Replenish to maximum stock level
FX	Fixed order quantity
YF	Period of Supply of 6 days
YQ	Period of Supply of 14 days
Y3	Period of Supply of 20 days
YK	Period of Supply of 10 days
YY	Period of Supply of 28 days
YP	Period of Supply of 13 days

I know this plant is on a five-day work week, so a week is 5 days, not 7. When I see periods of supply (POS) in multiples of 7 I know the plant is not set up correctly. When you have a POS of 28, it means 5 weeks and 3 days, not four weeks or one month.

When I see POS of 6 days or 13 days, I have nothing to say really. They just look odd.

Another thing I would check is the number of coverage profiles being deployed.

With this site they are using 18 different coverage profiles to manage the 420 parts in this segment. Coverage profile is on the MRP2 tab.

 When I exclude the lot size EX, and look at the number of items with a coverage profile, I find 281 of the parts in this segment how a coverage profile and a lot size other than EX.

If you read my article on coverage profile you will recall that these fields interact to create a supply plan that is essentially additive of the two values. I know from experience when I see this the planners are not aware of what they are doing, and they are taking whatever variation is in the demand plan and amplifying it 5 to 10 times or more in the supply plan. That is not good.

I would also look to see if the planner is using both coverage profile and safety stock and at least ask the question why? If they are using coverage profile, safety stock, and safety lead time it especially needs review.

When I go into a segment and see this much that I need to ask about, I know a few things right away.

- There is no standard work, decisions trees or policies deployed.
- No one is monitoring the master data.
- There is no clear understanding of how a nine-block segmentation is supposed to work.
- The concept of simplicity has died if it was ever even alive.
- Your supply plans are being injected with an enormous amount of variation.
- There is huge potential for improvement.

Chapter 5 Standard SAP Reports for Materials Analysis

In this section we will look at standard SAP transactions that impact planning and inventory levels. I will show you how to set them up to get more out of them than the standard default layout and give you some clues on how to use the analysis.

These codes are part of the Logistics Information System (LIS) in SAP and create standard information structures for reporting. There are MANY reports here, and we will just touch on the few that I use regularly, and I view as critical for problem solving.

MC.9 The first Tcode we will look at is my favorite tcode, MC.9. MC.9 is a standard method of doing inventory analysis in SAP. Information on the number of times an item is used, the quantity used, and the type of consumption (planned or unplanned) can be built into standard extracts.[1]

Questions that the standard inventory screens can help answer include:

- What is my consumption history?
- When did I last receive an item?
- When did I last consume an item? A last receipt or consumption long ago may indicate excess and potential obsolescence.
- What is my inventory turns? Are they low? Are they too high and causing stock outs?
- Days of Coverage based on consumption?

First let's look at the opening layout and key points in it.

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[1] There are multiple similar codes to MC.9. For example, MC.5 provides the same information, but by storage location. MCBE and MC.1 can provide similar views.

INVENTORY ANALYTICS

For items that get put to a stock location, MC.9 can help you determine the vitality and trends of your inventory.

You can run it by MRP controller, wide open by plant, or by any other maintained value listed on the selection screen.

MC.9 always defaults to the last 90 days for a date range, but you can modify that just by changing the date range.

After making selections hit the execute button.

Material Analysis: Stock: Selection

SelectVers. | User settings | Standard drilldown

Characteristics

Plant	2745	to	
Storage Location		to	
Material		to	
MRP Controller		to	

Material Groupings

Material Type		to	
Material Group		to	
Valuation Class		to	

Period to Analyze

| Month | 03/2017 | to | 05/2017 |

Valuation

- ⦿ Standard
- ◯ Std w/o Distrib.
- ◯ MaterialLedger Active
- ◯ Current Price

If this screen pops up, just hit the green check mark, and move through it. Usually it means something proprietary (think defense related) and excludes certain materials.

SelectVers. | User settings | Standard drilldown

Characteristics

Plant	2745	to	
Storage Location		to	
Material		to	
MRP Controller		to	

Material Groupings

Material Type		to	
Material Group		to	
Valuation Class		to	

Period to Analyze

| Month | 03/2017 | to | 05/2017 |

Information ✕

ⓘ Authorization check: Scope of selection 'Plant' was restricted

Valuation
- ⦿ Standa
- ◯ Std w/
- ◯ Materia
- ◯ Current

Parameters

| Analysis Currency | |
| Exception | |

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- This should bring you here

This is a very important Button that lets you add a lot of power to this view

Material Analysis: Stock: Basic List

Switch drilldown... Top N...

No. of Material: 17475

Material	ValStockValue		Valuated stock		CnsgtStock	
Total	36,620,325.17	USD	8,633,948.471	***	0.000	***
MS20659-130	0.00	USD	0	EA	0	EA
MS21044N04	0.00	USD	0	EA	0	EA
MS21044N06	0.00	USD	0	EA	0	EA
MS21083C08	0.00	USD	0	EA	0	EA
MS21209C0420	0.00	USD	0	EA	0	EA
MS21209C0615	0.00	USD	0	EA	0	EA
MS21209C0615L	12.48	USD	2	EA	0	EA
	0.00	USD	0	EA	0	EA
	0.00	USD	0	EA	0	EA
	0.00	USD	0	EA	0	EA
	0.08	USD	8	EA	0	EA
	0.38	USD	64	EA	0	EA
	0.00	USD	0	EA	0	EA

This is your part number
This is your current $ value
This is your current in stock

Switch drilldown... Top N...

No. of Material: 608

Material	ValStockValue		Valuated stock		CnsgtStock	
Total	4,746,041.97	USD				
RCR07G103JS	0.00	USD				
RNC55H1913BS	0.00	USD				
RNC50H9532FS	0.00	USD				
RCR07G271JS	0.00	USD				
	0.00	USD				
	0.00	USD				
	0.00	USD				
	0.00	USD				
	2,007.69	USD				
	0.00	USD				
	0.00	USD				
	16.65	USD				
	0.54	USD				
	296.87	USD				
	0.00	USD				
	127.48	USD				
	0.00	USD				
	0.00	USD				
	0.00	USD				
	0.00	USD				
RCR07G330JS	0.00	USD				
RCR07G622JS	0.00	USD				

Choose Key figures

All

Selection criteria	Pool
Valuated Stock Value	No.cnsgt issues
Valuated stock	No.cnsgt.receipts
Consignment stock	No.material mvmts.
Last consumption	No.unpl.consumptions
Last Receipt	No.val. stk receipts
No. total usage	No.val.stock issues
Total consumption	No.val.stock zero
	Safety stock
	Stock M at Gds Rec
	Total stock
	Total stock = zero
	Total stock coverage

Current number 7
Maximum number 30

When I click here,
This comes up.
When I select the options,
I can bring them over to
The main spreadsheet by
Hitting the sideways
Triangles.
After I add the options
I want I have to hit the
Green check mark.

Now we start to get to the "good stuff".

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Material Analysis: Stock: Basic List

No. of Material: 608

Material	ValStockValue		Valuated stock		CnsgtStock		Last consumptn	Last Receipt	No. total usage	Total usage	
Total	4,746,541.97	USD	146,930.000	***	0.000	***			9,136	167,826.000	***
RCR07G103JS	0.00	USD	0	EA	0	EA	10/05/2016	01/03/2016	1	2	EA
RNC55H1913BS	0.00	USD	0	EA	0	EA	10/09/2016	10/17/2016	4	98	EA
RNC50H9532FS	0.00	USD	0	EA	0	EA	09/22/2016	08/20/2016	1	98	EA
RCR07G271JS	0.00	USD	0	EA	0	EA	10/08/2016	01/03/2016	1	8	EA
RCR07G202JS	0.00	USD	0	EA	0	EA	10/05/2016	01/03/2016	1	5	EA
JANTX1N5647A	0.00	USD	0	EA	0	EA	05/12/2017	02/23/2017	2	3	EA
M38510/10101BGX	0.00	USD	0	EA	0	EA	11/23/2016	11/23/2016	4	4	EA
M39015/3-008PM	0.00	USD	0	EA	0	EA	02/22/2016	01/29/2016	1	1	EA
M38510/12802BGX	0.00	USD	0	EA	0	EA	09/27/2016	01/03/2016	1	3	EA
RCR07G390JS	0.00	USD	0	EA	0	EA	10/08/2016	01/03/2016	1	4	EA
M38510/55501BZX	2,007.69	USD	1	EA	0	EA	01/10/2017	07/31/2016	2	27	EA
RCR20G302JS	0.00	USD	0	EA	0	EA	10/08/2016	01/03/2016	1	4	EA
M21038/27-02	0.00	USD	0	EA	0	EA	05/11/2017	03/31/2017	32	127	EA

Step 2

Material Analysis: Stock: Basic List

No. of Material: 608

Step 1

Material	ValStockValue		Valuated stock		CnsgtStock		Last consumptn.	Last Receipt	No. total usage	Total usage	
Total	4,746,541.97	USD	146,930.000	***	0.000	***			9,136	167,826.000	***
RCR07G103JS	0.00	USD	0	EA	0	EA	10/05/2016	01/03/2016		2	EA
RNC55H1913BS	0.00	USD	0	EA	0	EA	10/09/2016	10/17/2016		98	EA
RNC50H9532FS	0.00	USD	0	EA	0	EA	09/22/2016	08/20/2016		98	EA
RCR07G271JS	0.00	USD	0	EA	0	EA	10/08/2016	01/03/2016	1	8	EA
RCR07G202JS	0.00	USD	0	EA	0	EA	10/05/2016	01/03/2016	1	5	EA
JANTX1N5647A	0.00	USD	0	EA	0	EA	05/12/2017	02/23/2017	2	3	EA
M38510/10101BGX	0.00	USD	0	EA	0	EA	11/23/2016	11/23/2016	4	4	EA
M39015/3-008PM	0.00	USD	0	EA	0	EA	02/22/2016	01/29/2016	1	1	EA
M38510/12802BGX	0.00	USD	0	EA	0	EA	09/27/2016	01/03/2016	1	3	EA
RCR07G390JS	0.00	USD	0	EA	0	EA	10/08/2016	01/03/2016	1	4	EA
M38510/55501BZX	2,007.69	USD	1	EA	0	EA	01/10/2017	07/31/2016	2	27	EA
RCR20G302JS	0.00	USD	0	EA	0	EA	10/08/2016	01/03/2016	1	4	EA
M21038/27-02	0.00	USD	0	EA	0	EA	05/11/2017	03/31/2017	32	127	EA

Keep this little icon in mind.
When I click into a table field (step 1), and then click the icon (Step 2), the next slide shows up.

The field selected was the number of total usage (number of times an item was used, not the number of pieces used). If you recall when we ran this by MRP controller, we selected the date range 1/2016 t0 5/2017. This now shows us all the total usages by month.

Time series

Key figure   No. total usage

Material	01/2016	02/2016	03/2016	04/2016	05/2016	06/2016	07/2016	08/2016
Total	180	563	997	701	611	838	729	822
RCR07G103JS	0	0	0	0	0	0	0	0
RNC55H1913BS	0	0	0	0	0	0	0	0
RNC50H9532FS	0	0	0	0	0	0	0	0
RCR07G271JS	0	0	0	0	0	0	0	0
RCR07G202JS	0	0	0	0	0	0	0	0
JANTX1N5647A	0	0	0	0	0	0	0	0
M38510/10101BGX	0	0	1	0	0	0	0	0
M39015/3-008PM	0	1	0	0	0	0	0	0
M38510/12802BGX	0	0	0	0	0	0	0	0
RCR07G390JS	0	0	0	0	0	0	0	0
M38510/55501BZX	0	0	0	0	0	0	0	0

In the lower right-hand corner is an export button so if you are doing an XYZ analysis, you can pull it into a spreadsheet for easier manipulation and calculation of the coefficient of variation.

Click the little sideways arrow and the "Save List" pops up, and then select the green check mark and a location to save it.
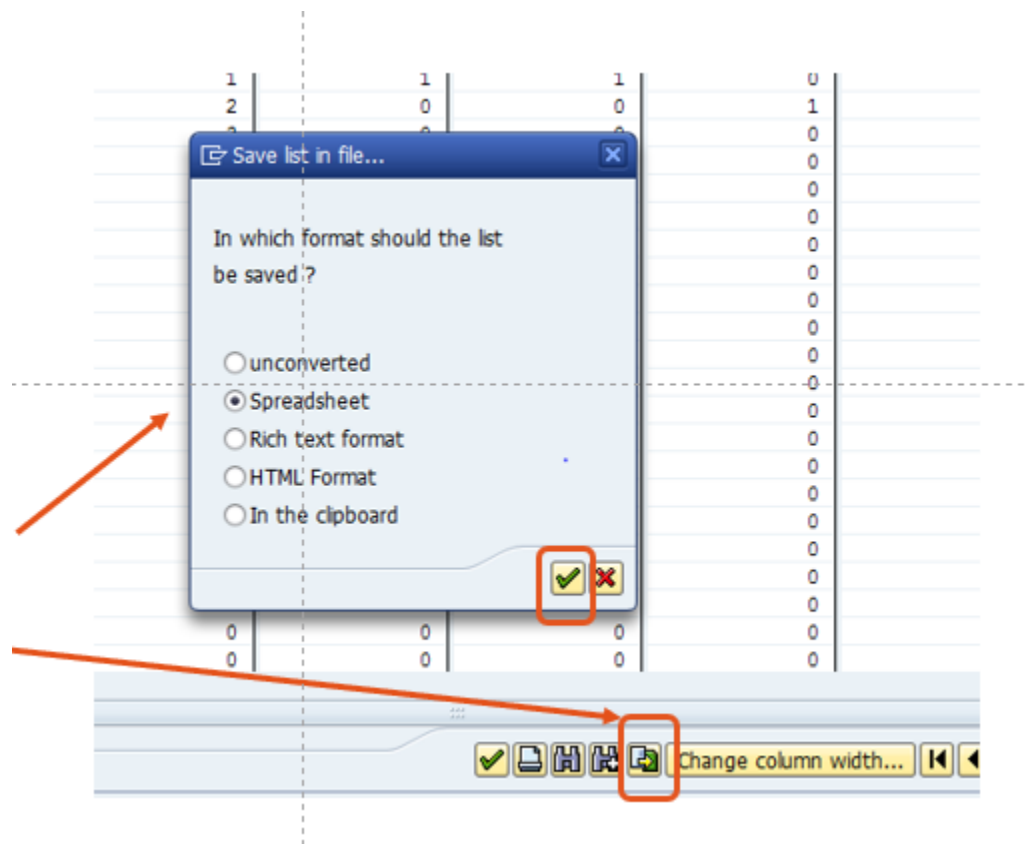
I am going to do the same thing for Total usage (which is the quantity used by month) and save that as well.

- Green check mark.
- Select directory.
- Name/Save file.

I can also export the higher-level current state snapshot. Note the export arrow is in the upper left corner for this one.

You may choose different defaults; these are the ones I typically use.

Note, when running analysis, I typically specify a 12-month date range as well.

After saving, if you want to add more dimensions, go ahead. If you don't save it, the default should stay the same.

- Valuated Stock Value is the value in the currency your plant uses, by part number.
- Valuated Stock is the quantity by part number.
- Annual Total Stock Turn Value is the turns by part number for the year.
- Average Range of Coverage is the number of days of the FORECAST covered (does not include past due).
- Total Usage Value is the value of the materials consumed in plant currency.
- Total consumption is the consumption quantity.
- The number of times the stock went to zero is the number of times an SAP location went to zero units, in that location. Some locations, like receiving, we will want to go to zero often.
- Number of total usages is the number of times a part was used (regardless of the number of pieces used each time).
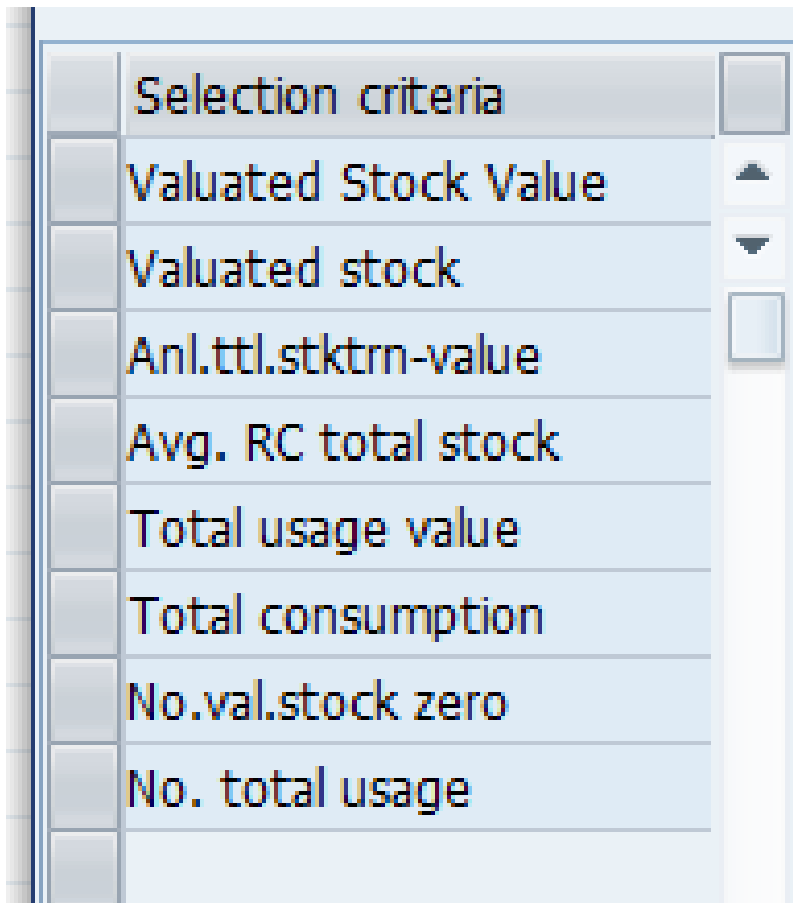
To save the key dimensions you like, so when you come back to MC.9 view you want, go to "Settings" and select save settings.
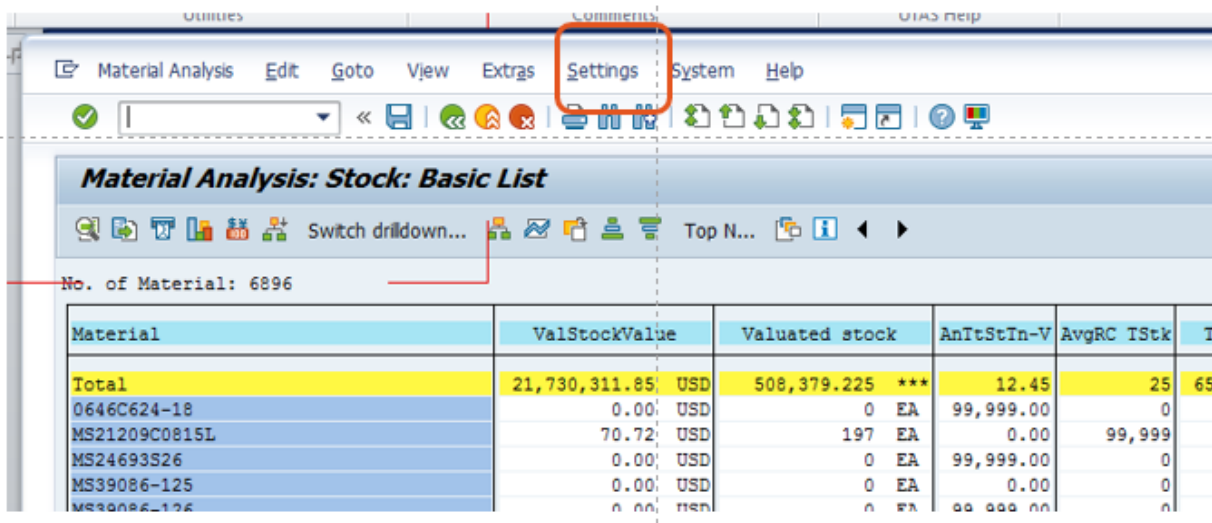
MC48 Learning to see with MC48.

A picture is worth a thousand words, and there are several MC screens that feature graphing capabilities and can certainly cause long conversations. One of my favorites is MC48. I use this Tcode ALL the time when problem solving.

To use it, type in the Tcode and populate the plant and one or more-part numbers.

This should bring you here. Next, single click in the blue field with the part number in it, and then go to the detail display button.

That will take you here where you select stock level and execute.

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Detailed Info on Material

Material

Plant.........

Goods movements (graphical/tabular)

- ○ Cumulative receipts/issues diagram
- ○ Goods issues
- ○ Goods receipts
- ◉ Stock level

- ○ Stock movements
- ○ Cumulative stock movements
- ○ Stock overview

✓ Back 🔍 ✖
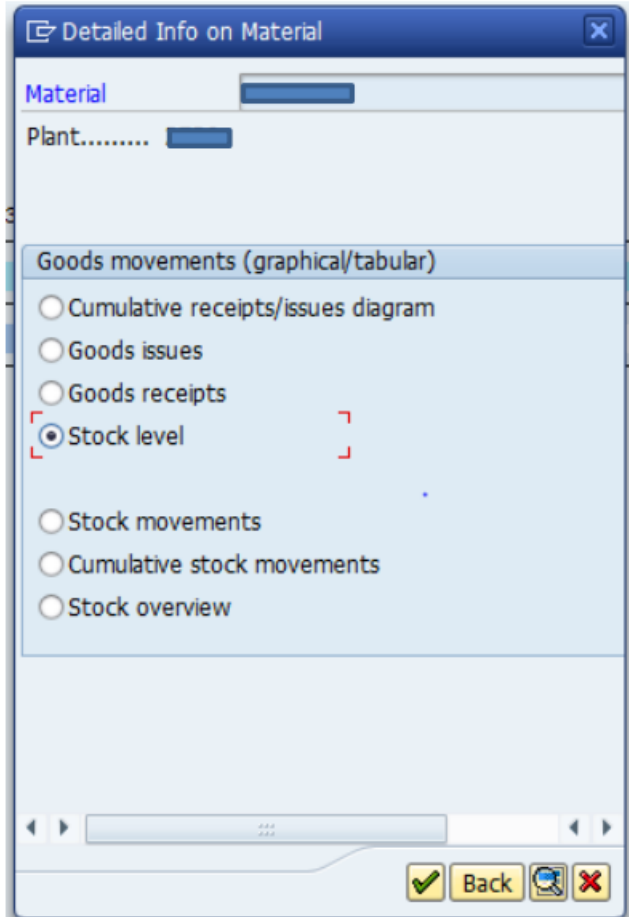
And that brings you here. What this screen shot tells you is your on-hand stock level over a range of time, up to three years. And that can tell you quite a bit.

I added the yellow lines to show you that the slope of the consumption is always the same. That means it is an "X" part. I can also tell I am using about 10,000 to 15,000 units a month by looking at the change in stock over that period.

With the blue lines I added, I can see we always replenish about one month's worth at a time.

From the white line, I can see we never go below 10,000 units in stock.
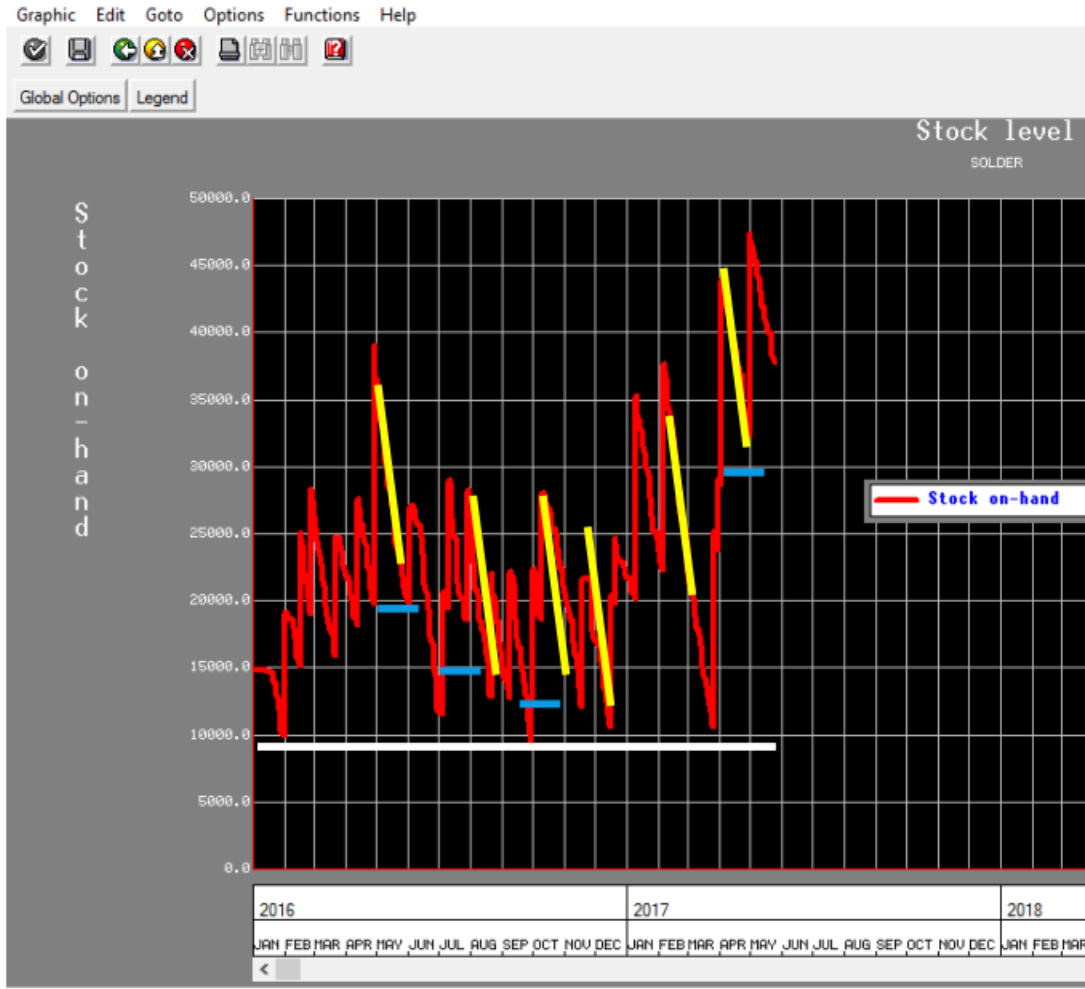
What I cannot figure out from this is what changed from 2016, where there was an extended period where the inventory levels were repeatable with the smallest variation, to 2017 where the inventory started to increase?

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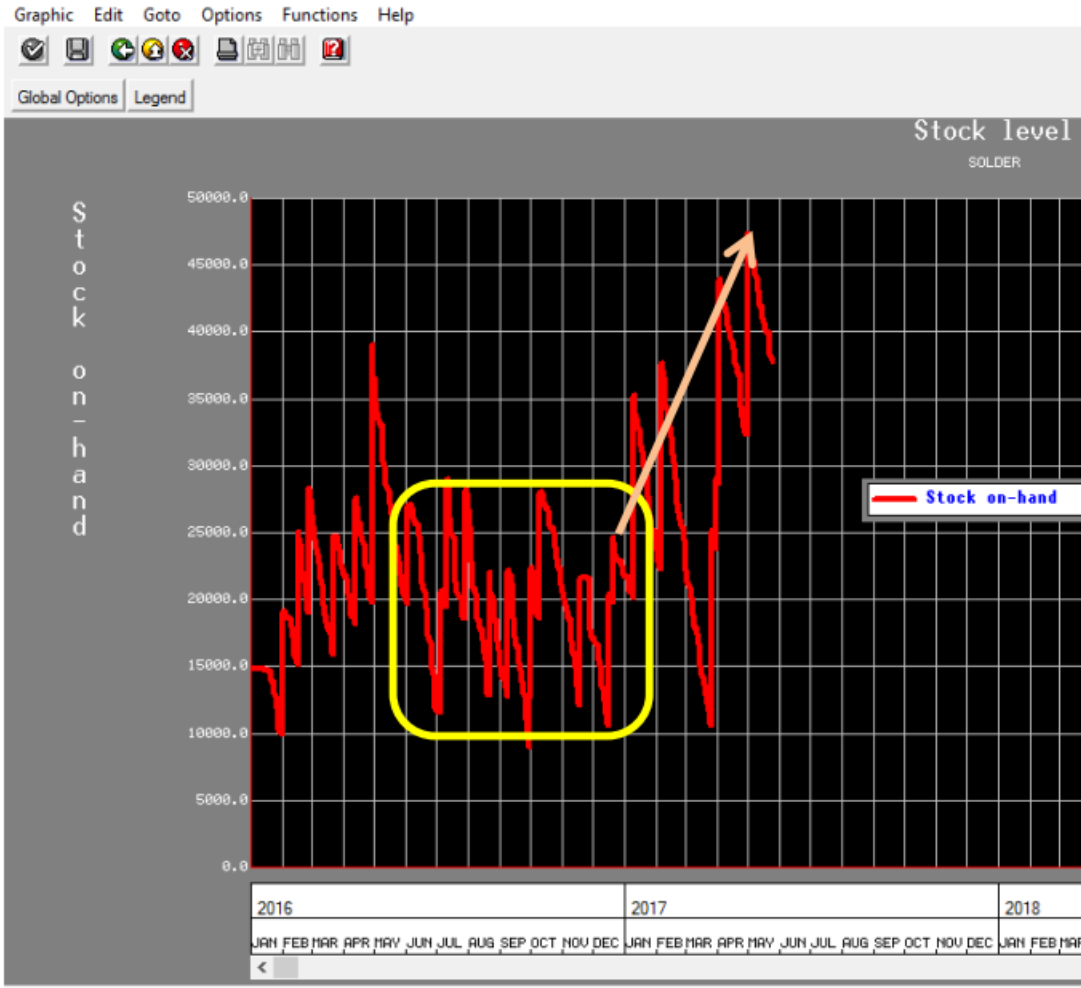
Typically, I would review the materials master for buffer changes, but I found a note in MD04 that told me what I needed to know.

Quantities and dates agreed to through EOY to secure favorable pricing. DO NOT MOVE PO's¤

I always use this on any part number where I have issues. It helps me start to walk through history and start to see when changes occurred. See my short article "Investigating a Materials Behavior in SAP" to see other tips.

Other MC Transactions

These have standard settings, so if you have been through the other MC reports, you will get through these.

Going into any analysis screen in SAP, I strongly advise you to thoroughly understand what the analysis screen is telling you. Many bad decisions have been made based on a bad interpretation.

When I first started using these, I had to toggle back and forth through multiple screens, especially MD04, to understand the meaning of what I was looking at. Sometimes I had to set these codes aside and come back later, often weeks later, with a fresh view to get the benefit.

And it is important to keep executives and middle managers out of the loop on these transactions until you understand them. They will make some wildly interpretive decisions based around these transactions, and you will be the one to suffer. And you will suffer badly.

MC44 Analysis of Inventory Turnover

You must populate an Object to Analyze and an Analysis period (Date Range). You can run it wide open or by a set of part numbers or by MRP Controller. The more you ask it to do, the longer the walk around the plant you will need to take while it is working.

When I went onto this screen after running a small set, I thought it was telling me gibberish, and it was. The materials set I had selected was low volumes, and the calculation was really looking at average usage divided by average on hand, or something like that. Since the job lots came few and far between, some low volume materials looked like they had terrific velocity. This was driven by the fact that I could assemble them quickly, and always shipped out the same day they were assembled (which was 3 months after we started making the components). So, it looked to be fast, but it was not.

In situations like this, you need to get as much information visible as possible, so I selected the "triple line" and figured it out from there. It did take an effort to understand what it was telling me, and you do need to be careful you check and understand the data before launching a load of interpretation upon the organization.

MC45 Analysis of Usage Values

Like the caveats in MC44, the Triple Line button illuminates what this transaction is telling us. Basically, it tells you where your volume is in terms of usage. Note that the usage is by material, so there is double counting. For example, a motor used in a car would have the usage for the motor counted at the motor level, but then again at the car level.

You could restrict this by running by MRP controller codes or sets if you want to. And this double counting is only a caveat, as there is a lot of useful information in knowing by $ value where your big hitters are for any given period.

MC46 Analysis of Slow-Moving Materials

This one looks at the usage of a part, specifically the last usage, and tells you how long it has been since there was a known usage. You can define the days to any number you want but it defaults to 400 days.

When you run this, it is good to go into triple line for at least the first visit. Some key points to remember as you do your analysis:

• New Parts may have no "usage."

• Large Lot Sizes can make usage look lumpy (or non-existent for certain ranges).

• If you moved something from being an SAP Inventory item to an expense or bulk item, you will not see SAP usage.

MC47 Requirements Value

Again, always understand what you are looking at, and validate. This screen looks at requirements by plant site, which should be straight forward enough if you validate what types of requirements you are working with, dependent or independent, and understand what you are seeing in terms of interplant activity. Also, watch out in MD04 to make sure you understand the lot size and frequency of builds over the date range.

One thing I would double check, and at this point I cannot find an example to prove one way or the other, is whether it looks for independent requirements as well as dependent requirements. It might treat independent requirements differently (or not at all). I will try and validate this shortly.

MCPW (and MCPU) Reviewing Cycle Time

One of the first things I do when I go into a site is to check how the site is performing against its manufacturing cycle times. Routings are important, and the Tcode MCPW is insanely easy to use, so why not check it?

When you go into MCPW it looks like this. You enter the plant, and if you want to you can change the date range.

Material Analysis: Lead Time: Selection
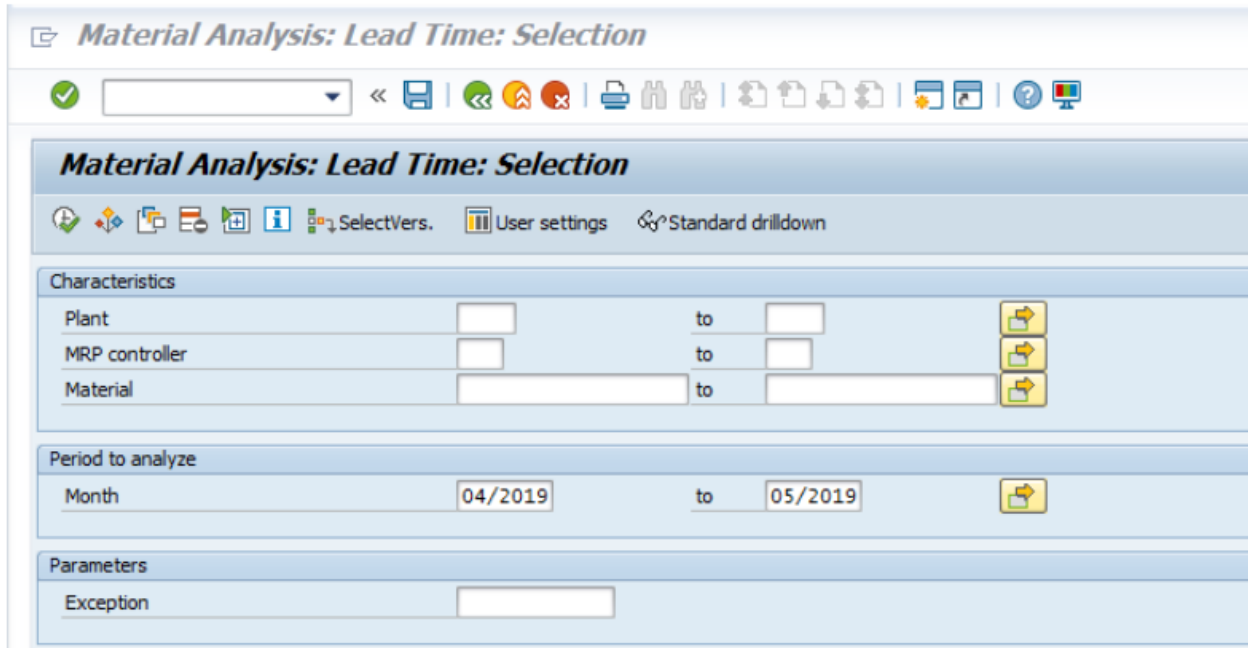
When you run the transaction, you won't get this unless you have set it up.

To set it up you go into the key figures icon and select them. Note: The key figures Icon is in most or all the MC screens.
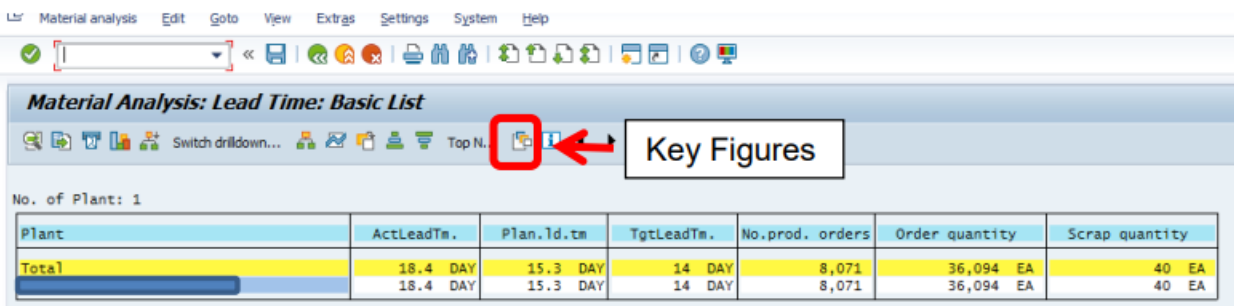
Use the little sideways triangles to move dimensions around.

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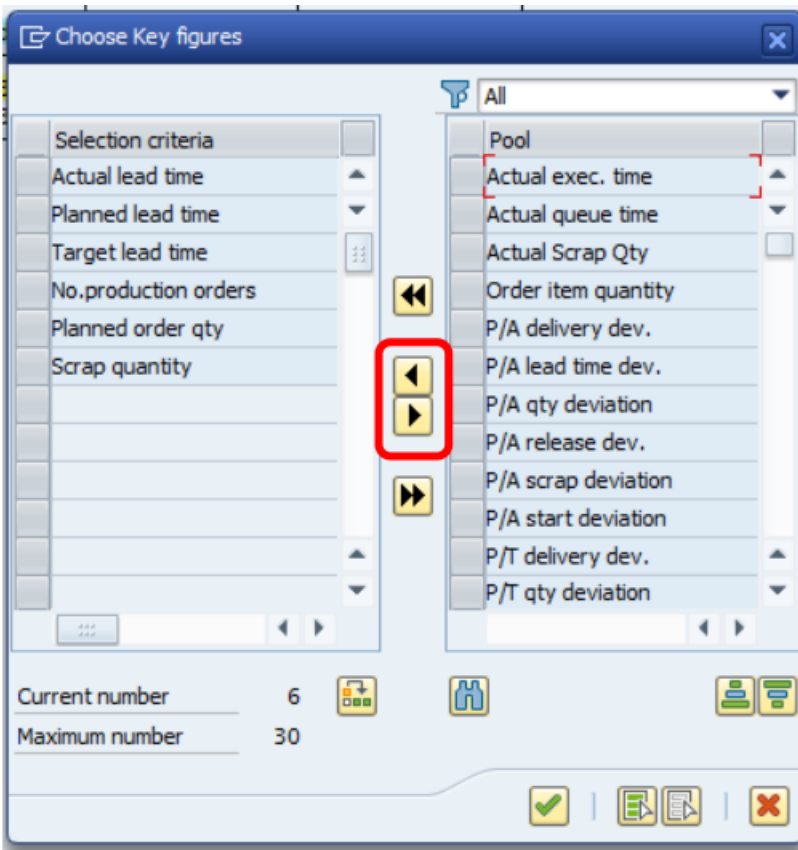
You can then go under settings and select save settings and click the green check marks to save them as your basic default lay out.
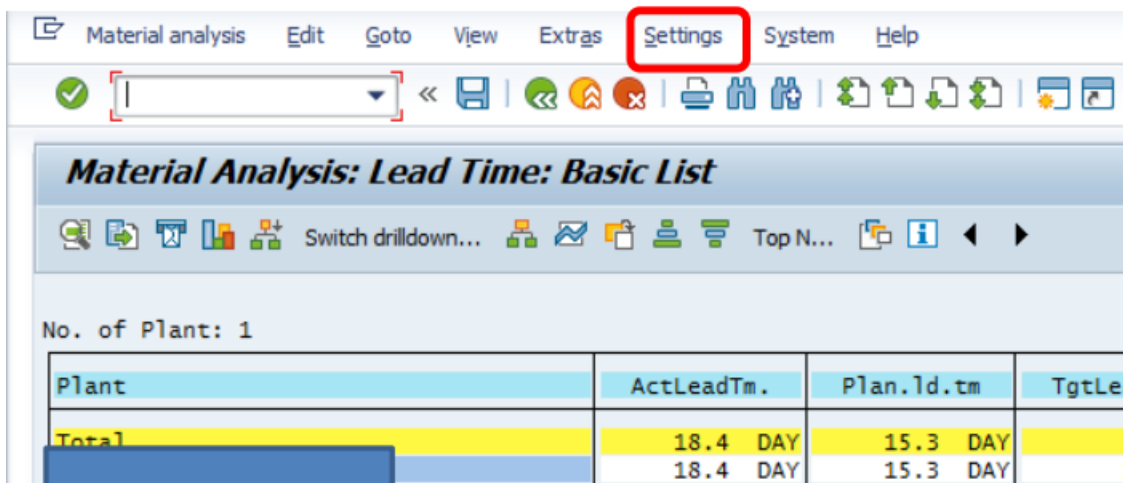
So, what is this now telling me?

At the plant level, I can see how we are performing to actual cycle time, planned cycle time at the order header level, and at the operation level. It does not tell me if I started on time, but it does tell me once I have started, how long it takes.

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No. of Plant: 1

Plant	ActLeadTm.	Plan.ld.tm	TgtLeadTm.	No.prod. orders	Order quantity	Scrap quantity
Total	18.4 DAY	15.3 DAY	14 DAY	8,071	36,094 EA	40 EA
	18.4 DAY	15.3 DAY	14 DAY	8,071	36,094 EA	40 EA

I can also drill down into it. Double click on the Plant number (hidden here to protect the guilty), and it takes you to the MRP Controller. I can sort using the icons for sorting by clicking into the white space of the key figures and moving the highest volume in pieces or in orders to the top.

Material Analysis: Lead Time: Drilldown

Switch drilldown...   Sorting icons

Plant   2735 PRO Electronics

No. of MRP controller: 17   Order quantity

MRP controller	ActLeadTm.	Plan.ld.tm	TgtLeadTm.	No.prod. orders	Order quantity	Scrap quantity
Total	18.4 DAY	15.3 DAY	14 DAY	8,071	36,094 EA	40 EA
2C	20.8 DAY	16.5 DAY	15.1 DAY	2,194	17,049 EA	0 EA
	17.5 DAY	15.8 DAY	14.5 DAY	717	4,268 EA	0 EA
	10.9 DAY	14.1 DAY	13 DAY	1,299	3,242 EA	40 EA
	14.7 DAY	14.7 DAY	13.3 DAY	622	3,239 EA	0 EA
	10.8 DAY	13.2 DAY	11.9 DAY	1,431	2,649 EA	0 EA
	12.5 DAY	13 DAY	11.6 DAY	556	1,713 EA	0 EA
	32.1 DAY	23.6 DAY	22.3 DAY	385	1,344 EA	0 EA
	27.7 DAY	16.8 DAY	15.5 DAY	264	783 EA	0 EA
	66.3 DAY	10.2 DAY	9.2 DAY	197	558 EA	0 EA
	48.4 DAY	23.2 DAY	22 DAY	145	536 EA	0 EA
	5.1 DAY	11.9 DAY	10.7 DAY	165	430 EA	0 EA
	38.2 DAY	18.3 DAY	17.1 DAY	82	270 EA	0 EA
	11.3 DAY	5 DAY	4.3 DAY	8	11 EA	0 EA
	104 DAY	3 DAY	1 DAY	1	2 EA	0 EA
	106 DAY	0 DAY	0 DAY	1	0 EA	0 EA
	163 DAY	0 DAY	0 DAY	2	0 EA	0 EA
2	126.5 DAY	0 DAY	0 DAY	2	0 EA	0 EA

I can double click on the MRP Controller and get to the part number level.

Prd.orders

	Prd.orders	Item quantity	Plan.ld.tm	TgtLeadTm.	Act. lead time
	717	3,792 EA	15.8 DAY	14.5 DAY	17.5 DAY
CIRCUIT CARD ASSY	37	272 EA	22.9 DAY	21.6 DAY	16.4 DAY
	35	203 EA	12.3 DAY	11.1 DAY	9.4 DAY
	33	145 EA	9.3 DAY	8.1 DAY	5 DAY
	31	126 EA	8.2 DAY	7 DAY	3.6 DAY
	29	232 EA	14 DAY	12.8 DAY	7.4 DAY
Part Number	27	84 EA	13.5 DAY	12.3 DAY	16.4 DAY
	26	243 EA	7.1 DAY	5.8 DAY	4.1 DAY
	21	168 EA	5.7 DAY	4.1 DAY	2.4 DAY
	19	116 EA	38.6 DAY	37.1 DAY	24.2 DAY
	18	136 EA	23.6 DAY	22.3 DAY	14.6 DAY
	17	152 EA	25 DAY	23.6 DAY	13.1 DAY
	17	125 EA	6.9 DAY	5.4 DAY	4.1 DAY
	16	92 EA	19.6 DAY	18.1 DAY	16.8 DAY
	15	97 EA	18.1 DAY	16.7 DAY	12.3 DAY
	14	86 EA	22.9 DAY	21.6 DAY	18.4 DAY
	13	78 EA	19.5 DAY	18.4 DAY	25.6 DAY
	13	63 EA	12.3 DAY	11.2 DAY	7 DAY
	12	55 EA	10.8 DAY	9.6 DAY	5.8 DAY

By double clicking on the part number, we can see how that part has performed over the period selected.

Prd.orders	Item quantity	Plan.ld.tm	TgtLeadTm.	Act. lead time
37	272 EA	22.9 DAY	21.6 DAY	16.4 DAY
19	136 EA	22.1 DAY	21.1 DAY	17.1 DAY
18	136 EA	23.9 DAY	22.1 DAY	15.7 DAY

MCPU is another transaction very similar to this, but it allows you to get more discreet with regards to the date range. These are very easy and quick transactions so really there is no reason not to try them out.

MC$6 and MC$4 How Late is Late? Vendor Analysis in SAP.

Suppose you worked at a company with an absolute train wreck of a supply chain, and you wanted to figure out which were the biggest contributors from the supplier base? Probably best to start with the worst suppliers in terms of being very late and working your up from there.

These T codes help you do that. As a Materials Manager I was always very interested in suppliers that were very late. From a traditional on-time score card, I could tell which suppliers were late, but had no quick way to sort out the ones that were really impacting me.

Go to the tcode MC$6 or MC$4 and add a plant and execute. You can open the default date range if you want to see more data.

My default is set for these key figures.

Choose Key figures

Selection criteria		Pool
Invoice Amount		Contract items
Deliv. date var. 1		Deliveries
Deliv. date var. 2		Delivery schedules
Deliv. date var. 3		GR quantity of returns
Deliv. date var. 4		GR value as at pstg. date
Deliv. date var. 5		GR value on order date
Mean delivery time		GR value: rets. as at pstg. d
		Inv.Amt (PstgDt.)
		Invoice amount: Returns
		Invoice price
		Invoice quantity
		IR qty. (pstg. date)

Current number 7
Maximum number 30

If your default does not look like this (and it won't in MC$4), here is how you change them. First, select your key figures (remember this is an MC screen so what you did for MC.9 works here as well, and remember to save your settings).

Vendor Analysis: Purchasing Values: Basic List

Key figures Icon

Sorting Icons

No. of Vendor: 206 Del.dt.vr5

Vendor	Invoice Amount	Del.dt.vr1	Del.dt.vr2	Del.dt.vr3	Del.dt.vr4	Del.dt.vr5	Mean del. time
Total	91,083,344.40 USD	6,130	12,862	2,524	2,833	16,188	82
	47,413,386.67 USD	2,952	3,301	786	1,319	13,625	51
	8,258,040.11 USD	1,479	1,752	236	321	455	96
	3,230,670.96 USD	442	508	121	98	369	37
	382,980.30 USD	43	762	242	260	297	137
	1,373,915.52 USD	46	364	80	61	228	121
	0.00 USD	47	250	64	14	132	10
	516,820.71 USD	19	450	50	35	100	125
	375,383.95 USD	64	147	36	44	64	136
	1,622,887.13 USD	14	56	18	9	56	110
	1,089,344.05 USD	46	311	76	45	52	117
	1,583,948.73 USD	49	431	144	85	48	160
	2,169,807.68 USD	81	131	9			74
	203,647.45 USD	36	200	38			196
	10,356.23 USD	3	47	20			123
	5,642.64 USD	15	59	8			354
	54.89 USD	97	118	26			111
	1,476,150.94 USD	32	107	30			126
	93,343.24 USD	26	221	5			139
	167.27 USD	15	41	12			340
	228,179.92 USD	35	149	17			195
	9,032.70 USD	15	13	16			85
	360,734.60 USD	27	177	13	12	26	120
	9,118,578.01 USD	84	207	22	11	22	43

Supplier names hidden to protect the guilty

My favorite column to sort. Just click in it and use the sorting icon.

What do these key figures mean?

In standard SAP the categories mean:

Delv Date 1 = greater than 10 days early.

Delv Date 2 = 2 to 10 days early.

Delv date 3= (+/-) 2 days early or late.

Delv Date 4= 2 to 10 days late.

 Delv Date 5 = 10 days or more late.

The date ranges can be modified and customized so check with your SAP team to validate these are the settings you are getting, and then decide amongst yourself if they are what you want.

Materials that are ten days or more late almost always will cause disruptions in production. Materials more than ten days early can impact inventory and is a concern as well.

In the below example we will look at the very late.

First, I sort on the lines late in DLV Date 5 to get the data sorted to show the supplier with the most lates.

This vendor is a good example of a vendor who is missing most lines. We can also see the mean delivery time for the suppliers.

Vendor	Invoice Amount	Del.dt.vr1	Del.dt.vr2	Del.dt.vr3	Del.dt.vr4	Del.dt.vr5	Mean del. time
Total	621,779,306.13 ***						
	35,619,153.82 ***	3,388	4,157	913	1,459	13,267	60
Supplier names	6,927,148.57 ***						
	49,086,309.18 ***	1,304	4,124	519	625	6,068	78
	13,897,218.94 ***	1,227	14,628	857	597	3,772	23
	3,365,476.88 ***	163	433	91	116	3,504	135

If I double click on the vendor's name, I can go to the part number level, and sort again to see which parts are performing the worst.

We can also double click on a part number and change the drill down to date and see that this part has performed poorly over most months.

Vendor [   ] Material [   ]

No. of Month: 6

Month	Invoice Amount		Del.dt.vr1	Del.dt.vr2	Del.dt.vr3	Del.dt.vr4	Del.dt.vr5	Mean del. time
Total	2,145,051.66	USD	54	86	12	116	859	36
06/2019	0.00	USD	0	0	0	0	55	8
05/2019	217,745.21	USD	0	0	0	0	259	55
04/2019	0.00	USD	0	0	0	6	168	52
03/2019	226,378.28	USD	0	17	4	27	123	27
02/2019	1,109,829.11	USD	54	69	8	80	45	11
01/2019	591,099.06	USD	0	0	0	3	209	43

This is an easy way to look at a lot of information quickly. I encourage you to play around with it and see what other goodies can be found in the other key figures and the drop-down menus.

Chapter 6 MRP_LIST (SAP MRP)

In this section we will look forward to what SAP's MRP is projecting. We will learn how to run the report, how to constrain it if necessary, and how to identify major MRP Elements. Knowing what the MRP system is driving is fundamental to managing our inventory levels and understanding how the future is compared to the past. It is also very important should we develop a planning workbook for both nine-block analysis, and detailed analysis at the part number level.

MRP_LIST is a listing of all things in an MRP Area – inputs, outputs, and balances. Every SAP MRP site should have an MRP_List. It is probably available as an extract custom report. If it is not, ask for it, demand it!

There can be multiple MRP Areas in a plant and each will generate a list. Many plants will have only one MRP Area so if this sounds "unfamiliar" it may be that your site just has one MRP area, and you can run it at the plant level. If you have multiple MRP Areas, you will need to define the RMP area when you set up the run of the list.

MRP Elements are things like purchase requisitions, purchase orders, STRs, STOs, dependent requirements, dependent reservations, etc.

They are "+", "-", and "B" balances. Pluses are inputs, minus is output, and balances are balances.

These are the typical MRP elements used, but not the only ones. I would recommend running your site for a specific time frame and seeing what ones you use. [2]

MRP Element	
SB	SB Dependent requirement
BE	BE Order item schedule line
AR	AR Dependent reservation
BA	BA Purchase requisition
LA	LA Shipping notification
LE	LE SA schedule line
U1	U1 Release order for a stock transfer order
FE	FE Production order
PA	PA Planned order
U2	U2 Release order for a stock transfer requisition
VC	VC Order
VJ	VJ Delivery

An important note about MRP_LIST...MRP is huge in terms of data. This will be a huge list and can be difficult to run it if you do not constrain it. Many times, I have heard "MRP_LIST

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[2] When I go someplace new, I do this, then count the number of element types and the number of times they show up to select the key elements I want to work with.

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does not work here" and really the issue is the size of the report, the amount of data you are trying to process. Too much and the system bogs down and times out.

Example – MRP List for purchased Materials (externally sourced materials Procurement type "F")

MRP_LIST is an extract of MRP by site and MRP Area. If I want to see what the external supply for an MRP Area is, I populate Plant, MRP Area, MRP Elements LA, LE, BA, BE, procurement type and date range and execute. It takes a little while to run, but I have run complex plants for three-year windows in less than an hour.
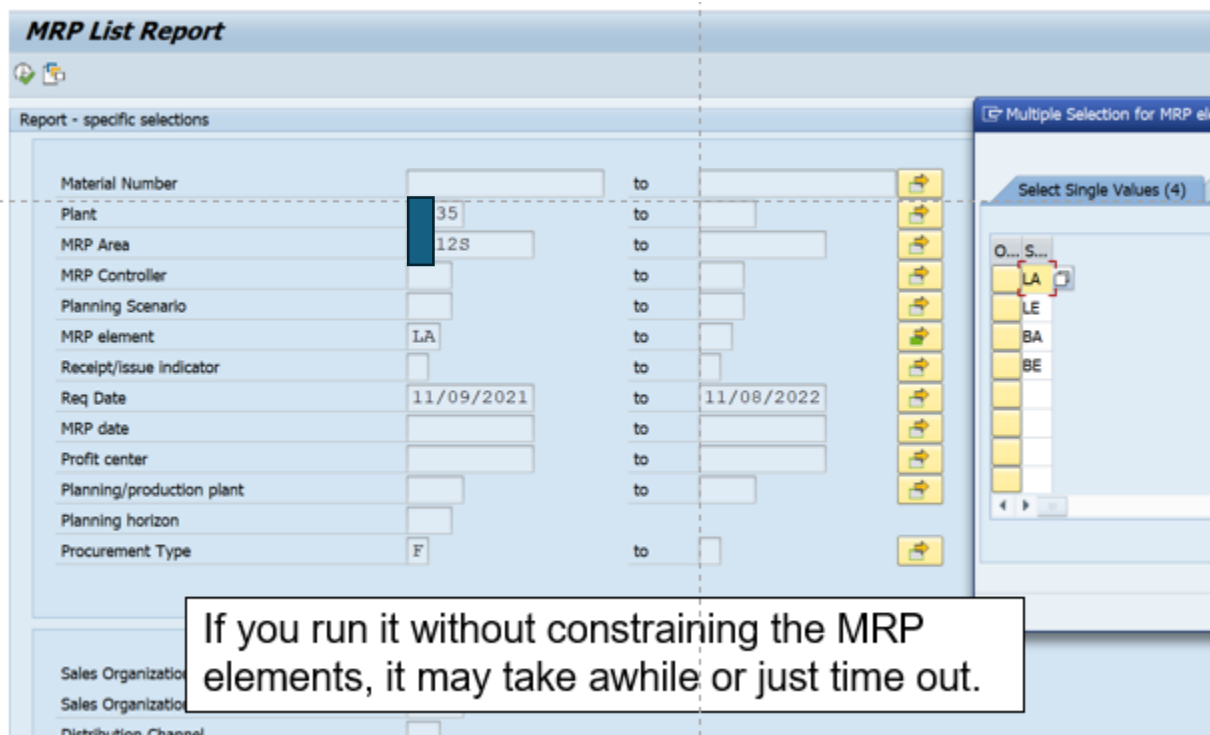
Output - My list default layout includes 52 elements, but you can make the listing smaller by changing the layout and saving it as something else. See highlighted icon.

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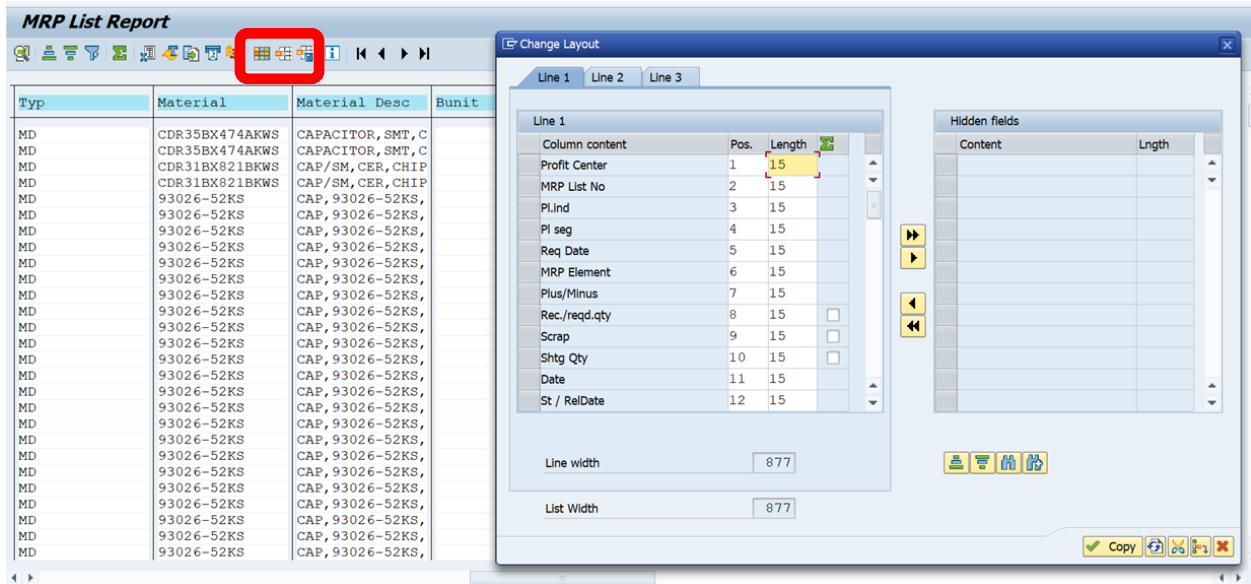
Exporting the file -The easiest way to export this is to hit the spreadsheet icon. The second highlighted icon also works but takes a couple more steps.
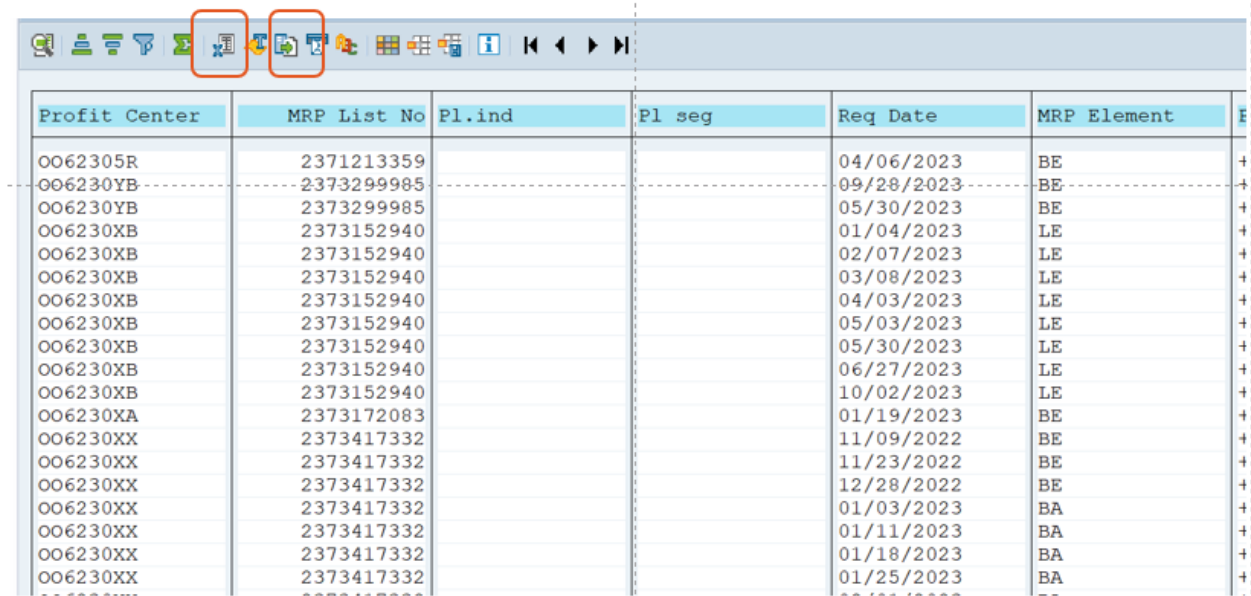
Adding cost to it allows you to use it for monthly inventory projections or allows you to quickly quantity the values of exceptions messages, by putting it into a pivot table.

STOs for Internal plants are included and are part of the BE MRP element for this site. Check this data point though for your sites. Sometimes when a company has sites that are in different legal entities, we might see purchase orders used (we might be treating the siter site as an external supplier).

You can do other stuff with it.

50

For one site I ran it for 12 months and then decided to see how many purchase requisitions I was generating per part number using a pivot table.

The top item is generating 284 purchase requisitions in a 12-month period – more than one for every working day (assume 250 workdays in your SAP Calendar).

Do we need 11 shipping notifications for one day? Followed by 11 receiving activities, and multiple invoices? And another set of POs do on the following day?

Row Labels	Count of MRP List No
1020427-4	284
1020423-4	215
1022365-11	106
1023859-3	103
5917231-46	84
1022365-12	68
1020429-3	66
5P8071-531-0001	61
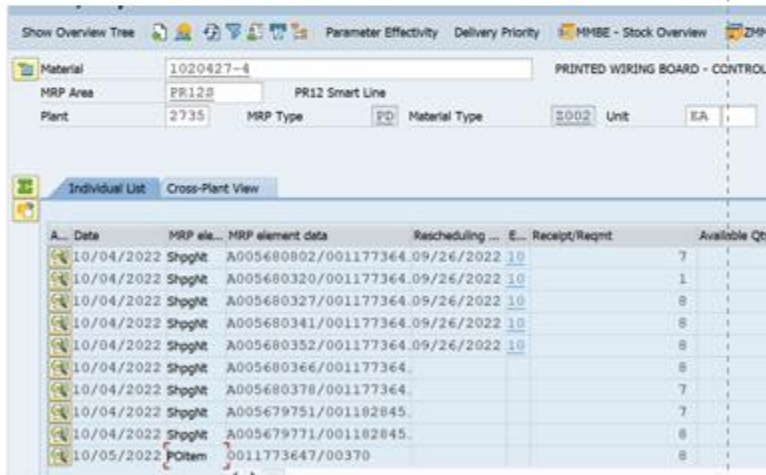
A good practice is to save these on at least a quarterly basis for record-keeping purposes.

Did the forecast change? Did it move? Increase or decrease?

If a supplier is short, and we historically over forecast, what does that mean?

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Chapter 7 Buffers

In this section we will focus on understanding SAP buffers and how they impact inventory optimization.

What we will cover includes static safety stock, coverage profile, and Safety Lead time.

Inventory optimization, in a perfect world, is the amount of inventory you would expect to have, based on key SAP Parameters such as lot size and buffers. Knowing what targets you have set SAP parameters to achieve gives us a good starting point for understanding where inventory optimization opportunities are.
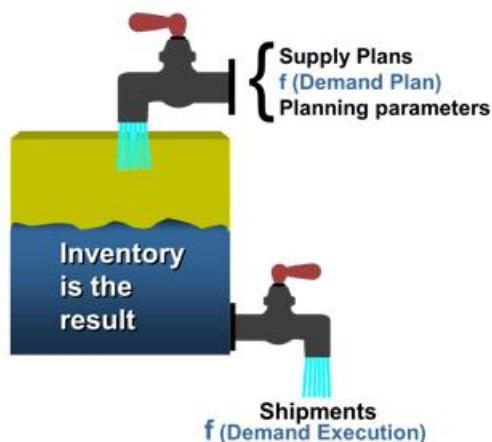
Inventory optimization is a function of:

- Replenishment Strategy.
- Lot Size.
- Buffers.

There are three types of buffers:

- Capacity, where you have enough excess capacity to meet demand.
- Inventory, where you bring in a supply greater than the requirement for a given period.
- Time, where you bring in a supply equal to the requirement, but you bring it in early.

The BEST buffers are:

- Part of an overall strategy that focuses on minimizing variation.
- The strategy should be based on a nine block but not a slave to it.
- Involve some kind of decision tree or check list.
- Documented as standard work.
- Solve a problem rather than cause some problems.

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- Simulated so you can see what you are doing.

SAP standard buffers are on the MRP2 screen in the materials master.[3]

Safety stock is an inventory buffer. It drives additional "demand" into the supply chain to create more inventory than is required by MRP in a period (1).

Coverage Profile is also an inventory buffer. The inventory buffer target is based on forecast and specified in days. Like safety stock, it will attempt to create a supply plan greater than forecast and customer orders in each period (2).

Safety Time is a time -based buffer. It causes materials to arrive before the start of the MRP production date (3). It does not theoretically drive Supply > Demand for a requirements period.

Goods receipt can also be argued to be a time-based buffer but let us not go there.
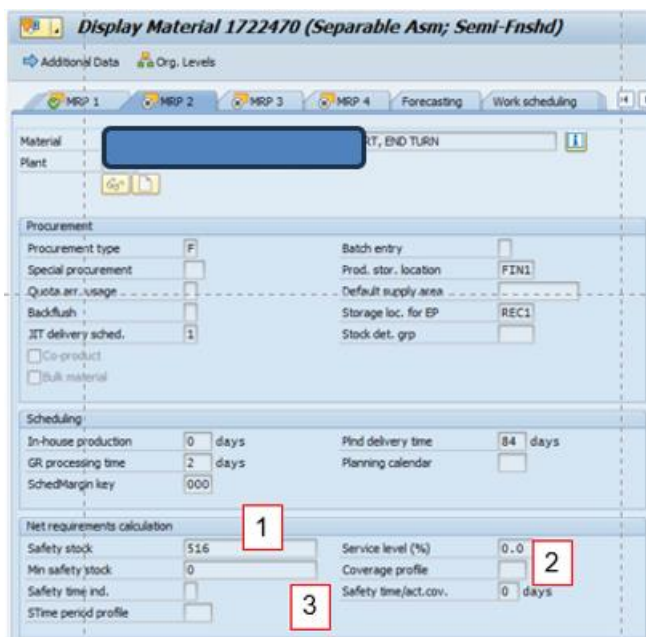
Buffers are used to minimize the impact of uncertainty in demand or supply. If capacity is not sufficient to meet this uncertainty, inventory, or extra time, can be used to prevent or minimize the impact of unexpected demand or interrupted supply.

Buffers, because they do increase your inventory levels, are not cheap, so we do need to have a strategy that can be followed and audited for impact.

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[3] Boring people will argue that any form of queue time such as a goods receipt time, or large lot sizes, are buffers as well, and that is sort of true, but sit with someone else at lunch.

Safety time is a time-based buffer. It brings in a supply equal to the requirement, but it brings it in earlier than the requirement's need date. It does not bring in "extra" material.

How to set up Safety Lead times:

GO TO MM02 and MRP2 tab.

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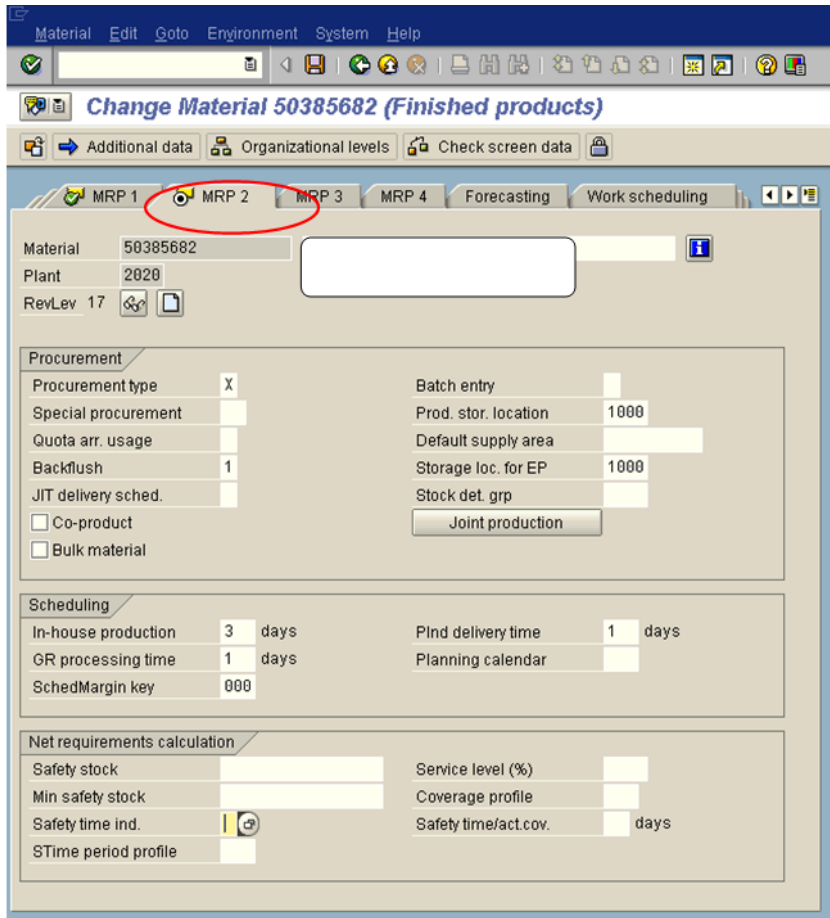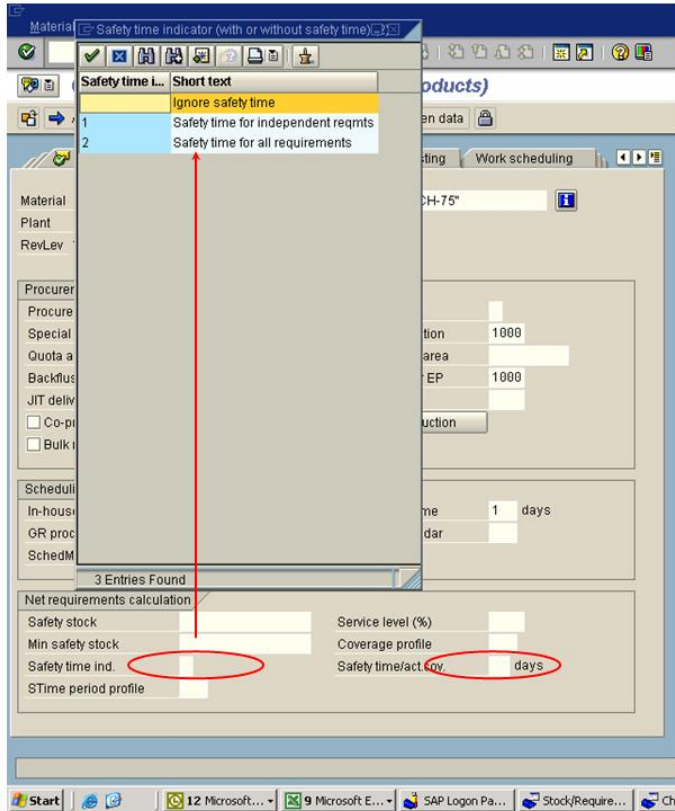
Safety Time indicators are usually set at "2", which buffers the entire demand, customer orders and forecast both. The "Safety Time/Act cov" is where you populate your days coverage. I strongly recommend you test your understanding of days. Check to see whether "5" is a week, or whether you need to put a "7" in to get a calendar week. It should reflect your shop/manufacturing calendar.

Be sure to run simulations and review in MD04. Is it doing what you expect it to do?

Safety Stock, when executed correctly, will create an inventory supply plan that is greater than the requirements for a given period.

With safety stock you specify a quantity to hold in buffer above the MRP requirements. SAP will work treat the value as a "false" zero and plan to keep the inventory above that level.

If we break that level, we can use the inventory (in most cases) until it is depleted. When we break the safety stock level, we should get an exception message "96" which means we are below the safety stock target.

Here is an example. In the table below we can see customer orders steady at 5 per week. We have two weeks set as our safety stock target (10 pieces). The starting inventory is 10, which keeps us at the safety stock level for week 1.

55

Supply, for whatever reason, is not steady. We get 5 pieces in week 1, but zero in weeks 2,3, and 4.

Week 1 MRP is stable, no exceptions.

In Week 2 our inventory goes below the safety stock target of 10 so we would get an exception message "96" warning us we were below target. We can still ship because although below target we still have inventory.

Week 3 will look the same. We get the "96" message and can still ship.

Week 4 we will get the "96" message but stop shipping since we have no inventory.

Week 5 rolls around, and we get a large supply order of 20, which allows us to ship the backlog from week 4, and week 5 orders. We also get back to the safety stock target and no longer have the "96" exception message.

	Week 1	Week 2	Week 3	Week 4	Week 5
Customer Orders	5	5	5	5	5
Shipments	5	5	5	0	10
Supply	5	0	0	0	20
Safety Stock	10	10	10	10	10
Inventory	10	5	0	0	10

Coverage Profiles are also an inventory buffer. Executed correctly we would have a supply greater than the requirements for a given period.

To do this we go to the MRP 2 tab to locate the coverage profile field.

Click on the drop-down button and you should see something like this (although hopefully a less insane number of them).

```
Coverage profile 87 Entries                           ✕

Prof. Name

001   3 days in the next month, then 5 days
005   5 times daily requirement
100   4 Periods - 1/2/40 end of horizon
101   4 Periods - 1/3/40 end of horizon
102   4 Periods - 1/4/40 end of horizon
103   4 Periods - 1/5/40 end of horizon
104   4 Periods - 1/6/40 end of horizon
105   4 Periods - 1/7/40 end of horizon
106   4 Periods - 1/8/40 end of horizon
107   4 Periods - 1/9/40 end of horizon
108   4 Periods - 1/10/40 end of horizon
109   4 | 1 |ds - 1/| 2 |0 end of horizon
110   4 |   |ds - 5/|   |5 end of horizon
111   4 Periods - 5/10/20 end of horizon
112   4 Periods - 5/10/40 end of horizon
113   4 Periods - 10/20/40 end of horizon
114   4 Periods - 10/15/20 end of horizon
115   4 Periods - 1/2/20 end of horizon
116   4 Periods - 1/4/20 end of horizon
117   4   What you care about is
118   4       1.  The number of periods.
119   4       2.  The 3 numbers here.
120   4
121   4 Periods - 1/5/20 end of horizon
122   4 Periods - 1/7/20 end of horizon
123   4 Periods - 1/10/20 end of horizon
124   4 Periods - 1/3/10 end of horizon
125   4 Periods - 1/5/10 end of horizon
126   4 Periods - 1/7/10 end of horizon
127   4 Periods - 1/2/10 end of horizon
128   4 Periods - 2/15/40 end of horizon
129   4 Periods - 1/3/5 end of horizon
134   4 Periods - 5/5/10 end of horizon
135   4 Periods - 10/10/20 end of horizon

                    ✔ 🔽 ⭐ 🔍 ✖
```

What coverage profile does is look at the forecast and it calculates a dynamic buffer in days. The number of periods considered is the number of (typically) months that are considered for the buffer's calculation. In the above example when it references "4 Periods" it tells

us the number of forecast periods it is using to calculate the average daily requirements.

The three numbers in a row (e.g. coverage profile 125, which is 1/5/10) tell you the following:

1. The first number tells you about the buffer in days. The idea is to never let your buffer go below, in this example, 1 day of supply.

2. The second number is the target for you to order up to. So here when the MRP believes it is going to have one day of supply, it will launch an order to get up to five days of supply. In a perfect world, your inventory would be between one day of supply and five days of supply.

3. The third number is about exception messages. Basically, you will not see an exception message until you exceed this number in supply. In this example, your supply will need to exceed 10 days before you get a message. And the message will not be a push out or pill in message. It will be a message saying you have "excess" (exception message number 25). It will not propose a reschedule out date.

So how does this work? Well, it can be confusing because other SAP Parameters, specifically lot size, can cause this to deliver results that may not be in line with what you were expecting. For simplicity's sake, we will look at a part number with a "lot for lot" lot size (EX). The part is also a high volume, stable consumption part (H and X).

Coverage Profile is 10/15/99 with a rounding value of 6. When in daily buckets you can see the system working the parameters. When the system expects to be at 10 days coverage, it generates a supply to cycle back up to 15 days.

A..	Period/segment	Requirement	Receipts	Avail. Quan...	ATP quantity	Actual coverage
	04/29/20	11-	0	36	0	13.2
	05/04/20	4-	18	50	0	15.5
	05/06/20	11-	0	39	0	13.5
	05/08/20	4-	0	35	0	11.5
	05/13/20	11-	24	48	0	16.8
	05/15/20	4-	0	44	0	14.8
	05/19/20	11-	0	33	0	12.8
	05/22/20	4-	18	47	0	15.2
	05/27/20	11-	0	36	0	13.2
	06/01/20	4-	0	32	0	10.2
	06/03/20	11-	24	45	0	14.0
	06/08/20	4-	0	41	0	11.0

Individual List | Cross-Plant View

Days | Weeks | Months

Date | GR | ST ... | Page | 6 / 24

Again, if you use coverage profiles on low volume materials (I or J items), you need to keep in mind that since coverage profiles are based on forecasts, periods with no forecast or

very low forecasts may not be buffered. Run simulations, see what the values look like, and decide if the system is giving you the results you want.

If you are not getting results you like on I and J items, and still want to buffer, consider static safety stock or safety lead time.[4]

Lot Sizes and Coverage Profile

One of the dark secrets of coverage profile is its almost unnatural relationship with lot sizes. When you use a lot size other than EX, the coverage profile replenishment signal and the lot size value at times appear to combine, to form a new supply signal.

This is a lot like the movie "The Fly" and almost as useful.

How does this look in SAP? For this example, we will look at a coverage profile targeting 10/15/20 and a lot size of Y3 which is a period of supply of 20 days.

The coverage profile wants to maintain a minimum of 10 days, and when replenishing target 15 days. You won't get an exception message until you exceed 20 days of supply. But the lot size wants to order 20 days at a time. So how does the system resolve this?

In the below example we can see the system takes the inventory down to almost 10 days, before sending a supply signal to take it over 30days (basically it is ordering the five days lot size the coverage profile wants PLUS the 20 days the lot size wants).

And because this is above the 20 days maximum, you will get exception message 25 (excess) on every order you generate.

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[4] I hate coverage profiles.

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A..	Period/segment	Requirement	Receipts	Avail. Quan...	ATP quantity	Actual...
	03/17/20	13-	0	345	0	14.4
	03/19/20	40-	0	305	0	12.4
	03/20/20	29-	0	276	0	11.4
	03/23/20	32-	0	244	0	10.4
	03/24/20	7-	0	237	0	9.4
	03/25/20	2-	0	235	0	8.4
	03/26/20	27-	539	747	0	31.0
	03/27/20	15-	0	732	0	30.0
	03/30/20	76-	0	656	0	29.0
	03/31/20	22-	0	634	0	28.0
	04/01/20	2-	0	632	0	27.0
	04/02/20	18-	0	614	0	26.0

You do not have to believe me that this is happening, but you should check the results in your own system and decide for yourself what it is doing. Usually when I see this, I realize that the people using the coverage profile both do not understand it and are not validating what the parameters are doing.

Since inventory optimization is a function of lot size, replenishment type, and buffers, it is critical to understand the interactions between the SAP settings if you want to get the most out of your working capital.

Additional Coverage Profile Examples

Using Coverage Profile 125, the signals are based on 1/5/10 days of average daily forecast for the next 4 periods (not the full horizon).

When we get down to an expected days on hand of 1 day, we will target a supply order to get us to the target value of 5 days.

The 10 days value says do not send any exception messages until we are expected to be over two weeks on hand (10 days). Then we should get an exception message "25" which simply tells us we are above target.

Coverage profile 87 Entries

Prof.	Name
120	4 Periods - 1/3/20 end of horizon
121	4 Periods - 1/5/20 end of horizon
122	4 Periods - 1/7/20 end of horizon
123	4 Periods - 1/10/20 end of horizon
124	4 Periods - 1/3/10 end of horizon
125	4 Periods - 1/5/10 end of horizon
126	4 Periods - 1/7/10 end of horizon
127	4 Periods - 1/2/10 end of horizon
128	4 Periods - 2/15/40 end of horizon
129	4 Periods - 1/3/5 end of horizon
134	4 Periods - 5/5/10 end of horizon
135	4 Periods - 10/10/20 end of horizon
136	4 Periods - 3/5/10 end of horizon
137	4 Periods - 5/5/10 end of horizon
138	4 Periods - 10/10/20 end of horizon
139	4 Periods - 10/25/40 end of horizon
140	4 Periods - 10/30/45 end of horizon
141	4 Periods - 10/35/55 end of horizon
142	4 Periods - 15/40/60 end of horizon
143	4 Periods - 15/45/70 end of horizon
144	4 Periods - 20/50/75 end of horizon
145	4 Periods - 20/55/85 end of horizon
146	4 Periods - 25/60/90 end of horizon
147	4 Periods - 20/60/90 end of horizon
300	4 Periods - 5/5/99 end of horizon
301	4 Periods - 5/10/99 end of horizon
302	4 Periods - 10/15/99 end of horizon
303	4 Periods - 15/20/99 end of horizon
304	4 Periods - 20/25/99 end of horizon
305	4 Periods - 25/30/99 end of horizon
306	4 Periods - 30/35/99 end of horizon
307	4 Periods - 35/40/99 end of horizon
308	4 Periods - 40/45/99 end of horizon
309	4 Periods - 45/50/99 end of horizon

In the above example we would see MRP do something like the below table. The system is balanced initially with each period ending with 1 unit in before and orders met.

In Week 3 for whatever reason our supply increases to 20 units. We end with 16 pieces in inventory. The supply order should have an exception message "25" associated with it since the supply order is expected to be excess the 10 days target of 10 pieces. Note it just tells us it is "excess". It does not suggest a rescheduling out date or splitting of the order. Our planners must manually do that work.

	Week 1	Week 2	Week 3	Week 4	Week 5
Customer Orders	5	5	5	5	5
Shipments	5	5	5	5	5
Supply	5	5	20	0	0
Coverage Profile Buffer	1	1	1	1	1
Inventory	1	1	16	11	6

One company I worked at had one site that understood the issue and adjusted their lot sizes to "EX" which is lot-for lot. This created a variable lot size that adjusted to the parameters.[5]

Other sites, which needed fixed lot sizes (contracts, batches, whatever the reason) and they could not do this, so they opted to take the max level number to 99 days. This basically hid the exception message.

A very important point in all this is that the parameters we set will interact with each other and may do things we do not expect.

An example using a periodic lot size YK=10 days of supply and a coverage profile of 302 (10/15/99) illustrates how parameters interact.

Based on the YK lot size, we would expect the system to order ten days of supply based on the forecast. Based on the coverage profile, we expect the system to stay above a 10-day minimum (the buffer), target a 15-day inventory level, and not generate exceptions until the supply plan exceeds 99 days.

There are two similar days of coverage calculations on the far right of this slide telling you how many days of coverage you have (1). One is based on a specified planning horizon, in this case a four-month forward view. The other one is based on the total horizon, and can be an average of 18 months, 36 months, 60 months, however far out your plan goes. I am not going to tell you which one is which because I want you to run your own data and figure it out.

You can also see your supply plan varies more than your demand plan and there is no standard supply size (2). Looking at the receipts, the current supply is lumped into 3-to-4-week buckets, not a 2 week/10 days of supply bucket. Should you care?

(3) Your target is always exceeded when you resupply. This is because the delta between the target and the minimum is added to the YK 10 days of supply, creating a supply greater than 15 days. This increases your inventory and the variability of the signal.

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[5] I hate variable lot sizes. Standard container sizes are needed to make a plan for every part work.

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The argument in favor of coverage profile over safety stock is based on the idea that coverage profile because it looks forward to four periods, will adjust the inventory buffer to respond to changes in forecast. This is true, IF you have your other data elements, like lot size, sized correctly for the strategy.

We always need to run simulations, using samples from each nine-block segment, and look at the results. Is the output what you expected, and if not, why not? Always run simulations when considering data changes. This is important.

A second important point is we need to often (at least quarterly) audit our data to make sure is generating the expected results. Things do change.

On a personal note, I absolutely detest coverage profiles. Why?

- I do not like variable supply plans.
- I find the exception message "25" frustrating because it does not tell you how or what date you need to adjust the supply order to. It is not helpful but hiding it by pushing the parameters out to hide it does not seem like a good idea either, since you are now basically doing safety lead time without the benefit od exception messages.
- I do not believe most materials people understand what is going on when they use coverage profiles and that is a problem. Run some examples and ask your planning team to explain the results. Start with their manager. I doubt that they can walk you through it.

In the interest of full disclosure, Coverage profile works on frequently used parts. High volume, frequently used parts tend to have stable forecasts. High volume parts are also

the ones most likely to have people work on standardized lot sizes that match our planned usage.

It does not do well at all on low volume parts. If we bothered to look at and study our nine-block based on frequency of usage (HIJ), we will see that most of our usages are on "H" parts which is a small subset of our total population of parts. Most parts are "J" parts, but most usage is on the few "H" parts.

I want to emphasize again that you need to test parts by your nine-block segment. You must test your planned strategy.

Chapter 8 Building a Materials Analysis Workbook

In this section we are going to build a materials' planning workbook that allows you to access the data in both a high level nine-block, and at the detailed part number level. The workbook will have historical information from MC.9, materials master information from the MARC Table, and forward-looking information from MRP_LIST. Some of this is a repeat of what we covered before but it is good to see it again, all in one section.

What we will cover are how to access the standard SAP transaction codes used to build the workbook, how to build the workbook, and what to use the workbook for.

To build this workbook we need to start by extracting data about forecast (MRP_LIST), historical usage (MC.9), materials master information for key planning parameters (MARC), and segmentation (MRP Monitor or MC.9).

Step 1: Forward looking forecast (MRP_LIST): We start by identifying parts you are interested in. In the following example we will work purchased parts with forecasted demand.

Step 2: Backwards looking consumption (MC.9). Run tcode MC.9 for the prior 12 months. This tells about inventory behaviors such as stock levels, turns by part number, consumption, usage frequency, etc.

Step 3: Materials master data (MARC and/or MMUSERS). Here will get information on price, lot size, buffers, etc.

Step 4: Run MRP Monitor for segmentation. Key segments can vary, but we will always use ABC (financial valuation), XYZ (part variation) and HIJ (frequency of picks or usage). If you do not have the MRP Monitor, we can use MC.9 to build a "ABCHIJ" Nine-block. We could also calculate one based on coefficient of variation but that is a bit more work, so I am not going to do it.

Forward Looking Forecast (MRP_LIST)

If you are running MRP in SAP, you almost certainly have an MRP_LIST report. It might be set up as a download and thus a customized MRP_LIST extract. Your SAP team should be able to get you this report. If they cannot, you need to rethink who is on the team.

Many planners I encounter do not use the report because they do not know how to use it. The most common issue is the report, if run wide open, will often time out because it is a big report with many data elements. Think about how MRP works, where we have many requirements consuming supply and updating balances, and depending on the size of the site and the date ranges selected, there can be many thousands of data elements.

To avoid this issue of the report being too large, we need to constrain it.

For this workbook, we will focus on purchased parts (Procurement type "F"). I will also only look at purchase requisitions for spot buys (MRP element "BA"), firmed purchases for spot buys (MRP Element "BE"), purchase requisitions for parts with scheduling agreements (MRP Element "LA") and firm purchases for parts under scheduling agreements (MRP Element "LE").[6]

I also will specify a plant and an MRP Area if you have more than one MRP area in a plant. The date range you use will depend on the size of the site. Here I used 12 months because the report would almost always run without timing out or otherwise failing. In some cases you may need to use shorter date ranges.
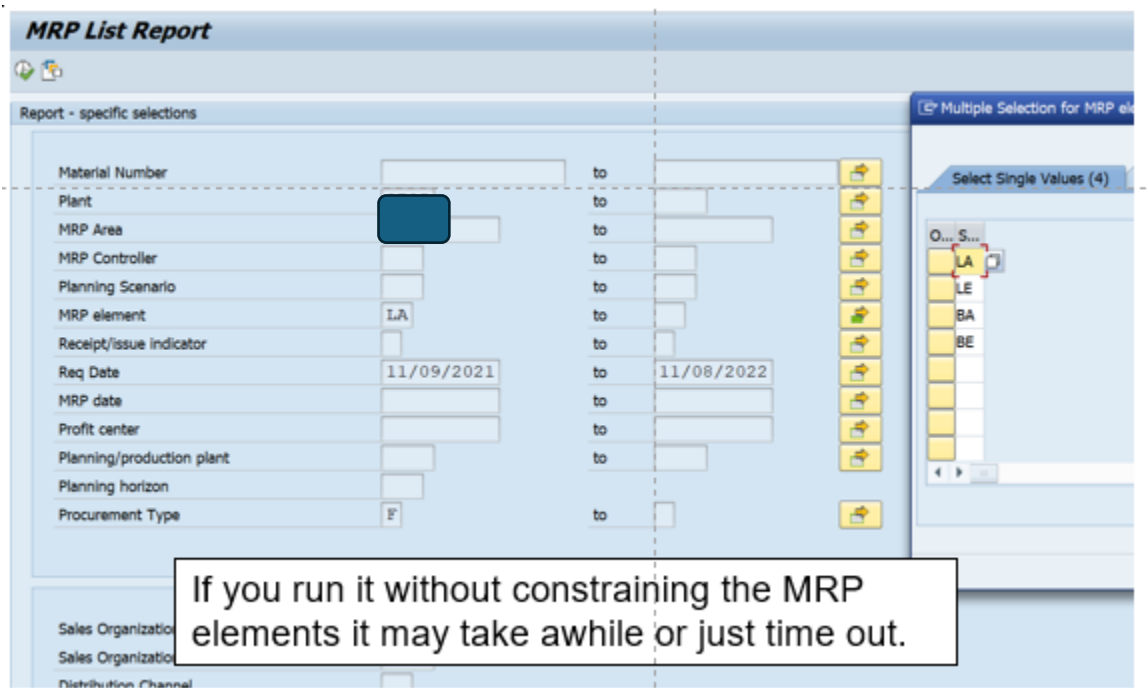
My list default layout includes 52 elements, but you can make the listing smaller by changing the layout and saving it as something else. See highlighted icon to select options, then use the sideways triangles to add or remove elements.

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[6] I recommend you run the report wide open for a very limited date range to see what elements you are using.

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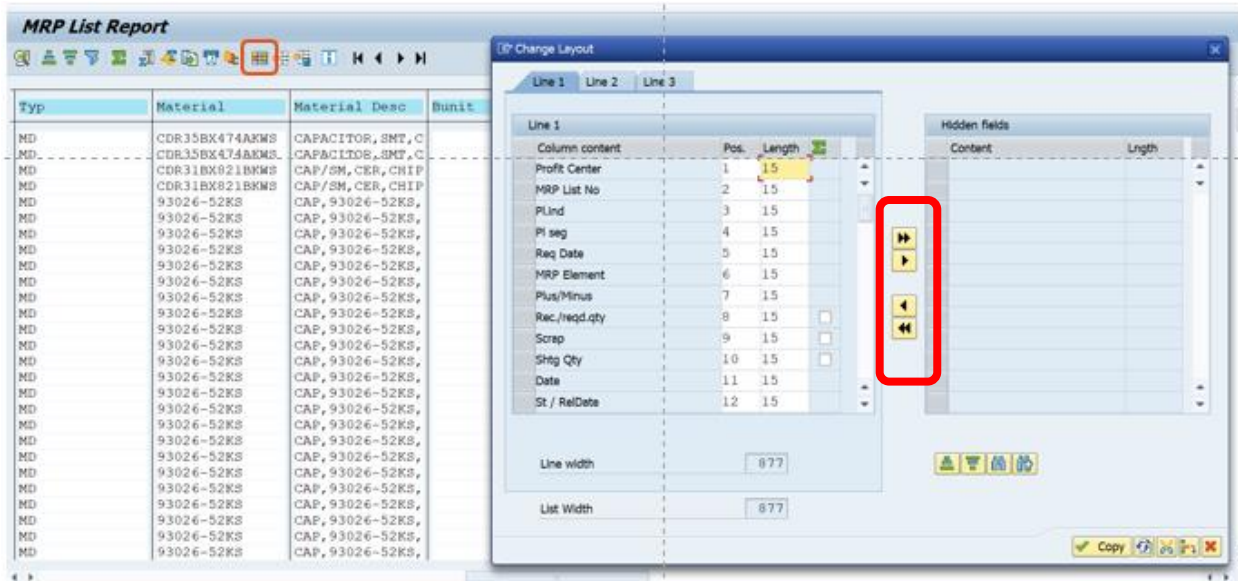
To export this to Excel hit the first (excel) icon it will go into excel. If you select the second icon it will give you text file options.
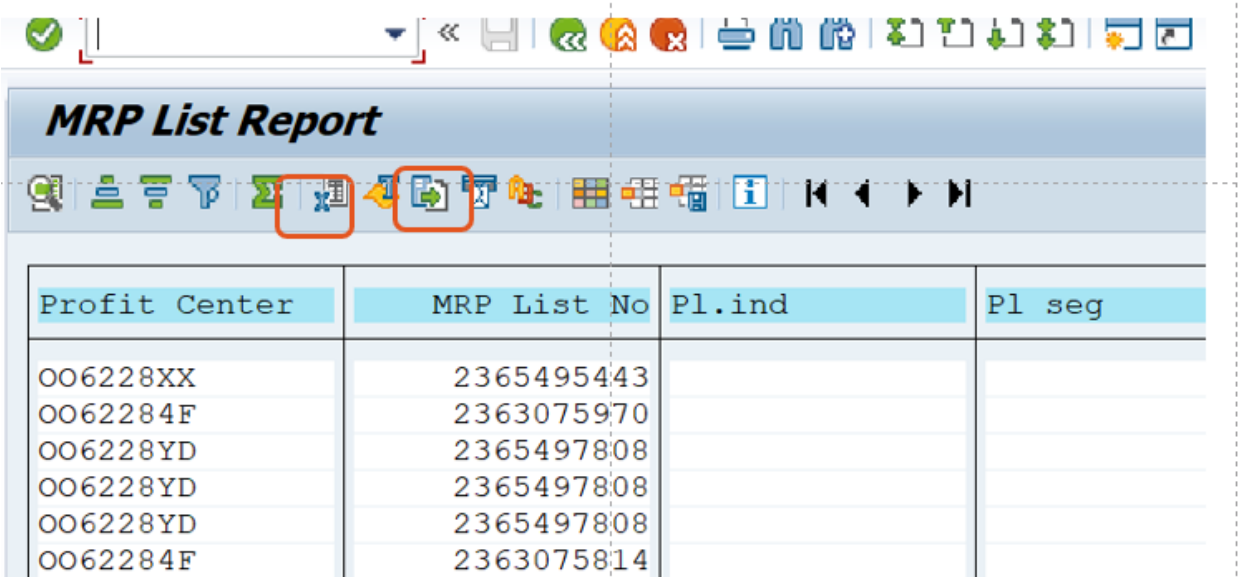
It looks like the first view when I run it and extract it. The second view is how it looks when I clean it up. To make analytics easier, I add year and month columns.

The columns in yellow are often the most interesting, also note even though I ran it by request, the MRP date is still available on the right side.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2		Profit Center	MRP List No	Pl.ind	Pl seg	Req Date	MRP Elem	Plus/Minu	Rec./requ	Scrap	Shtg Q	Date	St / RelDate	Op. Date	Type	Pl/pr plnt	El. No.
3																	
4		OO62305H	2265491702			5/17/2022	LE	+	50	0	0	5/13/2022	12/13/2021	12/13/2021	NB	2735	SL000180C
5		OO62305H	2265491702			6/15/2022	LE	+	50	0	0	6/13/2022				2735	SL000180C
6		OO62305H	2265491702			7/12/2022	LE	+	50	0	0	7/8/2022				2735	SL000180C
7		OO62305H	2265491702			8/17/2022	LE	+	50	0	0	8/15/2022				2735	SL000180C
8		OO62305H	2265491702			9/14/2022	LE	+	50	0	0	9/12/2022				2735	SL000180C
9		OO62305H	2265491702			10/12/2022	LE	+	50	0	0	10/10/2022				2735	SL000180C
10		OO62230XX	2265496574			8/23/2022	BA	+	13,800.00	0	0	8/19/2022	4/13/2022		ZPR		6.04E+09
11		OO62305H	2265491702			11/7/2022	LE	+	50	0	0	11/3/2022				2735	SL000180C
12		OO62305H	2265491702			11/23/2022	LE	+	50	0	0	11/21/2022				2735	SL000180C
13		OO62305H	2265491702			12/26/2022	LE	+	50	0	0	12/20/2022					SL000180C
14		OO62230XX	2265489334			12/28/2022	LE	+	1,000.00	0	0	12/22/2022					SL000010C
15		OO62230XX	2265484791			7/5/2022	LE	+	1,000.00	0	0	6/30/2022					SL000010C
16		OO62230XX	2265484791			12/8/2022	LE	+	1,000.00	0	0	12/6/2022					SL000010C

Year	Month	Req Date	MRP Element	Rec./req	Date	St / RelDate	Material		Material Desc	Bunit	Plnt	MRP Area	Name	PS	MRP date
2022	4	4/13/2022	BE	6	4/13/2022		36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2022	11	11/11/2022	BA	2	11/11/2022	7/12/2022	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	1	1/11/2023	BA	1	1/11/2023	9/12/2022	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	2	2/15/2023	BA	2	2/15/2023	10/17/2022	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	4	4/13/2023	BA	1	4/13/2023	12/8/2022	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	5	5/16/2023	BA	2	5/16/2023	1/13/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	7	7/11/2023	BA	1	7/11/2023	3/10/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	8	8/15/2023	BA	1	8/15/2023	4/14/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	10	10/11/2023	BA	1	10/11/2023	6/12/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	9	9/13/2023	BA	1	9/13/2023	5/12/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2023	11	11/13/2023	BA	2	11/13/2023	7/13/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2024	1	1/10/2024	BA	1	1/10/2024	9/11/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022
2024	2	2/14/2024	BA	2	2/14/2024	10/16/2023	36218		STUD,FLANGED		2735		PRO Electronics		1/1/2022

There are a few things to add and to quality check.

- Adding cost to it allows you to use it for monthly inventory projections or allows you to quickly quantify the values of exceptions messages, by putting it into a pivot table.
- STOs for my plants are included and are part of the BE MRP element. DO you see them in your extract?
- If you get "crooked" numbers in specific when you sum it up, look for things like blanket orders (qty=999,999) and other oddities. To find these numbers, I will take the quantities by month and convert them to $, then I will graph the dollars by month. If you always bring in $10 million in components but see a month in the future where you are bringing in $110 million, you probably have a crooked number.

You may have some formatting work to do depending on how you export it. And remember SAP does not always download parts numbers in the same format screen to screen so you often must fix that. A common issue with SAP is it can add spaces to parts, or format them as text or numbers or some other change that causes mis matches when we do the VLOOKUP to merge files.

In the above example, you should be able to forecast by month your expected input by part number by putting it in a pivot table.

Consumption History (MC.9)

MC.9 is a standard SAP transaction that is used for analysis of inventory. It shows history by month, and current on hand. Data we need to extract includes:

- Part numbers.
- Current on hand for the current month, and then month end inventory balances for all prior months.

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- Information on the number of times an item is used, the quantity used, and the type of consumption (planned or unplanned) can be built into standard extracts.
- How many pieces did we use?
- When did we last receive an item?
- When did we last consume an item?
- A last receipt or consumption long ago may indicate excess and potential obsolescence.
- What are my inventory turns?
- Days of Coverage based on forecast?[7]

I set up the MC.9 as shown below and ran for a 12-month period.

You should get something like the below output with each column holding a key dimension.

---

[7] In my experience this does NOT include past due, but you should assume nothing I say is true and check for yourself.

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I can also export the higher-level current state snapshot. Note the export arrow is in the upper left corner for this one.

My default key figures/dimensions.

- Valuated Stock Value is the value in the currency your plant uses, by part number.
- Valuated Stock is the quantity by part number.
- Annual Total Stock Turn Value is the turns by part number for the year.
- Average Range of Coverage is the number of days of the FORECAST covered (does not include past due).
- Total Usage Value is the value of the materials consumed in plant currency.
- Total consumption is the consumption quantity.
- Number of times the stock went to zero is the number of times an SAP location went to zero units.
- Number of total usage is the number of times a part was used (regardless of the number of pieces used each time).

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Selection criteria
Valuated Stock Value
Valuated stock
Anl.ttl.stktrn-value
Avg. RC total stock
Total usage value
Total consumption
No.val.stock zero
No. total usage

MARC Table

The MARC table is one of the key tables for understanding the Materials Master. Information includes:

- Lot sizes
- Minimum Order quantity
- Plan type
- Buffer information (Safety stock, Safety Lead time, Coverage profiles)
- And a whole lot more....

The information is specific to plants and MRP Areas.

Often, the extract INFORMATION IS FROM YESTERDAY. It is not live at this moment.

You can run it wide open for the whole plant or MRP Area, or you can just do a set of parts.

To do a set of parts:

1. Enter the plant.
2. Click on the drop down to open a new tile.
3. Take your part list and click into the first space.
4. Then hit the clip board.
5. Then check the green arrow.
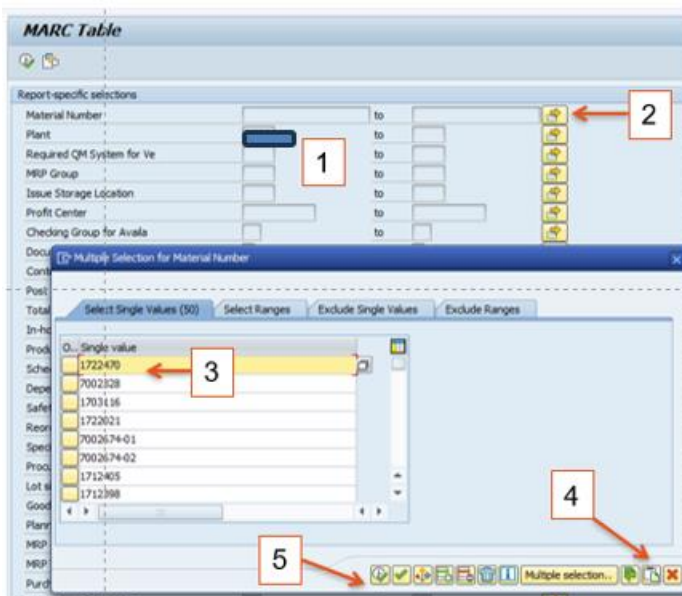
That should bring you back here. Now hit the green check mark with the clock in the left-hand corner.

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MARC Table

Report-specific selections

Material Number	1722470	to	
Plant		to	
Required QM System for Ve		to	
MRP Group		to	
Issue Storage Location		to	
Profit Center		to	
Checking Group for Availa		to	
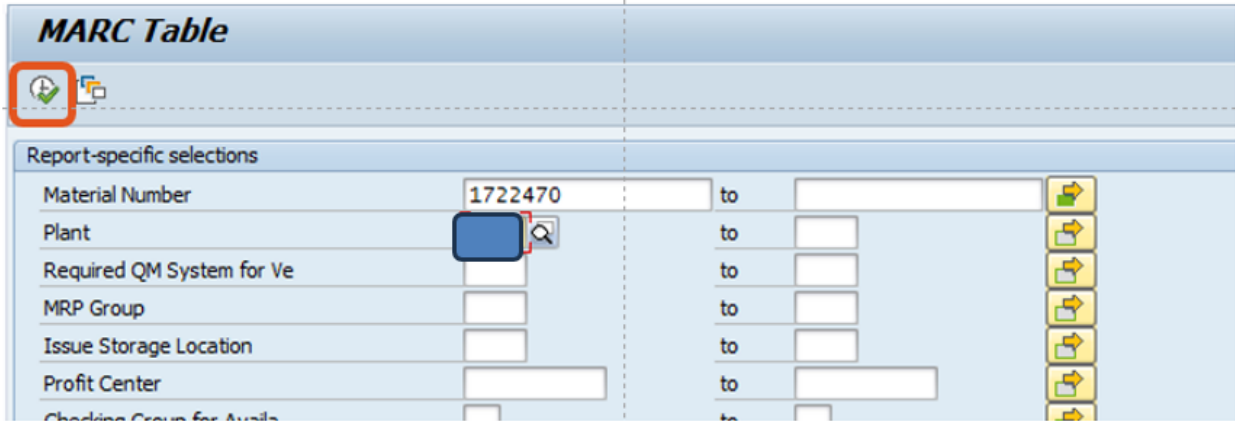
Now we are here.

To export, select the export option and select spreadsheet.

Sometimes it exports quickly, other times it takes few minutes.

MARC Table

MARC Table

Material	Plnt	Maint. status Pl	ValCat B	MS Valid from	ABC Cri	PGr	UoI MRPpr	Typ MRPC	M=B	PDT	ΣGRT	PI	ΣA.scrap	LS	ProcType
1000988-1	2732	DEALBVPQG		00/00/0000	C	5YX		PD 5XX		91	2	M	0.00	YY	F
1703116		DEALBVPQG		00/00/0000	A	5YX		PD 2VC		112	2	M	0.00	YE	F
1703373		DEALBVPQG		00/00/0000	C	5YX		PD 2VC		112	2	M	0.00	Y3	F
1708505-2		DEALBVPQG		00/00/0000	C	5YX		PD 2VC		70	2	M	0.00	YK	F
1708505-3		DEALBVPQG		00/00/0000	C	5YX		PD 4AU		70	2	M	0.00	Y3	F
1708505-4		DEALBVPQG		00/00/0000	C	5YX		PD 4AU		70	2	M	0.00	Y3	F
1708598		DEALBVPQG		00/00/0000	C	5YX		PD 2VC		84	2	M	0.00	Y3	F
1708762-10		DEALBVPQG		00/00/0000	C	5YX		PD 2VC		90	2	M	0.00	YK	F
1708762-11		DEALBVPQG		00/00/0000	C	5YX		PD 2VC		90	2	M	0.00	EX	F

Now we are here.

It will want to go to your SAP GUI, but I prefer to send it to me desktop.

Name it and I highly recommend assigning a date to help you know when you pulled it.

Remember this is yesterday's snapshot, not live this minute.
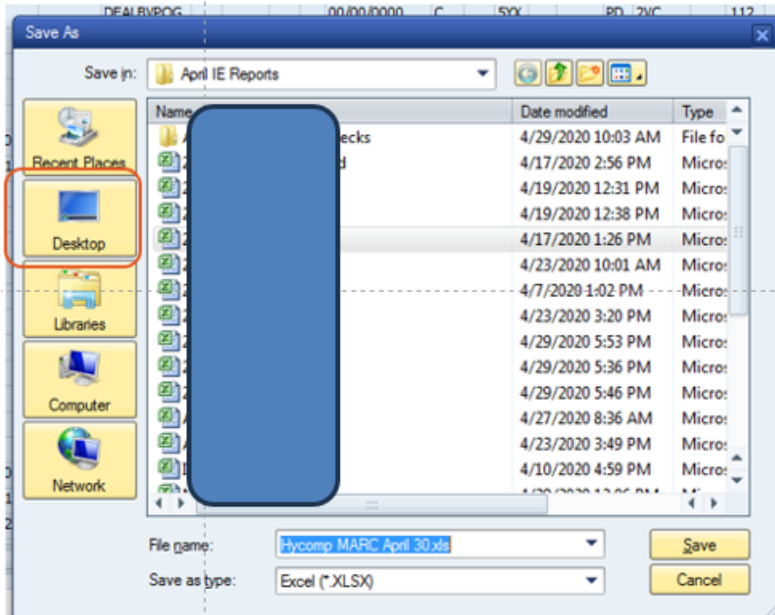
Two variations of this will pop up, select allow both times. On some set ups, if you select "remember my decision" it will stop popping up. It might also warn you the file is going to pop up in a different format and just approve/agree.
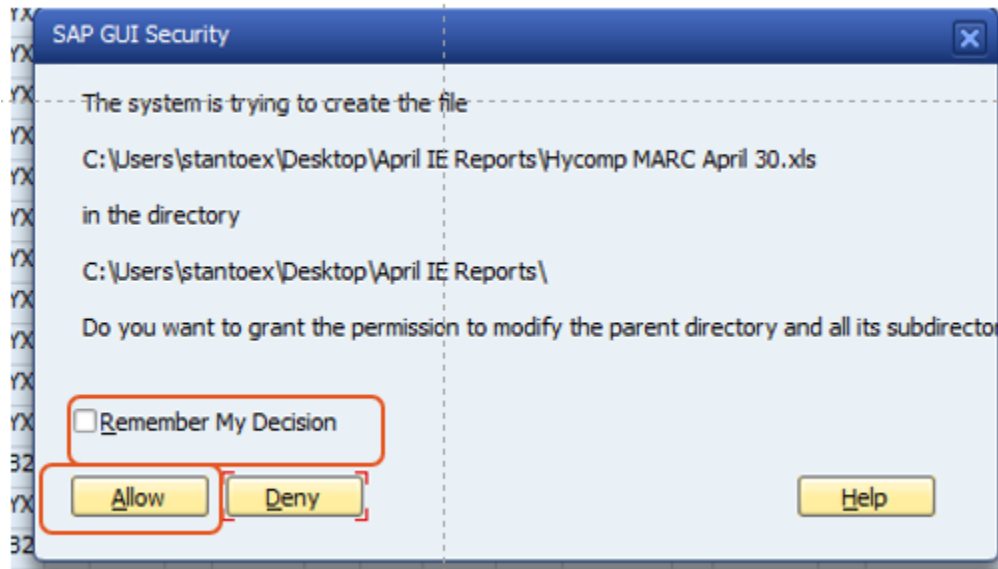
If successful you should end up with a file like below and should start to review the quality of your data.

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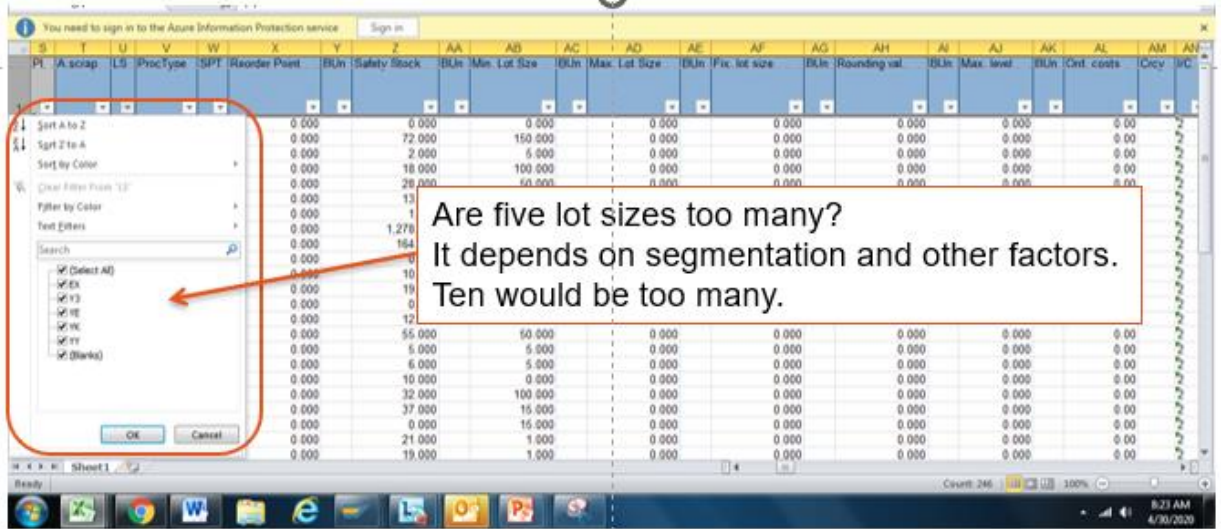
Putting the Workbook Together

Starting with the MRP list, I put the part numbers in the first column then will typically put demand in monthly buckets for 12 months out.

To do this I open the file, remove columns I do not need and then add month and year columns so I can work it into a pivot table.

Year	Month	Req Date	MRP Elem	Rec./req Date	St / RelDate	Material	Material C Bunit	Plnt	MRP Area Name	PSc MRP date
2022	4	4/13/2022	BE	6	4/13/2022		36218	STUD,FLANGED			1/1/2022
2022	11	11/11/2022	BA	2	11/11/2022	7/12/2022	36218	STUD,FLANGED			1/1/2022
2023	1	1/11/2023	BA	1	1/11/2023	9/12/2022	36218	STUD,FLANGED			1/1/2022
2023	2	2/15/2023	BA	2	2/15/2023	10/17/2022	36218	STUD,FLANGED			1/1/2022
2023	4	4/13/2023	BA	1	4/13/2023	12/8/2022	36218	STUD,FLANGED			1/1/2022
2023	5	5/16/2023	BA	2	5/16/2023	1/13/2023	36218	STUD,FLANGED			1/1/2022
2023	7	7/11/2023	BA	1	7/11/2023	3/10/2023	36218	STUD,FLANGED			1/1/2022
2023	8	8/15/2023	BA	1	8/15/2023	4/14/2023	36218	STUD,FLANGED			1/1/2022
2023	10	10/11/2023	BA	1	10/11/2023	6/12/2023	36218	STUD,FLANGED			1/1/2022
2023	9	9/13/2023	BA	1	9/13/2023	5/12/2023	36218	STUD,FLANGED			1/1/2022
2023	11	11/13/2023	BA	2	11/13/2023	7/13/2023	36218	STUD,FLANGED			1/1/2022
2024	1	1/10/2024	BA	1	1/10/2024	9/11/2023	36218	STUD,FLANGED			1/1/2022
2024	2	2/14/2024	BA	2	2/14/2024	10/16/2023	36218	STUD,FLANGED			1/1/2022

Once the data is moved into a pivot, I can see the quantity required by part number for the next 12 months. You can pivot it into different formats to see different buckets if you want to. Do a copy past special to make it an excel workbook and then go get more information.

Sum of Rec./reqd.qty	Column Labels											2022 Tota
		2022											
Row Labels	1	2	3	4	5	6	7	8	9	10	11	12
29103												
29562		93										
29762		70										
29764												
32155	330											
32764			31			20	16	20		16	12	16
32906												32
32945	37								32			4
32946		32						33				15
32950		20	20		20	20	20		20	20		20
32960				100							100	
33787												

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Next import the segmentation, usage history, price, and buffers.

- Using the MRP monitor I will bring in the ABCXYZ and ABCHIJ (Orange). If you do not have the MRP Monitor, you will need to use MC.9 to generate an HIJ segmentation based on usage frequency, and an ABC based on usage value.[8]
- Using a standard SAP report, I will bring in standard price (no color).
- MARC gives us the lot size, and information on things like minimum order quantities, rounding values, and buffers (yellow).
- MC.9 gives us the historical usage information (blue).

Material	ABCXYZ	ABCHIJ	Typ	LS	Safety Stock	Min. Lot Size	Rounding val.	Max. level	Planning time fence	Prof.	SafetyTime	Safety Stck	Piece Price	ValStockValue	Valuated stock	Tot. usage val.	Total usage	NoTotUsage	AnTtStTrnV	12 month Total MRP
29103	CZ	CJ	PD	Y3	0.000	141.000	0.000	0.000	0		25	0	24.01	$ 840	35	$ 624	26	7	0.45	88
29562	CZ	CJ	PD	EX	0.000	152.000	0.000	0.000	0		0	0	22.36	$ -	0	$ 402	18	7	2.22	93
32155	CY	CJ	PD	YZ	0.000	0.000	165.000	0.000	0		0	0	3.2303	$ -	0	$ 194	60	6	4.14	317
32764	CY	CJ	PD	Y3	0.000	0.000	0.000	0.000	0		20	0	9.88	$ 692	70	$ 1,166	118	33	2.69	136
32906	CZ	CJ	P1	YK	0.000	0.000	0.000	0.000	5		0	0	7.08	$ 312	44	$ 262	37	11	0.78	44
32945	CY	CJ	PD	YK	0.000	0.000	0.000	0.000	0		0	0	85.41	$ 1,110	13	$ 3,331	39	12	2.87	75
32946	CY	CJ	PD	YK	0.000	0.000	0.000	0.000	0		0	0	106.22	$ 1,275	12	$ 4,143	39	12	2.46	77
32950	CX	CJ	PD	Y3	0.000	20.000	20.000	0.000	0		25	0	18.07	$ 614	34	$ 2,385	132	33	9.3	131
32960	CY	CJ	PD	YZ	0.000	100.000	100.000	0.000	0		0	0	4.38	$ 600	137	$ 517	118	33	1.98	100
33787	BZ	BJ	PD	YZ	0.000	0.000	0.000	0.000	0		0	0	687.31	$ 1,375	2	$ 10,996	18	5	3.15	18
34329	BY	BJ	PD	YK	0.000	85.000	0.000	0.000	0		15	0	44.24	$ 3,318	75	$ 15,050	353	47	3.38	85
34350	CY	CI	PD	Y3	0.000	250.000	250.000	0.000	0		20	0	4.38	$ 1,086	248	$ 1,428	326	112	1.16	250
34480	BX	BI	PD	Y3	0.000	0.000	10.000	0.000	0		25	0	10.95	$ 2,310	211	$ 5,672	518	114	3.76	610
34672	CZ	CJ	PD	EX	0.000	23.000	0.000	0.000	0		0	0	150.65	$ 1,055	7	$ 1,205	8	3	0.65	23
34742	CZ	CJ	PD	YZ	0.000	25.000	0.000	0.000	0		0	0	438	$ 1,314	3	$ 876	2	1	0.52	3
34824	CZ	CJ	PD	YZ	0.000	0.000	0.000	0.000	0		15	0	236.72	$ -	0	$ 517	3	2	153.46	4
34927	CZ	CJ	PD	Y3	0.000	0.000	0.000	0.000	0		0	0	547.5	$ -	0	$ 68	1	1	6.41	6
35667	CZ	CJ	P1	YZ	0.000	0.000	0.000	0.000	5		0	0	16.7	$ 33	2	$ 33	2	1	1.6	4
36217	CZ	CJ	PD	EX	0.000	0.000	0.000	0.000	0		0	0	465.38	$ -	0	$ 2,792	6	2	5.13	10
36218	CY	CJ	PD	Y3	0.000	0.000	0.000	0.000	0		30	0	193.27	$ 580	3	$ 3,439	18	11	6.58	17
36219	CY	CJ	PD	YK	0.000	2.000	2.000	0.000	0		15	0	254.07	$ 9,147	36	$ 4,573	18	18	0.67	32
36222	BY	BJ	PD	YK	0.000	0.000	1.000	0.000	0		15	0	216.1	$ 4,322	20	$ 5,835	27	10	2.98	37
36223	BY	BJ	PD	YK	0.000	0.000	1.000	0.000	0		15	0	216.1	$ 4,970	23	$ 5,835	27	10	2.19	33
36350	CY	CJ	PD	YK	0.000	229.000	0.000	0.000	0		10	0	3.6026	$ 1,174	326	$ 3,419	949	36	2.19	1374
36474	CY	CJ	PD	Y3	0.000	30.000	0.000	0.000	0		25	0	97.37	$ 2,337	24	$ 4,284	44	11	3.17	30
36647	CY	CJ	PD	Y3	0.000	0.000	17.000	0.000	0		25	0	15.88	$ 127	8	$ 889	56	14	4.43	51
36657	BY	BJ	P1	Y3	0.000	8.000	4.000	0.000	5		25	0	96.85	$ -	0	$ 5,424	56	14	9.97	48

Now what?

We will need to add more columns based on the detail we have, but we will need a nine block either way.

Things you might be interested in doing:

- Add a column dividing the 12 month Forecast against consumption history. Is forecast increasing or decreasing compared to consumption history?
- How are your buffers set?
- What segment is holding all your money. Why don't we care about inventory $ in some segments, such as the CH segment?
- What are your turns? Are high turns a good thing or a bad thing?

Calculated columns I like to add:

- 12-month forecast divided by 12-month consumption.
- Average daily forecast.
- Buffer units and value (this might take a couple of columns).

Next build a nine-block from the excel pivot table.

---

[8] The dimensions I use are the Total Usage Value for ABC and the Number of Total Usages for HIJ.

- What can I tell you about my buffer cost? Do I see a standard approach by segment?
- And what is my MOQ doing to my inventory costs?
- What are my turns by segment?

Row Labels	Count of Material Number	% of Parts #'s	Sum of NoTotUsage	% of Times Used	% of Usage Value	Sum of Cost of Buffer	Buffer in Days of FC	Average of LS in Days	MOQ cost in days	Turns
AH	232	2%	268,293	22%	17%	$1,207,950	14	7	9	2.11
AI	521	4%	58,039	5%	43%	$1,951,280	8	7	24	2.04
AJ	661	6%	16,417	1%	26%	$1,548,856	9	7	36	1.72
BH	189	2%	153,027	12%	1.2%	$268,718	37	10	46	1.23
BI	325	3%	37,555	3%	2.1%	$215,911	14	13	67	1.28
BJ	973	8%	17,556	1%	6.5%	$728,496	14	13	86	0.96
CH	535	5%	438,206	36%	0.5%	$157,733	49	20	81	0.91
CI	1,351	12%	146,315	12%	1.0%	$210,752	30	20	200	0.76
CJ	6,865	59%	91,465	7%	3.7%	$696,148	24	19	365	0.35
Grand Total	11,652	100%	1,226,873	100%	100%	$6,985,843	11	17	50	1.53

At a part number level

- Comparing forecasted demand with historical consumption can give insight into what part numbers are growing or declining.
- Can your supplier support the growth or decline? Should other SAP parameters, such as safety stock, be reviewed?
- Are some parts turning very fast because they are stocking out frequently? Looking at parts with high turns in MC48 can be very insightful.

You could also use it for a supplier SIOP process. At a minimum, if you do this on a routine basis you will have a recorder of what you forecasted to suppliers and can talk about real facts other than "Uh...Forecast changed".

Material Number	Material Description	Avg Daily FC	AVG Daily FC in $	Avg Daily Consumption	FC compared to Usage
1024408-0001	MICROCIRCUIT - HYBRID, LVDT SIGNAL CONDI	18.296	$11,570.39	19.40	94%
4P8061-259-0001	MICROCIRCUIT, 208 PIN FPGA, FL	19.88	$ 8,866.08	6.95	286%
819279-2	TRANSDUCER, PRESSURE	8.976	$ 3,895.94	7.06	127%
1016734-1	OSCILLATOR, LOW VOLTAGE, GULL-	22.212	$ 2,917.55	9.78	227%
4P8061-314-0001	MICROCIRCUIT, 3.3V, FPGA, 450,	21.576	$ 2,637.02	7.20	300%
93026-48KS	CAPACITOR	66.736	$ 2,082.16	44.37	150%
813249-1	INDUCTOR, POWER	53.448	$ 1,988.27	15.92	336%
5917375-1	DC-DC, QUAD, 3.3/5/15/-15V,35W	8.292	$ 1,640.82	9.85	84%
CDR33BX104AKWS	CAP, FIXED, CHIP CERM, BX,.1UF 10%,50V	4385.828	$ 1,570.13	3,226.75	136%

The key take away is we now have a workbook that is based on data that is actually in SAP, and this facilitates the nine-block planning process, which in turn facilitates the development of standards around lot size and buffers.

Chapter Nine Investigating a Materials Behavior

I am going to show you two versions of this. The first one I wrote years ago back. The second version was designed to facilitate stand up meetings at the white boards of life. There is a PowerPoint for the second version at submitandpray.com.

One of the things that used to drive me crazy as a manager was when an employee would tell me "We are always out of this part" and then provides no additional information.
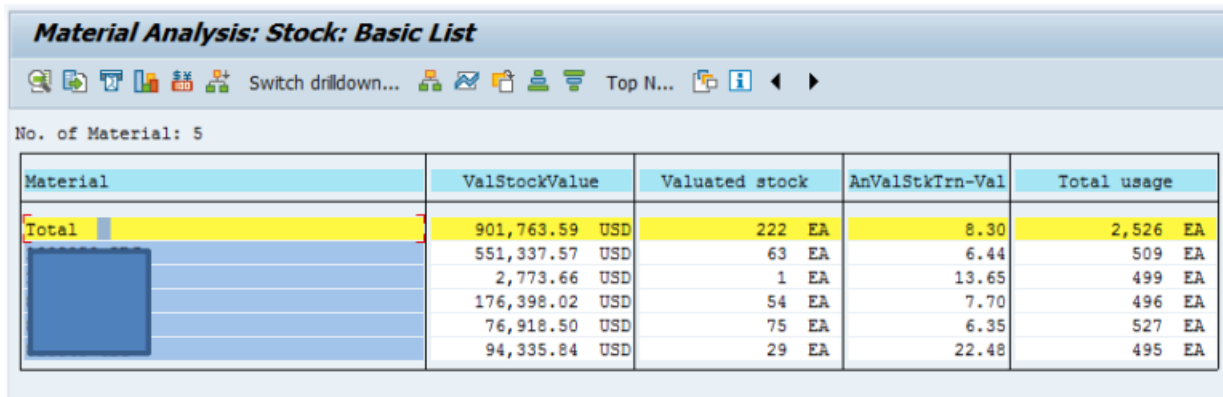
In this section, we will go through a review on how to get more information about a part, and how to start getting to think around problem solving in SAP. For most planners, this should take around three minutes for each part number.

Step One: Tell me the segments. What are its ABCXYZ and HIJ? You can get this from the MRP Monitor. Ideally you should have the segmentation available on some shared site so the planners can self-serve. If you don't have this, you can get close with MC.9. See my article "MC.9 and the Poor Man's Segmentation" at submitandpray.com.

Step Two: What is the lead time (EFG)? If it is a very short lead time, being out of stock may not be convenient but also not a crisis. Longer lead times can be a much bigger issue (says Captain Obvious).

Step Three: Tell me the average usage and turns compared to other materials. Are they in line with other part numbers or do they seem abnormally high? If the average turns for the plant are 8, and an item is turning at 15 times, is it because it is stocking out?

Below is a real-life example of a product that uses 1 each of 5 different components all from the same supplier. We build 40 each month. Lead time is the same on all five materials. From MC.9 we can see that one item is turning at 22.5 turns a year. The second one is turning almost 14 times a year, and the set is turning 8.3 times.

Material Analysis: Stock: Basic List

No. of Material: 5

Material	ValStockValue		Valuated stock		AnValStkTrn-Val	Total usage	
Total	901,763.59	USD	222	EA	8.30	2,526	EA
	551,337.57	USD	63	EA	6.44	509	EA
	2,773.66	USD	1	EA	13.65	499	EA
	176,398.02	USD	54	EA	7.70	496	EA
	76,918.50	USD	75	EA	6.35	527	EA
	94,335.84	USD	29	EA	22.48	495	EA

When we look at the ending inventory using the time series icon, we can see we are often at zero or near zero on two items with the higher turns. These items are stocking out and trapping the other inventory.

Material	01/2017	02/2017	03/2017	04/2017	05/2017	06/2017	07/2017	08/2017	09/2017	10/2017	11/2017	12/2017	01/2018	Average
P/N A	37	47	31	40	53	118	123	122	133	116	63	55	63	77
P/N B	0	1	16	16	9	7	31	93	132	91	56	12	1	36
P/N C	37	41	10	14	25	4	70	66	123	154	137	75	54	62
P/N D	51	41	4	20	46	107	129	146	153	108	58	96	75	80
P/N E	16	57	41	25	34	21	0	1	0	6	16	14	29	20

Step Four: Look at MC48 stock level over time. If we are targeting one week on hand at all times, does the MC48 stock break that line frequently?

Here is an item we use 400 pieces a month of. The blue line (which I added) shows the monthly demand and the yellow lines shows weekly demand (which I also added). Every time we break the yellow we are basically stocked out, unable to release the next set of orders. Note the slope of the consumption line is always the same, so we know demand is steady, i.e. this is an X part.
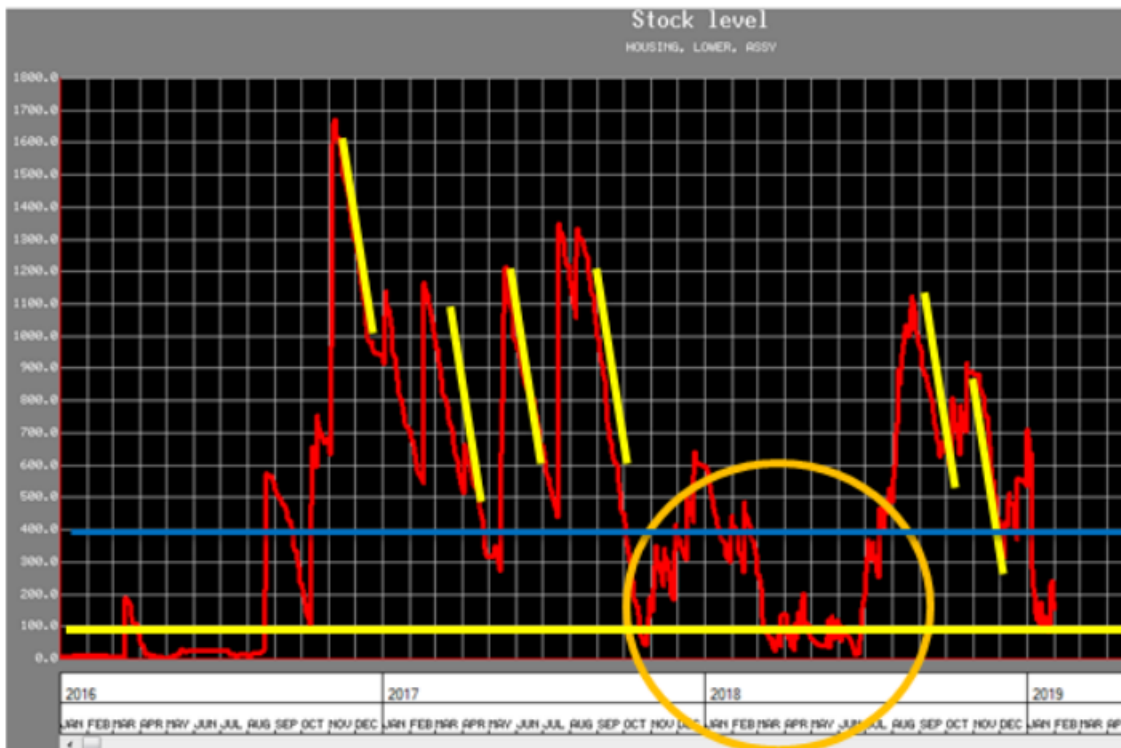
Step Five: What are the buffers? Do they make sense? If we are planning in weekly buckets, a one-day buffer may not make sense. I have seen buffers of one day on items with 100-day lead times and never quite understood the point. The only a one-day buffer is better than is no buffer at all.

Since the three ways to buffer are capacity, inventory, and time, we would look in the MARC table at things like safety stock, coverage profile, safety lead time, and lot size.

Step Six: look at the MD04 in weekly buckets. Is demand more stable than supply? If supply is less stable, is it because of a lot sizing rule we are following?

Below is an example where stable demand is translated into a more variable supply due to both a minimum lot size being set at 60 pieces and the coverage profile set to order a 20 days of forecast. If

this is an issue (and it may not be) then you should try other combinations to smooth out the supply.

A..	Period/segment	Plnd ind.req...	Requirement	Receipts	Avail.
	W 33/2019	0	140–	0	
	W 34/2019	0	150–	0	
	W 35/2019	0	135–	420	
	W 36/2019	0	136–	0	
	W 37/2019	0	137–	0	
	W 38/2019	0	137–	360	
	W 39/2019	0	137–	0	
	W 40/2019	0	137–	0	
	W 41/2019	0	137–	360	
	W 42/2019	0	137–	0	
	W 43/2019	0	137–	360	
	W 44/2019	0	145–	0	

So now we know a lot more about what is going on with the part and can start developing solutions. Again, since this is about a three-minute exercise, there should never be a conversation about "why are we always out" without a clear view of the part's behavior over time.

Investigating a Materials Behavior Version 2

We have all spent far too much of our lives standing in front of whiteboards, tracking excessively detailed KPI's in the name of the Gemba.

In this segment we will look at how we can prepare for the daily MDI/Tiered/SQDC/SQCIP. Some questions I would ask when shortages come up are:

- How does the part look in MD04?
- Does it look like we are signaling a steady supply rate?
- What policy is the part covered under?
- What is the ABC XYZ segment? HIJ?
- How are lot sizes, coverage profile set up? Does it comply with the policy?
- Do we have over consumption/under consumption of forecast?
- Are we stocking out? What are our turns in SAP or what does MC48 look like? If the chart shows shifts, were there changes to safety stock at the time of shift?
- What does Entitlement say we should have in stock? How much money is it?
- Are there known supplier issues?

If there is a standard work or policy, we can use text fields to identify them.

Go to the materials master, select the dropdown button on the right, and look at the SCM tab.

In this example we will include some MRP Monitor add on tool examples. If you are using the Monitor, see if you have the SCM tab in the materials master. If you have it, we can store text on what policy or standard work is being used there. This is also where the ABC XYZ and HIJ information should be.

Go to the materials master, select the dropdown button on the right, and look at the SCM tab.
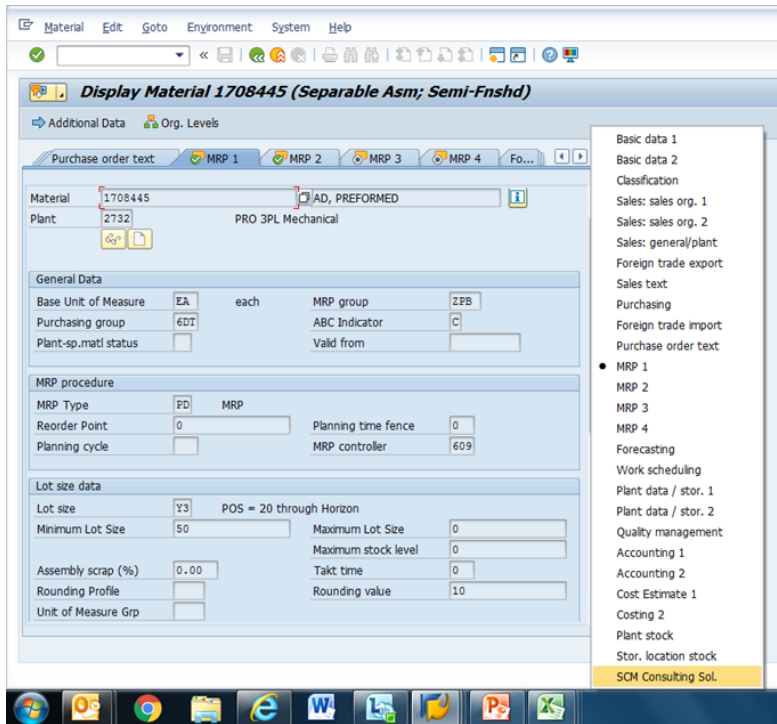
When in the SCM tab, select from this field the MRP Monitor option (1). Then the policy description should show up (2). You can also get your ABCXYZ HIJ from here (3).
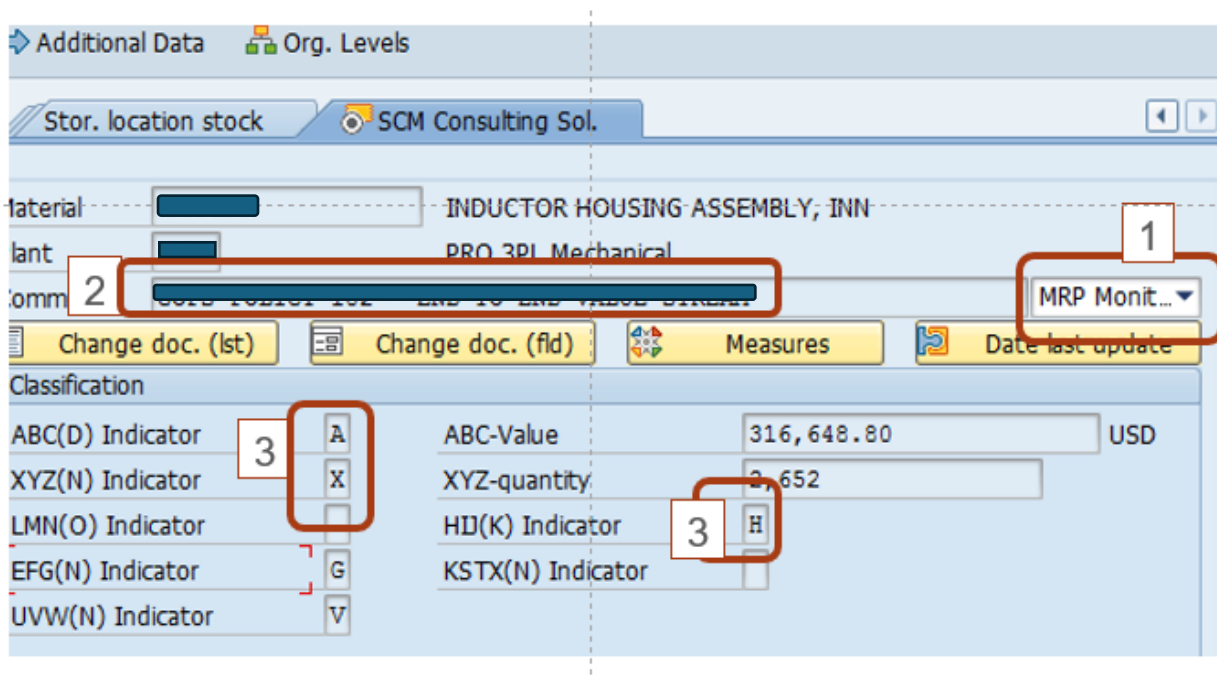
This is an AX part covered under the Brownies Policy 102 End to End Value stream.

It has a lot size of YE= 5days, and a coverage profile of 125 (1/5/10) so it complies with the Policy.
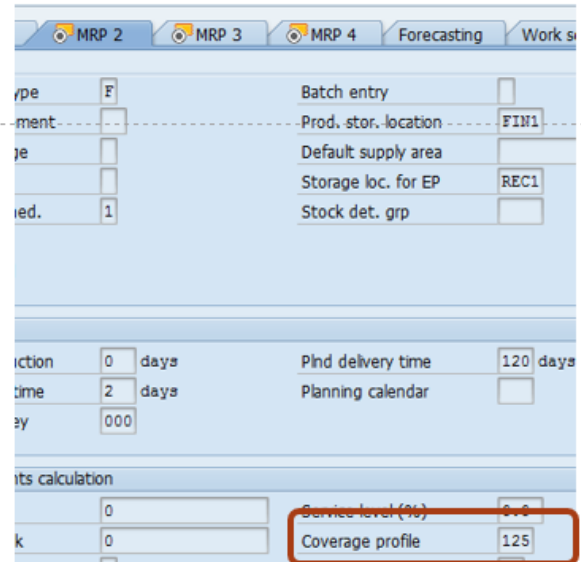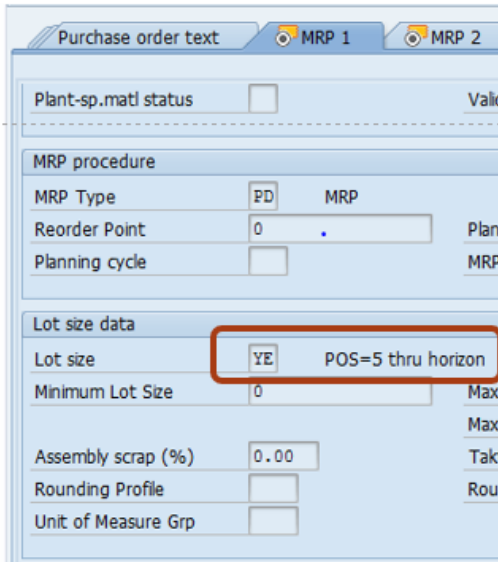
Next, I want to find consumption history. Go to the Forecast tab in the materials master. Scroll down. Click consumption values.

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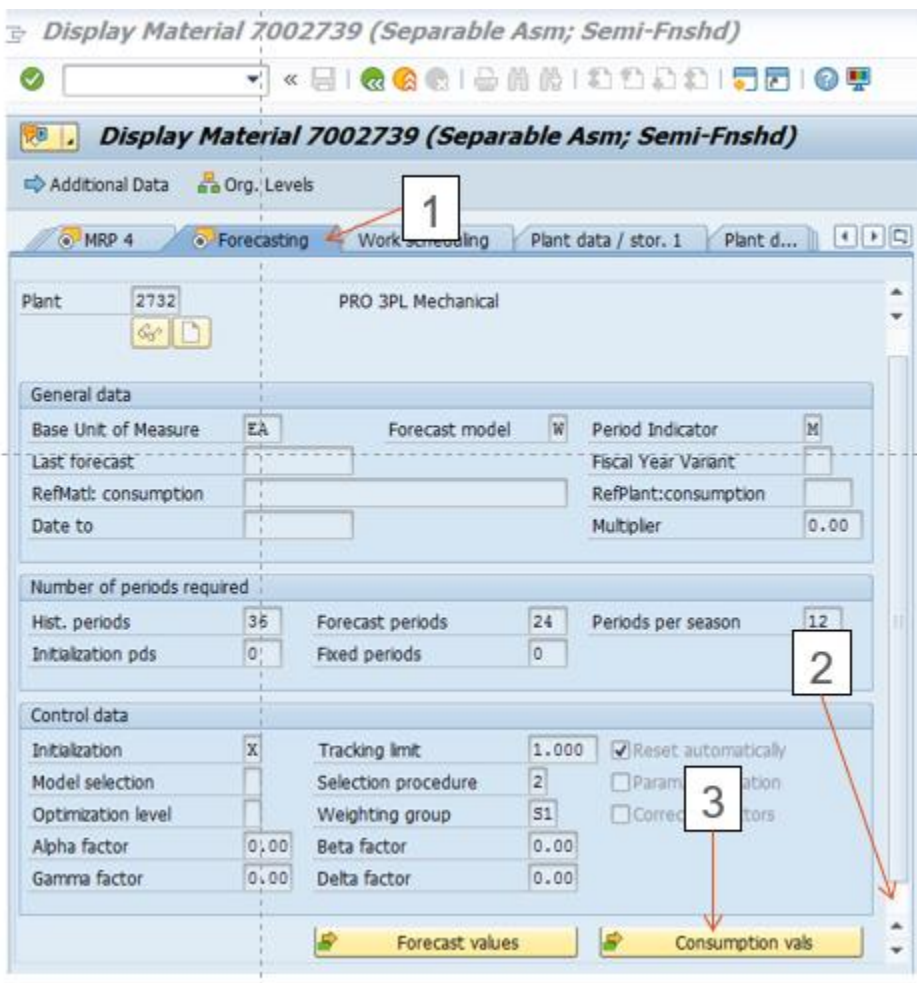
This part looks to be over forecasted by quite a bit.

Consumption is around 215 on average, with a peak of 319.
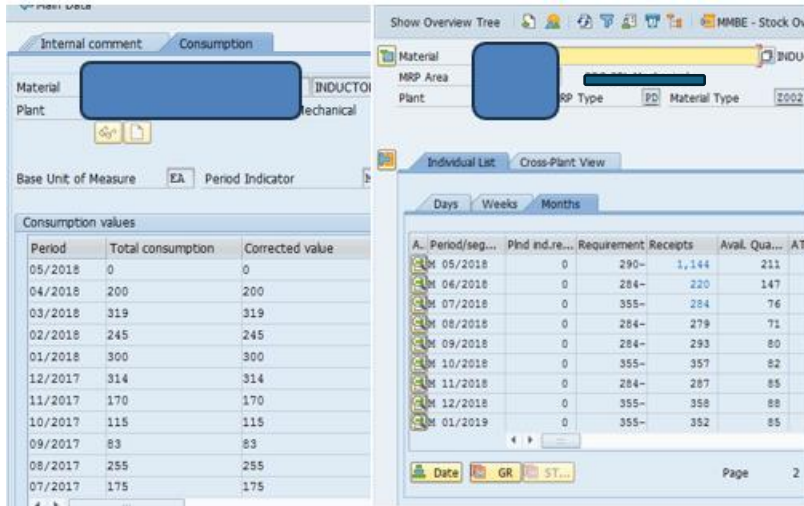
Using MC48 we can check stock levels.

Since we use around 55 a week, any week below 55 is probably a "zero" with regards to releasing more orders.
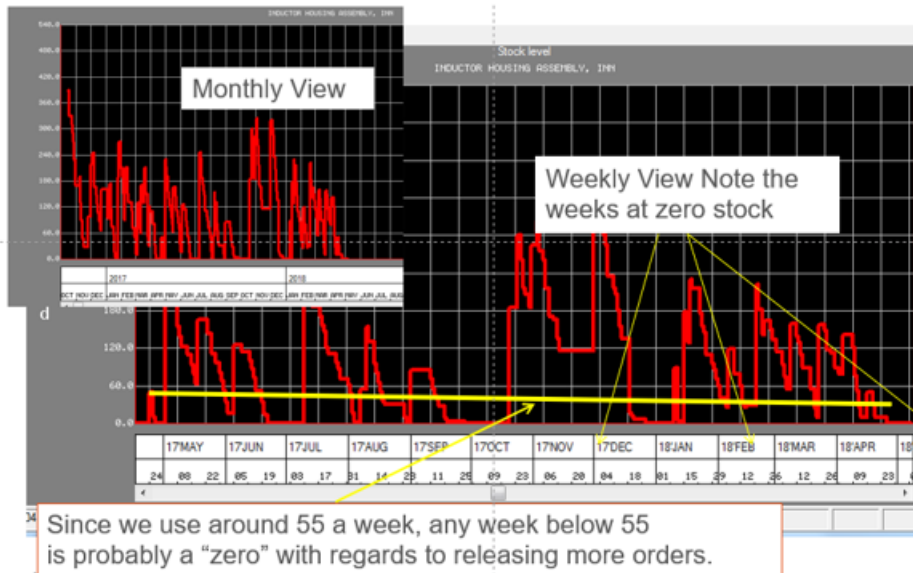
Next example:

Look at MD04 and get a feel for the part first. Is it past due? What do requirements look like? What does supply look like? Are signaling a steady rate?

Looking at the SCM Tab:

This tab will help us figure out how the part is supposed to be behaving.

- I know the inventory Policy being applied.

- I know the ABCXYZ.

- Since it is an AX it is a high value, steady demand/consumption part.

A quick review of consumption vs. forecast (which is not perfect but works most of the time) shows that this part is not being under forecast. If anything, we should have too much inventory.

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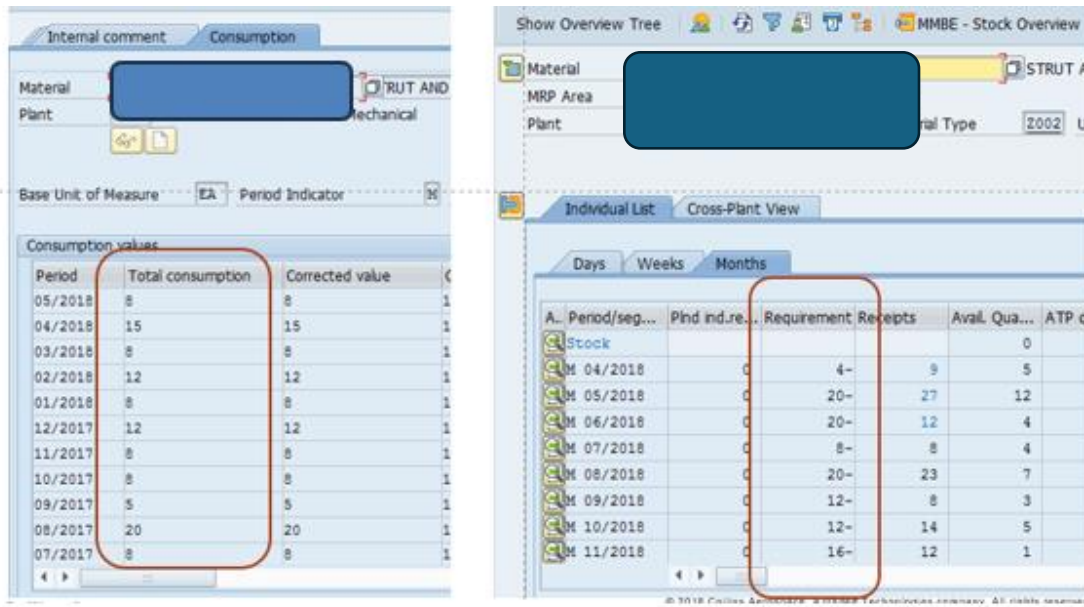
Let's go back to MC48. Keeping in mind we use approximately 12 to 14 a month, and forecast perhaps 16 a month on average, we should probably want to have around 6 pieces in stock to have availability for release.

What changed between Box 1 and Box 2? Let's see if SAP changed.

Between the yellow lines would be the target
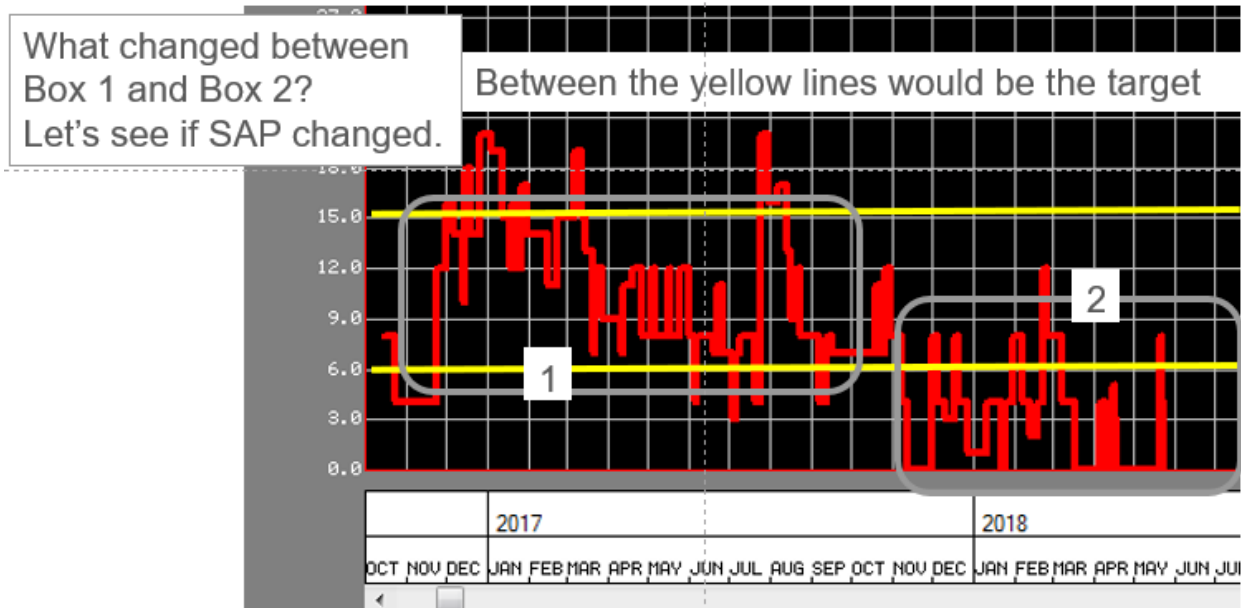
The first thing to check is to see if the SAP Parameters have changed, using "DISP_ALL".

- Let's run the changes to SAP transaction from June 2017 to now.
- The most obvious thing is the safety stock was taken from 8 to zero in September 2017.
- Looking at the prior chart the material stock outs increased in October.

Change Documents for Object Class MATERIAL

Material	Date	Time	Transaction	Short Description	Old value	New value	U:
1706157	05/04/2018	10:29:01	MM02(BAPI)	MRP Group	ZPZ	ZPB	8(
1706157	04/30/2018	12:51:37	MM02(BAPI)	Planned delivery time in days	182	238	8:
1706157	04/23/2018	12:28:51	MM02(BAPI)	Lot size (materials planning)	YK	YE	8(
1706157	04/23/2018	12:28:51	MM02(BAPI)	Range of coverage profile		125	8(
1706157	11/03/2017	07:05:38	ZMM02	Production Supervisor		GEN	6&
1706157	09/22/2017	16:12:49	MM02(BAPI)	Special Procurement Type for Costing	95	AO	6&
1706157	09/15/2017	14:13:21	MM02(BAPI)	Range of coverage profile	D05		8(
1706157	09/13/2017	11:57:39	MM02(BAPI)	Lot size (materials planning)	YF	YK	8(
1706157	09/13/2017	11:57:39	MM02(BAPI)	Safety stock	8 EA	0 EA	8(
1706157	09/13/2017	11:57:39	MM02(BAPI)	Range of coverage profile		D05	8(
1706157	08/18/2017	21:35:44	MM02(BAPI)	Total replenishment lead time (in workdays)	172	132	FF
1706157	08/02/2017	11:23:26	MM02(BAPI)	MRP Group	ZPA	ZPZ	8(

Do you remember the section about inventory entitlement?

Entitlement suggests a safety stock of 14 with an average inventory of 15 units total.

> We know consumption is lumpy lately do to shortages and we know we were more successful previously with 8 units in safety stock, so the truth may be some where in between, but the facts do suggest a path forward.

> If a part is a C item and the total safety stock suggested was $500, and we had an A item with $50,000 suggested safety stock, I would not spend too much time thinking about the C item.

		Planning Plant	Profit Center	Material Number	Final Suggested Safety Stock Units	Suggested Safety Stock $	Ch
			OO6231YF	1722470	353	$26,725.49	
			OO6231YD	1706157	14	$45,276.70	
			OO6231YF	5914861	91	$44,008.51	

What should a planner do at the tiered meeting?

- They should NOT bring a power point to the tiered meeting.
- They should do the research, and probably bring a picture of MC48.
- And the tiered meeting should consider keeping a tally based on segment to see where the defects cluster.
- Consider an email on each defect sent to the materials designate containing the above data, a recommendation, and a review period defined to see if the recommendation delivered the desired results.

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Nine Block Segmentation Part 2

Now that we have built our planning workbook, we will discuss other ways to use the nine-block in terms of buffers, service, and part shortage impacts. What do well structured nine-blocks look like? What questions do we ask?

In these examples, we have an assembly shop with deep Bills of Material. If we have an assembly that contains 20 purchased parts, and we are short of one part, we will trap the other nineteen parts while we procure the one missing component.

We will start by creating an overly complex nine-block, then break it down into more straightforward "slices" of nine-block.

Example One

First the overly complicated nine-block, built from our planning workbooks. We have identified the segment the parts are in, the inventory value of the segment, the number of parts in the segment, average daily forecast, number of times used in the prior twelve months, the value of the usage, forecast value, the buffer in days, the buffer value, and the turns. We then look at the percentages associated with each attribute.

Segment	Inventory Value	Number of parts in the segment	Averge Daily Forecst	Number of Times used	Usage Value	Forecast Value	Buffer in Days	Buffer Value	Turns	% of On Hand Inventory	% of Part Numbers	% of Avg Daily forecast	% of Usages	% of Usage Value	% of Buffer value
AH	$ 15,291,626	450	$ 314,397	60,000	$ 70,739,401	$ 78,599,334	5	$ 1,571,987	5.07	18%	4%	44%	5%	44%	44%
AI	$ 32,226,260	773	$ 280,044	40,000	$ 63,009,899	$ 70,010,999	5	$ 1,400,220	2.4	37%	6%	39%	3%	39%	39%
AJ	$ 2,853,493	62	$ 30,039	6,000	$ 6,758,841	$ 7,509,823	5	$ 150,196	2.3	3%	0%	4%	0%	4%	4%
BH	$ 1,399,557	297	$ 17,321	110,000	$ 3,897,131	$ 4,330,145	5	$ 86,603	3	2%	2%	2%	9%	2%	2%
BI	$ 9,060,713	966	$ 43,938	85,000	$ 9,886,110	$ 10,984,567	5	$ 219,691	1.5	10%	8%	6%	7%	6%	6%
BJ	$ 6,092,007	199	$ 9,916	12,000	$ 2,231,011	$ 2,478,901	5	$ 49,578	0.4	7%	2%	1%	1%	1.4%	1%
CH	$ 1,051,797	916	$ 2,004	560,000	$ 450,798	$ 500,887	5	$ 10,018	1.7	1%	7%	0.3%	46%	0.3%	0.3%
CI	$ 7,856,873	5,046	$ 14,403	300,000	$ 3,240,707	$ 3,600,786	5	$ 72,016	0.8	9%	40%	2%	25%	2.0%	2%
CJ	$ 10,501,220	3,769	$ 8,751	50,000	$ 1,968,898	$ 2,187,664	5	$ 43,753	0.25	12%	30%	1%	4%	1.2%	1%
Total	$ 86,333,543	12,478	$ 720,812	1,223,000	$ 162,182,795	$ 180,203,106		$ 3,604,062							

Next, we slice and dice to see some details. The most frequently used parts (H) represent 13% of the total part numbers in this set. "I" Parts are 54% of the total part numbers, and slow moving "J" parts are 32% of the total parts.

Segment	Number of parts in the segment	% of Part Numbers
AH	450	4%
AI	773	6%
AJ	62	0.5%
BH	297	2%
BI	966	8%
BJ	199	2%
CH	916	7%
CI	5,046	40%
CJ	3,769	30%
Total	12,478	

Segment	Number of parts in the segment	% of Part Numbers
AH	450	4%
AI	773	6%
AJ	62	0.5%
BH	297	2%
BI	966	8%
BJ	199	2%
CH	916	7%
CI	5,046	40%
CJ	3,769	30%
Total	12,478	

Segment	Number of parts in the segment	% of Part Numbers
AH	450	4%
AI	773	6%
AJ	62	0.5%
BH	297	2%
BI	966	8%
BJ	199	2%
CH	916	7%
CI	5,046	40%
CJ	3,769	30%
Total	12,478	

There are 12,478 active parts in this nine-block, so that is a bit, and I am not quite sure where to start until I add another dimension. We will start with the forecast value.

The AH segment, with 4% of the part numbers, represents 44% of the forecast value. The AI segment has 6% of the parts and represents 39% of the forecast for components. 10% of the parts are 83% of the forecast value. We cannot ignore the other parts because we depend on all components being available to ship and not trap inventory, but this does give us some clues on where we want to concentrate our efforts for inventory optimization.

Segment	Number of parts in the segment	% of Part Numbers	% of Avg Daily forecast
AH	450	4%	44%
AI	773	6%	39%
AJ	62	0.5%	4%
BH	297	2%	2%
BI	966	8%	6%
BJ	199	2%	1%
CH	916	7%	0.3%
CI	5,046	40%	2%
CJ	3,769	30%	1%
Total	12,478		

The AH parts could be great candidates for kanban or other pull strategies. But I still am not sure what to do next, so I add another dimension, around the number of times a part is used.

The AH parts were used 5% of the time. They are high value so maybe the main component in your assembly.

The CH Parts are interesting because while 7% of the part numbers are used very frequently, with 46% of the times used but only 3/10th of a percent of the total forecast value. Used often, and cheap. Here we can start to make up some rules around the nine-block.

A rule might be "Do not ever let a CH shortage keep us from shipping an AH Part". How we accomplish that is another issue to think about.

Segment	Number of parts in the segment	% of Part Numbers	% of Avg Daily forecast	% of Usages
AH	450	4%	44%	5%
AI	773	6%	39%	3%
AJ	62	0.5%	4%	0%
BH	297	2%	2%	9%
BI	966	8%	6%	7%
BJ	199	2%	1%	1%
CH	916	7%	0.3%	46%
CI	5,046	40%	2%	25%
CJ	3,769	30%	1%	4%
Total	12,478			

How do I avoid stock outs? Buffers are one method. If we get approval to add buffer, and decide we want two weeks our buffers in this example would add up to $7,208,124 total with each segment getting an even % based on the forecast value. Of that $7.2 million, $20k is used to buffer CH parts, which are 3/10th of 1 % of the forecast value, but 46% of the usages.

For the record, this is a dumb buffer strategy as it completely ignores the idea that we split parts into segments so we can develop logical rules for each segment. If we are going to apply the same rules to every segment, then we should just not bother to segment.

Segment	Number of parts in the segment	Buffer in Days	Buffer Value	% of Part Numbers	% of Avg Daily forecast	% of Usages	% of Buffer value
AH	450	10	$ 3,143,973	4%	44%	5%	44%
AI	773	10	$ 2,800,440	6%	39%	3%	39%
AJ	62	10	$ 300,393	0.5%	4%	0%	4%
BH	297	10	$ 173,206	2%	2%	9%	2%
BI	966	10	$ 439,383	8%	6%	7%	6%
BJ	199	10	$ 99,156	2%	1%	1%	1%
CH	916	10	$ 20,035	7%	0.3%	46%	0.3%
CI	5,046	10	$ 144,031	40%	2%	25%	2%
CJ	3,769	10	$ 87,507	30%	1%	4%	1%
Total	12,478		$ 7,208,124				

In the next example we will make all "A" parts have 5 days buffer, all "B" Parts have 10 days buffer, and all "C" Parts have 20 days buffer.

By making these changes, we reduce the value of the overall buffer by almost $3 million, while doubling the buffer on "C" Items, which are 74% of the total usage. At the same time, the buffer on the low volume CJ parts (4% of our total usages) is 4 times higher than the buffer on CH (46% of our usages) and we might not like that.

Segment	Number of parts in the segment	Buffer in Days	Buffer Value	% of Part Numbers	% of Avg Daily forecast	% of Usages	% of Buffer value
AH	450	5	$ 1,571,987	4%	44%	5%	36%
AI	773	5	$ 1,400,220	6%	39%	3%	32%
AJ	62	5	$ 150,196	0.5%	4%	0%	3%
BH	297	10	$ 173,206	2%	2%	9%	4%
BI	966	10	$ 439,383	8%	6%	7%	10%
BJ	199	10	$ 99,156	2%	1%	1%	2%
CH	916	20	$ 40,071	7%	0.3%	46%	0.9%
CI	5,046	20	$ 288,063	40%	2%	25%	7%
CJ	3,769	20	$ 175,013	30%	1%	4%	4%
Total	12,478		$ 4,337,295				

We could develop a strategy based on no buffer on low volume items and apply some of that savings/avoidance to the CH and CY segments. Here I have all "J" parts at zero buffer, and CH and CY at 40 days. In this example, my buffer value decreases by over $100k, while I get more buffer on the parts that make up 71% of my total usages.

Segment	Number of parts in the segment	Buffer in Days	Buffer Value	% of Part Numbers	% of Avg Daily forecast	% of Usages	% of Buffer value
AH	450	5	$ 1,571,987	4%	44%	5%	37%
AI	773	5	$ 1,400,220	6%	39%	3%	33%
AJ	62	0	$ -	0.5%	4%	0%	0%
BH	297	10	$ 173,206	2%	2%	9%	4%
BI	966	10	$ 439,383	8%	6%	7%	10%
BJ	199	0	$ -	2%	1%	1%	0%
CH	916	40	$ 80,142	7%	0.3%	46%	1.9%
CI	5,046	40	$ 576,126	40%	2%	25%	14%
CJ	3,769	0	$ -	30%	1%	4%	0%
Total	12,478		$ 4,241,063				

Tweaking further we might get the below view.

Segment	Number of parts in the segment	Buffer in Days	Buffer Value	% of Part Numbers	% of Avg Daily forecast	% of Usages	% of Buffer value
AH	450	5	$ 1,571,987	4%	44%	5%	40%
AI	773	5	$ 1,400,220	6%	39%	3%	35%
AJ	62	0	$ -	0.5%	4%	0%	0%
BH	297	10	$ 173,206	2%	2%	9%	4%
BI	966	10	$ 439,383	8%	6%	7%	11%
BJ	199	0	$ -	2%	1%	1%	0%
CH	916	40	$ 80,142	7%	0.3%	46%	2.0%
CI	5,046	20	$ 288,063	40%	2%	25%	7%
CJ	3,769	0	$ -	30%	1%	4%	0%
Total	12,478		$ 3,953,000				

There are many other factors to consider in this.

For example, "C" items might have a high MOQ in terms of days of supply, so we could argue there is buffer there.[9]

Types of buffers can matter. If we do a safety lead time will bring in forecasted requirements early, but only early, not more than the requirements. On low volume items I prefer that strategy.

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[9] In my experience there is risk there as well, since if we buy a roll of film that lasts two years, it might spoil, or we might have an inventory error.

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On closing this section of the book, one last note on how we should evaluate a shortage's Impact.

We can at times get overwhelmed by shortages and it can be difficult to know where to start. Let us refresh our memory around segmentation and frequency of usage.

HIJ segmentation is about frequency of usage.

- "H" items are frequently used materials, the runners in your inventory mix.
- "I" materials are used semi-frequently and are the repeaters in your mix.
- "J" materials are Strangers, or Aliens, are infrequently used materials.

Is there a difference between stocking out on a part you use 100 times a day, versus a part you use 5 times a year?

Below is a table from a cardboard factory listing parts with shortages. Clearly the low volume "J" parts are the biggest issue. On any given day most shortages are on "J" Materials.

Board Shop Shortages	1-Feb	7-Feb	21-Mar
H	64	60	45
I	275	286	213
J	494	490	464

But are "J" items really the biggest problem? If we add information on frequency of usage, we might see the issue in a slightly different light.

Here we can see that while the % of parts short varies from "H" with 6% of the part shortages, to "J" with 64% of then part shortages, the transactional impact is quite different. 57% of the transactional activity in this set is expected to be in the 6% of "H" part shortages, while the "J" parts are expected to have a 14% impact on transactions.

Board Shop Shortages	21-Mar	Average usage	Impact	% of Short parts	Impact %
H	45	1,207	54,315	6%	57%
I	213	132	28,116	30%	29%
J	464	28	12,992	64%	14%

At the end of the day, there is a customer behind every order, so we need to get all the materials, but there are some part numbers that are far more likely to shut your production down than others. Prioritizing the expedites is important.

Appendix

Are You Making Your SAP Supply Plan More variable than the Demand Plan?

Some companies put significant effort into Sales, Inventory, and Operations Planning and these companies typically will look at the signals they are sending their suppliers to better manage their performance.

Rather than get into a long diatribe into why steady signals are often better than variable signals, I will just show you how to see where the variation is. For the example I have chosen a part that is "X" (very forecastable because of low variation) and "H" (frequently used).

Go to MD04 and put the part into weekly buckets.

Go to the List Icon and select variable print.

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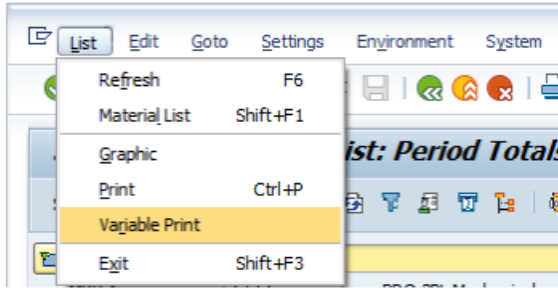
This will come up. Notice the top part are the planning parameters. The lower part shows your MRP plan.

MRP Type	PD	Matl Type	Z002	Unit	EA
MRP Cont.	5YP	Plng Group	ZPA	MRP Lot Size	YE
PurGrp	230	Proc.ID		FxdLotSz	0
Repl. Lead Time	180	Stock	30	MinLotSz	0
Procurement	F	PlndIss	4,766	MaxLtSz	0
SpecPrcKy		FirmIss	26	SftyStk	0
SpecProc		PlndRcp	2,062	ReorderPt	0
RngCovrgProf	113	FirmRcp	2,700	MaxStk	0

Current Date		11/30/2019

Period/segment	Plnd ind.reqmts	Requirement	Receipts	Avail. Quantity	ATP quantity	Act. RoC
W 08/2020	0	72-	66	87	0	19.4
W 09/2020	0	26-	62	123	0	24.7
W 10/2020	0	28-	0	95	0	19.7
W 11/2020	0	24-	0	71	0	14.7
W 12/2020	0	24-	64	111	0	20.0
W 13/2020	0	24-	0	87	0	15.0
W 14/2020	0	32-	63	118	0	23.4
W 15/2020	0	32-	0	86	0	19.4
W 17/2020	0	50-	82	118	0	23.6
W 18/2020	0	22-	0	96	0	18.6
W 19/2020	0	32-	0	64	0	13.6
W 20/2020	0	24-	83	123	0	23.3
W 21/2020	0	26-	0	97	0	18.3
W 22/2020	0	24-	0	73	0	13.3

Export this into Excel. Some clean-up is required to get the excel sheet below. In yellow I have the average weekly quantities, and in blue I have the standard deviation. In pink I have the coefficient of variation. This shows a relatively stable demand plan with low variation is being translated into a less stable supply plan with approximately 6 times the level of variation.

Period/segmel	Plnd ind.re	Requirement		Receipts	
W 14/2020	0	-32		63	
W 15/2020	0	-32		0	
W 17/2020	0	-50		82	
W 18/2020	0	-22		0	
W 19/2020	0	-32		0	
W 20/2020	0	-24		83	
W 21/2020	0	-26		0	
W 22/2020	0	-24		0	
W 23/2020	0	-32		73	
W 24/2020	0	-32		0	
W 25/2020	0	-32		64	
W 26/2020	0	-30	30.7	0	30.4
W 27/2020	0	-30	6.9	57	36.4
W 28/2020	0	-32	0.22	0	1.20
W 29/2020	0	-32		64	

Whether this is good or bad depends on how you want your inventory segmentation to be set up and what your goals are.

How to Export MD04 to Excel

SAP can be a challenge when it comes to exporting data with several different export methods used in different screens. MD04 has the most obscure path to excel.

To export, first go into MD04.
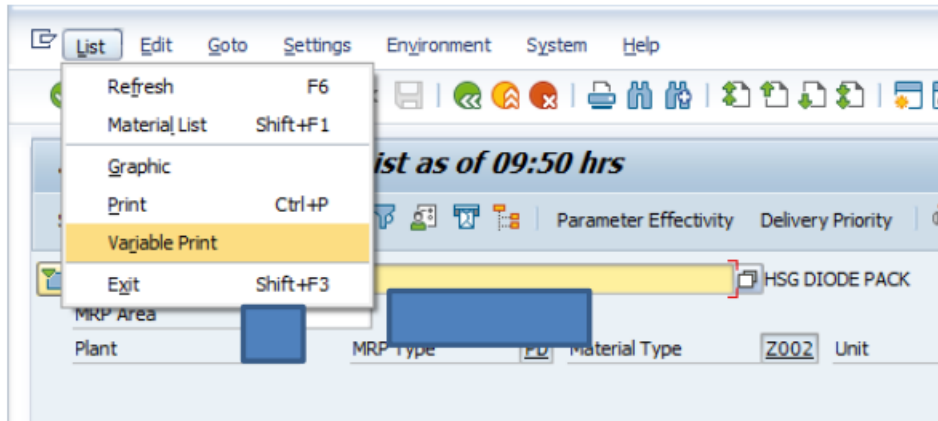
Click list then variable print. This will bring you here. Once here you see a more traditional export icon. Just follow the prompts.
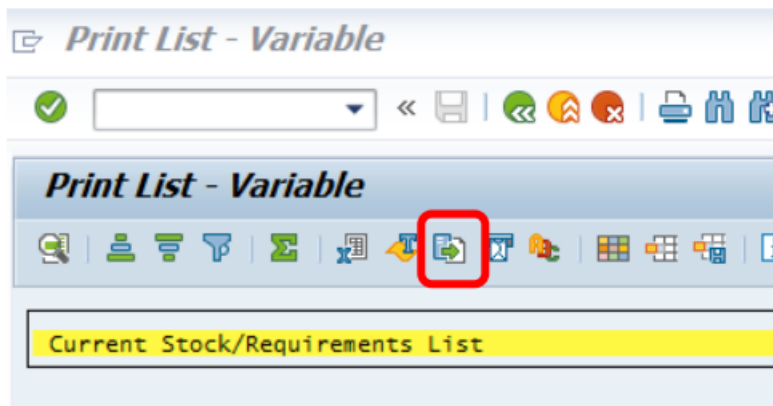
Note: Before exporting, decide what time buckets you want. For example, if you want weekly buckets, you need to put it into weekly buckets before exporting.

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Tips and Parlor Tricks

In this section we will look at different ways to get more out of SAP using built in short cuts, graphs, hot keys, and standard navigations you may not be aware of.

Some points will be repeated from other sections, but it is useful to have them all in one section.
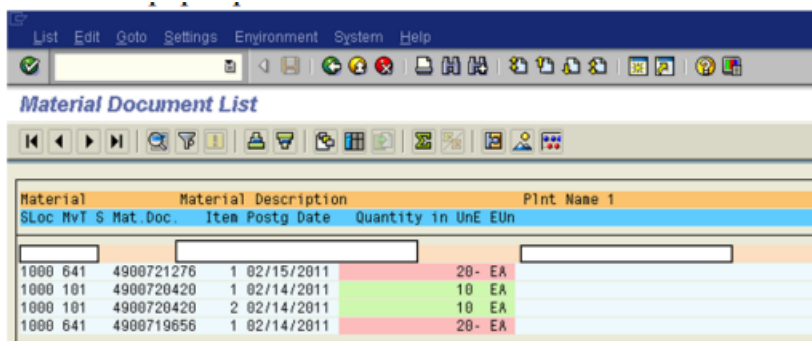
Layouts

Layouts allow you to create different data views in standard SAP transactions. They can be unique to a user, or standard global default. In general, DO NOT MAKE THEM STANDARD DEFAULTS, because this affects other users and will become their default view as well.

Important Note: to make a layout, you must be in the transaction. Let's go into MB51 and make a layout. Here I select an item to analyze, a plant, and then limit it to a date range so it does not run forever. Enter the data and click the execute button.
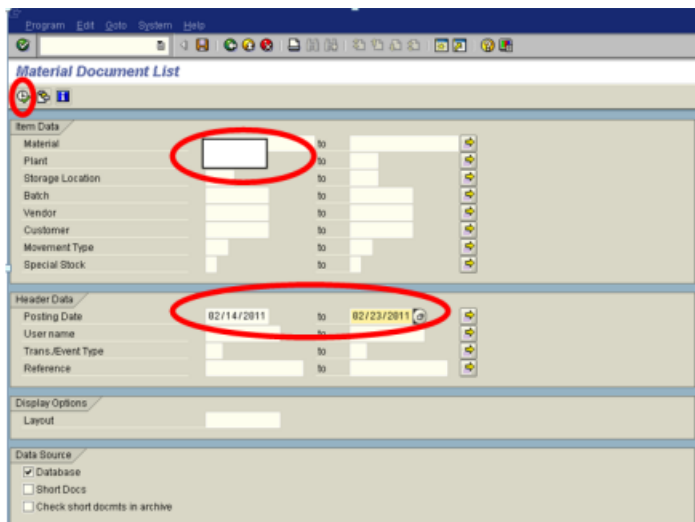
The below pops up.

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If creating, go into current layout through the "settings" drop down. The path is Setting – Select –Current.
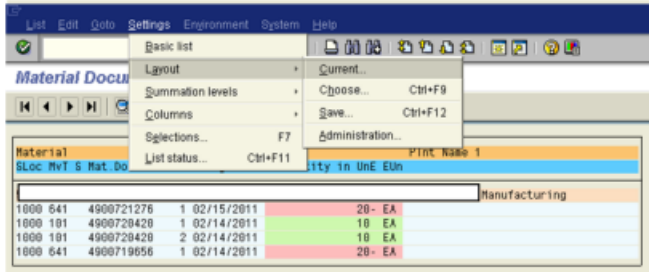
This brings us to the header. Once here, click on the position button to get more options.
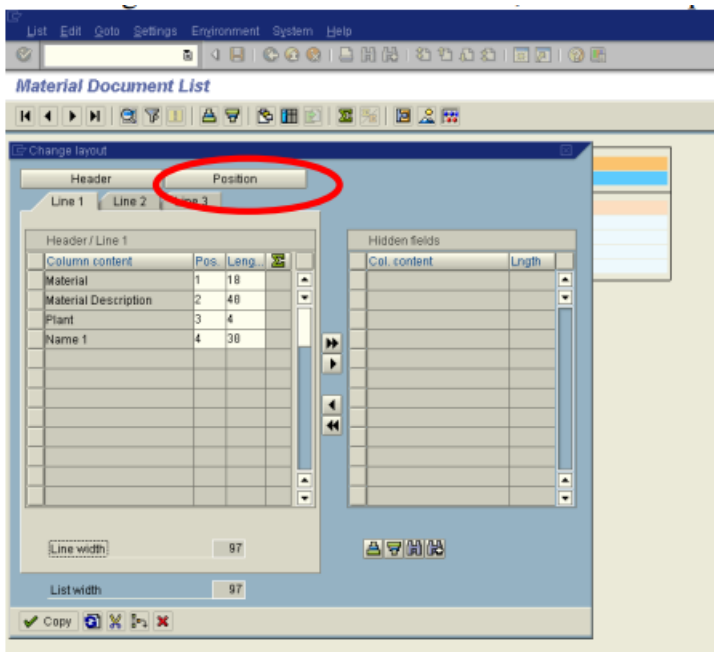
More options pop up, and you can then select from the options to pull more over.

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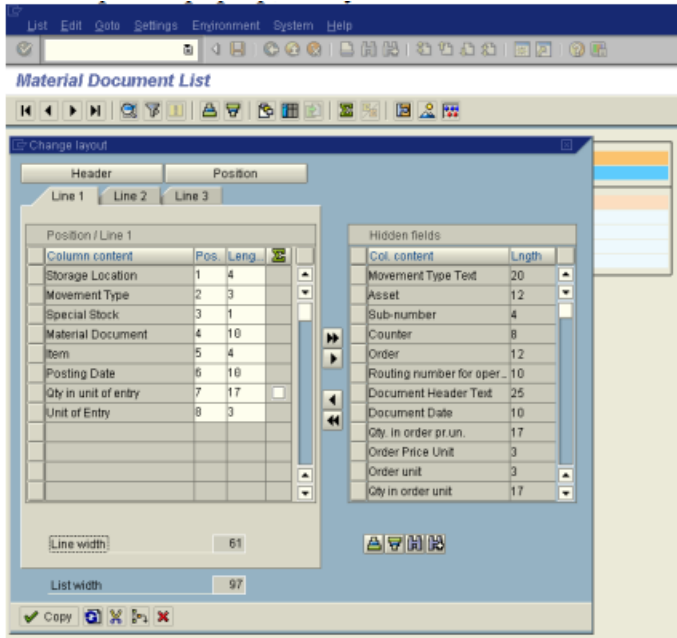
Here I am selecting "Amount in Local Currency" and a few other options from the list. Just click on them and they will highlight, and then hit the little black directional arrow heads in the center of the screen to add them and hit copy.
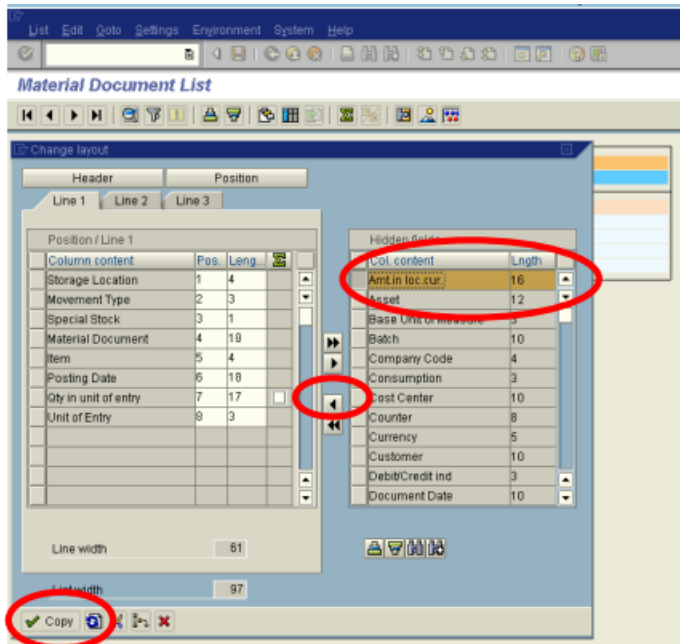
And the below should come up.

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Now I want to save it, so I go back to settings. ”Settings - Layout-Save”
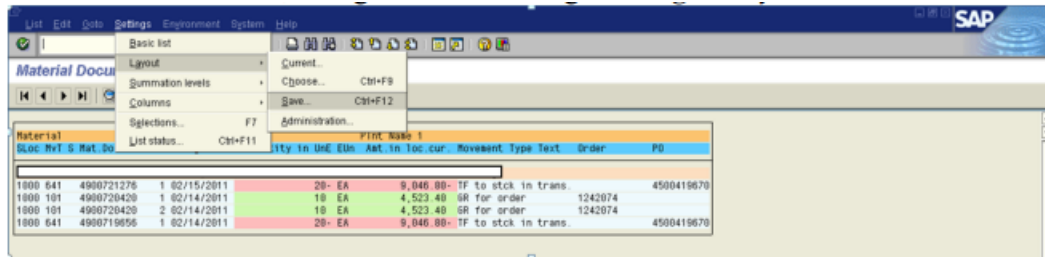
Next, you will need to name and describe the Layout. If you want it globally, put forward slash "/" at the start of it, but in general, do not do this. It will not automatically become the default for everyone, but since this is the convention, someone else may assume it should be and change it.

It is much better to be user specific in your layout naming convention. It would also be a good idea to make it somewhat relevant to a process or plant rather than a person.

To make it user specific, make sure the user specific box is checked.
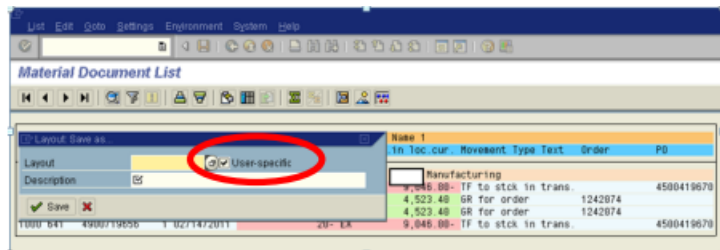
In the spirit of standard naming conventions (plant or process specific), let's disregard them and name one after me.
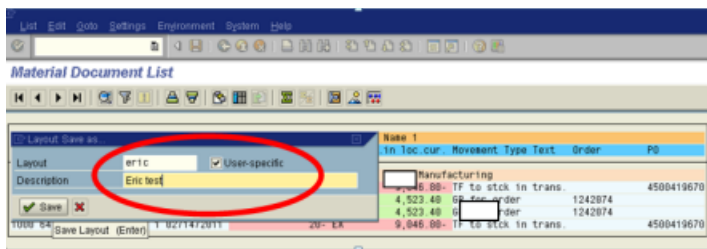
To make it user specific for the user, go to Settings – Layout – Administration.

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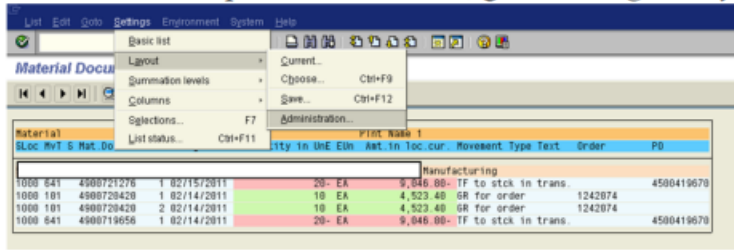
Go in and check the box next to the layout and hit the pencil button.
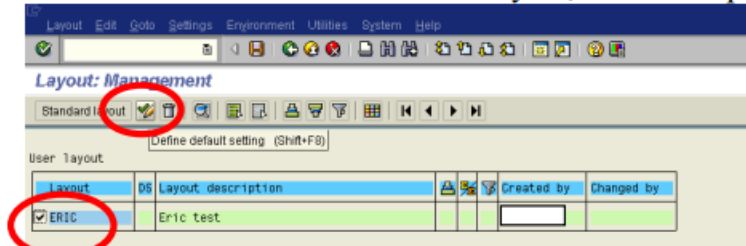
When you hit the checkmark, another check mark should come up, and then save to make it your default.
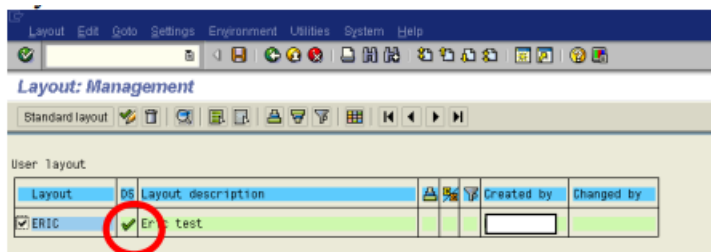
If you back all the way out, then come back in, you should go straight to your layout.
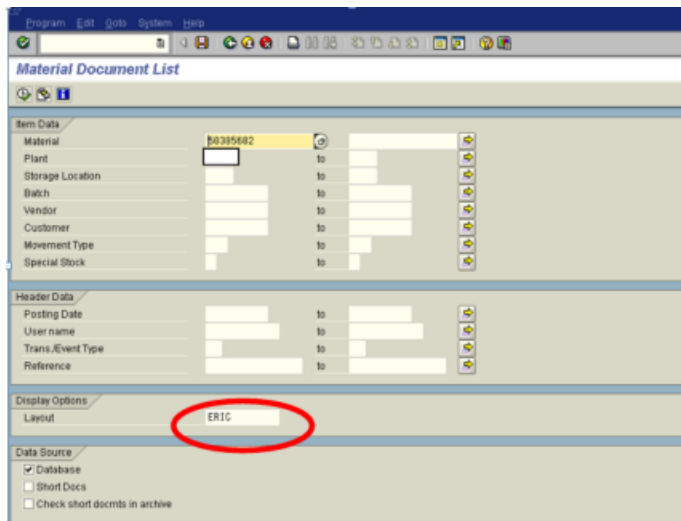
If you decide you want to change it, do the following Settings – Layout – Current.
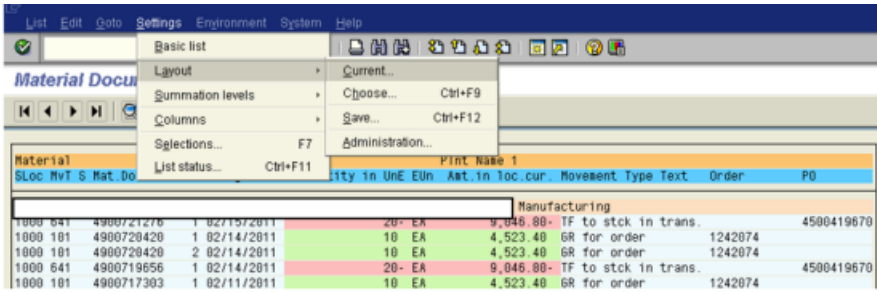
The options should pop up, and you can adjust and save as needed.

One other note – if you want to change the position of some data in the report, you can by going into the "Pos" column and typing what sequence you want the data in. Here I am changing the position of the "QTY" and the "Amount" by typing over them. You can also change the length of the field, so it fits better in the display.

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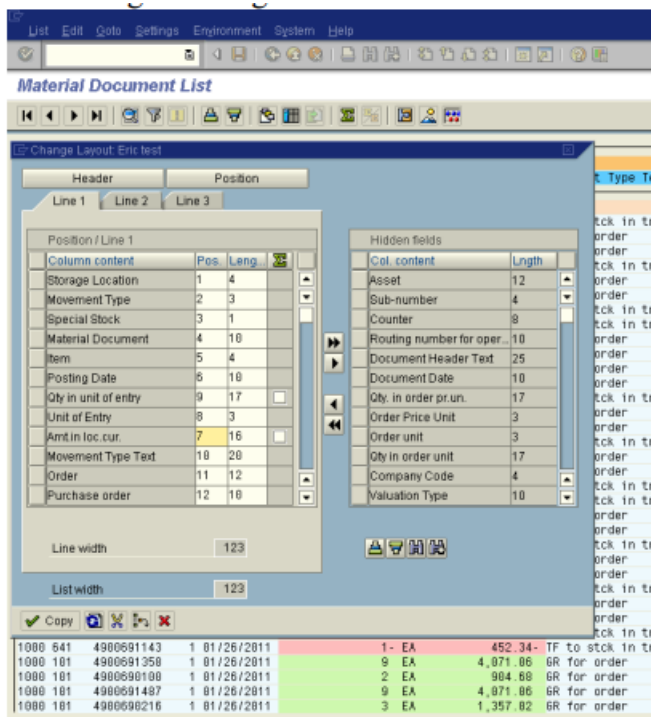
MC** Screens Navigation Aids

When working in MC screens (and other SAP screens), the path to the goodies is often repetitive, so to save time I will put a few of the common ones here but note that they are usually applicable to multiple Transaction Codes.

When in MC screens you can add data, called key figures, by selecting under Edit the "choose key figures" option.

You can also get it off the menu bar, on the icon that looks like papers stacked on themselves.
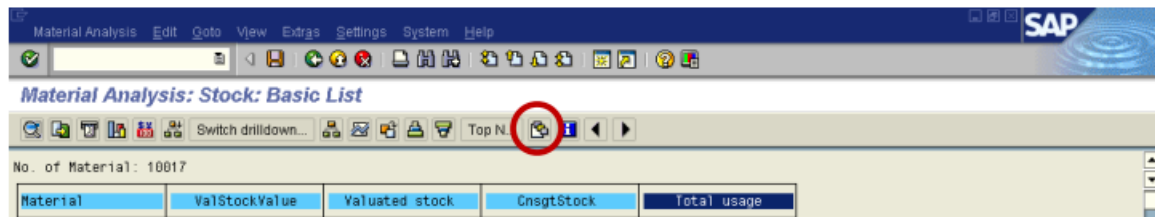
When you get this, you can select one or more options to pull over, from the list on the right. Click on the ones you want, then click on the little black arrows in the center, and they should move over.
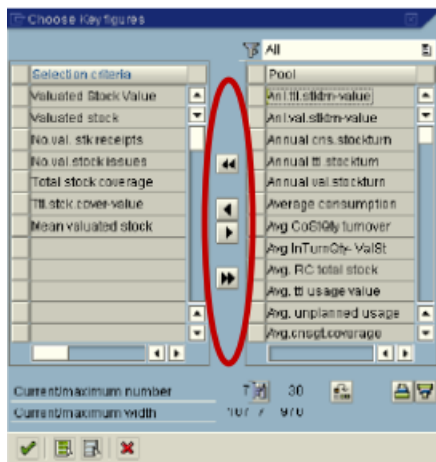
When you are in an MC transaction, you can also click on a column and change the period to analyze – this will open the selected column to whatever date range you put in the first screen and show you the totals and month to month change by part number.
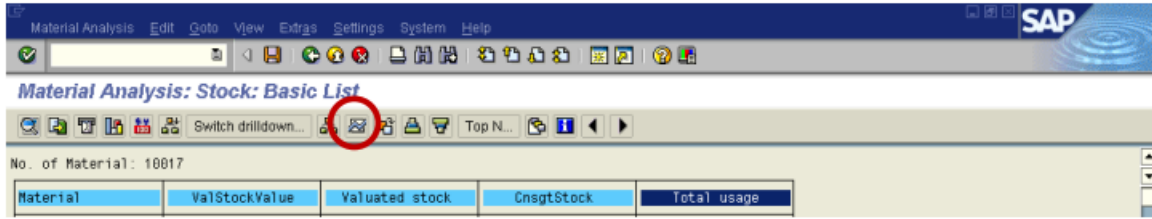
The below image shows buttons you should try out. All good stuff.
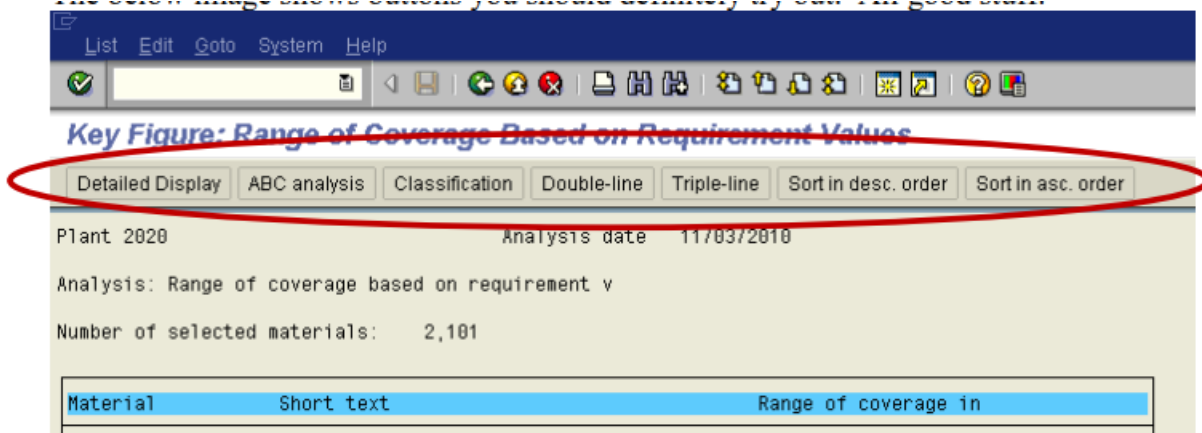
And do try any button that says Graphics. When I go into Graphics on a selected part number, I can see its inventory position over time. In monthly buckets, when the red line goes up, quantity has increased. Down movements indicate consumption. You can read into lot sizes (how much does it jump up), the rate of consumption (the slope of line as it draws down), and the level of overstock (called dead stock, but really it is just excess).

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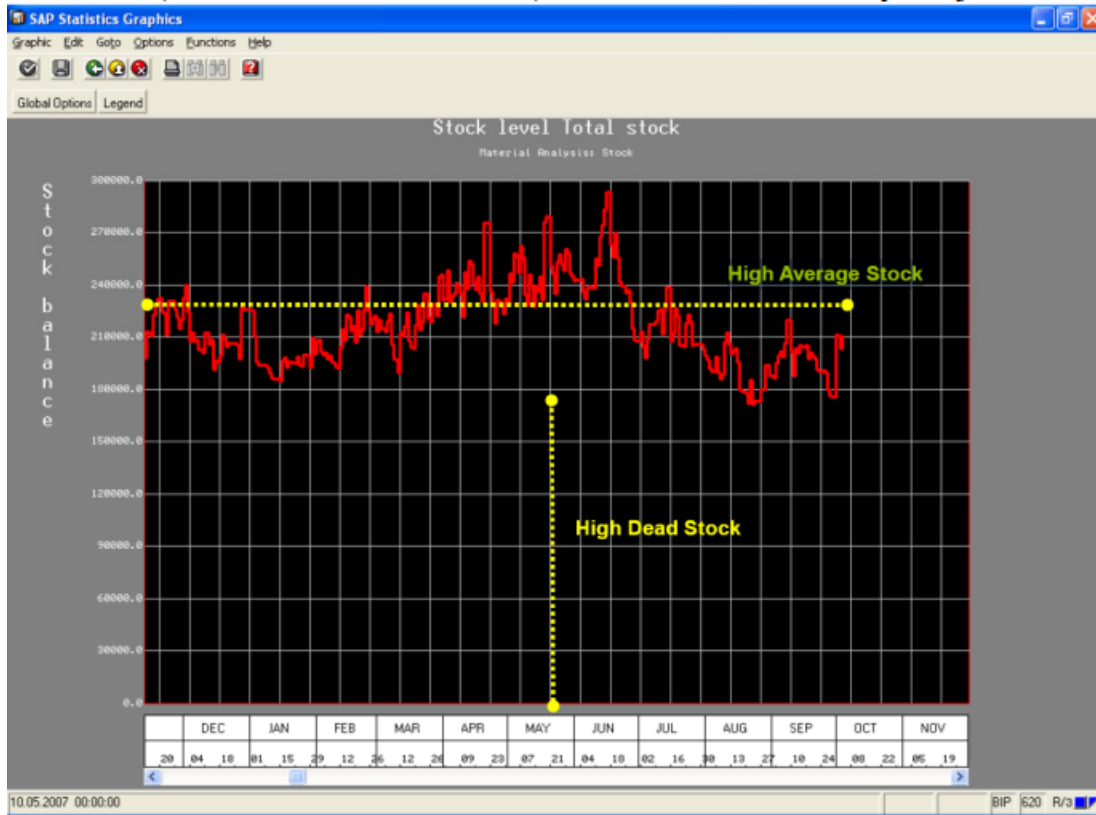
Finding Transaction Code Lists in SAP

If you want to try and find a transaction by description, type the following into the transaction field, and hit enter "search_sap_menu".
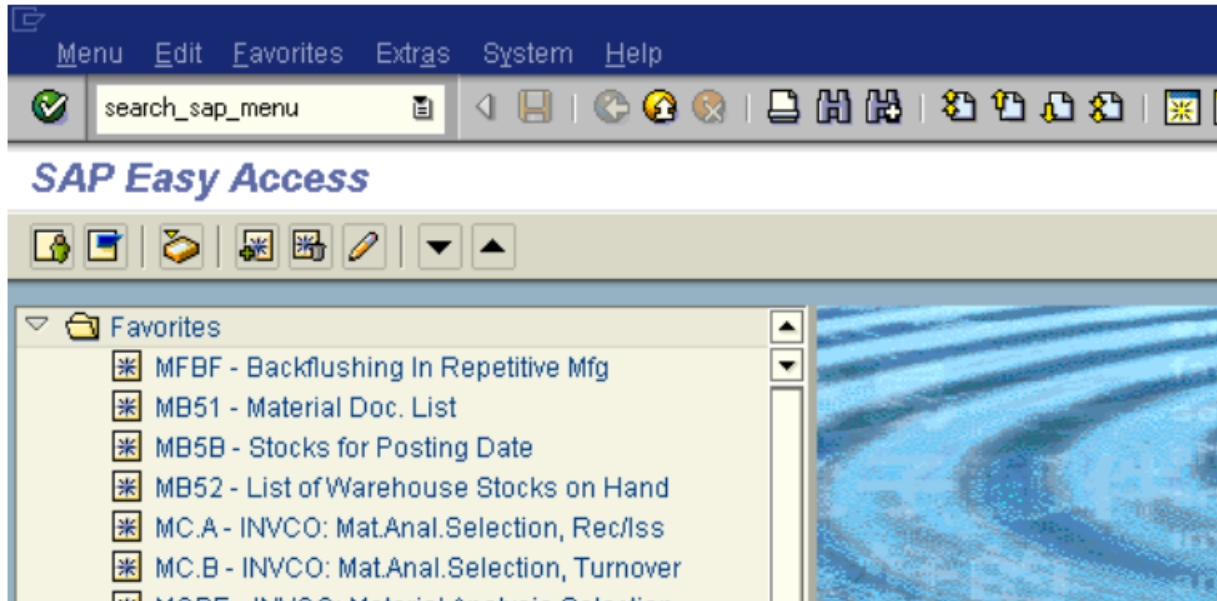
It should bring you here. Type the words you are looking for and hit enter.
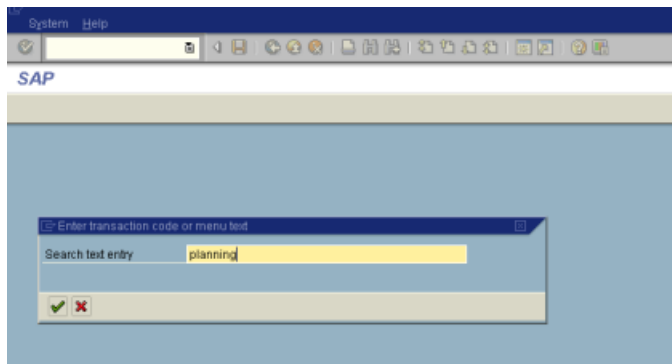
That should give you the below view. Some will be more helpful with Tcodes listed.

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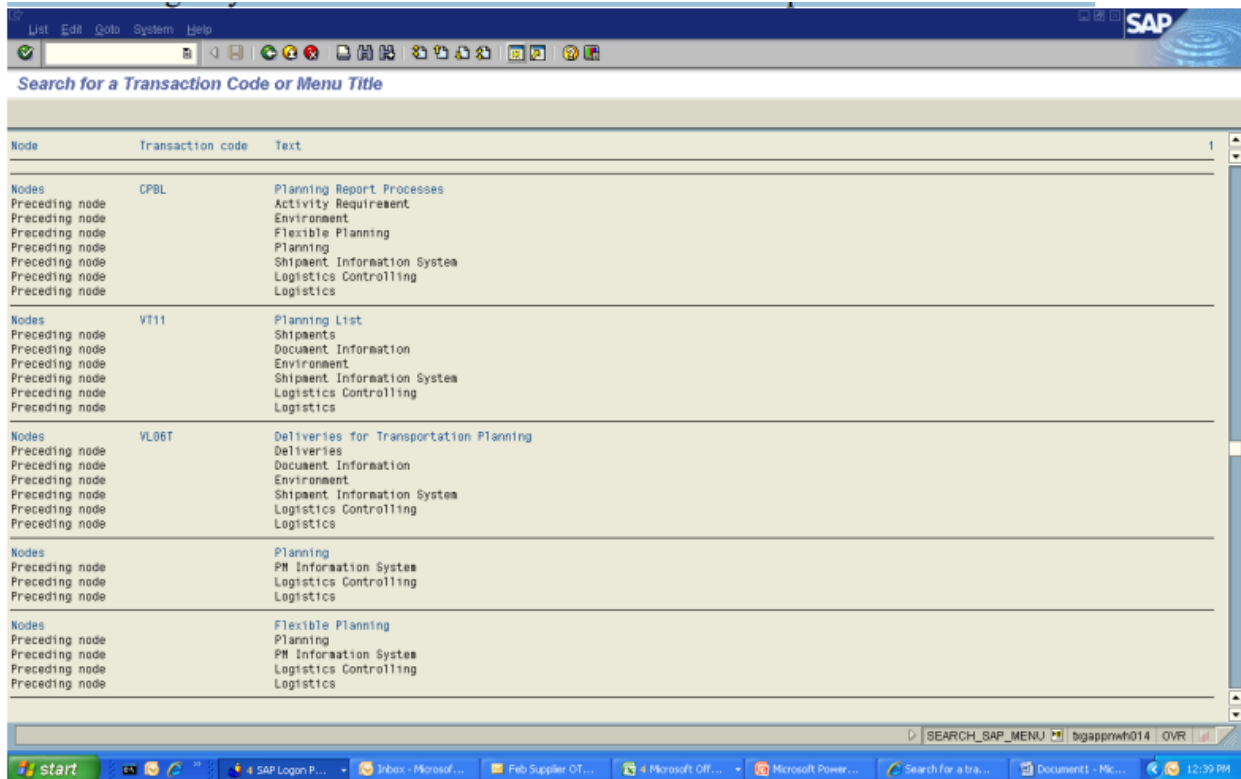
Other transactions that can help if you are allowed access are SDMO, SE16 (tables) and SE93. I am not allowed access, so you are on your own and are we not all on our own? Is not life's journey a fundamentally singular event? Who is truly with us at birth? At death? And in between? Sure, we can pick up some fellow travelers, and enjoy their companionship for a time, but in the end, we are all alone, and we need to accept that if we are going to get SAP implemented on time and on cost.

Hot Keys in SAP

Standard Toolbar Buttons

Button	Keyboard Shortcut	Description	Button	Keyboard Shortcut	Description
	Enter key	Enter/Continue		Ctrl G	Continue Search
	Ctrl S	Save		F1	Help
	F3	Back		Ctrl Page Up	Scroll to top of document.
	Shift F3	Exit System Task.		Page Up	Scroll up one page.
	F12	Cancel		Page Down	Scroll down one pag.e
	Ctrl P	Print		Ctrl Page Down	Scroll to last page of document.
	Ctrl F	Find	(PC only)	None	Create new session.
(PC only)	Alt F12	Customize local layout.			

Application Toolbar and Screen Buttons

Button	Keyboard Shortcut	Description	Button	Keyboard Shortcut	Description
	F8	Execute		None	Update/Refresh
	F5	Overview		Shift F5	Get variant
	Shift F2	Delete		Shift F6	Selection screen help

Button	Keyboard Shortcut	Description	Button	Keyboard Shortcut	Description
✔	Enter	Enter/Continue/Copy	✖	F12	Cancel
◀	F8	Scroll left	▶	Shift F1 Shift F7	Scroll right Next item
▲	Ctrl Shift F1	Move Favorites Up	▼	Ctrl Shift F2	Move Favorites Down
	Ctrl F7	Previous layout		Ctrl F8	Next layout
	Ctrl F10	User menu		Ctrl F11	SAP menu
	F6	Display Period screen			

Matchcode Buttons

Button	Keyboard Shortcut	Description	Button	Keyboard Shortcut	Description
(Mac)	F4	Display Matchcode list.	(PC)	F4	Display Matchcode list.
	F6	Insert in personal list. Click on an item, then on the button.		Shift F6	Display personal value list. After you create the personal list, click on the button to end the list.
	Shift F6	Restores the original Matchcode list.	(PC only)	Shift F4	Hold list displayed while you make a selection. Click on the button, then double-click to select a value

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Working with Data

Button	Keyboard Shortcut	Description
	Ctrl F1	Select all items on screen.
	Ctrl F3	Start/end of block. Select the first item; click the button. Select the last item; click the button.
	F7	Display all possible values.
	Ctrl Shift F5	Sort in ascending order: Change sort order to descending or ascending (Fund Analysis rpt)
	F2	Selection options. Choose values >, <, etc.
	F5 (Mac)	Display -> Change. Switches from display to change mode.
	None	Multiple Selection. Include or exclude single values or ranges of values.

Button	Keyboard Shortcut	Description
	Ctrl F2	Deselect all items on screen.
	Ctrl F6	Display results.
	F8	Collapse all levels.
	Ctrl Shift F4	Sort in descending order.
	Shift F4	Dynamic selections. Select additional fields for search criteria.
	Shift F5	Filter; restrict values to search on Matchcode list.
	None	Replace item back into workflow in Workflow Inbox.

Using Transactions (Reqs, JVs, etc.)

Button	Keyboard Shortcut	Description
	F6	Display header details.
	F2	Display additional info for PO line item.
	Shift F5 Ctrl F12	General Statistics (Reqs) PO History
	Ctrl F11	Display delivery address.
	F7	Display the vendor address for a PO.

Button	Keyboard Shortcut	Description
	F2	Display line item details.
	None	Services for object (Display JVs, Reqs).
	Shift F5	Display delivery schedule for a PO line item.
	Shift F6	Display conditions for a PO line item.
	Ctrl Shift F6	Show release strategy for PO.

Formatting Text (Reqs, JVs)

Button	Keyboard Shortcut	Description
	Shift F2	Delete selection line.
(PC only)	Ctrl Shift F1	Cut text (JV line item).
	F9	Paste text into field after you copy or cut it. Position the cursor and click the button.
	F9	Select. Click in a line item, then on the button.

Button	Keyboard Shortcut	Description
(PC only)	Ctrl Shift F2	Copy text (JV line item).
	Ctrl F10 Shift F6	Item text (POs) Detailed text (JVs)
(Mac only)	Shift F4	Search and replace words in the JV text screen.
	F6	Create text (JVs).

Additional Help Screens and Navigation aids can be found on submitandpray.com.

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SAP Help Screens

To access screen help for a particular screen:

Step 1. At the SAP Easy Access screen, type the desired transaction code (ex: MC43) in the field and click the button.

Step 2. Click Help - Application Help.
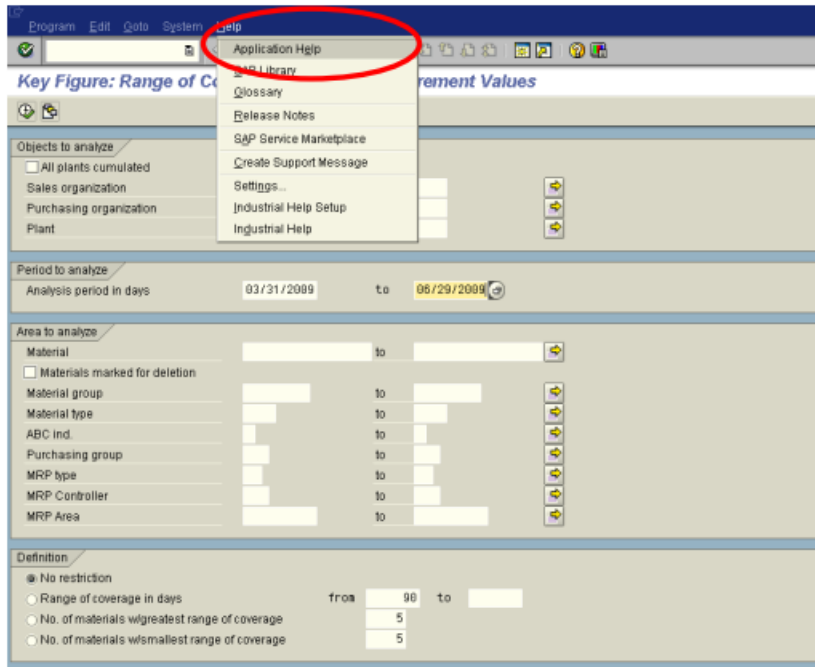
Step 3. After viewing the screen help, click the button to close the help screen. It will open your browser and give you the below screen.

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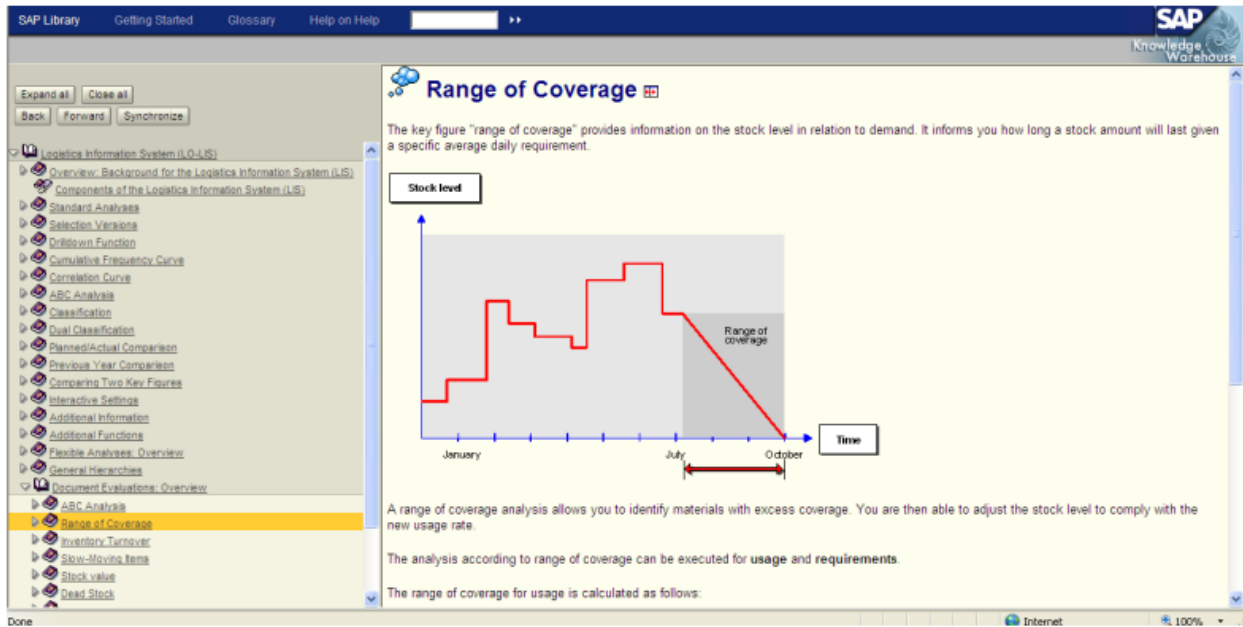
Customizing MD04 - How to Change Font Size and See More Lines

Suppose you want to see more lines in MD04, how can you change your layout to allow you to see more lines.

Go to MD04 and enter a part number. The little monitor icon at the top is the "customize" icon.
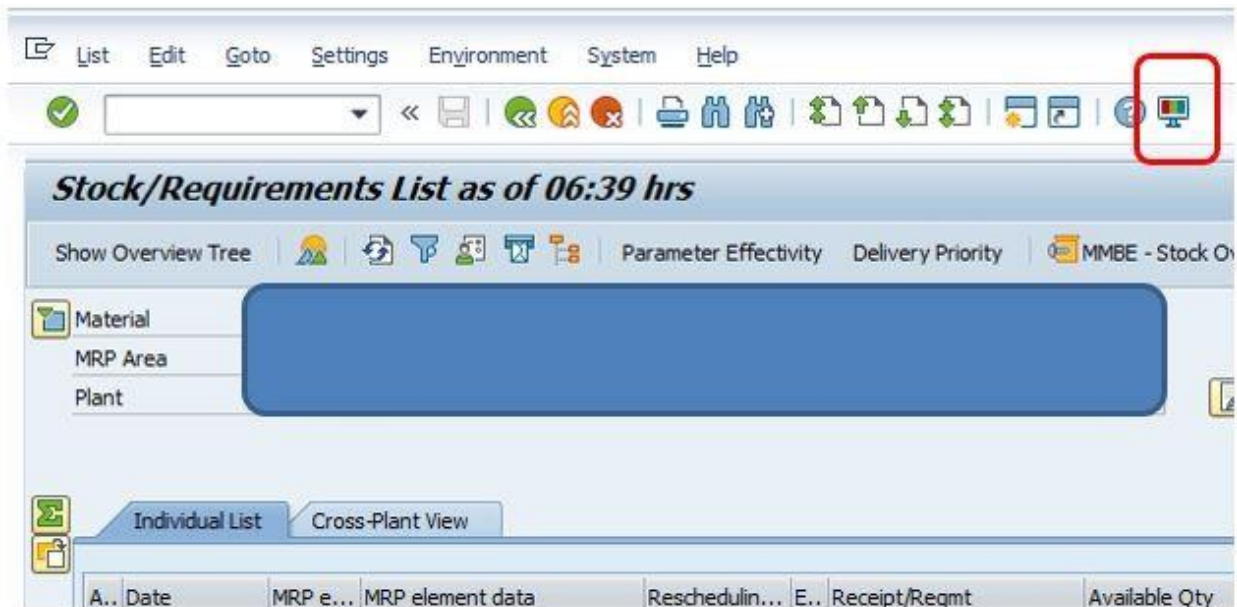
Select the options icon from the drop down. This comes up.

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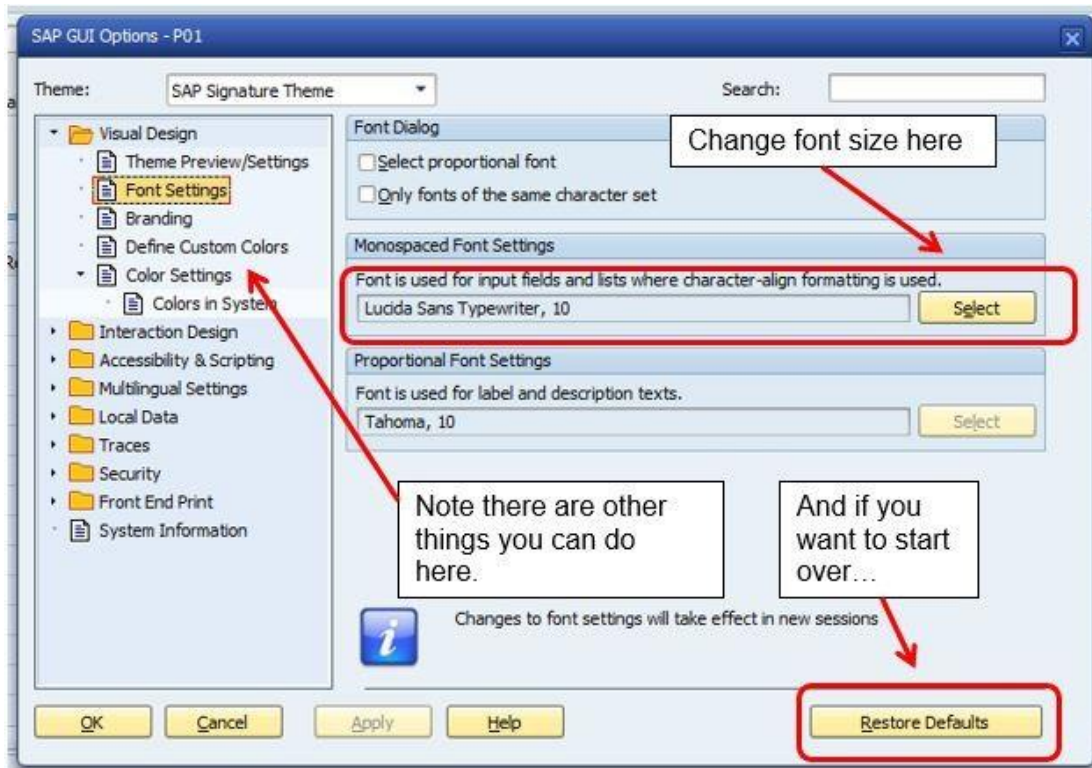
You do have to exit and re-log in to see the changes.