9th International Conference of the
TOC Practitioners Alliance - TOCPA
www.tocpractice.com
Nov 1-2, 2013 Utrecht, The Netherlands

Challenges for production planning while moving on TOC solutions for production

Presented by: Oded Cohen, TOC Strategic Solutions

Date: 1st November, 2013

Oded Cohen

Oded has nearly 35 years of experience in developing, teaching and implementing TOC methodology, solutions and implementation processes working directly with Dr. Goldratt all over the world. Among the countries to which Oded brings his expertise are the USA, Canada, Japan, India, China, the UK, Poland, Russia, Ukraine, Colombia, Chile, Peru, Turkey and many others.

Oded has authored multiple TOC articles and contributed to numerous TOC books.

Oded in the is the author of *Ever Improve – A Guide to Managing Production the TOC Way*, published in June 2010. Oded co-authored the book *Deming & Goldratt: The Theory of Constraints and the System of Profound Knowledge – The Decalogue.*

Together with Jelena Fedurko Oded has co-authored the book *Theory of Constraints Fundamentals.*

Oded is International Director of TOC Strategic Solutions Ltd and Founder and Co-President of TOCPA.

oded.cohen.gs@gmail.com
www.toc-strategicsolutions.com

Contents

1. Introduction
2. Implementation Problems:
   - Links between Customer Orders and Work Orders
   - Building production plans
   - Dealing with Purchasing
3. Conclusion

Introduction

The history of TOC implementations in the production area is full with success stories that brought significant improvements even in the short term.

Yet, we come across implementations when the results are not achieved quickly, easily or difficult to sustain.

Results in terms of performance and in contribution to bottom line.

The TOC solutions for production are:

- MTO
- MTA
- Mixed environment – MTA (majority) with some MTO (specials/projects)

PPC – Production Planning and Control play a significant role in the implementation and they confronted with significant challenges

Why there is a Gap between expectations and real outcomes?

There are three major reasons:

- Difficulties in the technical implementation
  - Layer 5 of change
- Incompatibility with the existing systems
  - Layers 4, 3 and 2
- Logistics are not the major problem of the organization
  - Layer 1

In MTO environment that has MRP/ERP system the implementation is relatively simple and very technical. Nevertheless, it is still challenging as the core problem does not disappear.

Why there is a Gap between expectations and real outcomes?

In MTS environment – the challenge is to move it to MTA.

Some MTS environments pretend that they are MTO and some are working to forecast.

The change is challenging from system point of view and the mindset due to inertia – even when performance and bottom line results have not been satisfactory.

The most challenging environment is the MTA/MTO one as PPC has to deal with:

- Two systems contributing to the company's performace
- Two sets of technicalities
- Trade offs between the systems

A recent case of mixed environment

The company produces products used by the construction sector.

They have 2500 products out of which 700 are stocked items. These items represent 80% of sales in monetary terms. all the other items in the catalog are produced to order.

After being exposed to MTO and MTA top management decided to start with a pilot in MTA and thereafter extend to roll out of more stocked items under MTA.

The sequence of introducing TOC to production was:

- MTA pilot for 19 SKUs
- Extending MTA pilot to 49 SKUs
- Roll out MTA to total of 105 SKUs

The MTA solution is geared for availability

Tactics: Production and Material Management are on the TOC Replenishment system

Mindset
Produce to ensure availability
Injection 1

Immediate improvement in availability
Injections 2-5

Continuous improvement
POOGI
Process of Ongoing Improvement
Injections 6-8

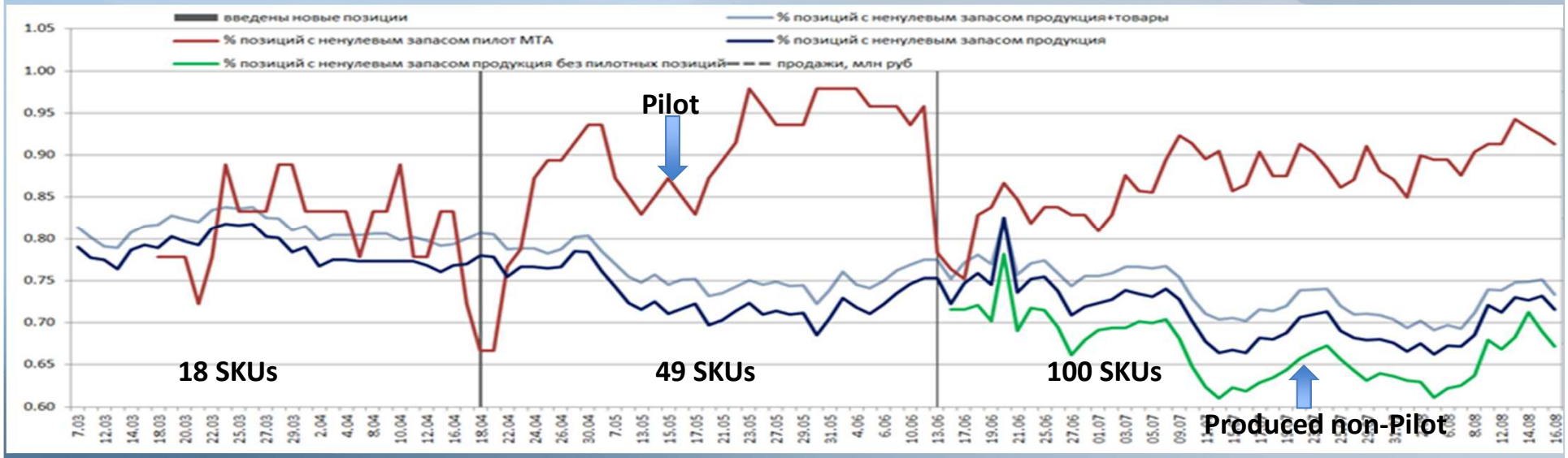
Availability

Graph of

Availability of MTA items

versus

Availability of stocked items produced internally that are non-MTA



Availability – Some Observations:

- It took production some time to align themselves to availability
- After a while the impact of black and red has brought to increase in availability.
- Introducing more SKUs into the pilot and into the roll out caused a drop in availability that demanded some time to recover.
- Availability of MTA items has been high on the expense of the non-MTA.

At the same time it was claimed that DDP of the MTO has been very high – nearly 100%

(yet, based on quoted delivery dates that not always were acceptable to the customers).

Challenges for PPC

Major challenges:

- **Setting up the target level (Buffer Size) of the Finished goods, and later of the Semi Finished Goods – Injection 2**
- **Creating Links between Customer Orders (CO) or Replenishment orders (RO) to the production Work Orders – Injection 2**
- **Producing production plans – Injection 2 and 3**
- **Dealing with Purchased raw Material and Components – Injection 5**

The Key Injections of the TOC Solution for MTA

Tactics: Production and Material Management are on the TOC Replenishment system

Mindset
Produce to ensure availability
Injection 1

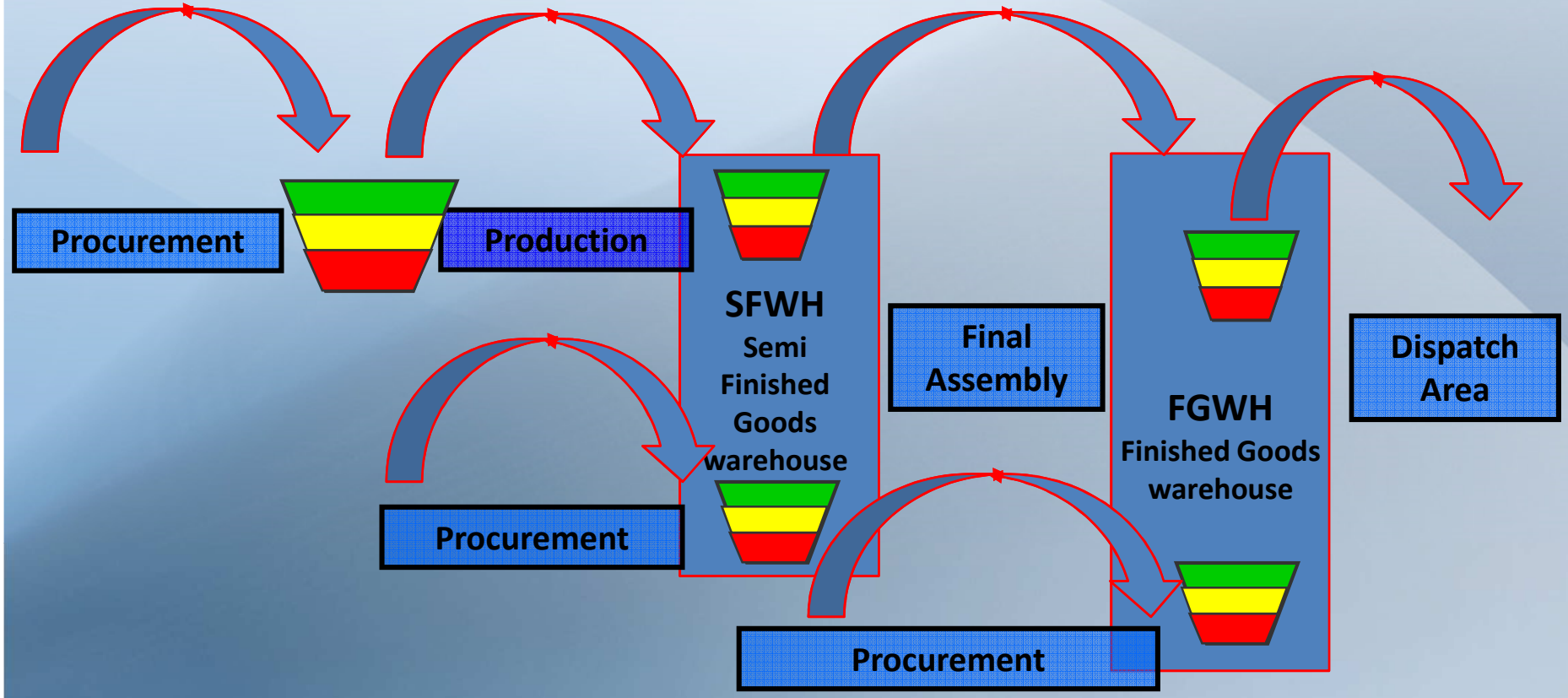
Immediate improvement in availability
Injections 2-5

Continuous improvement
POOGI
Process of Ongoing Improvement
Injections 6-8

Stock Buffer	WO Priority	Recovery	RM & Components
MTA-Injection 2 Stock Buffers in the Plant (Central) Warehouse are maintained to ensure 100% availability, with Production Work Orders (WO) released according to the consumption from the P(C)W Buffers	MTA-Injection 3 Open Work Orders (WO) are prioritized according to the status of their corresponding buffers in the Plant (Central) Warehouse	MTA-Injection 4 Buffer Management for recovery actions is in place	MTA-Injection 5 Availability of Raw Materials and components is monitored and managed

Determining Buffer Size

The General Structure of MTA



Determining the Buffer Size

Working with the formula – Max consumption in the RRT – Reliable Replenishment Time

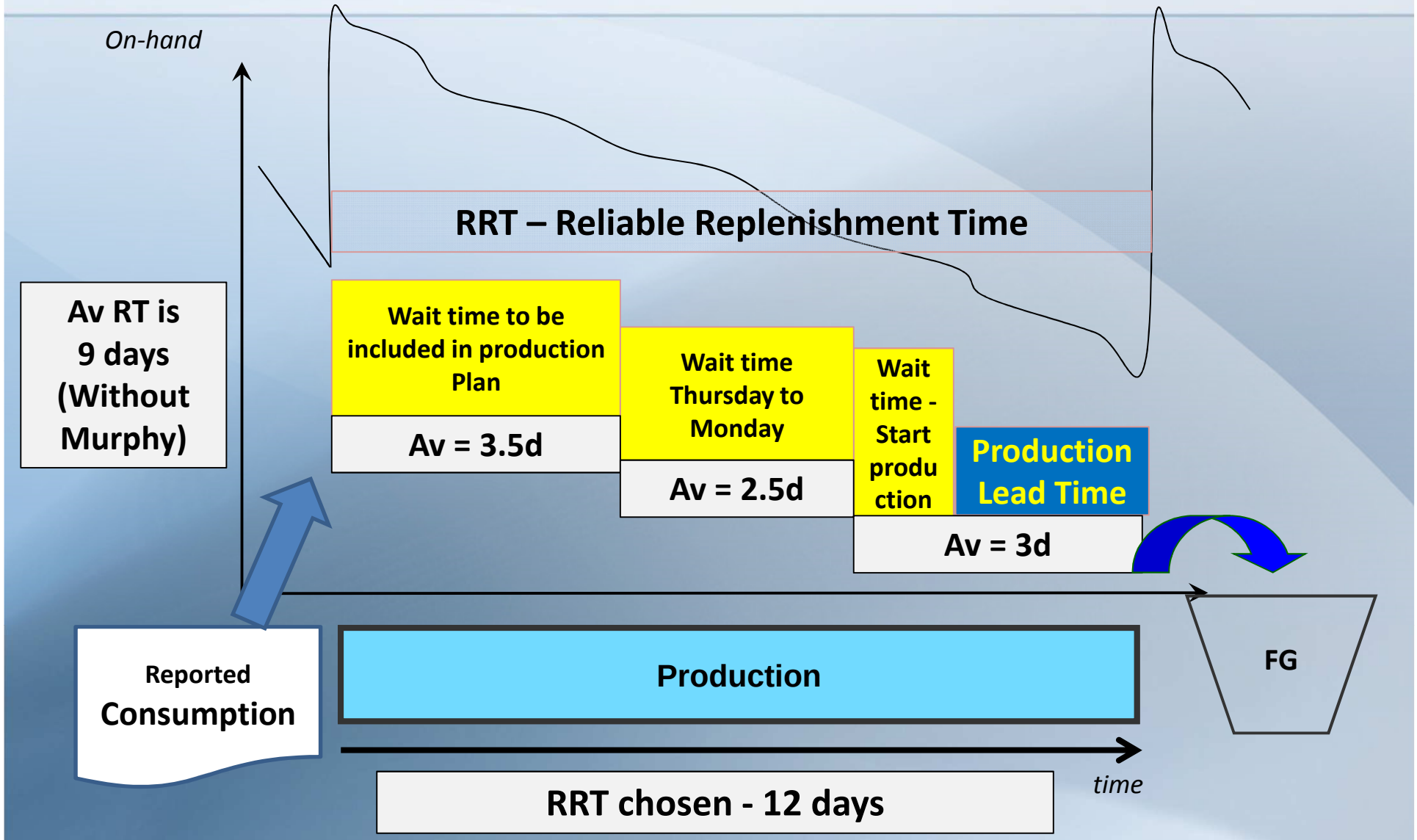
Concerns:

- Determining the RRT – the dependency of the mode of operation.
- The consumption is based on past consumption:
  - Some products are phasing out
  - Which period to take – 3 months? 6 months?
  - What about seasonality?
  - What about replacing products?

- The fear of over stocking

Example

RRT – Reliable Replenishment Time Working with Weekly Production Plan



Mode of operation: Weekly production plan

The company operates with weekly production plans

(this is common in environments of MTS based on forecast. Actually, it used to be monthly production plans).

The planning flow:

Central planning gathers all the requirements for the coming week.

Input is from forecast, customers orders, replenishment orders etc.

They check availability of RM and Components

And build plans for assembly based on perceived available capacity

The plan is given as quantity per SKU per week.

The plant planning department – translate the weekly plan into daily buckets and give instructions for part production and semi-finished assembly 2 days and 1 day prior to assembly

This process elongates RRT and hence the buffer size and t increases as so the total stock in the system. Also it prevents from responding faster to shortages.

Determining the quantity for replenishing the stock

As per the MTA Solution:

The daily consumption is reported to PPC.

The direction of the solution states that what is consumed is replenished.

However, in most cases it is make sense to accumulate the consumption and to issue replenishment instruction periodically – as frequent as practical.

Therefore, PPC has to decide when to release a production order and the quantities.

The natural tendency is to work to pre-determined quantity that may be based on minimum batch quantity, EBQ or even daily quantity an assembly team can produce etc.

On the other hand there are times PPC fears the quantity required to replenish to the top of the Green is far too much.

Determining the quantity for replenishing the stock

Conceptually, the decision when to release a production order and the quantity to produce is left to PPC.

We expect PPC to develop simple and practical solution that will be easy for them to operate – as long as they are committed to availability coupled with no excess inventory.

One approach is to develop a plan for assembly on a daily basis – with rolling horizon of 7 (calendar) days.

Building the Assembly Plan is done per assembly station/team. The loading is done according to the status of the FG Buffer. B-R-Y-G.

The plan is frozen for three days (rolling) as there is a need to prepare the parts and the semi-finished (sub-Assemblies).

In their case – the semi-finished are bulky and are fragile – therefore, it is not recommended to keep them in stock for too long.

Production Plans for MTA SKUs

What to produce?:

	A	F	G	L	M	N	O	Q	R	S
1		average sales	Target level	on hand physically	booked	consumption of previous day	DIOH in units, days	free on hand	buffer status	
3										
3120	25/6	137	700	417	534	270	0	-117	117%	
3121	25/6	8	400	0	10	0	0	-10	103%	
3122										
3123	26/6	1,205	16410	21,458	1,912	1,800	16	19,546	-19%	
3124	26/6	2,450	15440	22,813	4,731	1,970	7	18,082	-17%	
3125	26/6	891	8060	5,687	1,605	700	5	4,082	49%	
3126	26/6	1,097	5480	5,129	1,259	1,100	4	3,870	29%	
3127	26/6	88	1210	526	446	180	1	80	93%	
3128	26/6	34	210	104	146	43	0	-42	120%	
3129	26/6	154	450	400	94	10	2	306	32%	
3130	26/6	284	2470	3,101	1,374	130	6	1,727	30%	
3131	26/6	62	1140	901	360	0	9	541	53%	
3132	26/6	89	860	757	370	0	4	387	55%	
3133	26/6	263	3810	5,292	460	150	18	4,832	-27%	
3134	26/6	94	1990	6,045	1,344	0	50	4,701	-136%	
3135	26/6	49	1320	599	40	26	11	559	58%	
3136	26/6	112	2140	1,587	1,313	188	2	274	87%	
3137	26/6	9	1100	208	7	100	22	201	82%	

Sequence of planning:

First - what is in Black

Then - Red

What about the Yellow?

Better to consider:

- **DIHO**
- **Pattern of consumption**
- **Recent consumption**

What to do if there is no material/components available an still available capacity?

Building the Production Plan for MTA SKUs

What quantity to produce?:

	average sales	Target level	consumption of previous day	DIOH in units, days	free on hand	buffer status	in production							to order to complete buffer
							26/6	27/6	28/6	29/6	30/6	1/7	2/7	
26/6	1,097	5480	1,100	4	3,870	29%	0	0	0	0	0	0	0	1610
26/6	88	1210	180	1	80	93%	0	0	0	0	0	0	0	130
26/6	34	210	43	0	-42	120%	0	100	0	0	0	0	0	-48
26/6	62	1140	0	9	541	53%	***190***	0	0	0	0	0	0	409
26/6	89	860	0	4	387	55%	0	0	0	0	0	0	0	173
26/6	94	1990	0	50	4,701	-136%	0	0	0	0	0	0	0	-2711
26/6	49	1320	26	11	559	58%	0	0	0	0	0	0	0	761
26/6	112	2140	188	2	274	87%	0	0	0	0	0	0	0	366
26/6	9	1100	100	22	201	82%	500	500	0	0	0	0	0	-101
26/6	698	1240	0	0	-334	127%	0	0	200	0	0	0	0	174
26/6	79	780	0	6	480	38%	***465***	0	0	0	0	0	0	-165
26/6	19	150	0	0	-75	150%	100	0	0	0	0	0	0	-25
26/6	84	700	0	6	496	29%	0	0	0	0	0	0	0	204
26/6	27	200	15	4	100	50%	0	100	0	0	0	0	0	0
26/6	46	105	0	7	301	-187%	0	100	0	0	0	0	0	-296
26/6	95	1000	50	10	975	3%	0	0	0	0	0	0	0	25
26/6	58	1,000	0	25	1,443	-44%	0	0	0	0	0	0	0	-443
26/6	104	1,000	22	14	1,419	-42%	0	0	0	0	0	0	0	-419

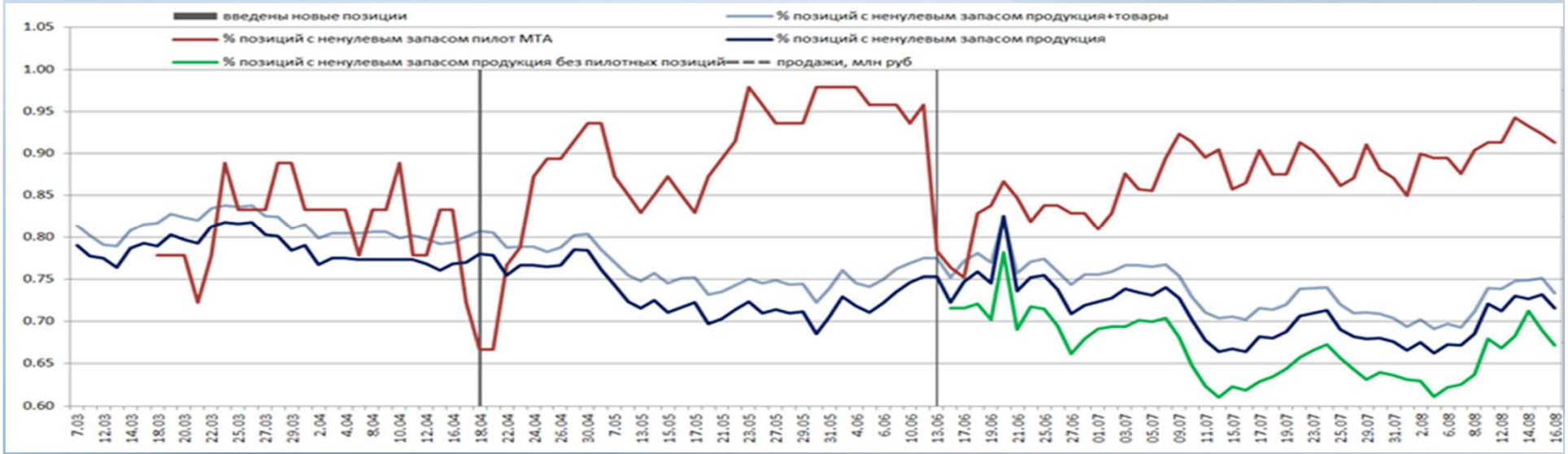
They have started with setting the quantities to the top of the Green.

However – in some cases this meant using and/ or components needed for other SKUs.

So, in such cases they have set the quantities to the top of the yellow or even to the middle of the yellow.

Building the Production Plan for MTA SKUs

Results - Availability



The availability of the MTA SKUs has gone up.

Central Planning felt it is easier to decide what to produce.

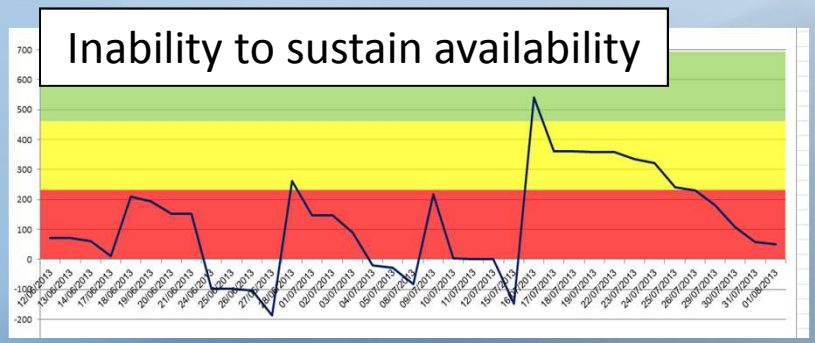
The non-MTA continued to be planned based on customers' request/forecast.

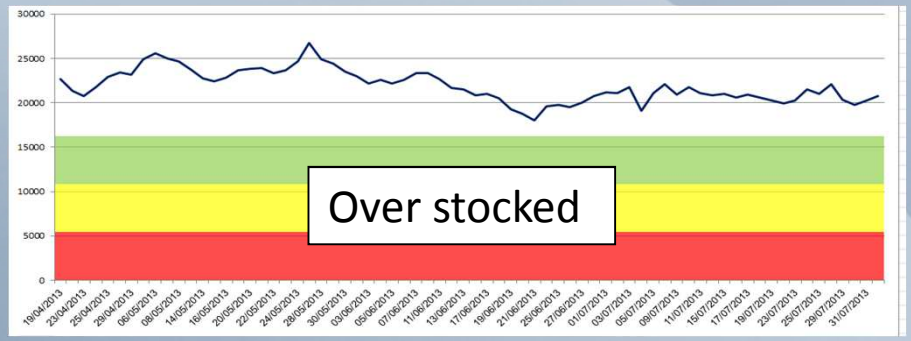
Building the Production Plan for MTA SKUs

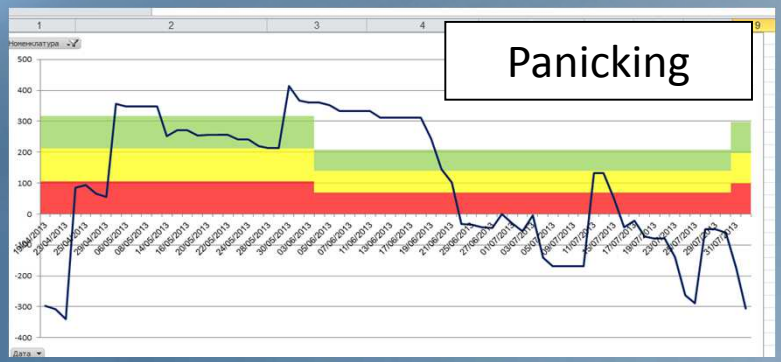
Results – No excess inventory

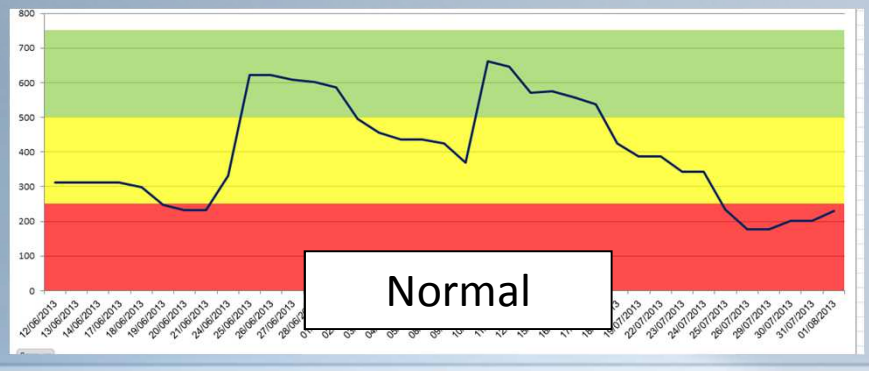
Planning is done manually, by planners that are responsible for 20-30 SKUs each – they can watch closely the behavior of the SKUs.

The key is to monitor closely and perform the DBM – as the buffer status may be misleading. Here are some examples of OH profiles:









A clash – Build up for the high season

Three Seasons:

- **Low – January to May**
- **Mid - Ramp up – June to August**
- **High – September to December**

No available capacity to respond to market demand on the high season.

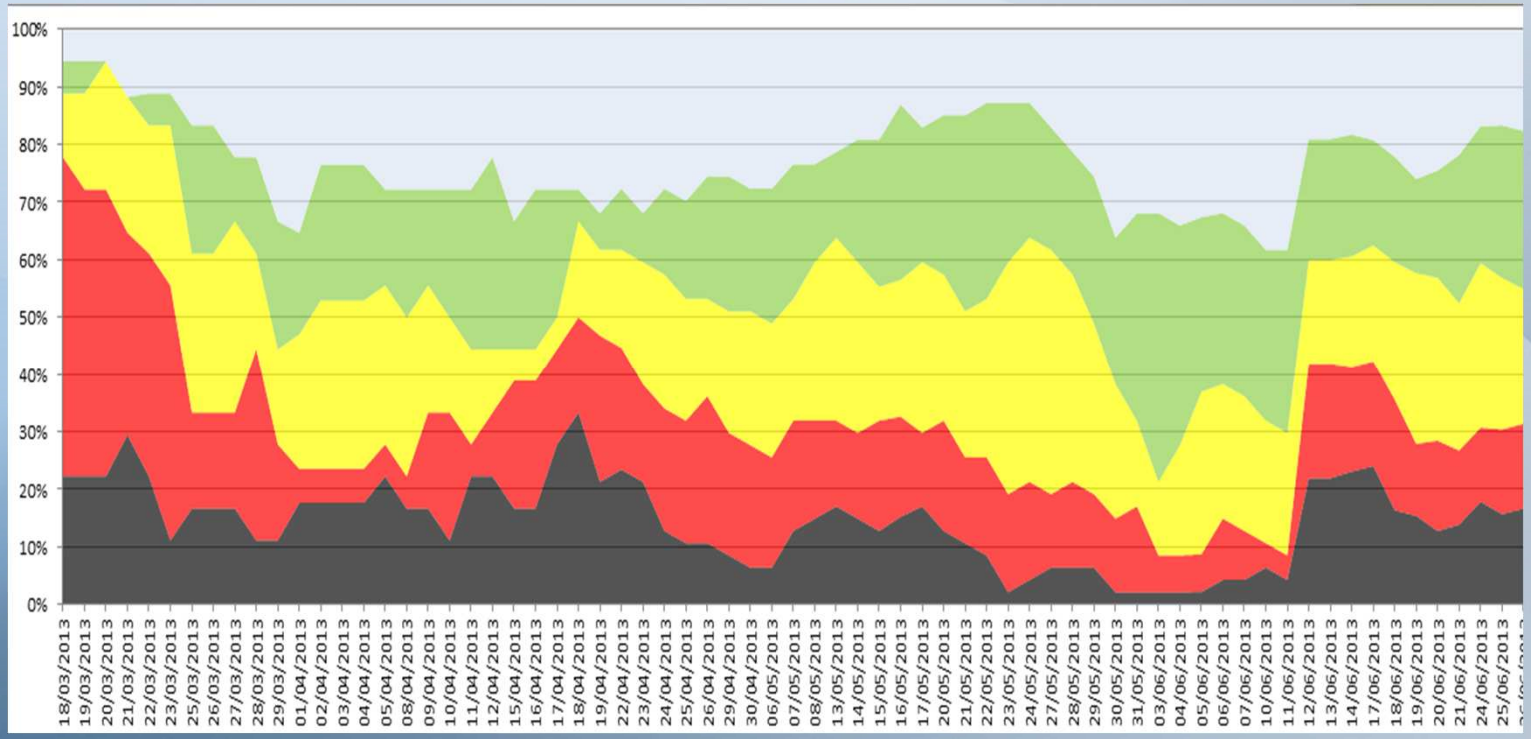
- **What to do?**
- **How to set up the buffers?**
- **Which products to build up?**

Decision - set the buffers based on last year Mid Season

Build up high runners – the risk is lower and the capacity will be freed to respond to the market demand of the SKUs that will experience pick demand

A clash – Build up for the high season

Why Clash?



In order not to have shortages in the future capacity and components are used at present and stocked items are in black.

What is preventing Availability?

Capacity

Capacity of Assembly?

Actually, they work only 5 days in two shifts.

They can work over time in the weekend – however, workers are not interested.

There is uncertainty in the amount of workers appearing to work.

Capacity of machine shop?

Not enough - working 24/7. There are not enough operators.

Availability of purchased materials and components

Many raw materials are specials with long procurement time. The same is true for many components.

Therefore, there is a need to get the purchasing department involved.

Dealing with Purchasing

MTA-Injection 5 states:

Availability of Raw Materials and components is monitored and managed

The reality:

- **There are practical problems in ensuring availability**
- **The way purchasing has been working up to now – forecast, contracts, commitments, call off etc.**
- **Central Planning has been promising DD to customers based on availability of materials and components.**
- **When DD was not satisfactory – Central Planning negotiated with purchasing convincing them to place urgent orders on suppliers.**

This is not good for MTA.

- **The use of purchased items is not as per the forecast but as per the actual demand of the market.**

Injection 5 – Availability – PTA Purchase to Availability

Recommendations:

1. **Establish PTA - even though it is challenging.**
2. **Deal with the major issues that PTA is experiencing and find simple and practical solutions to every problem raised (… expect many).**
3. **Negotiate changing the purchasing contracts Changes to allow flexibility in calling off of purchased items as per the actual consumption.**
4. **For long procurement lead time - continue with forecasting – which is not ideal – handle these items as constraints and ensure the better exploitation of them. Find ways to elevate the burden of such items.**
5. **Persuade purchasing to accept injection 5 as their major contribution to the organization. This is not easy if top management thinks differently.**

Summary
The link between production solution and the bottom line

Traditionally – production has been blamed for the inability of the company to achieve the desired bottom line results of t he company.

This is valid when production is the constraint of the company.

Is it always true?

Effective production is a necessary condition but not always enough.

The MTO solution bring bottom line results only when improved DDP bring Throughput earlier and prevent losing potential orders. Competitive QLT can lead to more orders only if the market needs it and can see the value.

In MTA – we have to be careful as the company may hold stocks for reasons of convenience while the market does not really suffer from lack of availability.