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Finding the Simplicity – three supply chain cases from Venezuela

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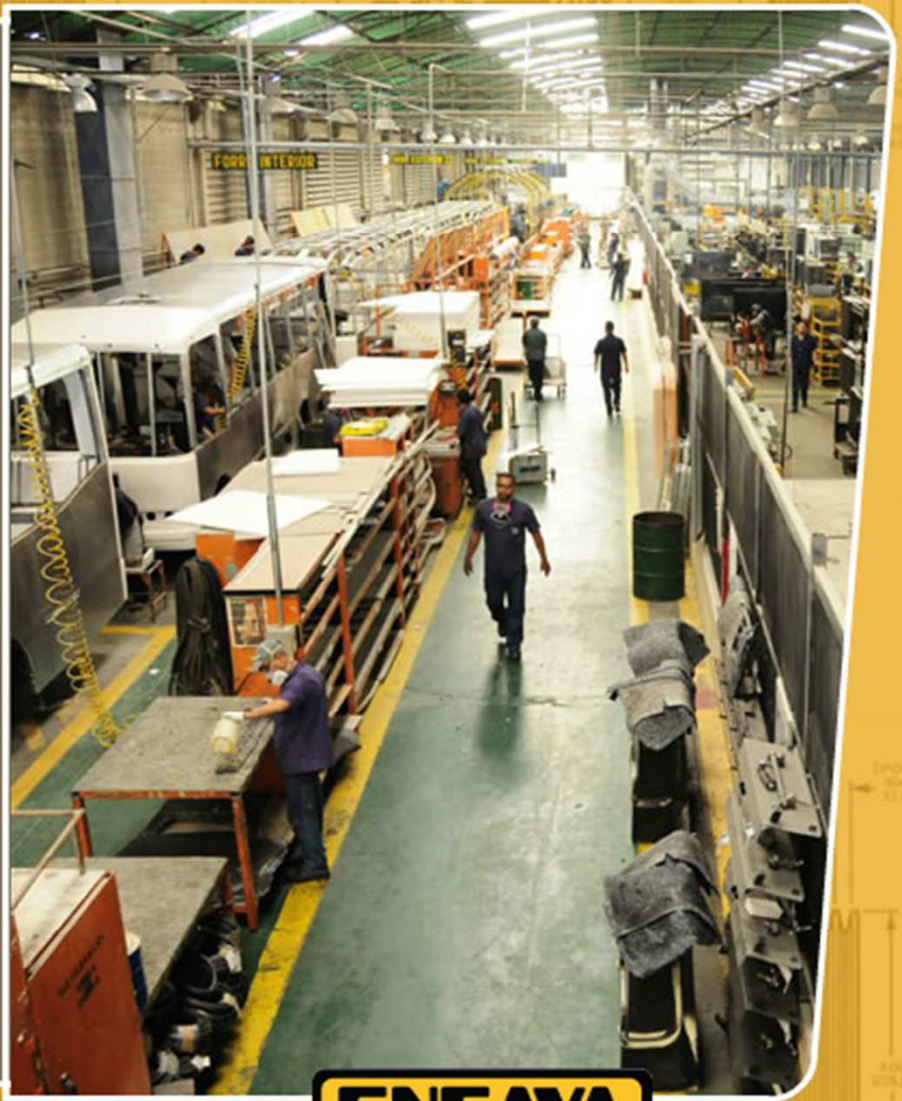
ENCAVA

FABRICA DE AUTOBUSES

ENCAVA *in Numbers*

- Started operations in 1962, located in Valencia, Venezuela
- 100% venezuelan private owners
- Market leader of bus vehicles in the country, more than 30.000 units produced
- More than 1.200 direct employees and 10.000 indirect along its supply chain
- Original design where more than 70% of the parts are manufactured locally
- High value recognition in the market place



- **July 2006**

"Introduction to TOC" recommended by DuPont (Paint Supplier)

- **January 2007**

"Introduction to Supply Chain"

Undesirable Effects

- Lots of parts missing
- Incomplete units all along the assembly line
- Fire fighting – last minute notice for parts to be supplied immediately to the assembly line
- End of the month syndrome
- Cannibalization of parts to deliver products at the end of the month
- Deliveries to the customers are late and it is impossible to estimate a lead time
- Information for parts needed from internal and external suppliers is difficult to follow

Applying the TOC five focusing steps ….

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1 . Identify the system's constraint:

For vehicle assembly plants, the constraint is in the paint section. Flow analysis identifying the situation for each unit (each number represents a unit).

Chassis	Buffer	Carroceria					Pintura				Linea F		
Prod	Patio	plataforma	soldadura	forro ext	forro int	fibra vidrio	Buffer alimentacion	Preparacion	Pintura	Buffer descarga	1	2	3
Mini Pullman/Especiales											piso platinas	ventanas	accesorios
	4037	4125	4123	4120	4118		1293	4036		4085	4016	4030	4029
			4124	4121	4119		4013	4087		4027	4015		
				4122			4017			4016	4012		
							4018			4015			
							4031			4032			
							4034			4014			
							4088			4079			
							4089			4035			
							4090			4086			
							4115						
							4116						
							4117						
							4080						
Urbano													
		1519	1517	1513	1512							1494	
						1502							
						1503							
1527	1521					1504		1499					
1528	1523					1505		1500					
1529	1524					1506		1501					
1530	1525					1507		URB 350					
	1526					1508							
						1509							
		1522	1516	1514	1510						1498	1496	
		1520	1515	1511									

Applying the TOC five focusing steps ….

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2 . Decide how to Exploit the system's constraint:

Daily production meeting following the flow and getting the focus where needed to maximize Throughput – at the paint section. Colour code helps identify problems in the line (green – OK, yellow – moving with missing parts, red – cannot move). Implemented buffers before and after the paint cabin to properly feed the lines.

3 . Subordinate everything else to the above decisions:

The production line with excess inventory was stopped. Actions to prevent any possible hole along the assembly lines. Buffers in place in materials that feed the lines. Basic training on DBM for the purchasing department to communicate requirements from outside suppliers.

Results

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- Significant increase in number of Units sold to the market without missing parts !!!

Line	avg	Oct	Dif	%
3300	11	21	10	94
Urbano	72	80	8	11
Pullman	12	35	23	186
Total	95	136	41	43
Incomplete	31	0		

- **WIP** Reduction

WIP	Sept	Oct	Dif	%
In process	21	7	14	67
Final line	56	32	24	43
Total	77	39	38	49

- Hidden capacity has been released
- Apparent bottlenecks from the past have disappeared
- The company is totally focused on DAILY DELIVERIES without missing parts
- Systematic way of working is in place
- ENCAVA is making more money

CAIVET
Transformadores

Overview

1st Stage : Monophasic (Single Phase)

January – June 2009

training – implementation – follow up

- MTA (Make To Availability)
- MTO (Make To Order)

Template for daily production follow up. Replenishment buffer system in place for FG, tanks, nucleus, aluminium. Work included ALL required templates.

2nd Stage : Triphasic (3 Phase)

June – December 2009

training – implementation – follow up

- MTA (Make To Availability)
- MTO (Make To Order)

Template for daily production follow up. Replenishment buffer system in place for pad mounted standard types.

Overview

Additional: Pilot test for Dynamic Buffer Management with DuPont products

June – December 2009

data collection - training – implementation – follow up

- PTA (Purchase To Availability)

Template for consumption follow up based on Dynamic Buffer Management. Warehouse, purchasing and DuPont aligned on the initiative and use of the buffers.

2011

A tool developed internally based on DBM principles has been developed for more than 1000 bought in products.

Results

- Monophasic (Single Phase) – Triphasic (3 Phase)
  - Engagement and Professionalism
    - Production meetings are now part of day to day activities
      - Missing transformers are followed
      - Quality issues are reported
      - Recovery actions being executed
    - Planners and the team are engaged
    - Sales people are part of the meeting and are able to give a better response time to the customer
    - Full ownership of the tools
  - Production Control

    Monophasic (Single Phase)
    - Systematic process for production control is in place – visibility and accuracy of the inventories is a reality.
    - MTO (Make To Order) based on due dates – Significant reduction of late orders. Procedure for control of tanks and nucleus dramatically improved.
    - MTA (Make To Availability) – The driver to launch orders is based on Dynamic Buffer Management. 100KVA and 167KVA (big and more difficult to produce) availability has dramatically improved.

Results

– Production Control

Triphasic (3 Phase)

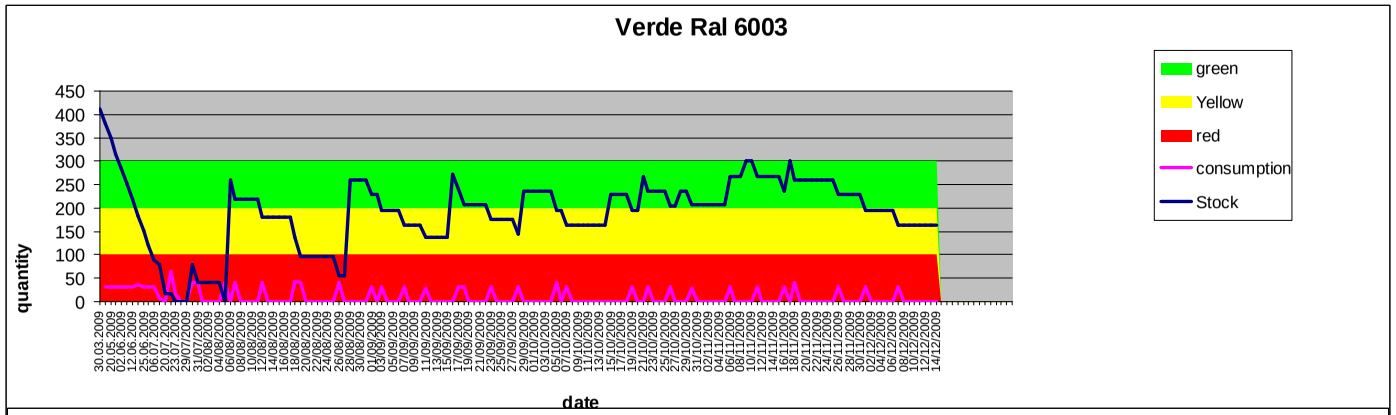
- Systematic process for production control is in place – visibility and a magnetic board (visual system) has dramatically improved the flow and focus.
- MTO (Make To Order) based on due dates – Significant reduction of late orders and total of days late. Significant reduction of WIP.

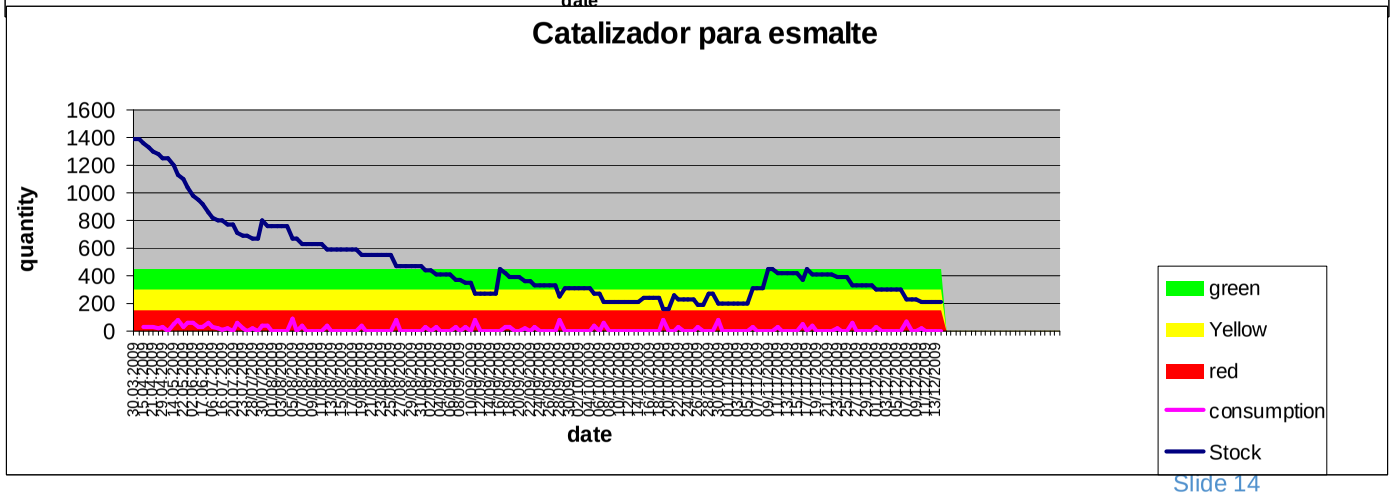
	31/03/2009	16/12/2009	DIF
No. of open orders	89	71	20%
Total late days	1033	878	15%
No. of late orders	30	10	67%
Pending orders for release	77	55	29%

- Lead time was reduced: from 12 weeks to 8 weeks for standard products and reduction of 2 to 3 weeks for the rest of the products. The reputation for not being on time is changing (3 main distributors are very happy with the changes). With a more controlled flow Caivet has the ability to expedite an urgent order.

Results

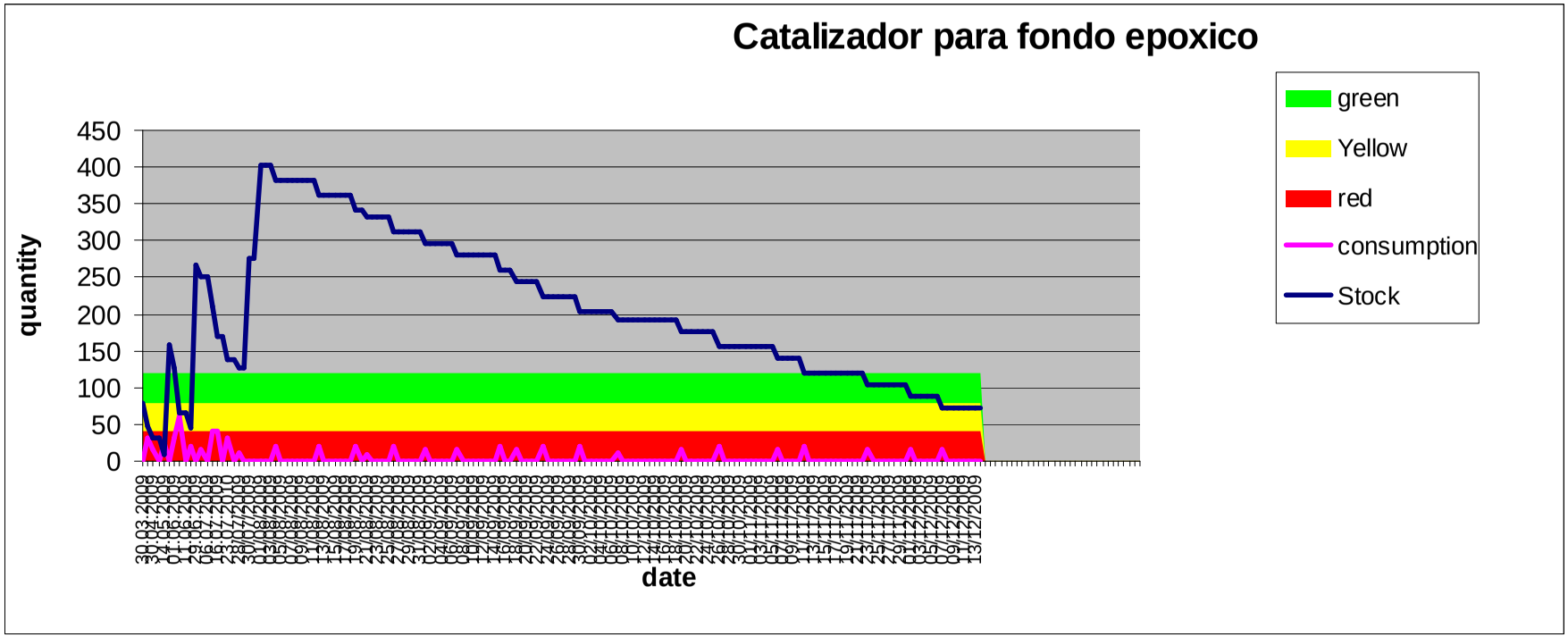
- DBM for DuPont products
  - Dramatic improvement on communication with DuPont, no more last minute emergencies, more frequent deliveries to replenish up to the buffer level. The purchasing has a systematic process in place that has made a real difference to the flow (including cash flow). Some examples :





Results

- DBM for DuPont products



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Counting wheels at DACA

DBR in place

DACA

Implementing "TOC"
The five focusing steps

- Identify the constraint :

  "lijado section" – the bottleneck

  scrap wheels

- Decide how to exploit the constraint "lijado section"

  For "lijado section"

  – Do not allow starvation
  – Maximum possible availability of personnel on this area
  – Daily close follow up on the performance
  – Minimum disruption on the work flow during power cut periods

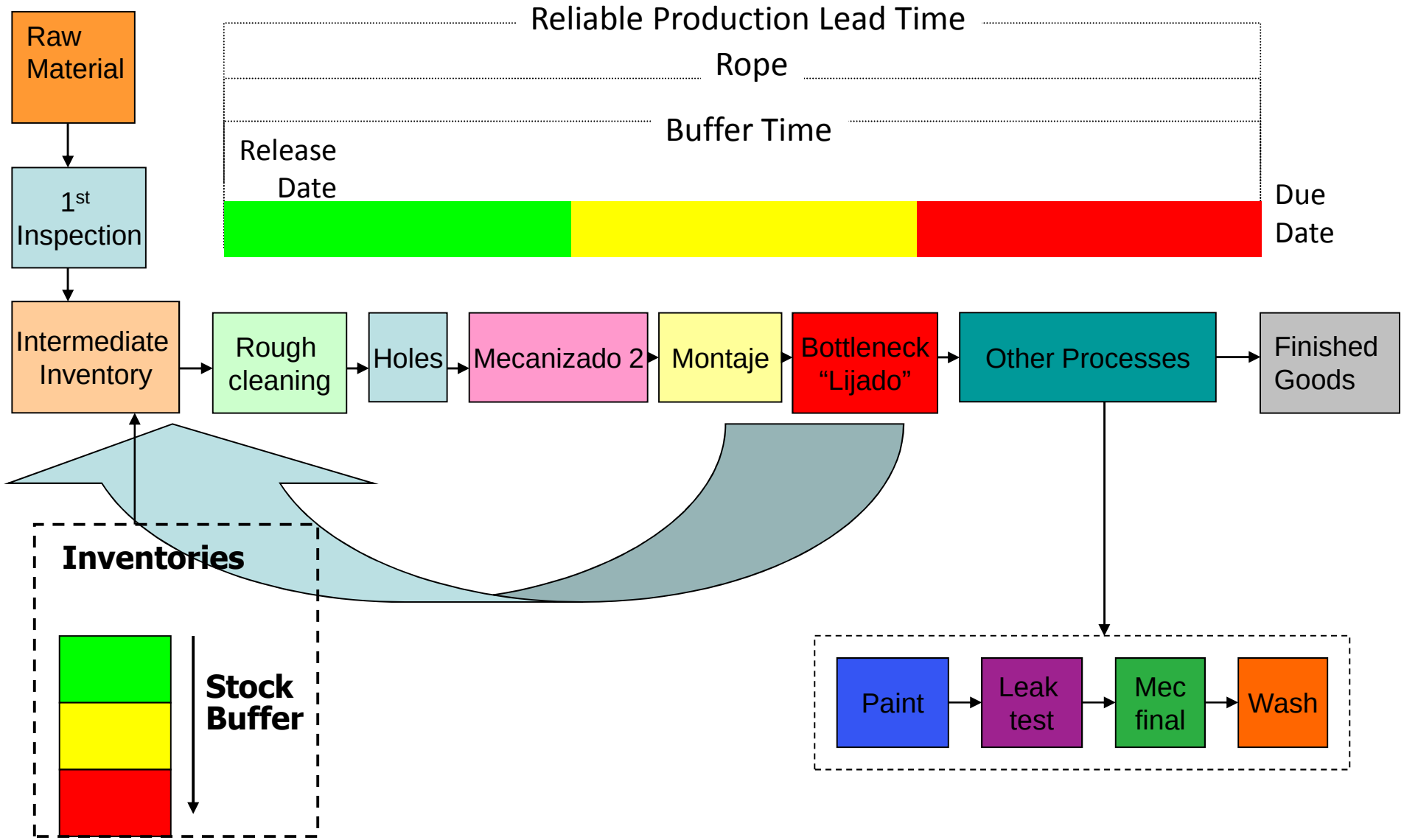
  For scrap wheels

  – Daily control for scrap at casting, before and after the bottleneck
  – More close control at the start of the process (casting)
  – Possibility to recover wheels has maximum attention
  – Detailed check on doubtul wheels : General Manager has the final word
  – Information is registered daily on the board

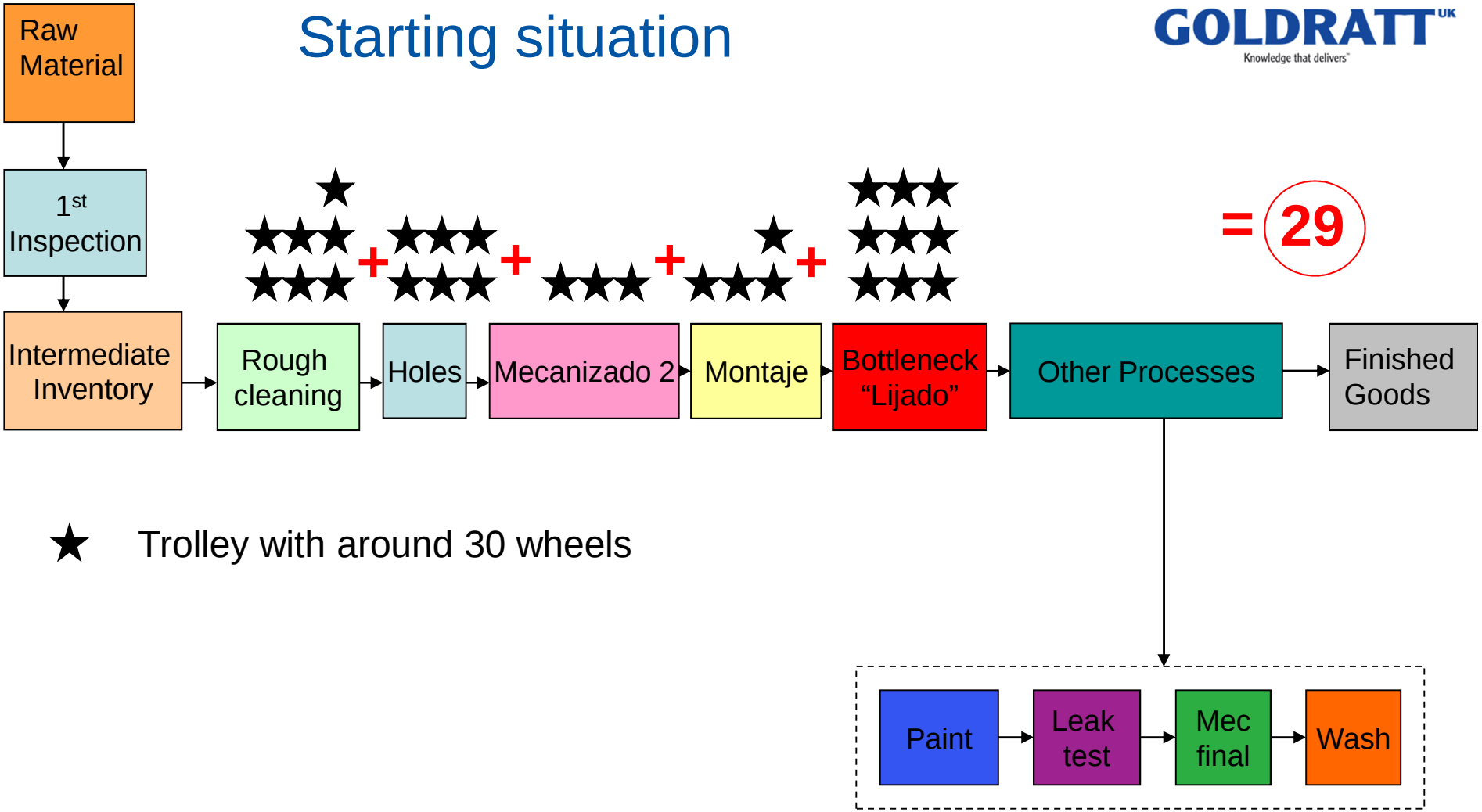
Implementing "TOC"
The five focusing steps

- Subordinate everything else to the above decision
  - DBR (Drum – Buffer – Rope) and Buffer Management priorities
  - Look ahead daily monitoring is easy and straight forward
  - Reprocessing of wheels that can be saved is handled

Suggested model for DACA

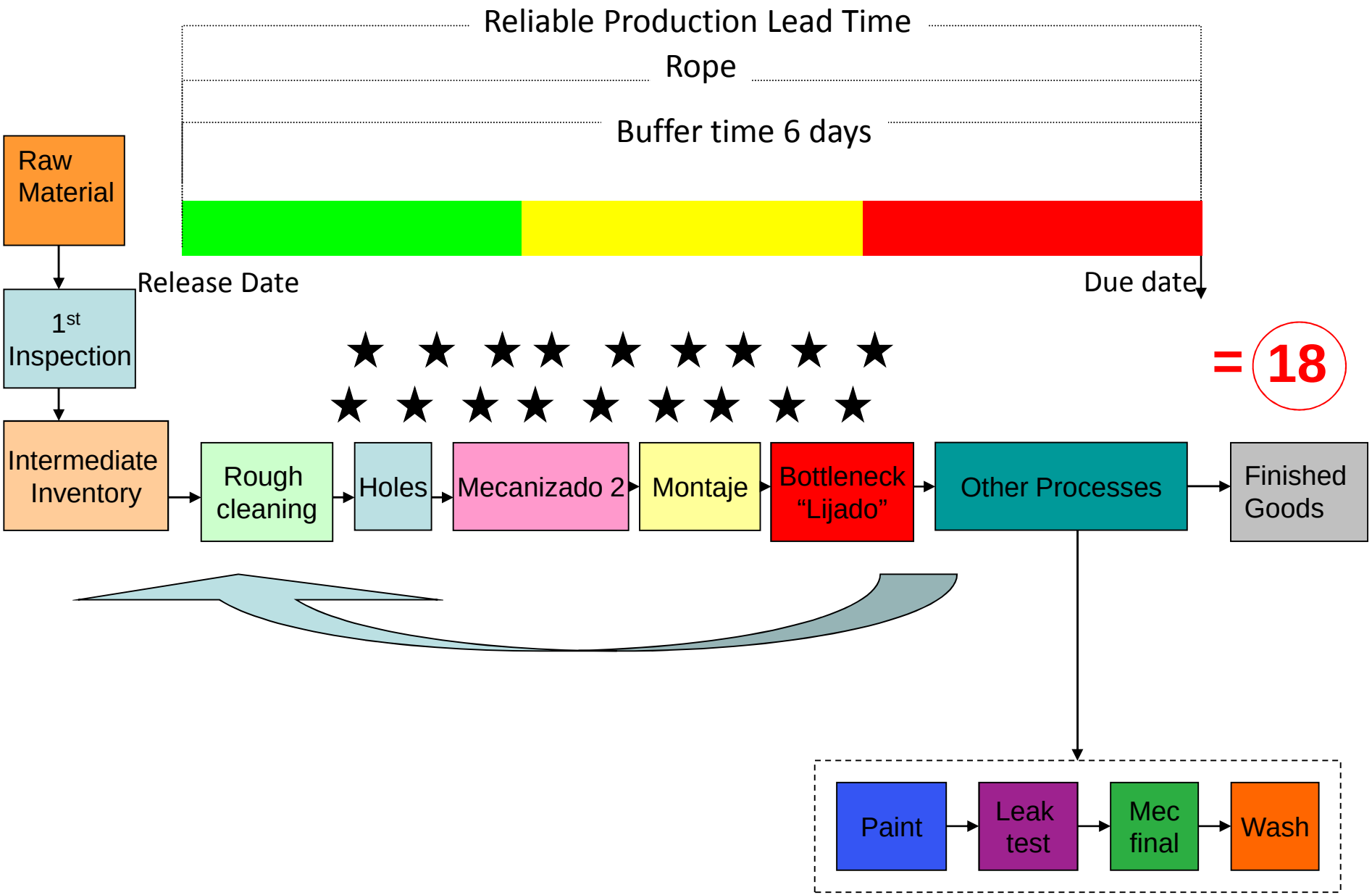


Starting situation



★ Trolley with around 30 wheels

“TOC”model – colour card system



Shop Floor Control

No. Orden	Modelo	TAMAÑO	Montaje	Fecha inicio	Fecha Entrega Almacen	Buffer (dias)
310	STELLA NOVA	15 X 8	5X5,5 ND	12-Feb-10	19-Feb-10	6
320	STELLA NOVA	15 X 8	5X5,5 ND	15-Feb-10	22-Feb-10	5
330	STELLA NOVA	15 X 8	5X5,5 PD	15-Feb-10	22-Feb-10	5
340	STELLA NOVA	15 X 8	5X5,5 PD	15-Feb-10	22-Feb-10	5
350	STELLA NOVA	14 X 8	5X4.75 ND	16-Feb-10	23-Feb-10	4
360	STELLA NOVA	14 X 8	5X4.75 ND	16-Feb-10	23-Feb-10	4
370	STELLA NOVA	14 X 8	5X4.75 ND	17-Feb-10	24-Feb-10	3
380	STELLA NOVA	14 X 8	5X4.75 ND	17-Feb-10	24-Feb-10	3
390	STELLA NOVA	14 X 8	5X4.75 ND	18-Feb-10	25-Feb-10	2
400	NEXUS	16 X 8	6X5,5 MD	18-Feb-10	25-Feb-10	2
410	STELLA NOVA	14 X 8	5X4.75 ND	18-Feb-10	25-Feb-10	2
420	NEXUS	16 X 8	6X5,5 MD	18-Feb-10	25-Feb-10	2
430	NEXUS	16 X 8	6X5,5 MD	18-Feb-10	25-Feb-10	2
440	NEXUS	16 X 8	5 X 150 MD	18-Feb-10	25-Feb-10	2
450	EXCEL	14 X 6	4X100 P RC	19-Feb-10	26-Feb-10	1
460	EXCEL	14 X 6	4X100 P RC	19-Feb-10	26-Feb-10	1

Overview

1st Stage : Operations

February – May 2010

training – implementation – follow up

MTO (Make To Order):

- Choking the release
- DBR (Drum – Buffer – Rope)
- Buffer Management

Training sessions for management, supervisor and workers (both machining and casting areas). Everyone was exposed to the main TOC concepts.

Production control under TOC methodology. Traffic light system to identify priorities. Board for explanation. Daily follow up chart for Bottleneck, casting and scrap performance.

Template for daily production follow up. It includes casting plus an additional format for daily recording of the scrap.

Results

- Production Control

  Easy and simple system to follow up.

  Control at the “lijado section” bottleneck and Buffer Management (amount of red orders).

  “Look ahead” with daily follow up and projected figures at any time

  Continuous flow that guarantees no more “end of the month syndrome”

  There is a systematic process for production control

  Organized flow

  Actions to expedite and stop orders are easy to put in place

- Scrap levels

  Projected number for scrap number is down by 27% compared to February (250 wheels less)

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