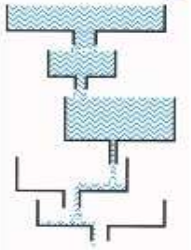
organized by:

Supply Chain Conference
Vilnius, Lithuania

How to quickly become a much better manufacturer than your competitors?

Philip Marris

Marris Consulting



Vilnius, Tuesday 30th April 2013

V1.0 UK

Summary

- Introduction
- Case study N°1 : An automotive equipment manufacturer
- Case study N°2 : A process industry, a perfume bottle producer
- Conclusion

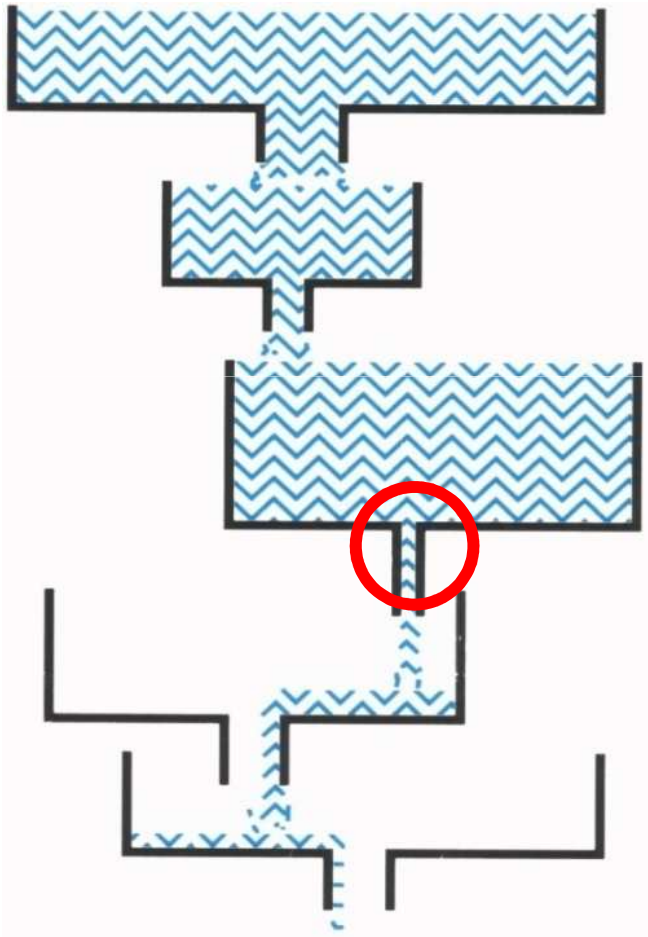
- Annexes

The speaker: Philip Marris

- Started his Lean journey in industry in1984.
- Started his Theory Of Constraints (TOC) journey in 1986 when he worked with Eliyahu Goldratt.
- CEO of a management consultancy firm based in Paris focused on industrial operations. 80% of projects are based on TOC + Lean.
- Has led over 90 projects in all areas of industry.
- Author of the very boring French TOC reference book *Le Management Par les Contraintes*.
- Founding member of the TOCICO French regional board and member of the advisory board of the TOC Institute (India).
- Founder of the LinkedIn group “TLS - TOC Lean & Six Sigma”.
- 53, bi-cultural English/French, sorry no Russian or Lithuanian!

To very quickly improve the company's performance all you have to do is focus on the constraints

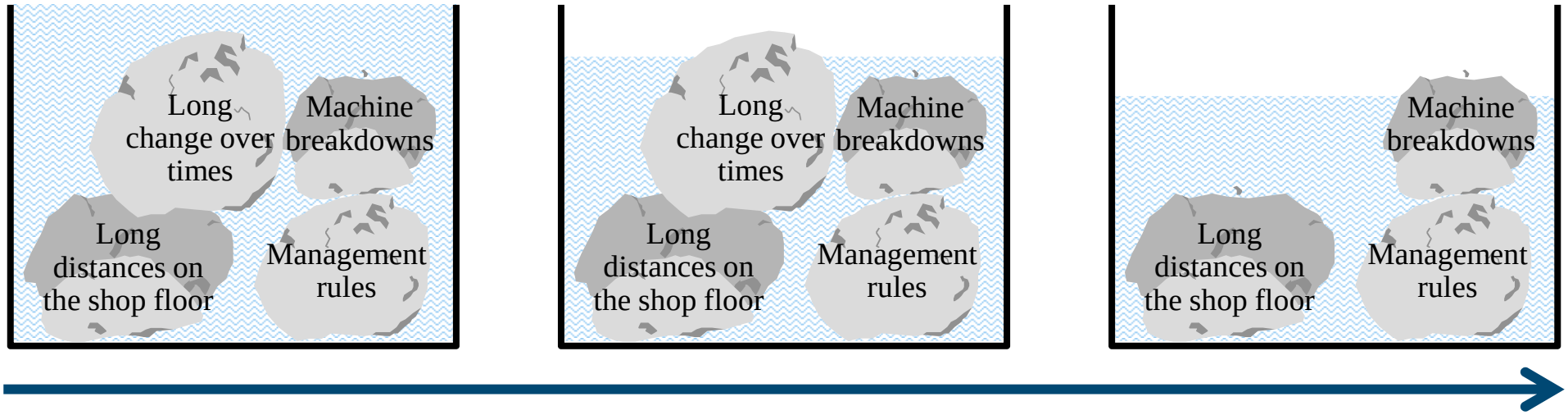
- All organizations are "unbalanced"; the workloads are not evenly distributed.
- So there are 2 types of resources: constraints (or bottlenecks) and non-constraints.
- Focus on improving the system constraints will quickly improve overall company performance.
- You don't have to solve all the problems!
- A factory usually has only 1 or 2 constraints



- Warning: In some cases the constraint is not in manufacturing, it can be elsewhere : New Product Development, Marketing & Sales, …

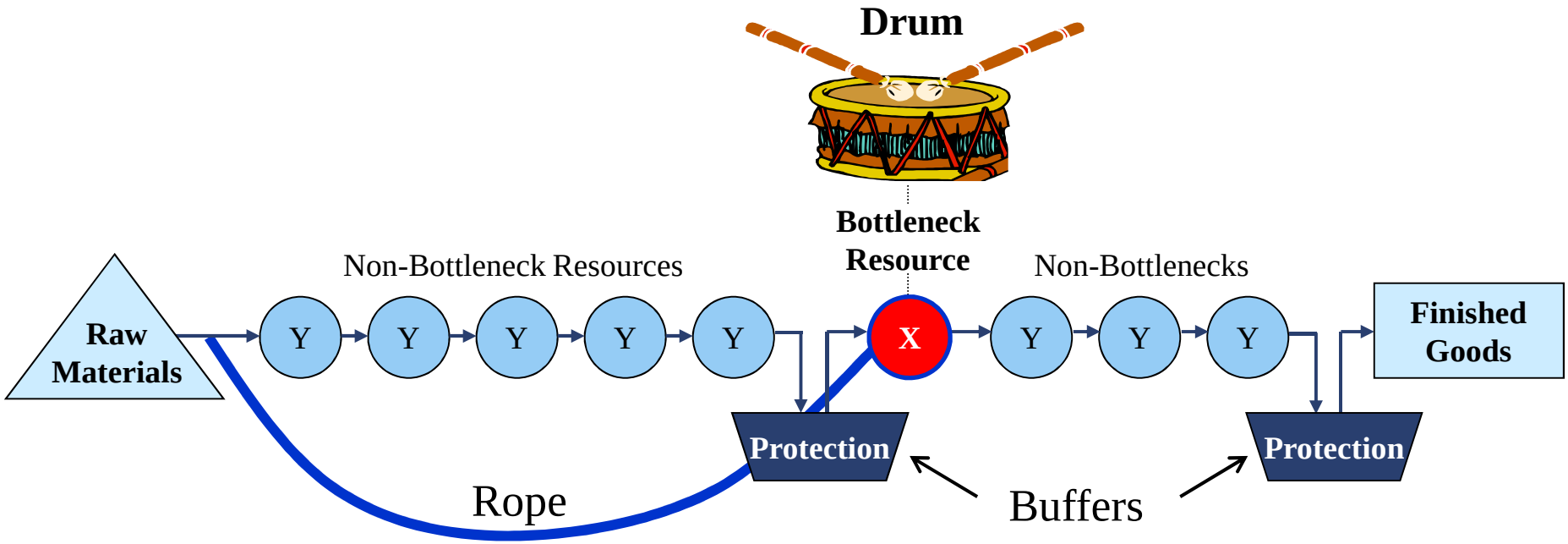
You must also keep your Work In Progress inventory as low as possible

- This is one of the main lessons of the Toyota Production System : shop floor inventory will hide your problems, increase waste, create inertia, …
- Too much Work In Progress is bad.
- This point of view, this obsession, is shared by both the "Toyota Way" (good Lean) and the Theory Of Constraints.



Taiichi Ohno's (Toyota) river analogy

To maximise output while minimising inventory the Theory Of Constraints uses the "Drum Buffer Rope" system



Another TOC system exists: Simplified DBR or S-DBR
It is used when there is no bottleneck and therefore only the second buffer is implemented

Case study N°1

The first case study concerns one of the Leanest organisations in the world

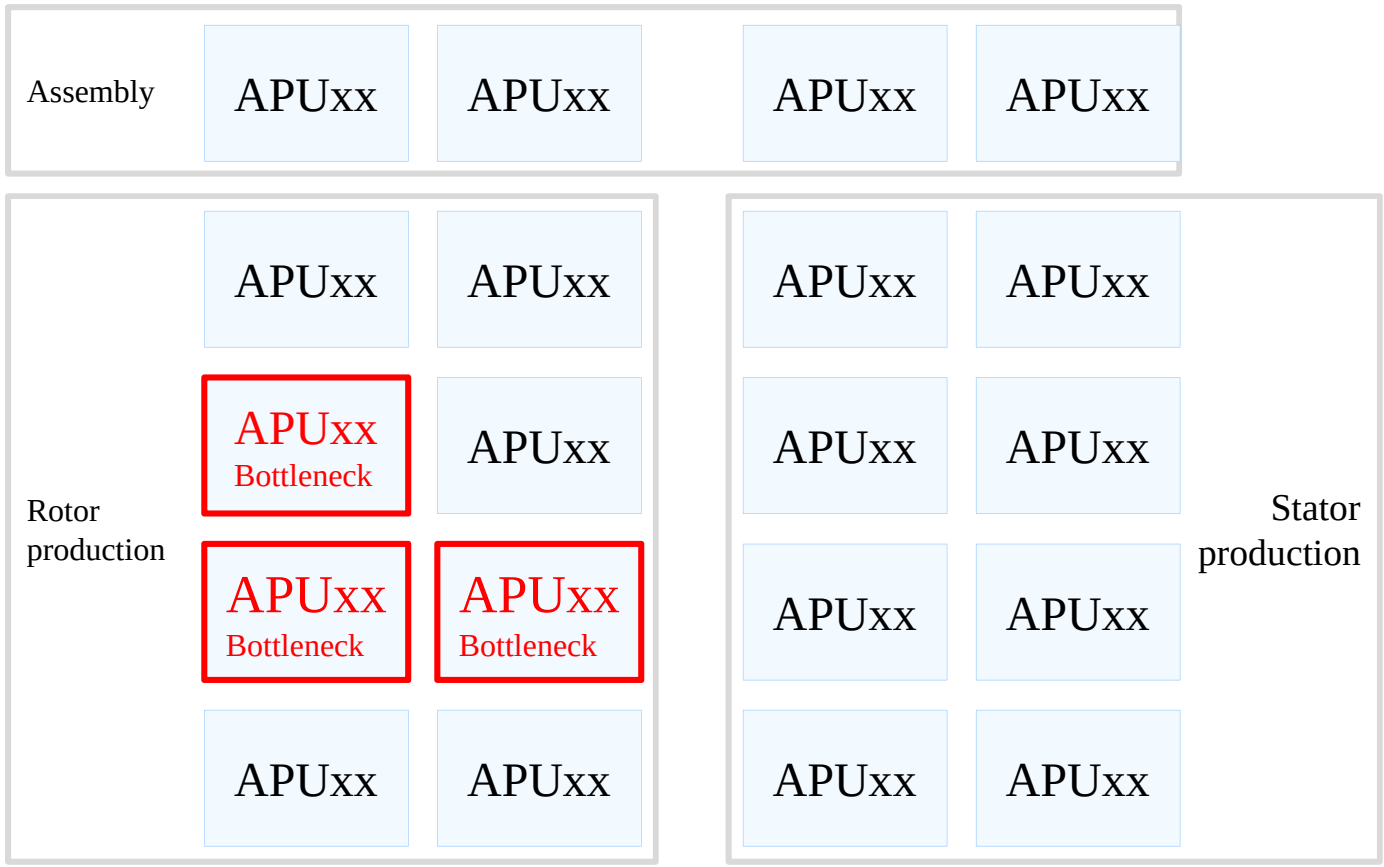
- One of the 10 largest automotive OEM suppliers in the world.
- Was one of the first to begin it's Lean journey after Toyota at the end of the 1970s.
- All the Lean techniques are used: Gemba, SMED, PDCA, 5S, ppm, Andon, Poka Yoke, Kanban, VSM, VSD, 8D, …
- The case study factory:
  - Production of car alternators for the American continent,
  - Over 1 000 people.

Mid 2011, the factory was in great difficulty…
…desperate, they decided to inject some TOC into their Lean

- The factory was hopelessly overloaded
- Due date performance became a big issue
- They were being threatened by their largest clients
- They had done all they could:
  - Over 10 of their best production managers added to the staff
  - Very fast investment to double the plant ’s capacity
  - Additional direct labor added until you could not fit an extra person into the production line
- So…with very mixed feelings among the top management …
- …they decided to inject some TOC into their xPS

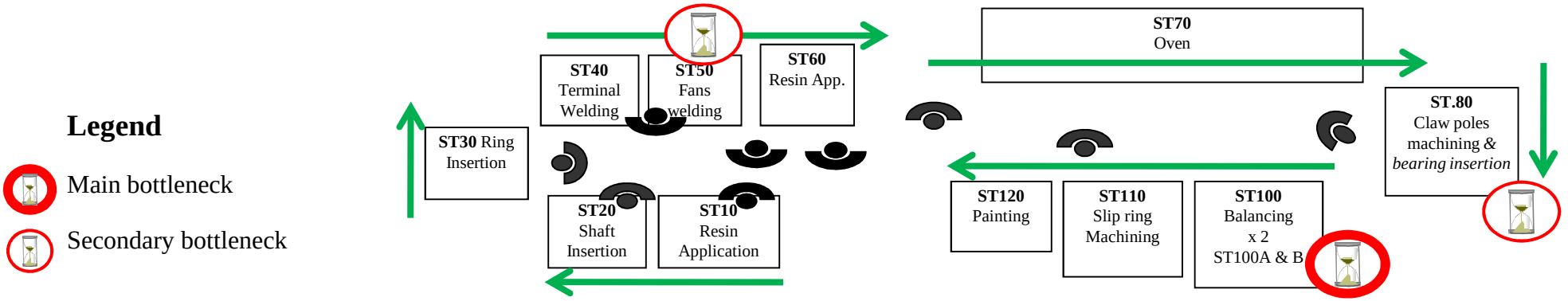
So the first step is to identify the bottlenecks

- The plant had over 20 APUs (Autonomous Production Units) of about 10 people per shift
- 2 ½ of them were identified as bottlenecks



We will focus on one of the bottleneck APUs

- Daily production 6 000 units per day = cycle time 15 seconds
- The system is standard Lean: One piece flow, the O.E.Es are approximately 70%, Quality is O.K.
- The bottleneck was already formally identified

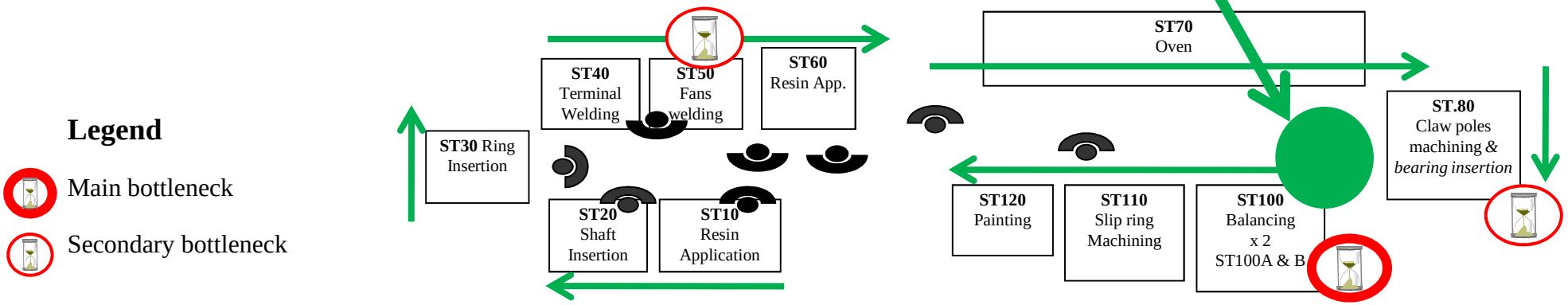


A question!

How can we increase
Throughput (production rate)
by more than 15%
in less than 15 minutes!?

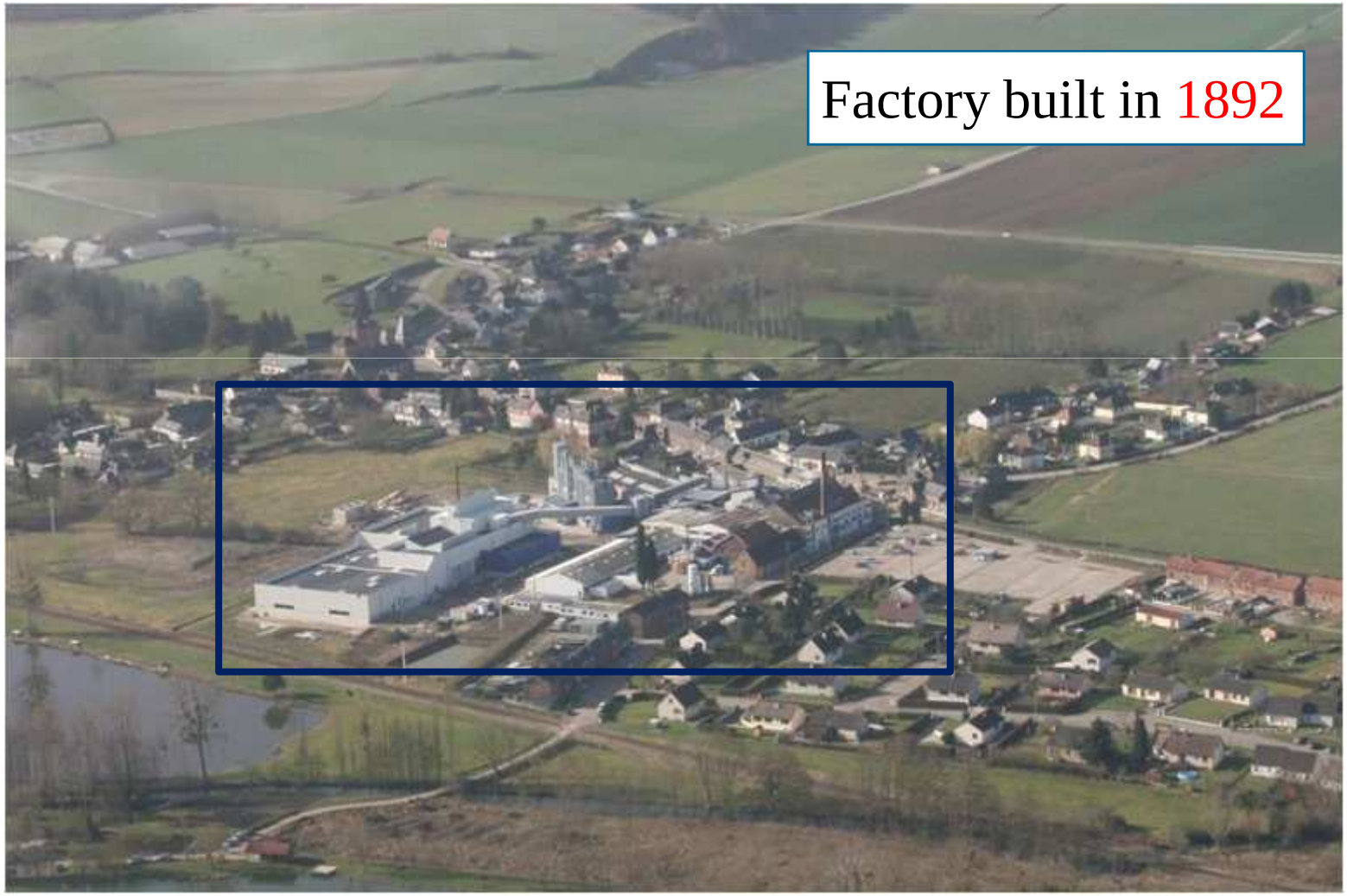
The solution: protect the bottleneck with a buffer!

- A buffer initially of about 12 parts was implemented just in front of the bottleneck operation. This protected the bottleneck from micro stoppages lasting between 1 second and 3 minutes
- This immediately increased the Throughput by 17%
- Also from that moment onwards we were able to convincingly mobilize the whole team to adopt the rule « The bottleneck must never stop » and begin a focused improvement process



Case study N°2

A small factory located in France's "Glass Valley" in Normandy



Produces perfume bottles for prestigious clients

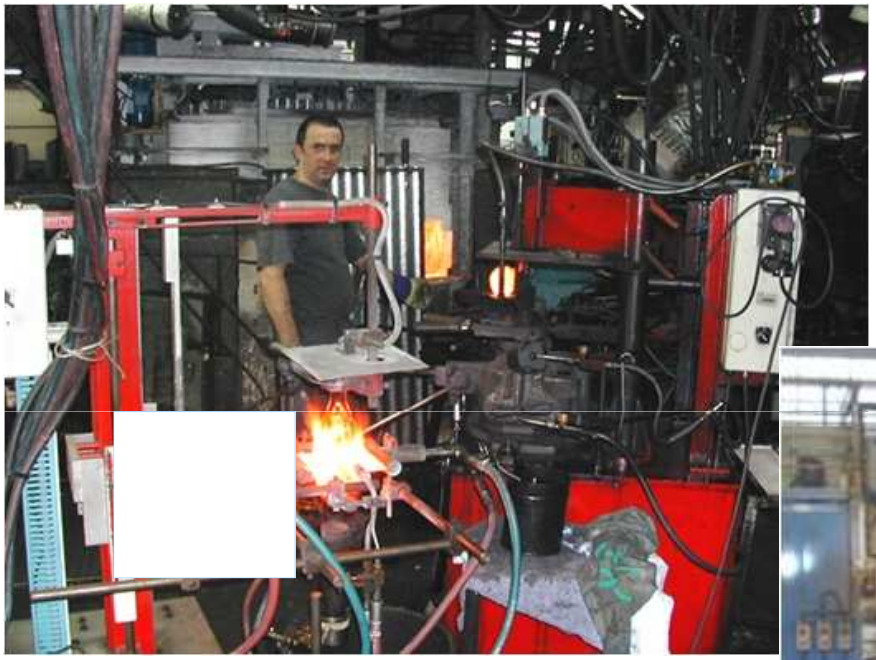
P&G Procter & Gamble

CHANEL

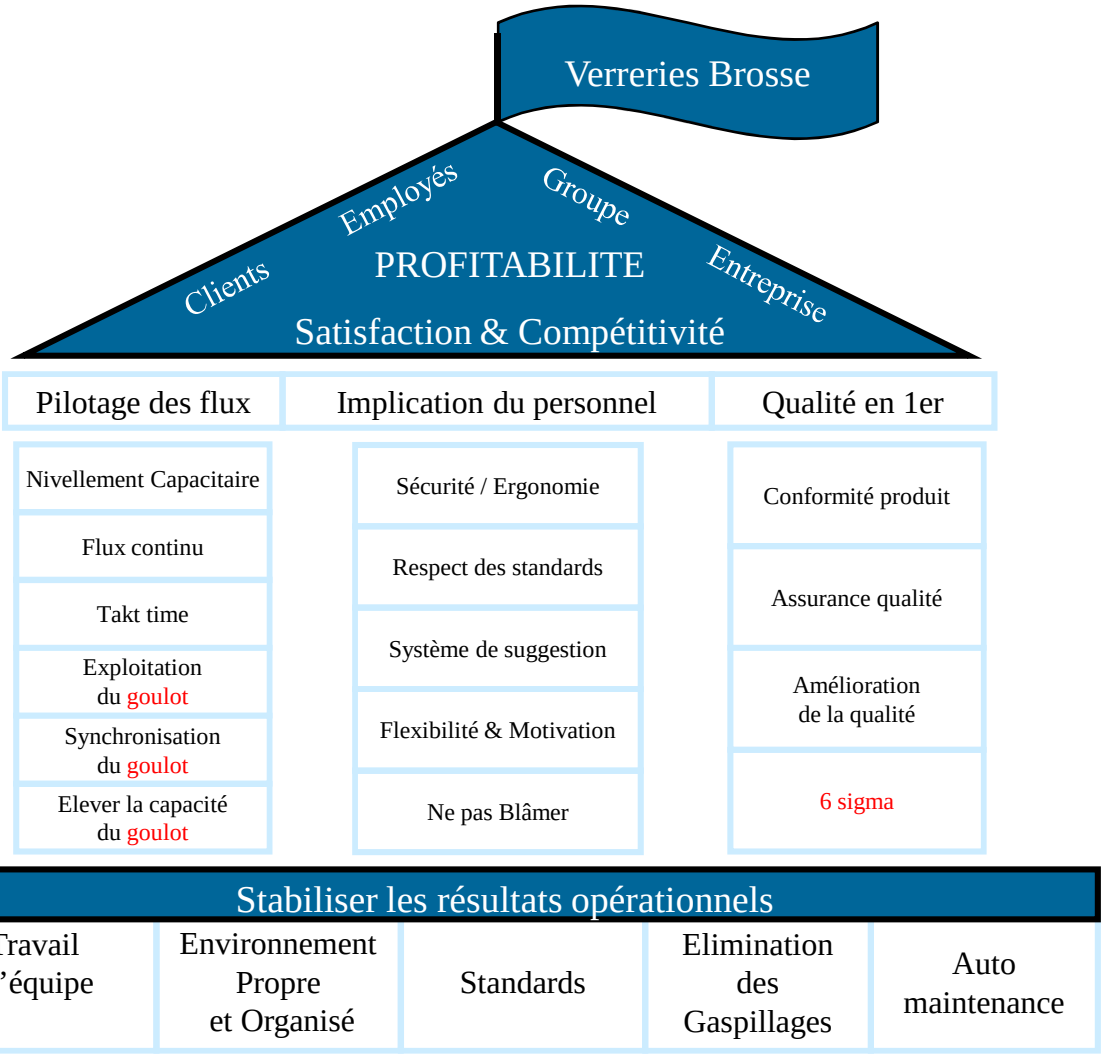
Dior

LVMH MOËT HENNESSY • LOUIS VUITTON

The factory has 2 different manufacturing processes: semi-automatic et automatic

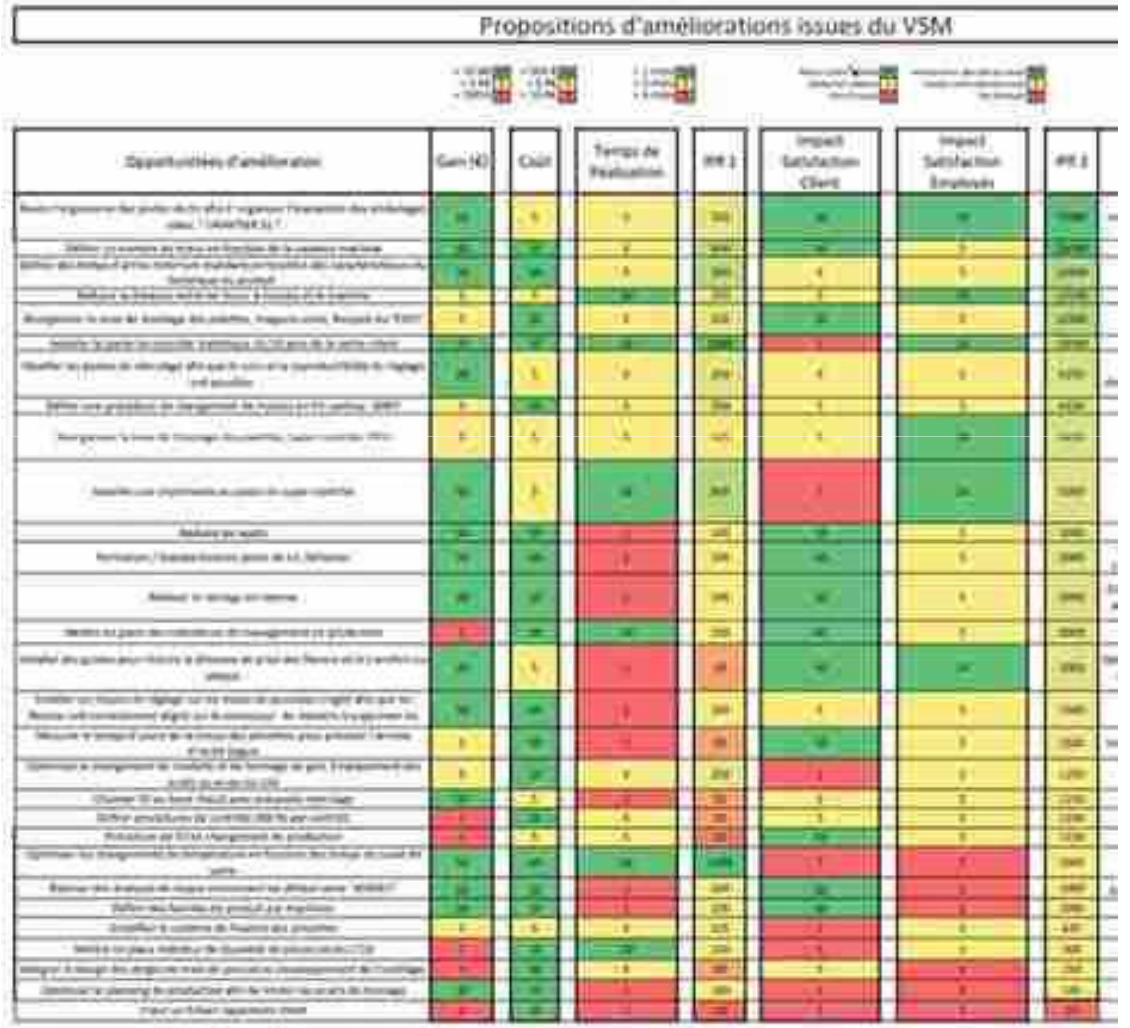


The Brosse Production System is a combination of TOC + Lean + Six Sigma

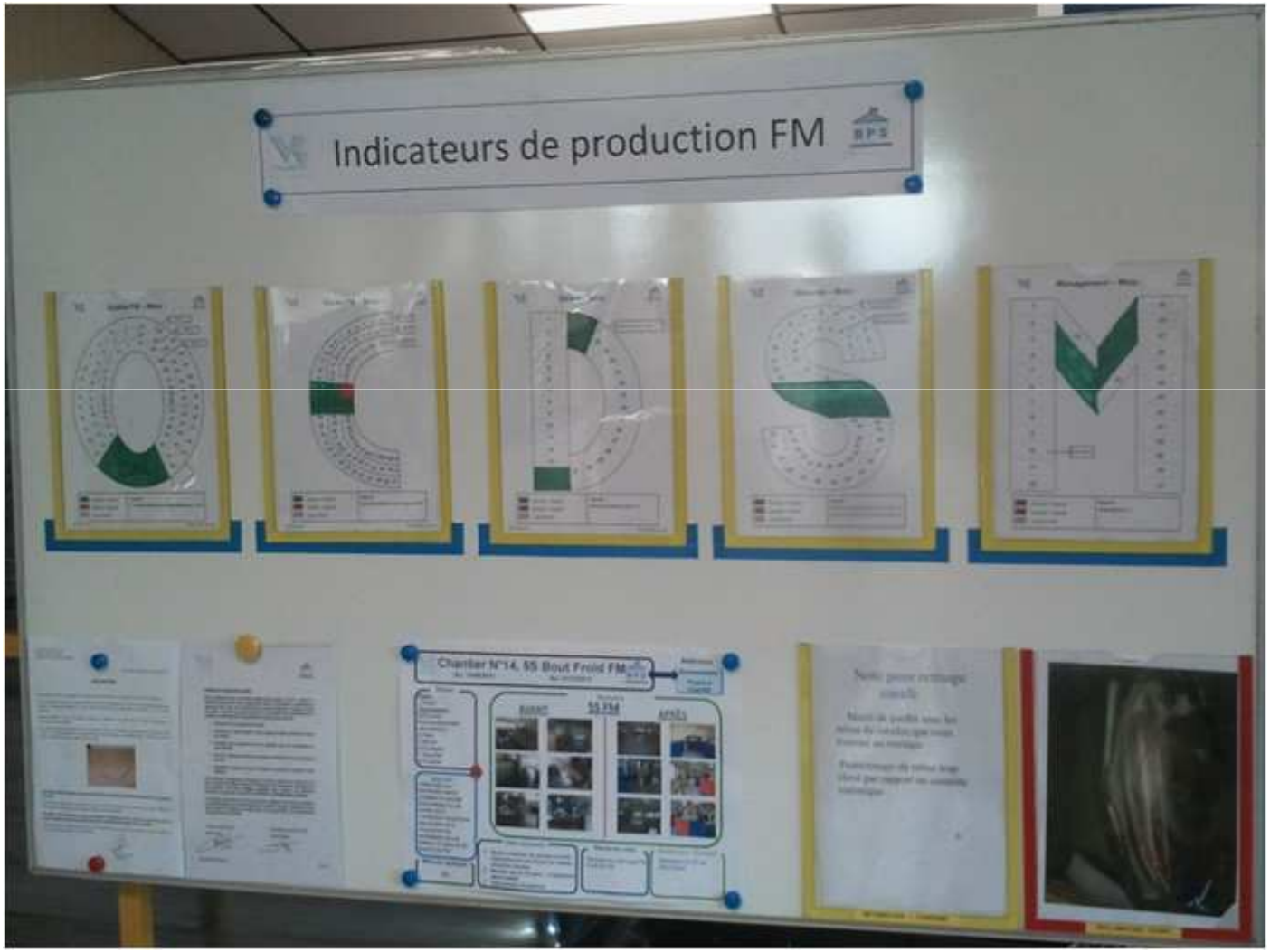


The company's priorities are determined by a global (TOC inspired) point of view

- Global financial gains
- Investment required
- Time to implement
- Impact on customer satisfaction
- Impact on employee satisfaction

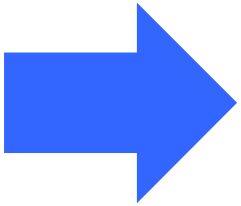


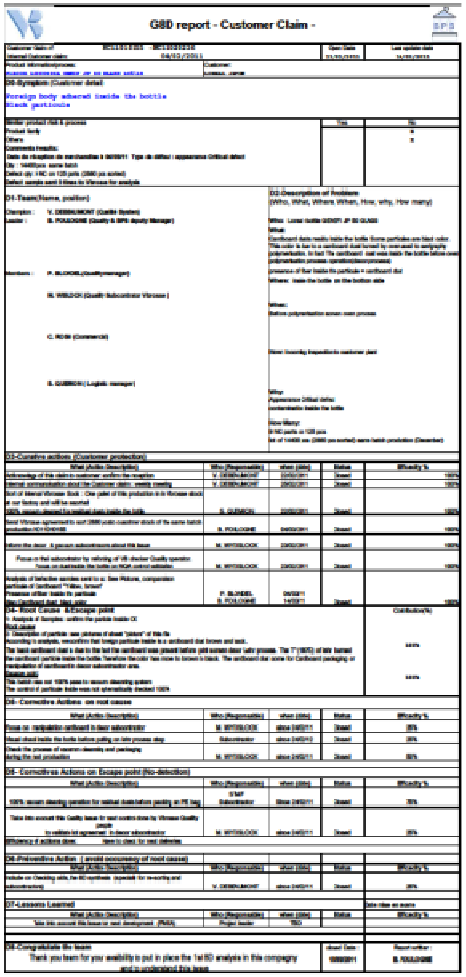
Lean:
Visual Management was deployed in all departments



An in depth training programme was implemented

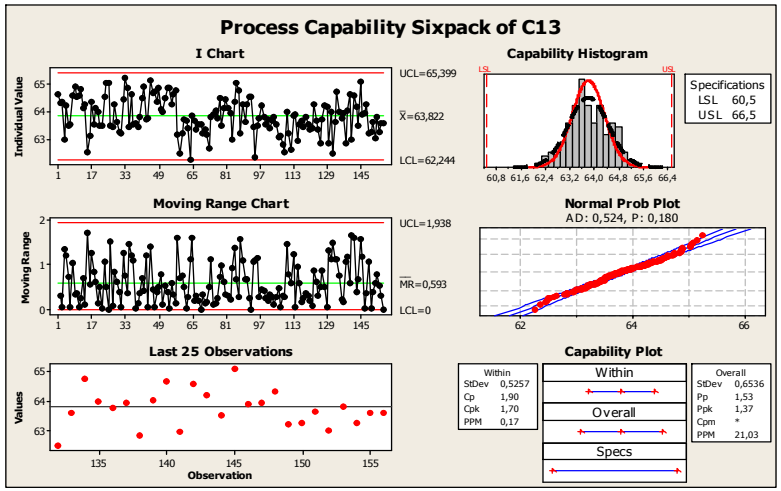
Lean:
Ford's 8D system was used to handle all customer complaints

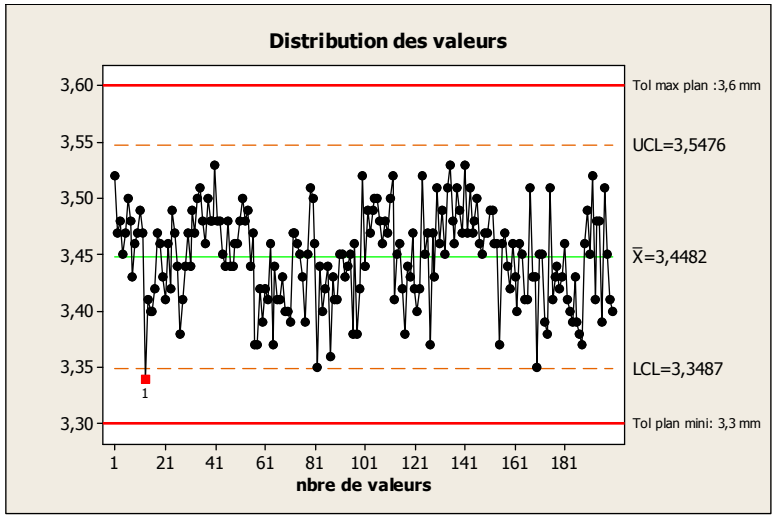


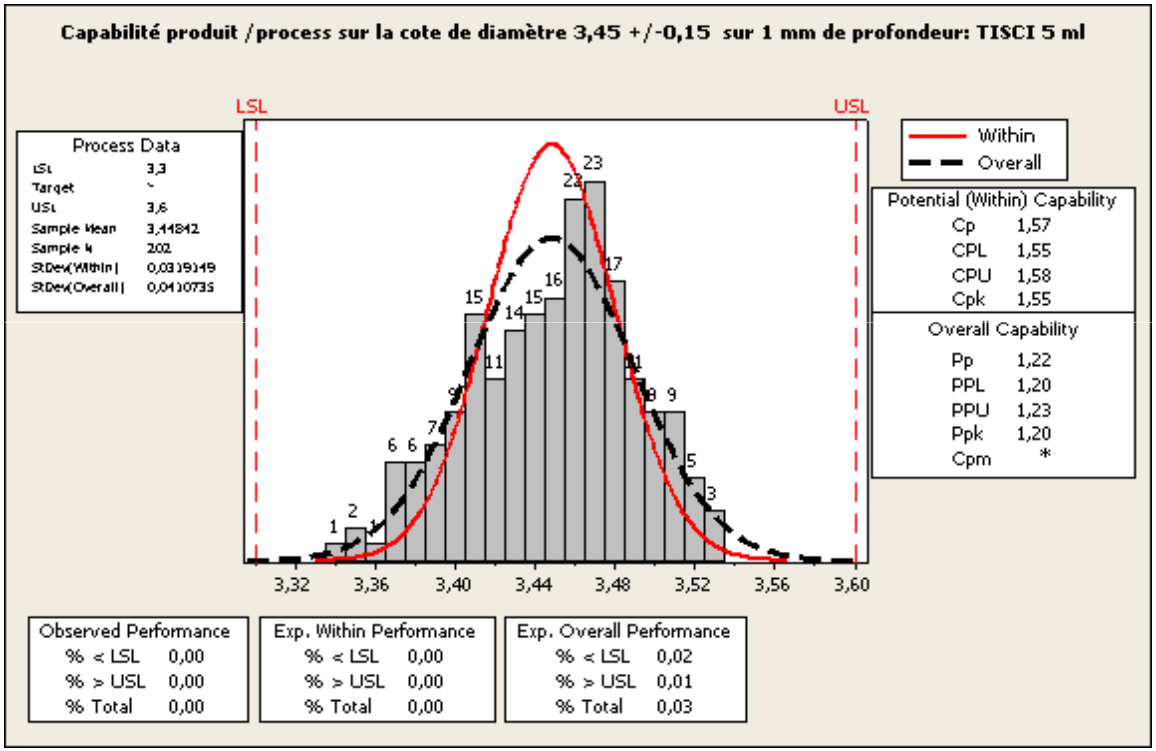


Lean:
5S was deployed throughout the factory and the offices

Six Sigma and Design Of Experiments were used to better master the bottleneck operation (the bottle initial formation)

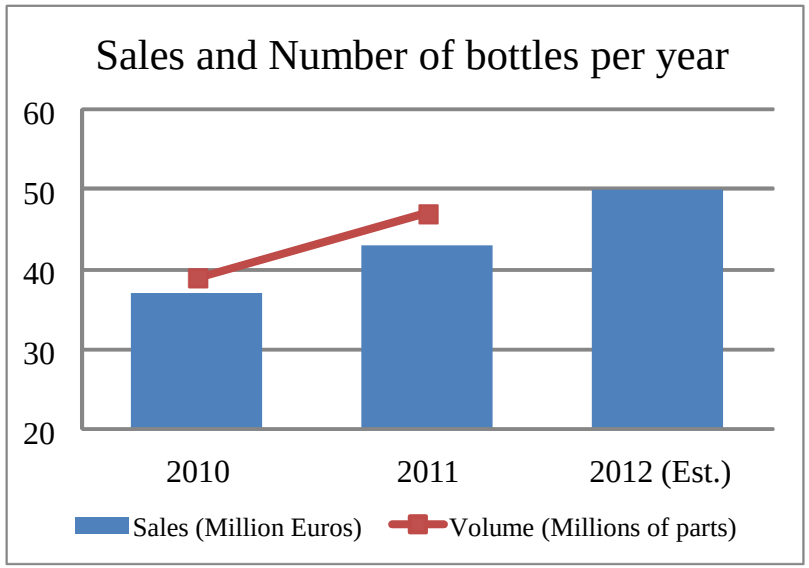


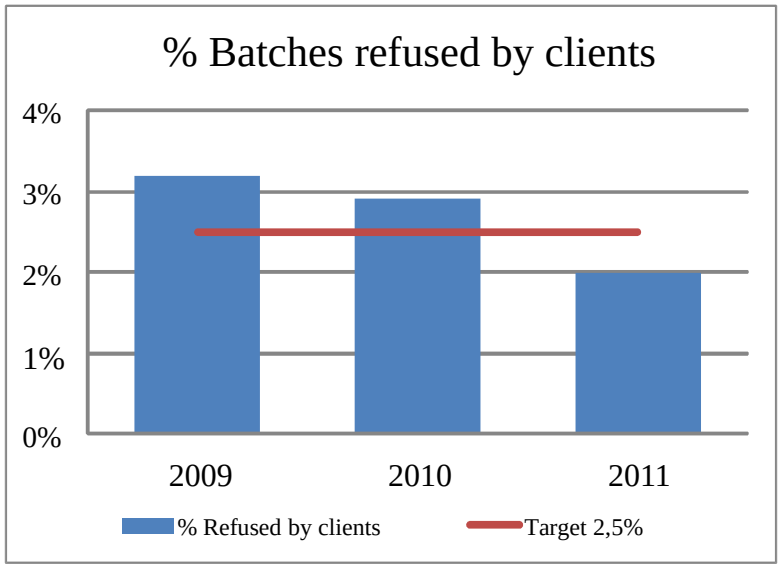




This generated rapid and significant improvements in many areas

- A reduction in Work In Progress and Finished Goods of 20% in the first year
- A significant reduction in the change-over time on the bottleneck
- But also improvements in quality, sales and profits.





Since the implementation of TLS in 2010 the Verreries Brosse have increased sales annually by 13%

Conclusion

Conclusion

Challenge 1 – Beware of local optima

Challenge 2 – Be open minded, choose and mix solutions

Conclusion : if you want quick results try TOC + Lean (+ Six Sigma)

- Industrial improvement efforts have been handicapped by quarrels concerning the relative merits of the different approaches and of the supposed fundamental differences among them.
- TLS considers, that we should seek to combine TOC + Lean + Six Sigma thereby creating a system that contains the best aspects of each movement.
- The combination of TOC + Lean (+ Six Sigma) enables a company to focus on the "leverage points" that will quickly impact the overall performance.

Thank you for your time

Questions?

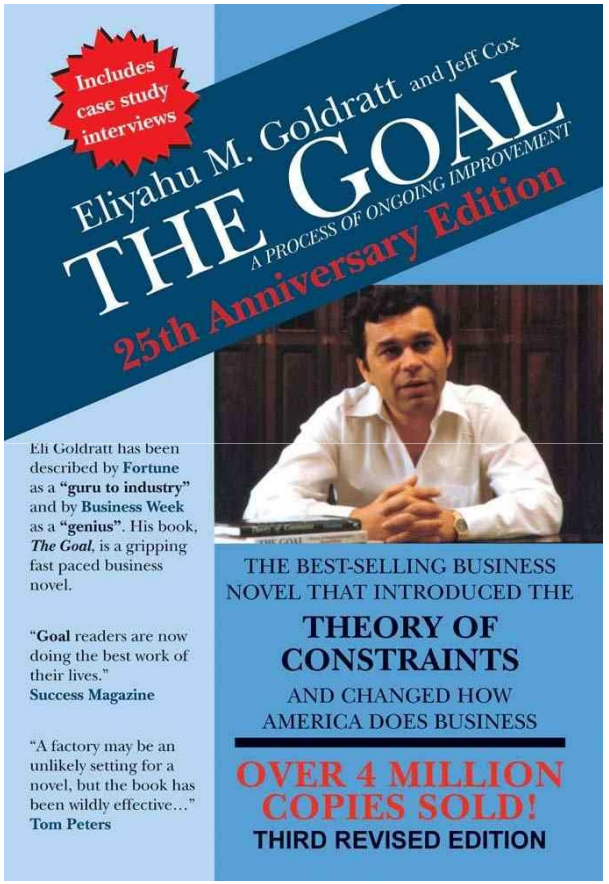
Note : Annexes contains bibliography, more case studies and other material.

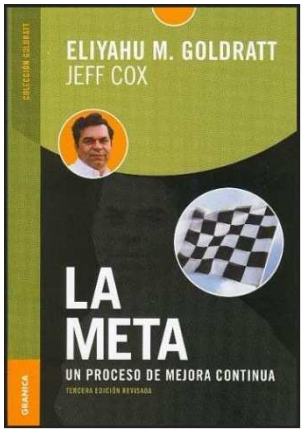
Annexes

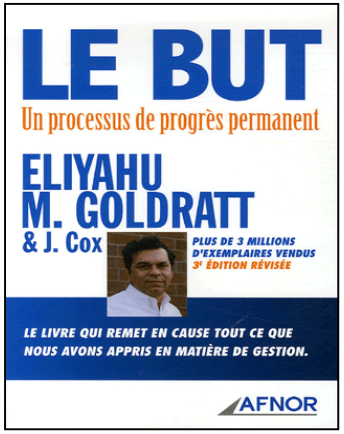
Annexes

The Theory Of Constraints has become known all over the world due to the original best selling novel "The Goal" by Eliyahu Goldratt

- More than 5 million copies sold in 27 languages.
- Mandatory reading in most MBAs.
- Written by Eli Goldratt the founder of TOC.
- The first book to use the novel format to explain a managerial approach.
- Named in 2011 one of the 25 most influential books of modern times by Time Magazine.







The Five Focusing Steps of the Theory Of Constraints or Process Of On-Going Improvement (POOGI)

0. Define THE GOAL
1. IDENTIFY the system's constraint(s).
2. Decide how to EXPLOIT the system's constraint(s).
3. SUBORDINATE everything else to the above decision.
4. ELEVATE the system's constraint(s).
5. WARNING!!!! If in the previous steps a constraint has been broken, go back to step 1,
   but do not allow INERTIA to cause a system's constraint.

Official version 2013 except for Step 0

The different components of the Theory Of Contraints (TOC)

Importance of constraints in the ideas

Theory Of Contraints (TOC)

Approach initiated by Eliyahu Goldratt
A systemic view seeking the global optimum
based on a dual view of constraints/bottlenecks & non-constraints

Thinking Processes
This could be considered to be at another higher level than simply a component

Drum – Buffer - Rope Production Management

The importance of constraints, DBR & S-DBR, Focused approach, …
[historical origin of approach]

Critical Chain (CCPM) Project Management

Project Buffer (not "local" tasks), Fever Chart, Critical Chain (not Path), Bad Multi-tasking, Student syndrome, …

Replenishment Distribution

High frequency periodic replenishment, stocks centralized (not too distributed), [DDMRP?]

Marketing & Sales Marketing & Sales

Mafia Offer or (URO) + Decisive Competitive Edge (DCE) + Delta T-Selling + Sales force constraints

Throughput Accounting Cost Accounting

T,I,O.E. : Throughput, Inventory & Operating Expenses
Dollar x Days, Total Variable Cost, Product Mix

Value Added Computing Information Systems

Data & Information
Necessary but not sufficient
The 6 questions
[Philip Marris' personal opinion]

Thinking Processes Problem resolution

Evaporating Cloud (conflict resolution), Strategic & Tactic Trees, Current/Future Reality, Pre-requisite & Transition Tree

Other new ideas !? or Other possible elements

Standing on shoulders of giants, Behavior & Organizations, Viable Vision, Strategy, KM, + new TA ,… ?

TLS case study: Autoliv
Injecting TOC into the Autoliv Production System to save a factory

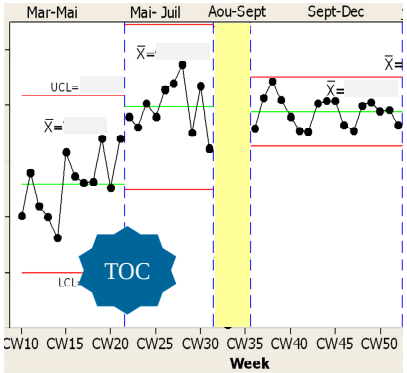
- In 2009, as a consequence of the volatility of the automotive market
- One of Autoliv's French factories that produces airbag electronic control systems
- Injected TOC into the Lean inspired Autoliv Production System
- This enabled a 70% increase in the parts shipped per week and saved the factory

Autoliv

TLS VERRERIES BROSSE Des Usines, des Hommes & des Résultats Marris Consulting

Et en 4 mois les performances de l'ensemble de l'usine sont pareillement transformé et le nouveau système est stable

Volumes de production de l'usine



Augmentation du volume moyen = +30%
Variabilité divisée par 2

TLS : renouer avec la croissance en combinant Théorie des Contraintes, Lean et 6 Sigma
Marris Consulting & Verreries Brosse

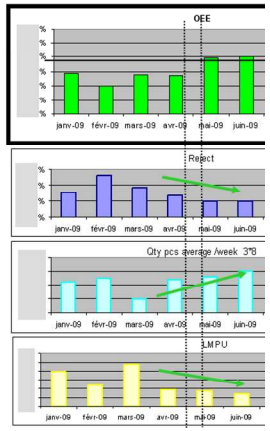
39

TLS VERRERIES BROSSE Des Usines, des Hommes & des Résultats Marris Consulting

En 3 mois les résultats sur la ligne pilote dépassent toutes les attentes

- Augmentation des pièces produites par semaine de >+70%
- Augmentation du TRS déjà élevé de >+15%
- Réduction des rebuts qualité de >-50%
- Efficience >+50%
- Respect des délais retrouvé
- « Premium Freight » stoppé

- Ces résultats ont été essentiellement obtenu le premier mois puis entretenu sur les 2 mois suivant

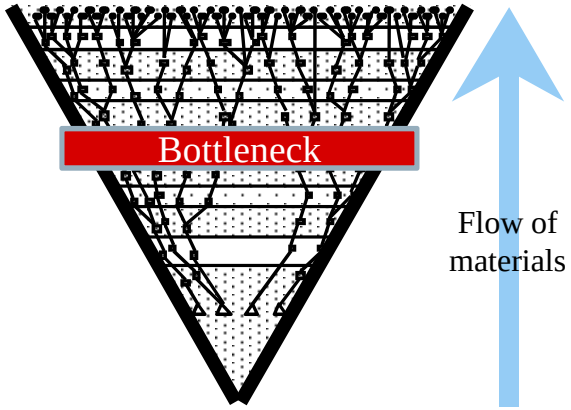


TLS : renouer avec la croissance en combinant Théorie des Contraintes, Lean et 6 Sigma
Marris Consulting & Verreries Brosse

37

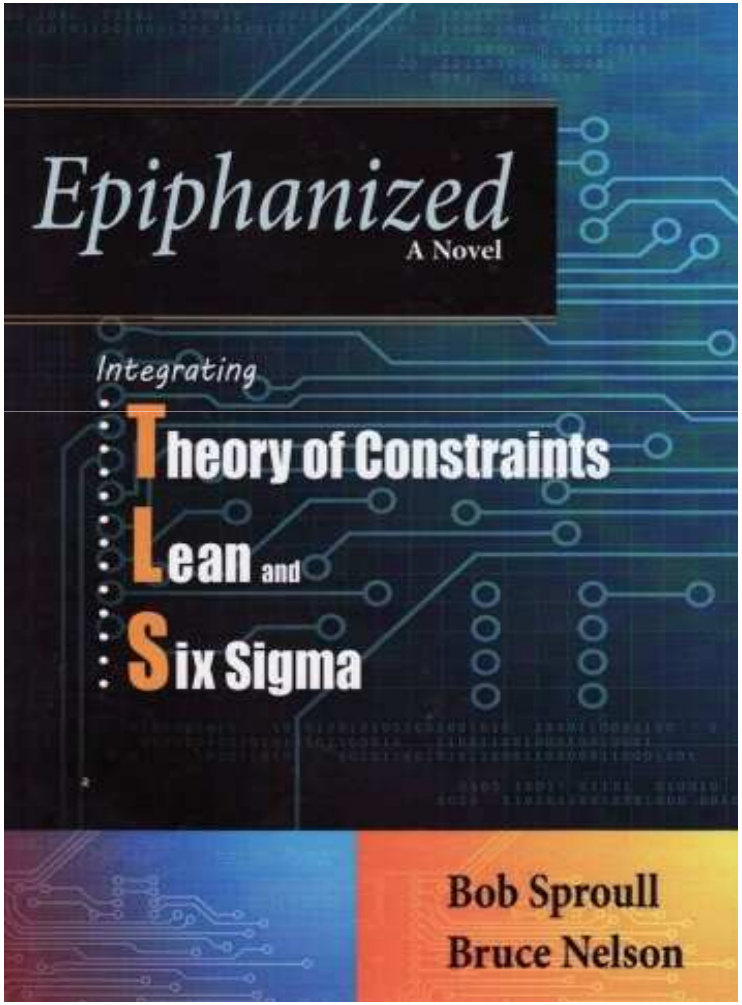
TLS case study: Metallurgical Enterprise: >20% improvement in sales in 3 months

- Case: a metallurgical factory with more than 1,500 workers.
- TOC identified the bottleneck process as heat treatment (and not the other expensive processes such as the rolling mill)
- Improvement efforts were focused on the bottleneck:
  - SMED (or rather "Process SMED") was used to significantly reduce the (temperature) change-over times,
  - Six Sigma was used to greatly reduce the variability and reduce the scrap and re-work.
- The Drum-Buffer-Rope method greatly reduced the amount of WIP (>50%).



The combination of TOC, Lean led to a rapid increase of the Throughput (and sales) of >20%

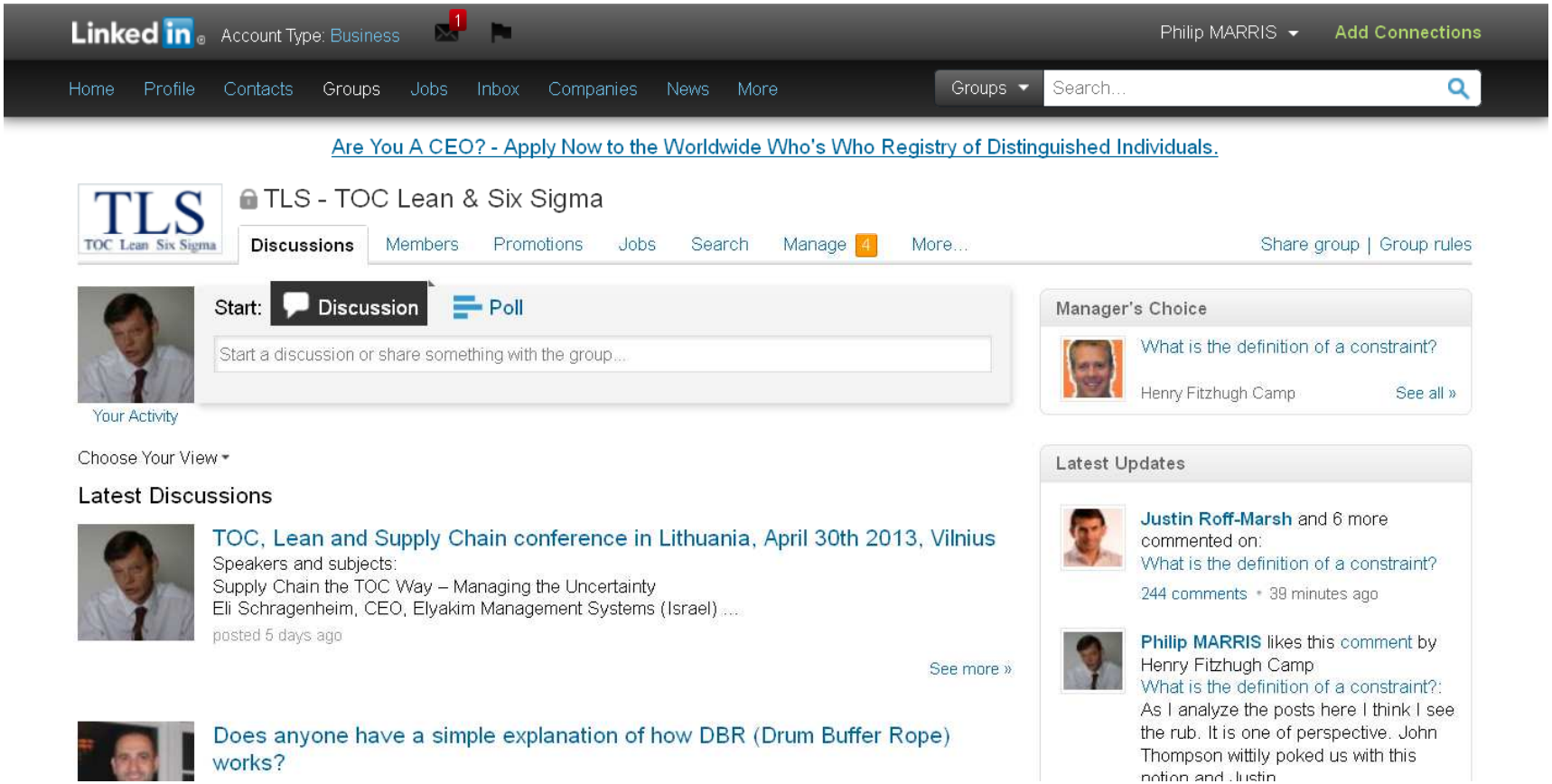
If you want to learn more about TLS read the novel *Epiphanized*



An internet discussion group to learn more about "TOC + Lean + Six Sigma"

www.linkedin.com :

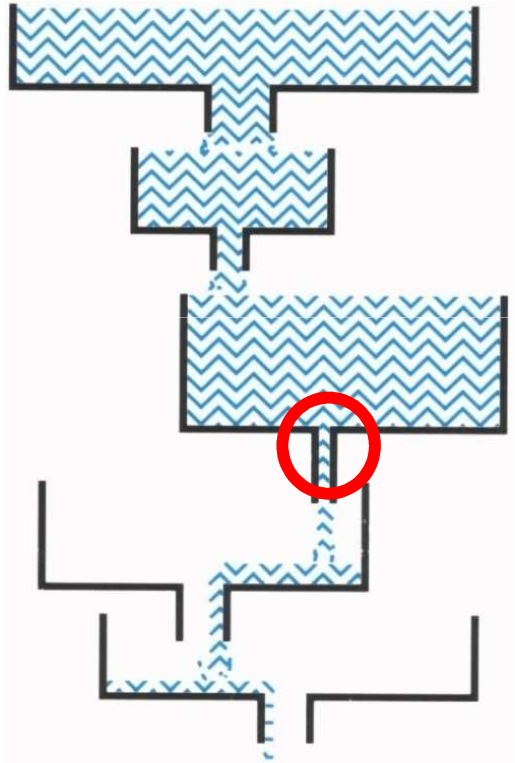
Group « TLS – TOC Lean & Six Sigma »



The 3 components: TOC

- Theory Of Constraints (TOC)
  - Focus on improving the system constraints that determine overall performance
  - Increase profits by increasing sales rather than by cutting costs and hence avoid headcount reductions
  - Developed by Eliyahu Goldratt since the 1980s

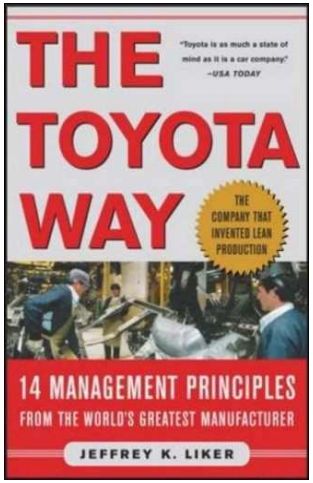
Eliyahu Goldratt

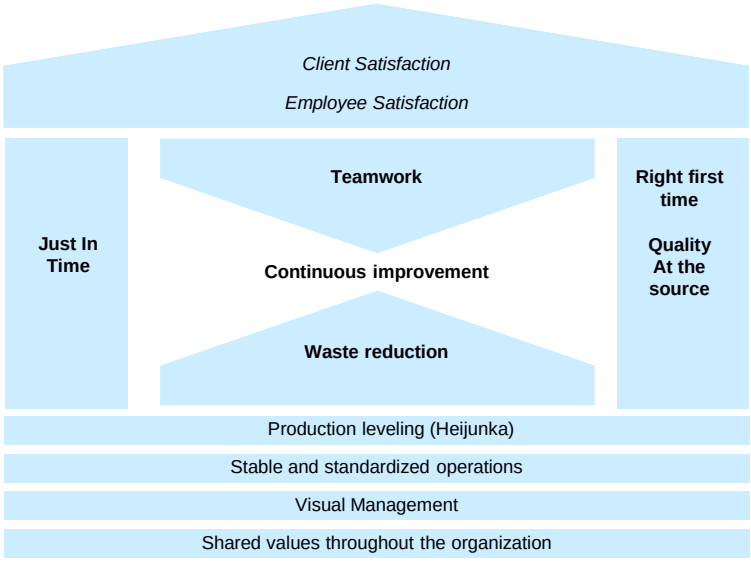


The 3 components: Lean

- Lean Manufacturing / Toyota Way
  - By far the most widespread approach in industry throughout the world
  - A focus on eliminating all forms of waste
  - A multi-dimensional approach: management, Just-In-Time, 5S, Lean Engineering, …
  - Developed by the Toyota Motor Company since the 1950s,
    called “Lean” since 1990

Taiichi Ohno

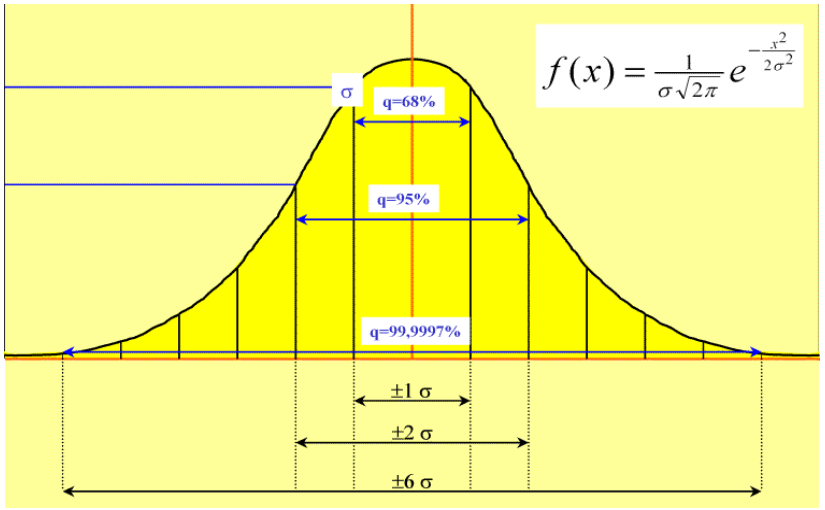




The 3 components: Six Sigma

- Six Sigma
  - Reduce process variability to 3.4 defects per million occurrences
  - Mostly implemented using certified experts Green Belts, Black Belts, …
  - Includes a powerful tool to be used on important and complex problems (Design Of Experiments / DOE)
  - Promoted by Motorola & General Electric in the 1980s

Jack Welsh



TLS: The integration of the 3 approaches

Emerged in 2006 (Pirasteh & Farah APICS article)

Industrial improvement efforts have been handicapped by quarrels concerning the relative merits of the different approaches and of the supposed fundamental differences among them.


Continuous Improvement Trio

The top elements of TOC, lean, and six sigma make beautiful music together

TLS considers, that we should seek to combine

TOC + Lean + Six Sigma

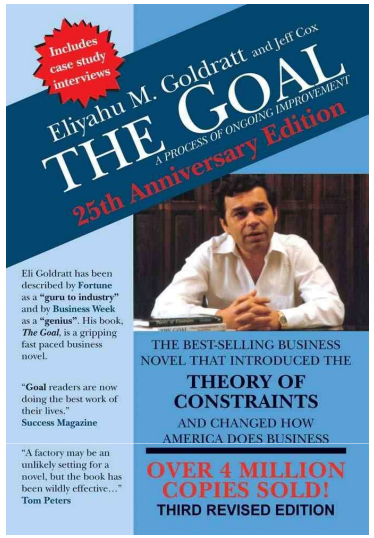
thereby creating a system

that contains the best aspects of each movement.

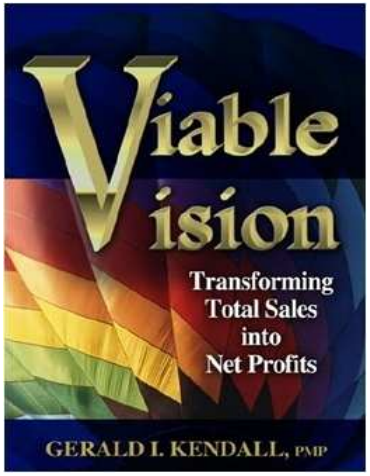
Theory of Constraints books:

- *The Goal* by Eliyahu Goldratt
  - The first use of the business novel as a format for explaining a management process. It has sold more than 3.5 million copies in 29 languages and is required reading in most MBA programs.

    Eli Goldratt is the founder of the Theory of Constraints (TOC) approach . His book The Goal was selected by Times Magazine in 2011 as one of the 25 most influential business books ever written.
  - Required reading

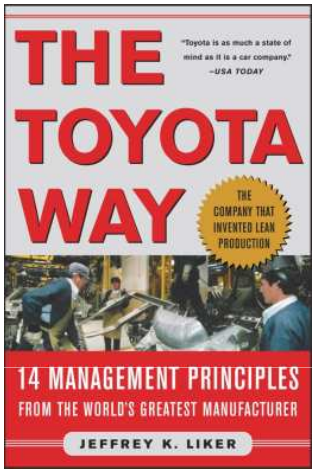


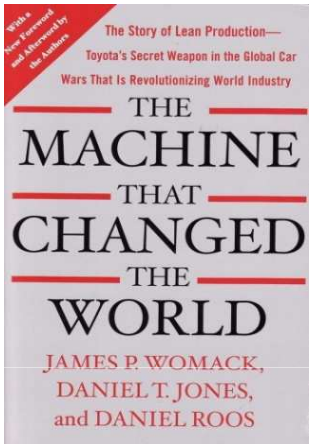
- *Viable Vision* by Gerald Kendall
  - An excellent executive summary that presents many aspects of TOC that are important in understanding TLS including: Critique Chain Project Management, the Thinking Processes, Mafia offers, Replenishment, etc.

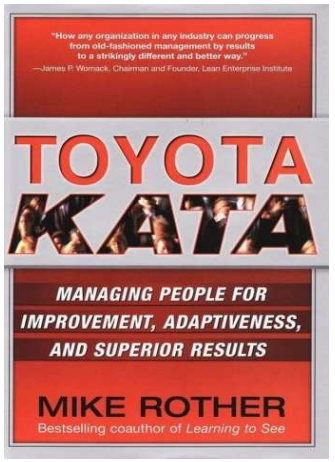


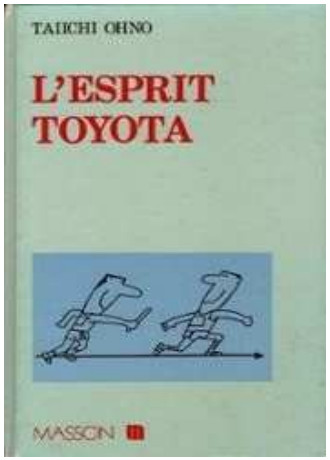
Lean Manufacturing books:

- *The Toyota Way* by Jeffrey Liker
  - The reference book on the Toyota way, recent and well written. It describes the complete approach as used by Toyota. Liker has written several other books for those who wish to go even deeper in the Toyota method Toyota Culture , Toyota Talent, Toyota, Toyota Continuous Improvement , …
- *The machine that changed the world* by J. P. Womack, D. T. Jones &D. Roos
  - In spite of its age (1990) it is still pertinent and is worth rereading for the wealth of comparative information it contains on Lean development in Europe, the United States, and Japan. The first known reference to the term “Lean” for this method of production is found in this book
- *Toyota Kata* by Mike Rother
  - A recent (2009) book, well appreciated by practitioners of Lean, it goes well beyond the fundamentals.
- *The Toyota Spirit* by Taiichi Ohno
  - Written by Taiichi Ohno and originally published in 1990, this book is no longer in print. It marked the debut of Toyota’s Lean philosophy in France. Taiichi Ohno is one of the founders of Lean.



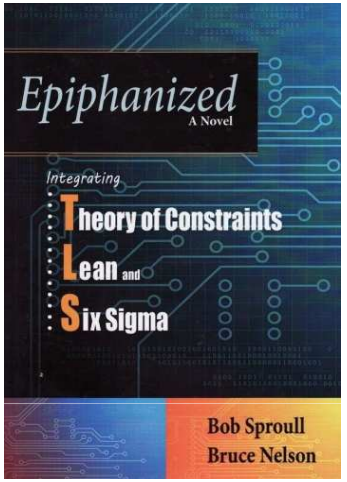




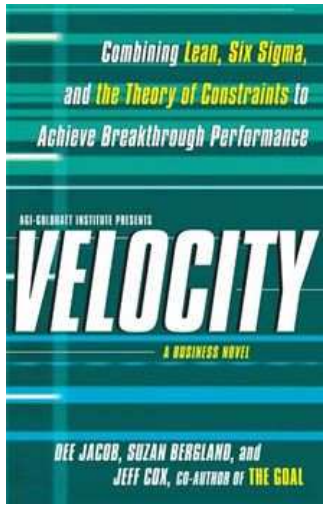


TLS books: 2 business novels

- *Epiphanized* by Bob Sproull & Bruce Nelson (2012)
  - While taking the form of a novel to get the ideas across there are also 1100 pages of technical material which explain in detail the principles of TLS, Throughput Accounting, the Thinking Processes, the Replenishment Model, DBR (Drum – Buffer – Rope), Critical Chain Project Management, etc.

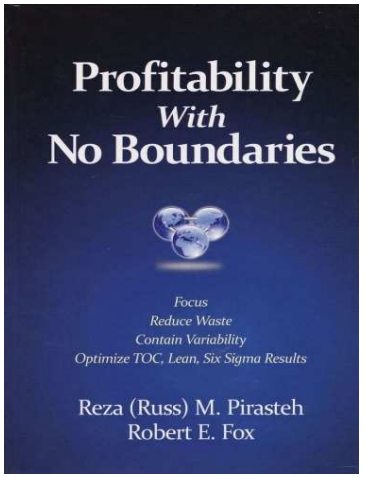


- *Velocity* by D. Jacob, S. Bergland & J. Cox (2010)
  - A business novel which describes how to combine the three approaches. This novel lays out an interesting case of a double bottleneck. During the course of the novel the actors solve both a managerial constraint as well as a production constraint.

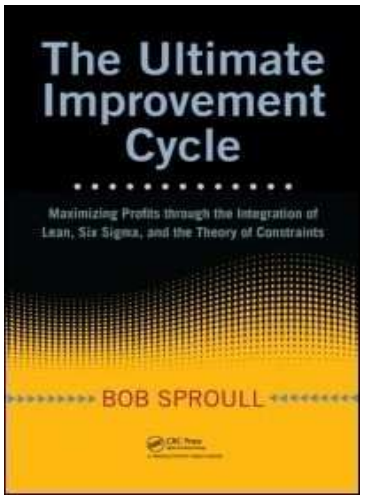


TLS reference books:

- *Profitability with no boundaries* by Reza Pirasteh & Robert E. Fox (2010)
  - Written by two well respected authors this book is principally a reference book for exploring the details of integrating TLS into an enterprise. It introduces iTLS® a systematic method for integrating the three components.



- *The Ultimate Improvement Cycle* by Bob Sproull (2009)
  - Written by one of the co-authors of *Epiphanized* . Recent (2009). The author is probably the most experienced implementer of TLS in the world.



BIOGRAPHY: Philip Marris

Philip Marris is CEO of Marris Consulting, a management consultancy based in Paris France focused on industrial operations. Over 80% of the firm's projects are based on TOC, "TOC + Lean" or TLS. He is the author of the French reference book « Le Management Par les Contraintes en gestion industrielle ». He is involved in the "TOC + Lean" movement and founder of the LinkedIn "TLS - TOC Lean & Six Sigma" group. He has designed, sold and executed over 90 transformation projects. He is a founding member of the board of the recently created TOC France association & TOCICO French regional group and is active in increasing the awareness of TOC in Europe. He is a member of the Advisory Board of the TOC Institute (India). Philip Marris was in charge of Manufacturing Operations in France and the "Rest Of the World" (Europe, Asia, Africa but excluding the US) in large consulting firms. He started his TOC journey in 1986 when he joined Creative Output France and had the honor and pleasure of working with Eli Goldratt and his brother Issi Pazgal. He started his Lean journey in 1984 and has been trying to better master Lean ever since. He has over 29 years of experience in industry and in consulting. Philip Marris started his career as a production engineer in the steel industry in the north France. He is English and is bilingual and bi-cultural.

Speaking experience

Philip Marris gives about 4 conferences a year. For instance in the past 2 years: TOCICO 2012 in Chicago "Injecting TOC into a very Lean organization", French Operational Excellence annual summit Paris "TLS", ProGestion Franco-Swiss Business Leaders in Geneva "TOC, Lean & Six Sigma", French APICS annual congress in Paris (TOC / DBR), French Pharmaceutical industry annual Congress in Montpellier "CCPM: twice as many projects in half the time", PIOM (Performance Improvement & Operations Management) conference in Luxembourg on TOC in the M.R.O industry, Critical Chain Project Management Conferences in Paris (4), "TOC + Lean" conferences in Paris (4).

Details of published works

Philip Marris wrote the best-selling textbook in French on how to implement TOC in manufacturing operations: "Le Management Par les Contraintes en gestion industrielle". Reprinted in 1996 and 2000. He is currently finishing a new edition. A website in French is dedicated to this book: wwww.management-par-les-contraintes.com. Among other things this book argues that the 5 focusing steps of TOC that lead to perpetually eliminating the current constraint is not always appropriate. It argues that in many cases a company should choose its "best constraint" or bottleneck resource and organize excess capacity around the constraint.

He publishes about 6 articles per year in printed or web based media. For instance in the past 2 years: l'Usine Nouvelle (2), Quality World Magazine, Industrie & Technologies (2), Pharma Pratiques, Supply Chain Magazine (2), Railway Gazette International, TechniquesIngenieur.fr, Maintenance & Entreprise, Logistiques Magazine, Qualitique, Mesures, Innovation & Industrie, Qualitéonline, Production Maintenance & UsineNouvelle.com.

In 2013 he contributed to the translation of the prologue of the new memorial edition of Eli Goldratt's "The Goal" in French : Standing on the shoulder of giants.

Marris Consulting
Paris, France

- Marris Consulting conducts regular training courses in TOC, TLS, Critical Chain project Management, and other related areas of practice. The courses are delivered in Paris but can be arranged to be conducted at other sites.
- Clients : ArcelorMittal, Valeo, SNCF / French Railways, Veolia, Salzgitter Mannesmann, EADS, Aubert & Duval / Eramet, Autoliv, SKF, ABB, Man, Michelin, Glaxo, Bobst, Ceva Santé Animale, Banque de France, DSS / Kaysersberg Packaging and over 50 Small & Medium Enterprises.
- Marris Consulting has conducted over 100 engagements in transforming industrial enterprises in France and around the world.
- The firm is recognized as an expert in Theory of Constraints & Lean Manufacturing. Philip Marris is the author of the TOC reference book in French: *Le Management Par les Contraintes*. A new edition of this book is in the works. Philip is English and worked with Eli Goldratt in the formative years of TOC.
- TOC manufacturing & CCPM websites (English versions of these sites will be available soon)
  - www.management-par-les-contraintes.com
  - www.chaine-critique.com
- Founded in 2005, 12 consultants + freelance network

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