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Eli Goldratt's Legacy in the World

46th TOCPA International Online Conference

18-19 March 2021

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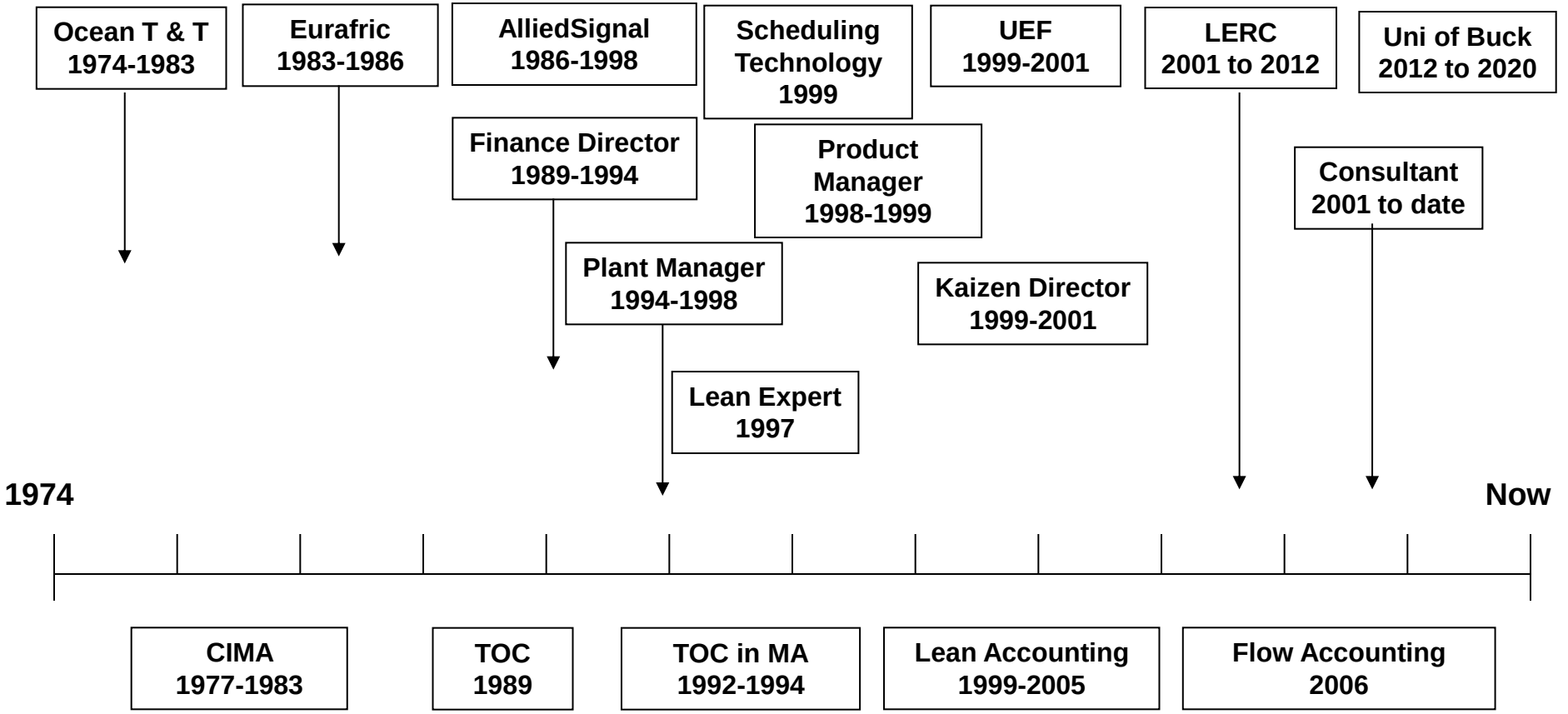
The Road Not Taken by Robert Frost

Two roads diverged in a yellow wood
And sorry I could not travel both
And be one traveller, long I stood
And looked down one as far as I could
To where it bent in the undergrowth….

And both that morning equally lay
In leaves no step had trodden black
Oh' I kept the first for another day
Yet knowing how way leads on to way
I doubted if I should ever come back

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I –
I took the one less travelled by,
And that has made all the difference

My own “meandering journey”



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AlliedSignal - Garrett Turbochargers O.E. Plant

OPT Software

Tried Standard Costing

Sales Mix

Capital Expenditure

Make versus Buy

Took a path that fundamentally changed the accounts

GARRETT AUTOMOTIVE LIMITED

ACCOUNTS PACKAGE

NOVEMBER 1992

Page

1 - 3 Throughput

4 - 7 Investment

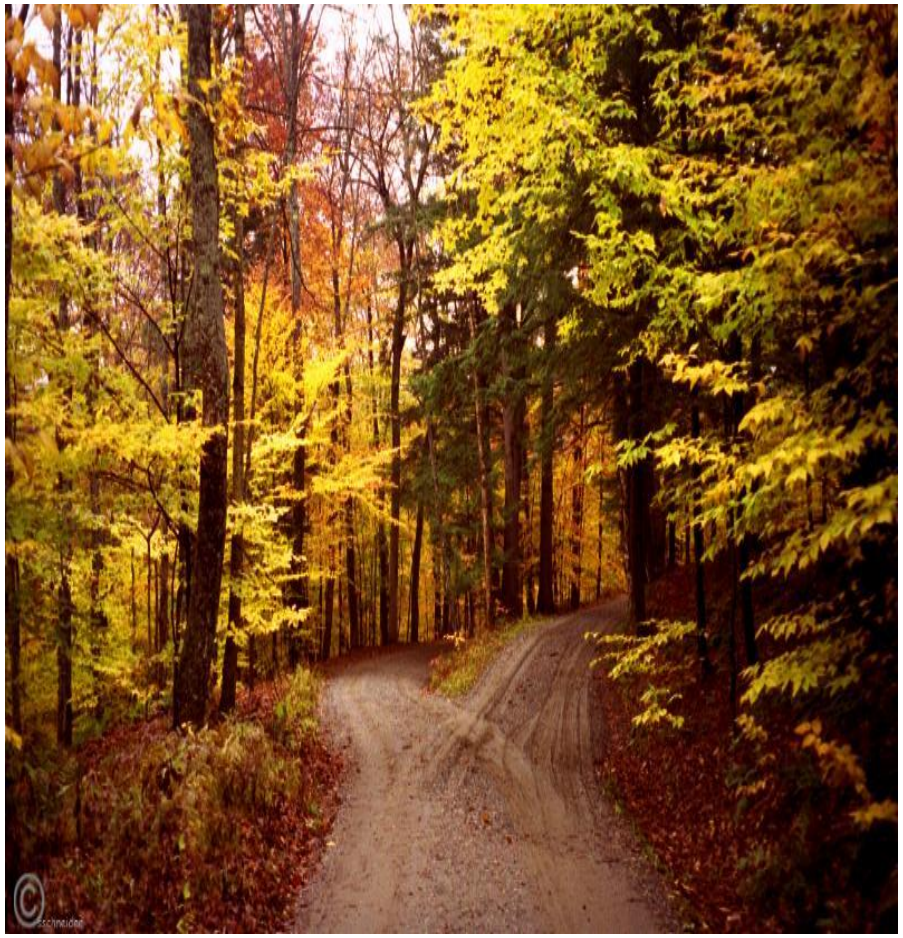
8 Operating Expense

9 - 11 Local Performance

T = Sales less material cost and royalty

I = Investment charge (Interest on all the money tied up in the business)

OE = Operating Expense (What we pay ourselves and others for their goods and services required to make turbochargers)



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Moved from this relatively conventional reporting.....

AlliedSignal Limited Turbochargers

Efficiency Report

	Turbine Housing	Compressor Housing	Centre Housing	Shaft Wheel Assembly	Impeller Backplate	Final Assembly	
Direct Headcount	52	18	25	59	38	78	270
Potenial Hours	1924	666	925	2183	1406	2886	9990
Absenteeism	100	50	80	249	38	376	893
Holidays	116	16	16	112	16	124	400
Overtime Hours	479	182	253	371	361	870	2516
Total Available Hours	2187	782	1082	2193	1713	3256	11213
Transfers In			74				74
Transfers Out	50	37		37	37		161
Actual Direct Labour Hours	2137	745	1156	2156	1676	3256	11126
Standard Hours Recovered	1531	590	747	1579	1199	2279	7925
% Overtime	22%	24%	22%	17%	22%	27%	23%
Cell Performance	72%	79%	65%	73%	72%	70%	71%

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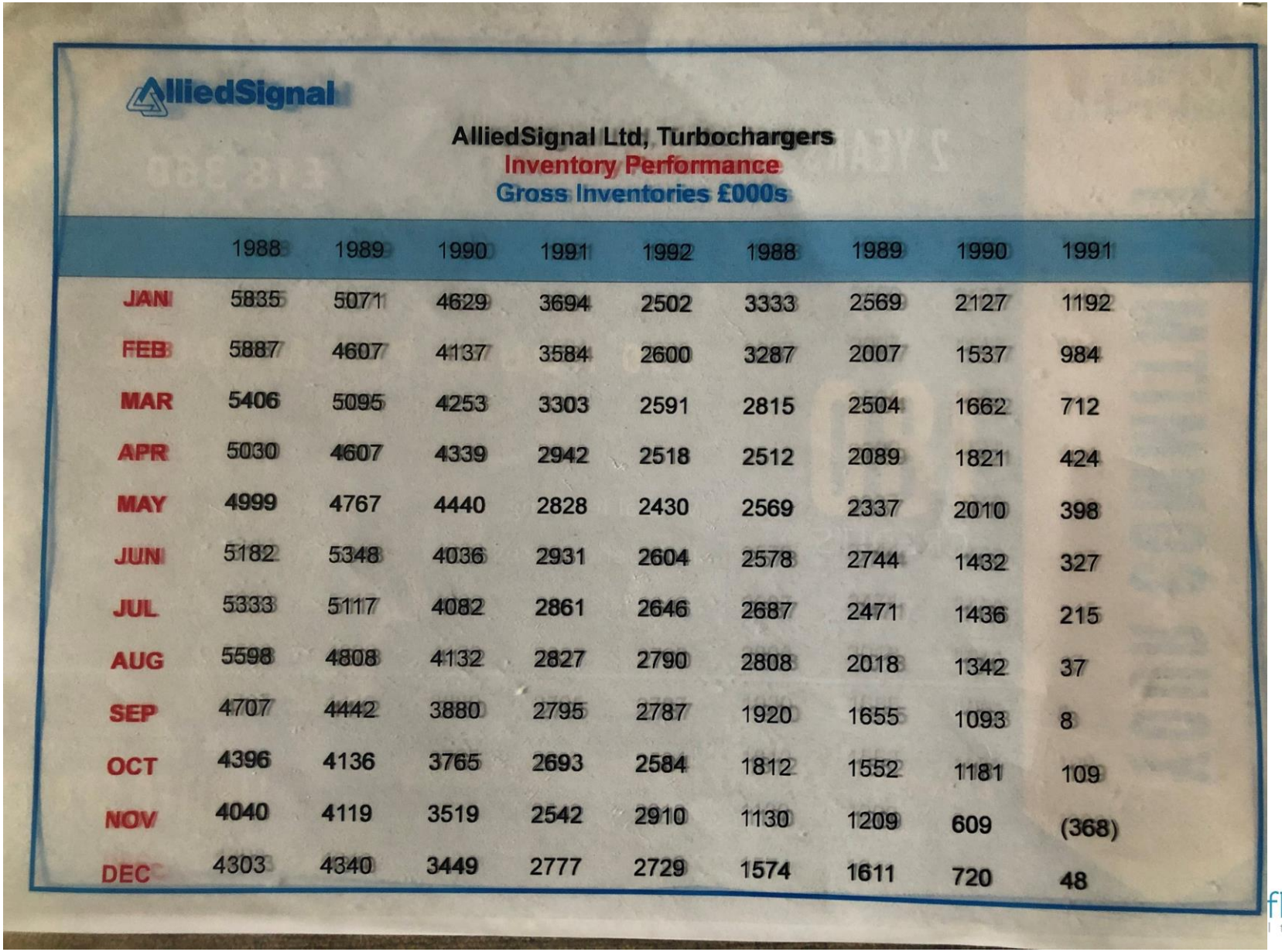
To this incorporating Schedule Adherence

AlliedSignal Limited Turbochargers

Turbine Housing Cell

Schedule Adherence	**Week 09**	**Week 10**	**Week 11**	**Week 12**	**Month**
Scheduled Quantity	17819	18278	18047	13187	67331
Scheduled Quantity Complete	17526	17033	15230	13167	62956
Mix Adherence	98.4%	93.2%	84.4%	99.8%	94%
Quantity Finished	18059	17253	15601	15823	66736
% Unscheduled Production	3.04%	1.29%	2.44%	20.17%	6.00%
Key Machine Breakdows (Parts Lost)	120	240	350	0	710
Quality					
First Time Capability	89%	83%	87%	74%	83%
Scrap (Lost Sales Value)	£10,365	£12,689	£16,566	£9,753	£49,373
Labour					
Potential No of Operators	52	52	52	52	52
Actual No of Operators	48	46	47	48	48
Overtime as %	22%	28%	27%	20%	24%
Absenteeism as %	3%	4%	4%	3%	4%
Holidays as %	3%	4%	5%	8%	5%
Inventory					
Planned Lead Time in Days	5	6	6	4	
Actual Lead Time in Days	5	7	7	5	
Change in the Value of WIP £'s B/(W)	£3,000	-£5,000	-£1,200	£6,000	
Consumable Usage £'s	£4,094	£3,214	£3,062	£2,145	£12,515
Sub Con/Support Throughput £'s	£1,112	£1,369	£7,702	£1,844	£12,027

Which helped Inventory reduction by over 50% or £3 million

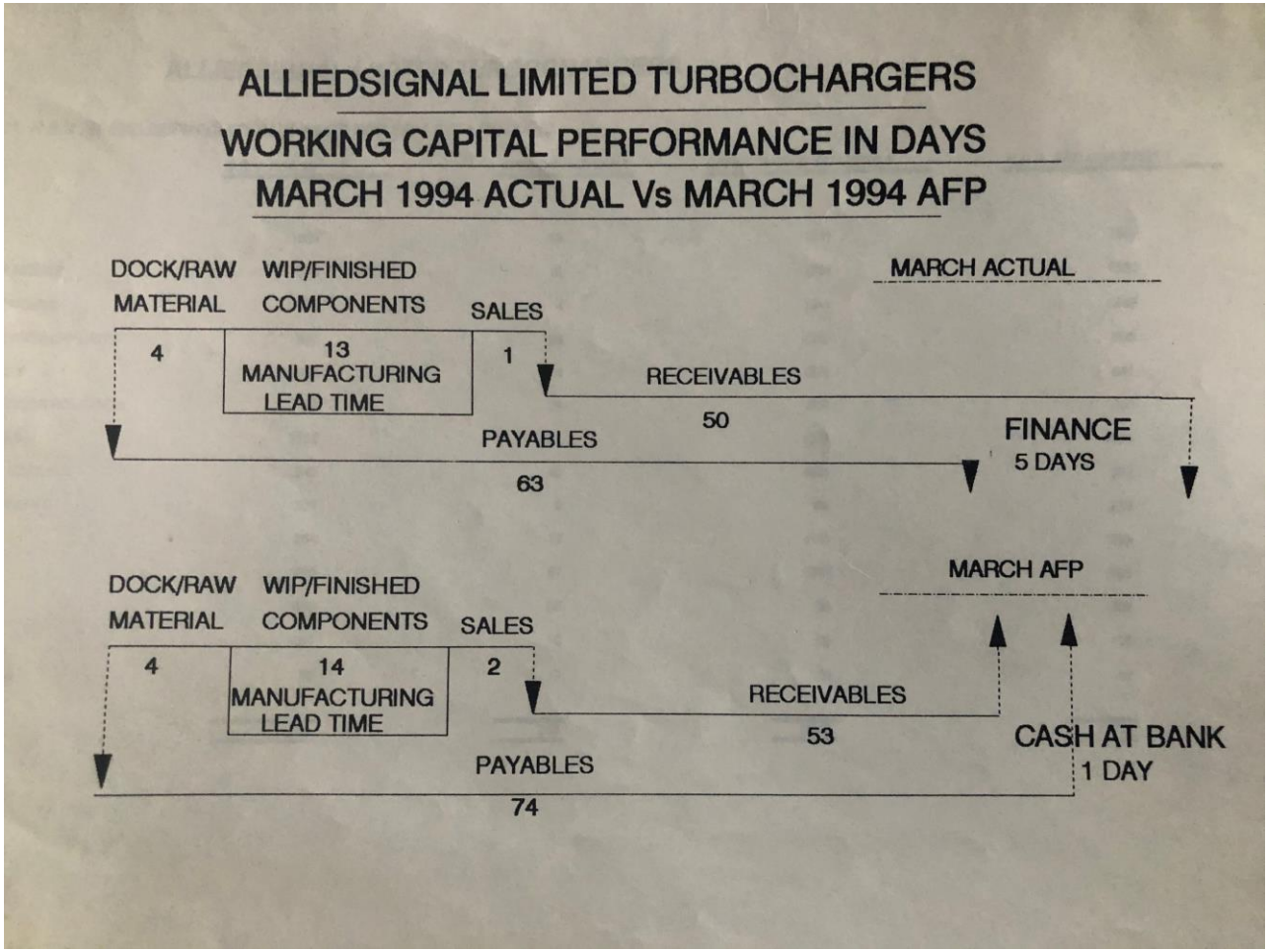


AlliedSignal

AlliedSignal Ltd, Turbochargers
Inventory Performance
Gross Inventories £000s

	1988	1989	1990	1991	1992	1988	1989	1990	1991
JANI	5835	5071	4629	3694	2502	3333	2569	2127	1192
FEB	5887	4607	4137	3584	2600	3287	2007	1537	984
MAR	5406	5095	4253	3303	2591	2815	2504	1662	712
APR	5030	4607	4339	2942	2518	2512	2089	1821	424
MAY	4999	4767	4440	2828	2430	2569	2337	2010	398
JUNI	5182	5348	4036	2931	2604	2578	2744	1432	327
JUL	5333	5117	4082	2861	2646	2687	2471	1436	215
AUG	5598	4808	4132	2827	2790	2808	2018	1342	37
SEP	4707	4442	3880	2795	2787	1920	1655	1093	8
OCT	4396	4136	3765	2693	2584	1812	1552	1181	109
NOV	4040	4119	3519	2542	2910	1130	1209	609	(368)
DEC	4303	4340	3449	2777	2729	1574	1611	720	48

Inventory Reduction



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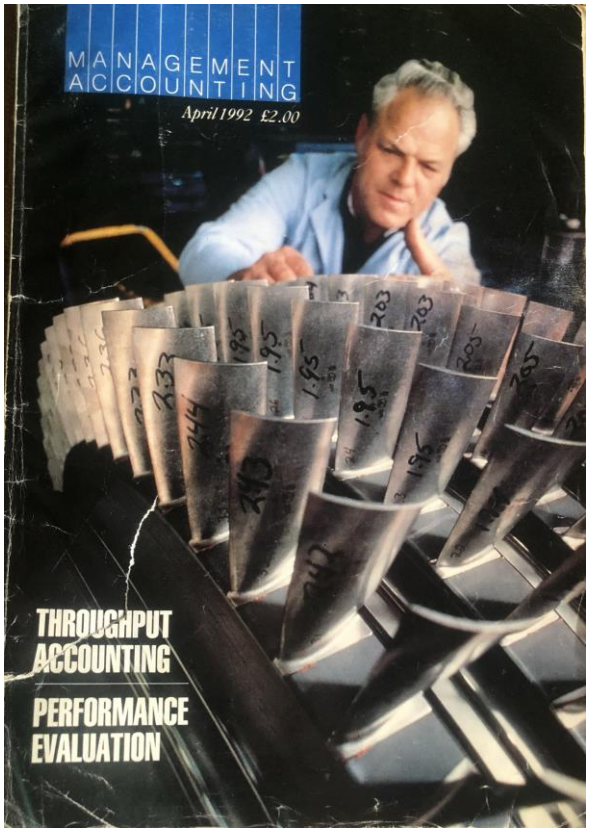
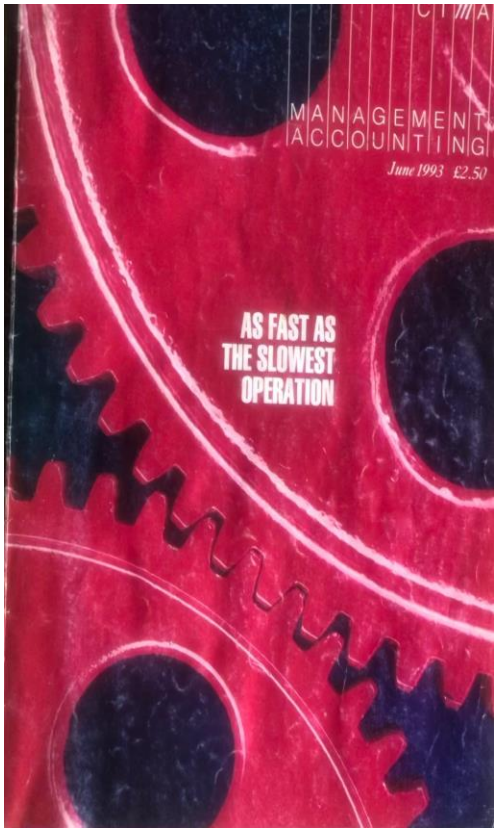
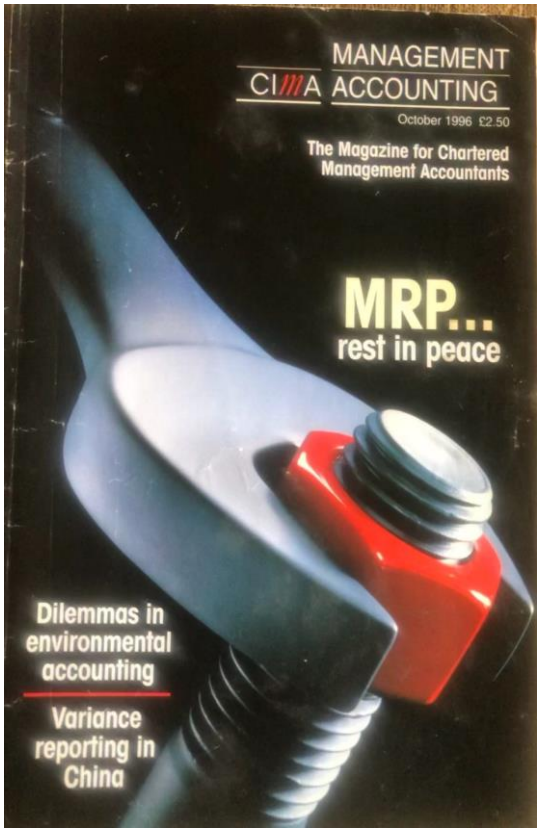
Started to gain confidence and wrote about it in CIMA magazine







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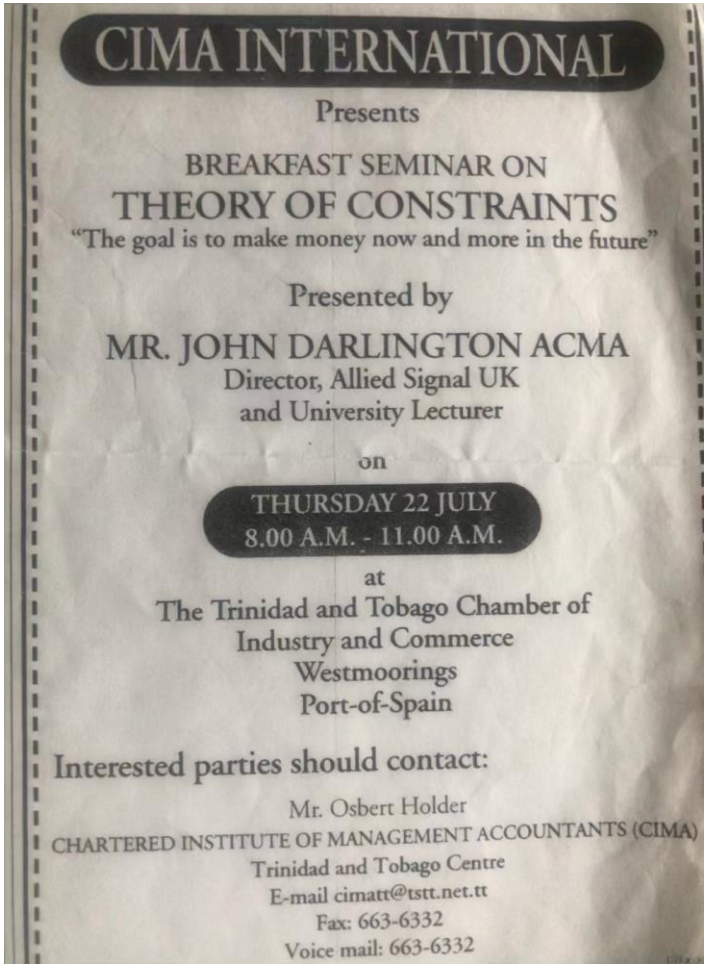
Started to get offered trips to foreign lands



CIMA INTERNATIONAL

Presents

BREAKFAST SEMINAR ON

THEORY OF CONSTRAINTS

"The goal is to make money now and more in the future"

Presented by

MR. JOHN DARLINGTON ACMA

Director, Allied Signal UK
and University Lecturer

on

THURSDAY 22 JULY
8.00 A.M. - 11.00 A.M.

at

The Trinidad and Tobago Chamber of
Industry and Commerce
Westmoorings
Port-of-Spain

Interested parties should contact:

Mr. Osbert Holder
CHARTERED INSTITUTE OF MANAGEMENT ACCOUNTANTS (CIMA)
Trinidad and Tobago Centre
E-mail cimatt@tstt.net.tt
Fax: 663-6332
Voice mail: 663-6332

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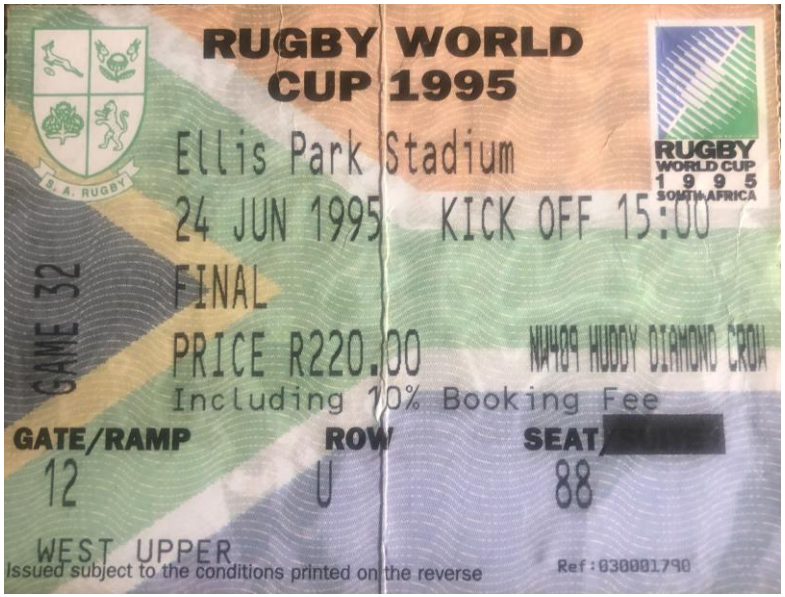
Started to get offered trips to foreign lands



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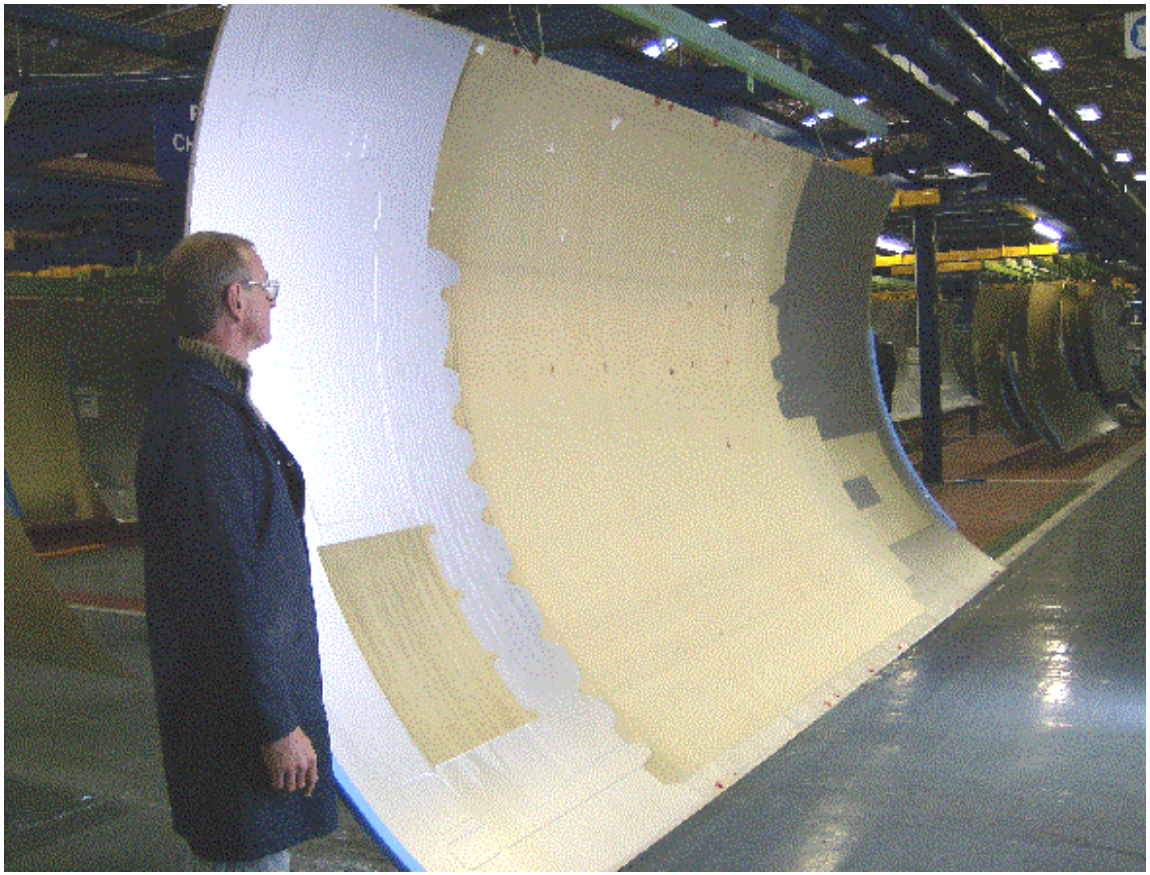
Gained enough confidence to try it out on others: Bombardier Aerospace Belfast



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Summary and Next Steps

	Before (Wk35 Yr1)	After (Wk15 Yr2)	
Inventory reduction			% Reduction
No. panels	432	178	59%
Days worth of Inventory	39	19	51%
$ Value	587K	254K	57%
New Flow KPI's			
Schedule Adherence	n/a	80%	
Flow Rate	n/a	92% Loop1 65% Loop 2	
Customer Satisfaction			
Avg No. of Jigs Stopped	6 per week	0-1 per week	

Next Steps

- Continue to improve pilot results
- Leverage to the balance of product / people in C04.
- Leverage beyond C04.

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RPZ Russia
Ramensky Priborostroitelny Zavod

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Eli Goldratt and TOC

- I was on the first wave of “Jonahs” run by Oded but rather naively thought I was on the shortened OPT course
- What I found was that I was being introduced to concepts of the Greek philosophers and the scientific approach
- Use of a method of teaching through questioning (labelled the Socratic approach after Socrates).
- Learning by doing (as preached by Aristotle)

- To say I was disappointed would be a massive understatement….but now

Eli Goldratt and TOC

- There was just enough that I understood to keep me “hooked” but I was very intolerant of some parts of what is known as “The Thinking Process”
- I ran a course on TOC for CIMA with Oded Cohen
- I bumped into Eli every now and then and made plans to leave accountancy and get into plant and operations management

My observation about “ tools & solutions”

- The bigger the “tool solution” the more danger in people hanging on to it when it is no longer relevant
- MRP was in its time a massive step forward
- Standard costing was fabulous when it was invented back in 1910-1926

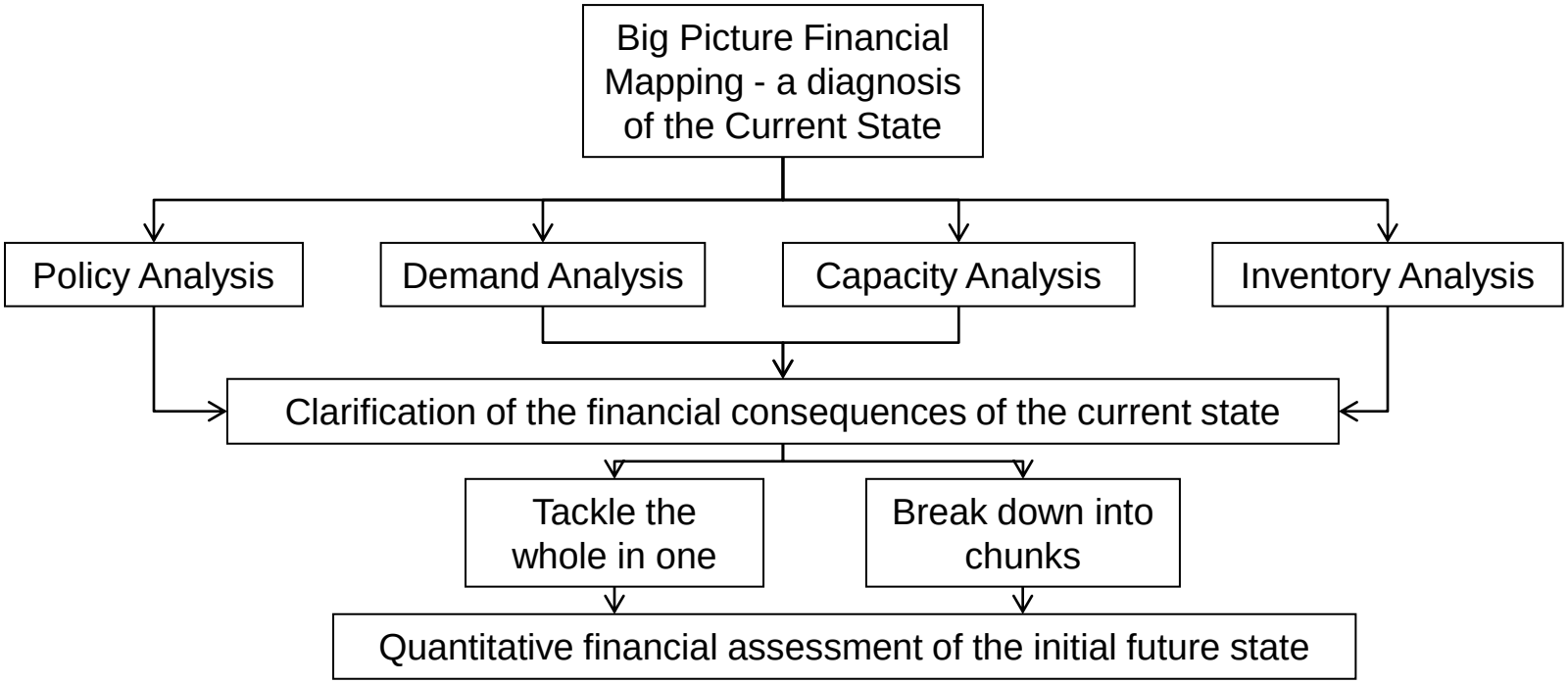
It’s all about flow!

- What do we mean by flow?
- Produce as close to real demand as you can and keep the flow going from one value adding step to another without any delay
- Just because it is moving doesn’t mean it is flowing!

Flow Accounting- The Principles

- The final arbiter of performance is the customer
- Measurements should be easy to understand
- They should be accessible and reflect responsibility
- Where possible they should appeal visually
- They should display trends and relationships
- They should emphasise time
- Accounting should recognise and then reflect the flow

Structure of the Flow Accounting Process



Value Flow Accounting & Decision Making

Data Acquisition Structure & Modelling

Value Flow Performance Measures

- Financially quantified current state
- Financial consequences of the future state agreed

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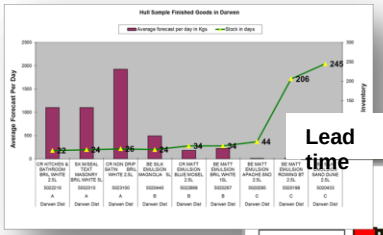
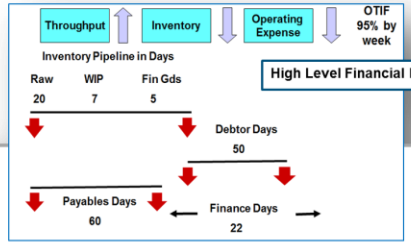
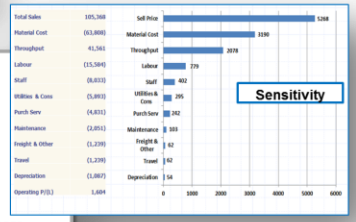
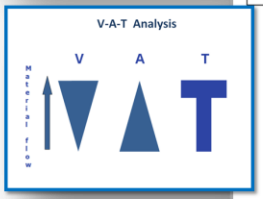
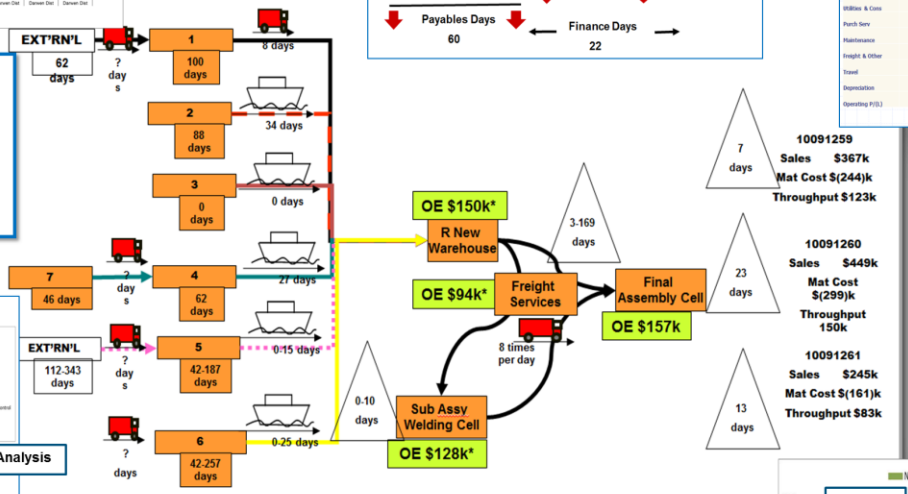
Big Picture Financial Mapping

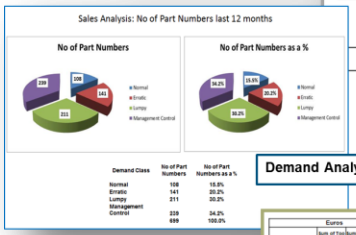


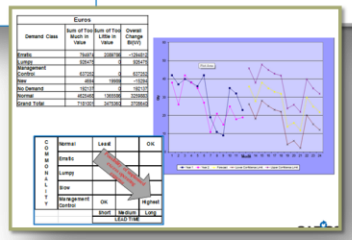


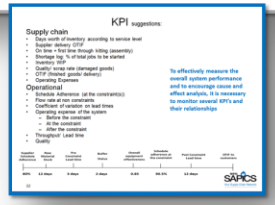


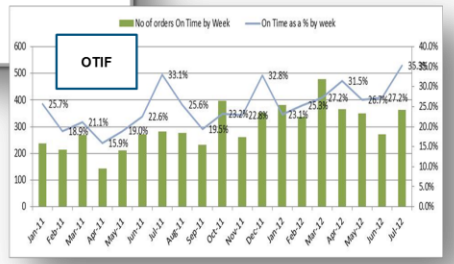












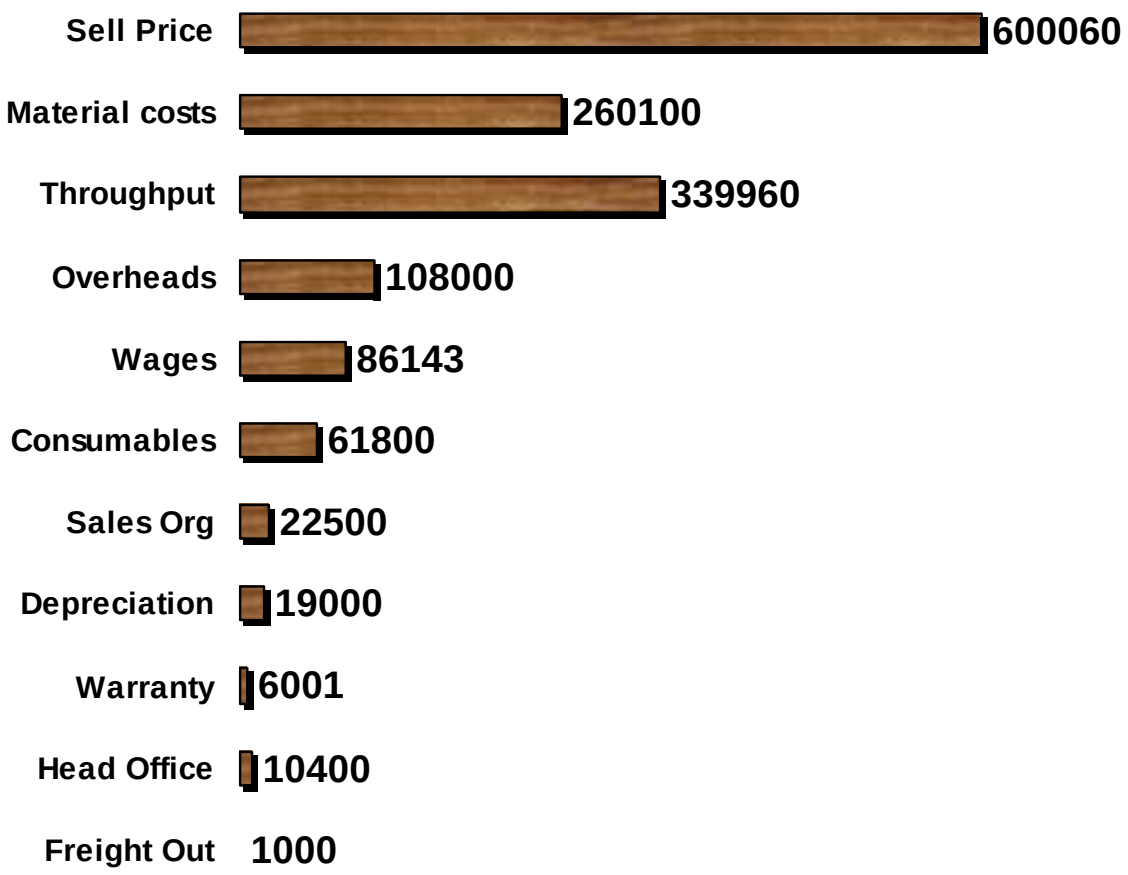
Key Drivers

Sept YTD Profit and Loss Actual £'s

Sales	12001200
Material costs	5202000
Throughput	6799200
Overheads	2160000
Wages	1722864
Consumables	1236000
Sales Org	450000
Depreciation	380000
Warranty	120012
Head Office	208000
Freight Out	20000
Profit	502324

Sensitivity Analysis

A 5% Change for better effects the bottom line by: -



Pareto works so use it!

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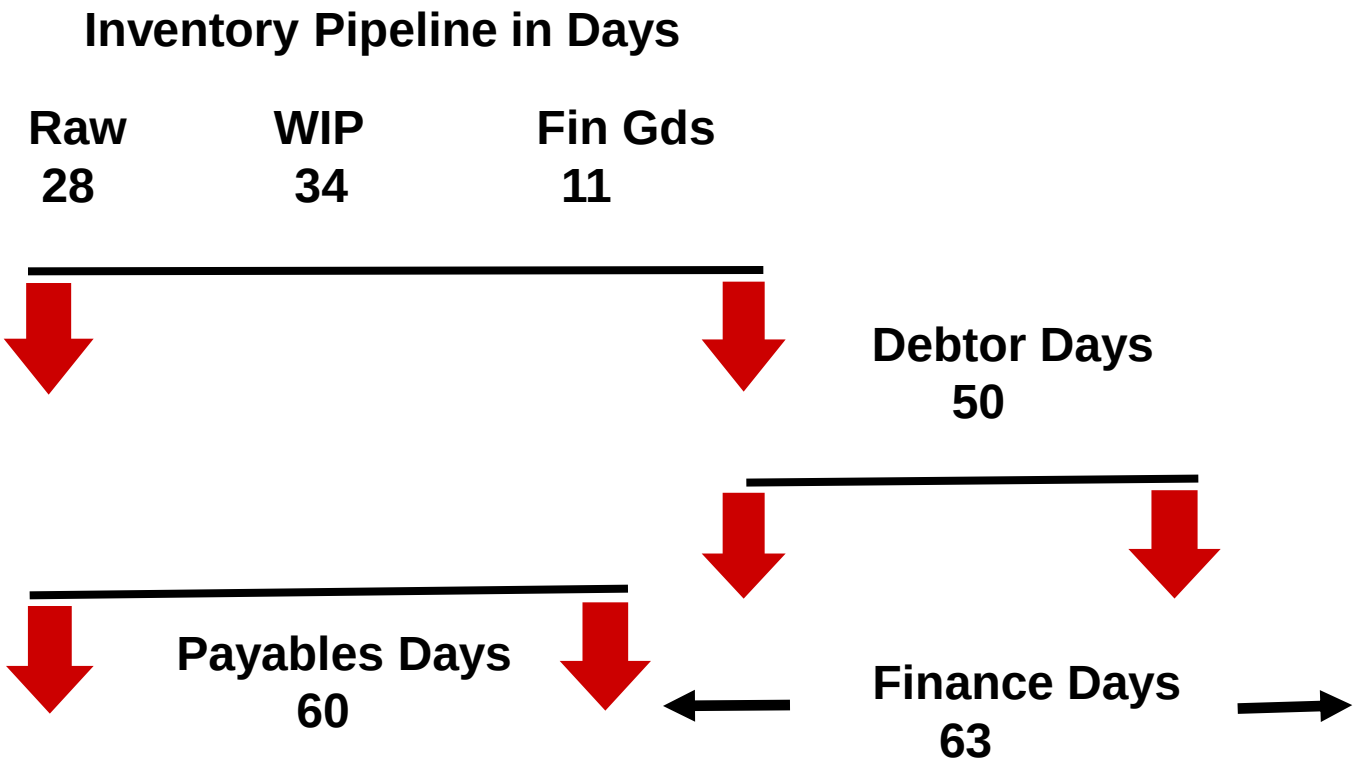
Working Capital Relationships

OTIF 82% by week

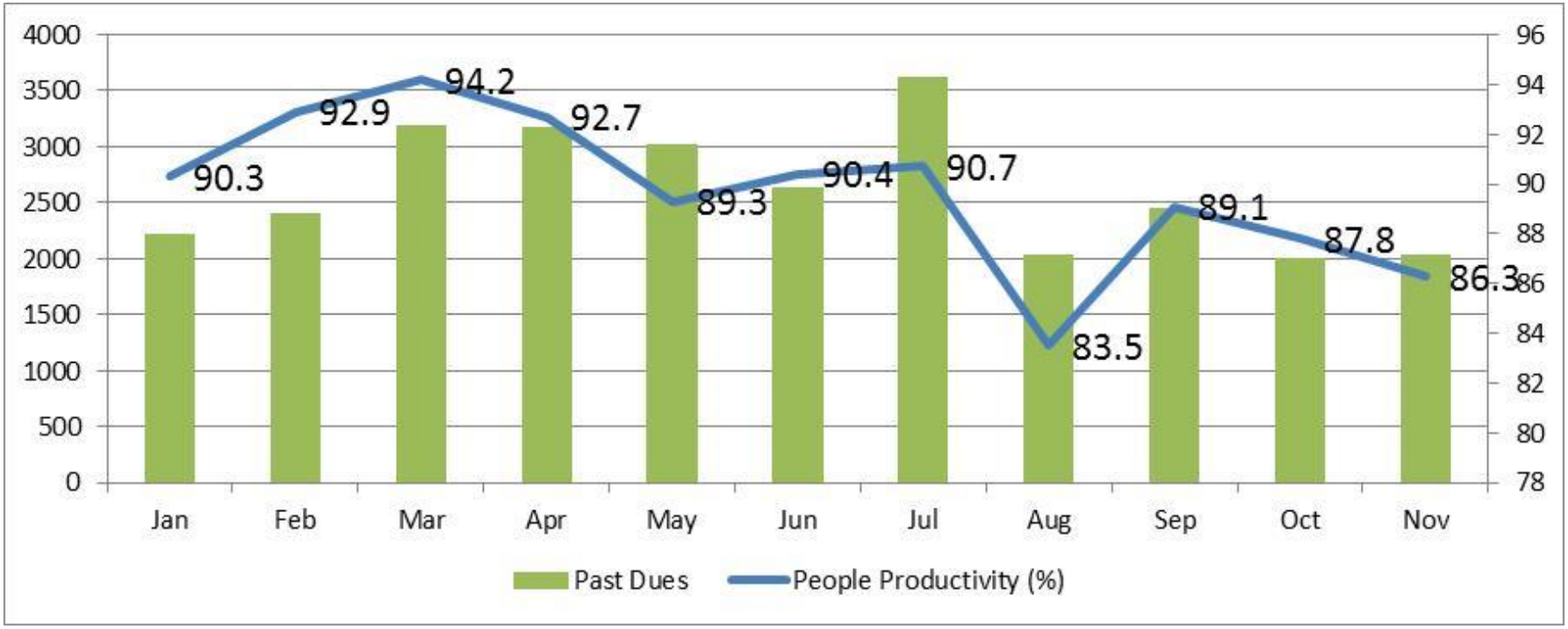


- ***June End Inventory in WIP of £1.4 million***

What is the message I'd like you to take away?

- Pursue a scientific approach
- Look for cause and effect
- Ask questions, there are no ultimate truths, only harder questions!!
- Beware of trying to apply tools which right for one condition are inappropriate in another
- Hold the tools in reserve until you have the correct understanding

Cause and effect analysis (speculation for feedback)



Medium to strong negative correlation of -0.64. Bonus Incentives (25%) to make volume of parts over the right mix of parts could be a contributory factor (If Null were true a correlation as great as this would occur by chance alone with a probability of less than 2.5%)

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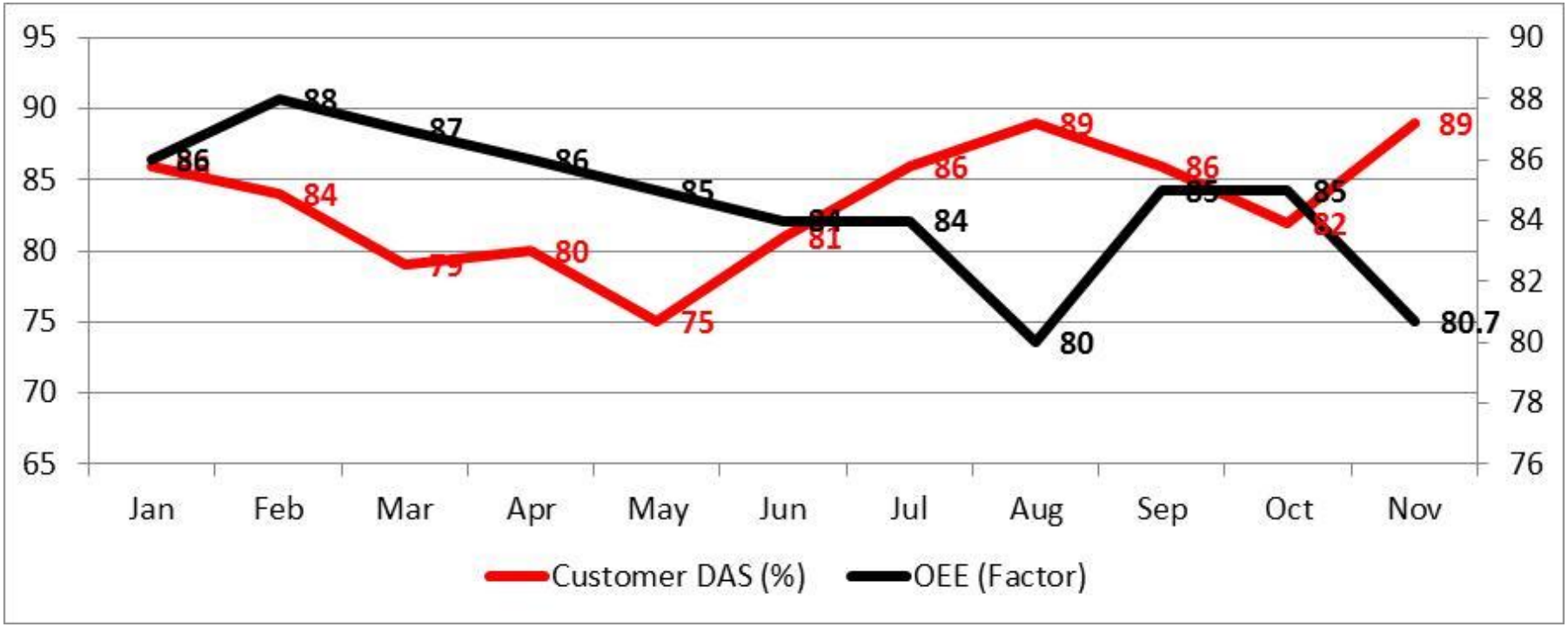
Cause and effect analysis (speculation for feedback)



Medium to strong negative correlation of -0.56. OEE does NOT tell you if you are making the right parts at the right time and is only appropriate for individual resources. The highest levels of customer service have been during the lowest periods of OEE. Batch sizing is very closely related to OEE. (If Null were true a correlation as great as this would occur by chance alone with a probability of less than 4%)

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No Highway by John Masefield

“…….Therefore, go forth companion : when you find
No highway more, no track, all being blind,
The way to go shall glimmer in the mind.

Though you have conquered Earth and charted Sea
And planned the course of all Stars that be,
Adventure on, more wonders are in Thee

Adventure on, for from the littlest clue
Has come whatever worth man ever knew ;
The next to lighten all men may be you…….”

A problem with accountancy

- 3 friends pay £30 for their meal and decide to share it equally……