Manufacturing

and

THE NEED TO CHANGE

How To Save £1,000,000 – Part 1

CONTENTS

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1st November 2023
This report may be updated as new data becomes available

1.1 INTRODUCTION

INTRODUCTION

Back in 1995 the "Open University and BBC Learning Zone" produced a TV program on **calculating volume**.

A Maths Question Was Asked;-

Based on the volume of the ice mass at the North Pole and South Pole...

What would be the rise in sea level if the ice melted...

The Answer:-

The **ice** floats on the **Arctic Ocean**. If it **melted - only the weather would be affected**...

If the ice covering **Antarctica melted**, the **sea level would rise** about **60 meters (200 feet)...**

LEAN MANUFACTURING TOOLS

A Report: LEAN Manufacturing Tools. Techniques and how to use them to improve business and reduce the effects of Climate Change.

We all know now that Climate Change is an issue, this report illustrates a few things to think about in manufacturing in order to reduce Non-Value Waste and improve business...

ABOUT THE AUTHOR

The Managing Director of an **Industrial Engineering Consultancy**

- In the mid 1980s founded a company in **LEAN Manufacturing and Process Improvement**
- Now been working in manufacturing for over 30 years and in 60 cross-sector companies

A Designer of Factories, Process Improvement and Company Turnaround.

- Working predominantly in the UK, also Czech Republic, France, Netherlands, Ireland, Canada
- **During the last 15 years saving and generating for companies around £12 Million...**

During the period August 2018 – January 2019 worked in the **Netherland's, Arnhem**.

- Project **Company Turnaround -** Process Improvements and **Cost Savings circa £2,000,000**

My Job Is To Help People In Business - Improve Their Business... A Trouble-Shooter....

WHY WE NEED TO "CHANGE"

- Google - worldometer - "real time world statistics".
- Google - the impact of sea level rise UK (images)
- Google - car free cities UK (images).

1.2 CLIMATE CHANGE

THE PROBLEM
We can see air pollution hanging over our towns, we can even smell the air pollution.

Causes Of Pollution

Industry - Manufacturing

Log Burners - Power Generation

Office Buildings - Household Boilers

Vehicles - Planes - Ships etc.

- **But people "only talk about the problems of vehicle pollution"...**
- **PEOPLE DON'T TALK ABOUT A SOLUTION or HOW TO IMPLEMENT A SOLUTION..**

SO: WHAT DO WE DO ABOUT IT, NOW...

- Option 1 – Do nothing, and hope it will go away
- Option 2 – Talk about it, and hope it will go away
- Option 3 – Talk about it, and hope someone else will do something about it
- Option 4 – Talk about it, Talk to other people, AND DO SOMETHING ABOUT IT...

SO: OPTION 4...

- **What are we going to do about it - And "LETS THINK OUTSIDE THE BOX"**

What Can We Do In Manufacturing ?

One Of The "Root Causes" Waste

"EFFECT"
(The World Under Water)

CLIMATE CHANGE

THE PROBLEM
and
THE OPPORTUNITY

IS IT REALLY **SO** BLEAK

2.1 PRINCIPLES OF IMPROVEMENT

THE PROBLEM

Over the years we have all just taken the Earth for granted... Oil – Gas - Atmosphere...

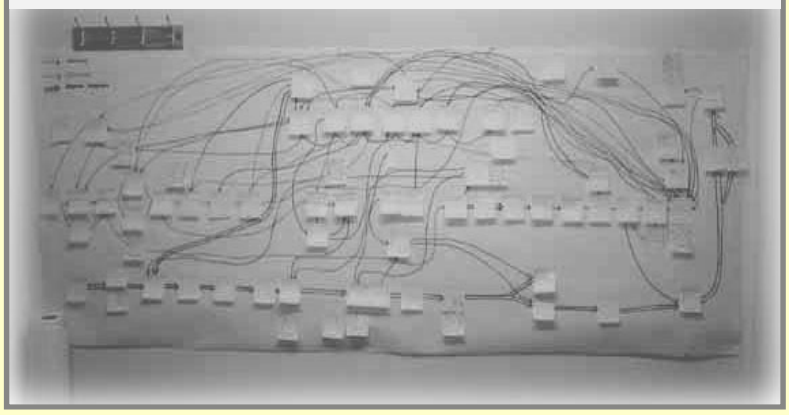
Now we need:-

- The Reduction of Waste -
- Better Utilisation of Resources -
- To Find New Resources...

THE OPPORTUNITY

In order to run a business successfully, one has to be constantly "On The Ball"

Does Your Business Look Like This Example?



NOW, WE NEED TO CHANGE...

- ✓ **Eliminate 'Non-Value Added' Systems and Procedures**
- ✓ **Reduce Waste – Rejects, Scrap, Resources**
- ✓ **Time Management**
- ✓ **Best Buy Policy**
- ✓ **Supplier Understanding**
- ✓ **Quality – Cost – Delivery**
- ✓ **SIMPLE – Designs and Manufacture**
- ✓ **STANDARDISE – Products and Process**
- ✓ **REDUCE VARIATION – Keep Things Simple**
- ✓ **Use Materials – that can be recycled or up-cycled**
- ✓ **What does the Customer expect – external and internal**
- ✓ **What does the Customer want – a washing machine or a clean shirt**

2.2 APPLYING IMPROVEMENT

THE PROBLEM

Manufacturers may have an excellent product –

- But how will it be manufactured ?

- Will the product be of excellent quality and "Fit-For-Purpose"
- Will people want to buy your product...
- Will it make profit...

- How much product will end in land-fill, that cannot be re-cycled because of "Poor Design"
- How much product will be rejected or scrapped, because of "Poor Operator Training"
- How much money could the business be losing because of "Poor Process"...

The Route To Lean.

Based around What the Customer Wants.

- Eliminate Non-Value Operations.
- Smooth Production Flow.
- Customer Pull-Through.
- Reduce Waste.
- Improve Quality.
- Improve Company Profits.

CONTINUOUS IMPROVEMENT - APPLYING IMPROVEMENT

- ✓ **Appoint Staff Champions – For Internal Ownership**
- ✓ **Measure and Map Primary and Secondary Processes**
- ✓ **Implement LEAN Process Principles**
- ✓ **Implement Better Utilization of Space**
- ✓ **Implement Better Utilization of Warehouse**
- ✓ **Implement Basic Discipline, Procedures, TPM, H&S**
- ✓ **Implement Quality Standards, Awareness and Training**
- ✓ **Implement Better Planning – Shorter, Effective Lead Times**
- ✓ **Implement Effective Visual Management – KPIs, Achievements**
- ✓ **Improve Communication – Inter Departmental – Manager – Staff**
- ✓ **Appoint an Energy Management Champion – Reduce Energy Use**
- ✓ **Reduce the need to transport goods – Find Business LOCAL**

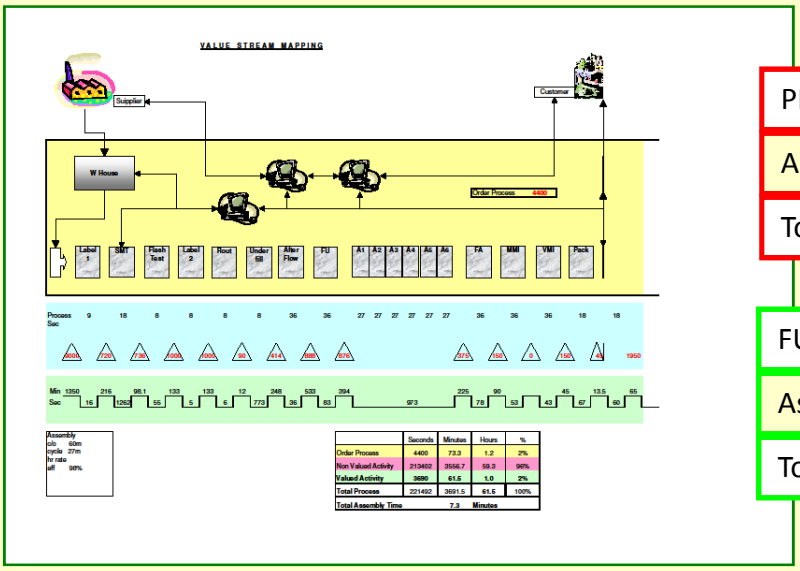
2.3 IMPROVEMENT THROUGH *"LEAN"*

THE PROBLEM

Over the years people in business "JUST DO THINGS" day after day...

- People will do the same thing tomorrow as they are doing today... WHY ?

"LEAN" Is about the reduction of NON-VALUE Waste and "Managing Change".



Value Stream Mapping

PRE-CHANGE
Assembly Time = 7.3 Min
Total Process = 61.5 Hours

FUTURE STATE
Assembly Time = 7.3 Min
Total Process = 13.0 - 6.7 Hours

CONTINUOUS IMPROVEMENT - IMPROVEMENT THROUGH "LEAN"

- ✓ **Remove – Non-Value Procedures & Operations**
- ✓ **Reduce or Eliminate – Waiting**
- ✓ **Reduce – Inventory**
- ✓ **Reduce – Process Motion**
- ✓ **Reduce – Process Time**
- ✓ **Reduce – Over Processing**
- ✓ **Right Size – Manufacturing Area**
- ✓ **Eliminate – Rework – Repair – Scrap**
- ✓ **Apply – Simple, Standardise, Reduce Variation**
- ✓ **Talk To The Customer – What Quality Standard Is Acceptable**
- ✓ **Talk To The Customer – Agree on a Quality Standard – To Reduce Rejects**
- ✓ **Talk To The Customer – Agree on a Quality Standard – To Reduce Energy Waste**

2.4 WORLD CLASS MANUFACTURING

THE PROBLEM

Waste in manufacturing evolves from many different areas... ***NON-VALUE / REJECTS / ENERGY***

- **SO.** What is **W**ord **C**lass **M**anufacturing ? - ***"The Reduction Of Waste"...***

Demings 85/15 Rule

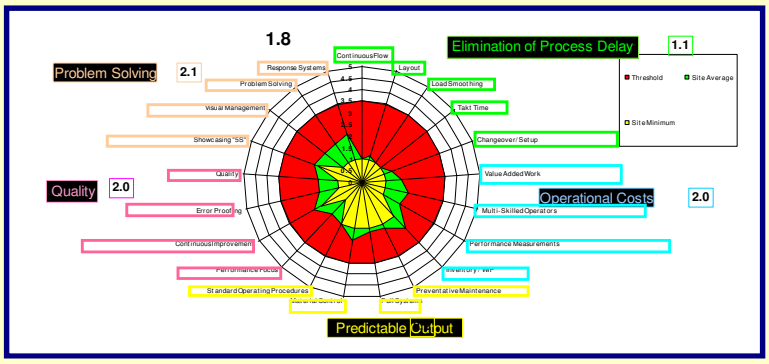
"85% of the reasons for failure to meet customer expectations are related to deficiencies in systems and process… rather than the employee...

- Product Design – We need to simplify and standardise the product design
- Manufacturing – We need to reduce Non-Value Waste and smooth process
- Product Quality – We need to reduce un-necessary rejects, scrap and landfill
- Gas, Electricity, Air – We need to reduce energy waste due to the re-making of parts
- Management Control – Management needs to measure the business and improve K.P.I.s.

WORLD CLASS MANUFACTURING

" Is the manufacturing system which constantly pursues *Streamlining* of the entire system through the complete elimination of *Waste."*

"It aims to build in *Quality* at the manufacturing process while recognizing the principle of cost reduction through the *Elimination of waste and non-value-added activities."*



2.5 CONTINUOUS IMPROVEMENT PLANNING

THE PROBLEM

Over the years people in business "JUST DO THINGS" day after day...

- People will do the same thing tomorrow as they are doing today...

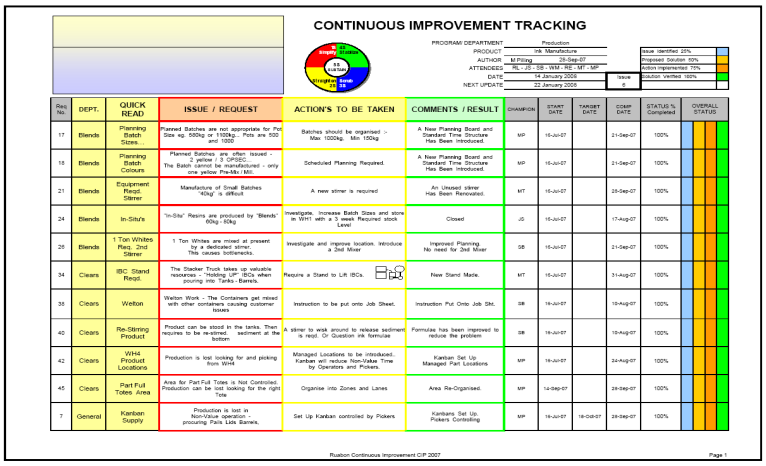
SO: What can we do to Change ?

THE OPPORTUNITY

Look around – what do you see:

- Too Much Inventory and W.I.P.
- Working to wrong drawing issue
- Lack of Std Operation Procedures
- Lights ON - when it's light outside
- Heating ON - and the doors are open
- Machines Running - but not producing
- Warehouse Inventory - NOT Organised...

SO: What Next...



CONTINUOUS IMPROVEMENT TRACKING

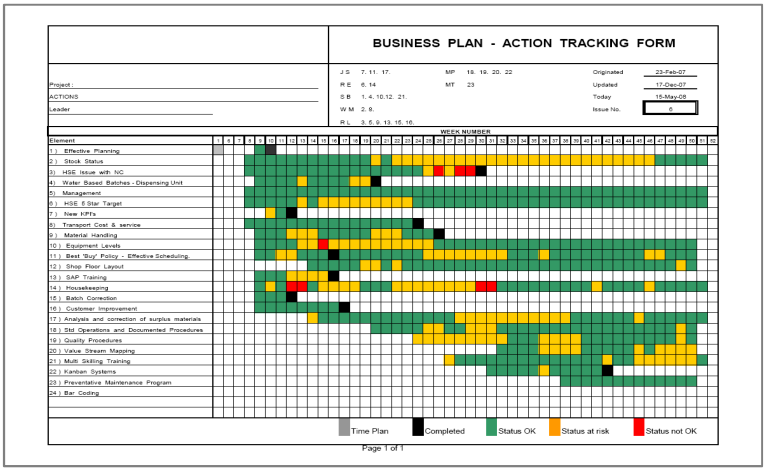
PROGRAM/ DEPARTMENT: Production
PRODUCT: Ink Manufacture
AUTHOR: M.Pilling 28-Sep-07
ATTENDEES: RL - JS - SB - WM - RE - MT - MP
DATE: 14 January 2008
NEXT UPDATE: 22 January 2008
Issue: 6

Issue identified 25%
Proposed Solution 50%
Action implemented 75%
Solution verified 100%

Row No.	DEPT.	QUICK READ	ISSUE / REQUEST	ACTION'S TO BE TAKEN	COMMENTS / RESULT	CHAMPION	START DATE	TARGET DATE	COMP DATE	STATUS % Completed	OVERALL STATUS
17	Blends	Planning Batch Sizes	Planned Batches are not appropriate for Pot Size eg. 500kg or 1100kg... Pots are 500 and 1000	Batches should be organised :- Max 1000kg. Min 100kg	A New Planning Board and Standard Time Structure Has Been Introduced.	MP	16-Jul-07		21-Sep-07	100%	
18	Blends	Planning Batch Colours	Planned Batches are often issued - 2 yellow / 3 GPSEC. The Batch cannot be manufactured - only one yellow Pre-Mix / Mill.	Scheduled Planning Required.	A New Planning Board and Standard Time Structure Has Been Introduced.	MP	16-Jul-07		21-Sep-07	100%	
21	Blends	Equipment Reqd. Stirrer	Manufacture of Small Batches "40kg" is difficult	A new stirrer is required	An Unused stirrer Has Been Renovated.	MT	16-Jul-07		28-Sep-07	100%	
24	Blends	In-Situ's	"In-Situ" Resins are produced by "Blends" 60kg - 80kg	Investigate, Increase Batch Sizes and store in WH1 with a 3 week Required stock Level	Closed	JG	16-Jul-07		17-Aug-07	100%	
28	Blends	1 Ton Whites	1 Ton Whites are mixed at present by a dedicated stirrer. This causes bottlenecks.	Investigate and improve location. Introduce a 2nd Mixer	Improved Planning. No need for 2nd Mixer	SB	16-Jul-07		21-Sep-07	100%	
34	Clears	IBC Stand Reqd.	The Stacker Truck takes up valuable resources - "Holding UP" IBCs when pouring into Tanks / Barrels.	Require a Stand to Lift IBCs.	New Stand Made.	MT	16-Jul-07		31-Aug-07	100%	
38	Clears	Welton	Welton Work - The Containers get mixed with other containers causing customer issues	Instruction to be put onto Job Sheet.	Instruction Put Onto Job Sht.	SB	16-Jul-07		10-Aug-07	100%	
40	Clears	Re-Stirring Product	Product can be stood in the tanks. Then requires to be re-stirred. sediment at the bottom	A stirrer to wok around to release sediment is reqd. Or Question ink formulae	Formulae has been improved to reduce the problem	SB	16-Jul-07		10-Aug-07	100%	
42	Clears	WH4 Product Locations	Production is lost looking for and picking from WH4	Managed Locations to be introduced. Kanban will reduce Non-Value Time by Operators and Pickers.	Kanban Set Up Managed Part Locations	MP	16-Jul-07		24-Aug-07	100%	
45	Clears	Part Full Totes Area	Area for Part Full Totes is Not Controlled. Production can be lost looking for the right Tote	Organise into Zones and Lanes	Area Re-Organised.	MP	14-Sep-07		28-Sep-07	100%	
1	General	Kanban Supply	Production is lost in Non-Value operation procuring Parts Lids Barrels.	Set Up Kanban controlled by Pickers	Kanbans Set Up. Pickers Controlling	MP	16-Jul-07	18-Oct-07	28-Sep-07	100%	

Ruabon Continuous Improvement CIP 2007 Page 1

1. **SCOPE / FOCUS / OPPORTUNITY**
   - I. What Is The Problem
   - II. What Is The Action
   - III. What Is The Result
   - IV. What Are The Benefits
2. **TEAM MEETINGS**
   - I. New ideas,
   - II. Manage "Change"
   - *III. Look underneath the box*
3. **Benefits = £££**



BUSINESS PLAN - ACTION TRACKING FORM

Project :
ACTIONS
Leader

J S 7, 11, 17. MP 18, 19, 20, 22
P E 6, 14 MT 23
S B 1, 4, 10,12, 21.
W M 2, 9.
R L 3, 6, 9, 13, 15, 16.

Originated 23-Feb-07
Updated 17-Dec-07
Today 15-May-08
Issue No. 6

WEEK NUMBER

Element
1) Effective Planning
2) Stock Status
3) HSE Issue with NC
4) Water Based Batches - Dispensing Unit
5) Management
6) HSE 5 Star Target
7) New KPI's
8) Transport Cost & service
9) Material Handling
10) Equipment Levels
11) Best 'Buy' Policy - Effective Scheduling
12) Shop Floor Layout
13) SAP Training
14) Housekeeping
15) Batch Correction
16) Customer Improvement
17) Analysis and correction of surplus materials
18) Std Operations and Documented Procedures
19) Quality Procedures
20) Value Stream Mapping
21) Multi Skilling Training
22) Kanban Systems
23) Preventative Maintenance Program
24) Bar Coding

Time Plan | Completed | Status OK | Status at risk | Status not OK

Page 1 of 1

PROJECT TRACKING

1. **Document Problems**
2. **Action the problems**
3. **Action week by week**
4. **Monitor the progress**
5. **Benefit from change**

2.6 PROJECTS and RETURN On INVESTMENT

THE PROBLEM

- ❖ **Projects are not started because: People only think about the COST...**
- ❖ **People DO NOT Think About The BENEFITS...**

- Business Improvements can bring expediential savings and **R**eturn **O**n **I**nvestment...

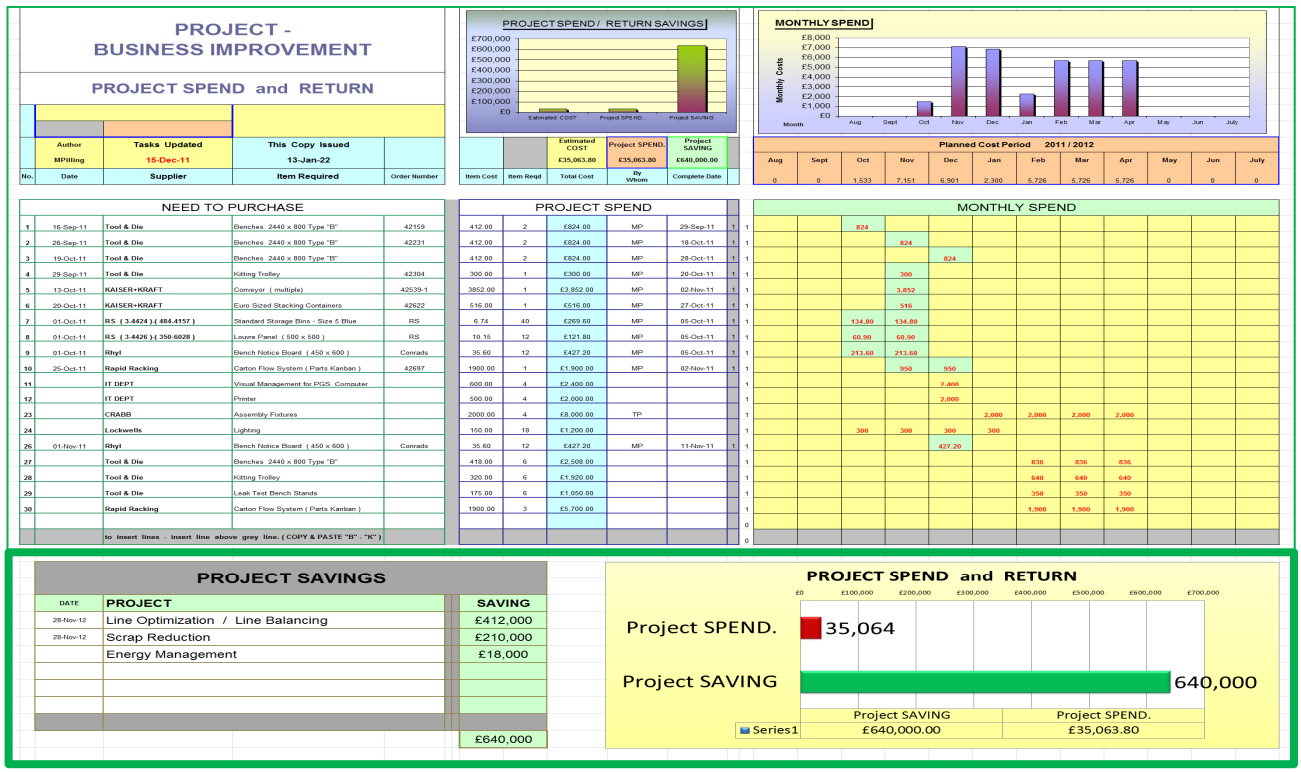
THE OPPORTUNITY

How much more could you improve the process or business...
How many more sales could you get because of process improvement...
How much more cash flow and profit could the business save or generate...

SO:-

1. Organise the money pot available to spend...
2. Track Project Spend - who with and when spent...
3. Track Project Savings - when and how much **"R.O.I."...**
4. Delegate to the best person/s to complete the project/s...
5. Benefit from Process Improvements and Greater Business Profits...

Example :- This IS LEAN Continuous Improvement – The Road To Business Growth...



2.7 VISUAL MANAGEMENT - KPI's

THE PROBLEM

People do the same things "day after day" – daily meetings, same problems:- quality issues, machine downtime, inventory issues, customer complaints, late delivery costs,…

But people tell me ***"We've always done it this way"***…

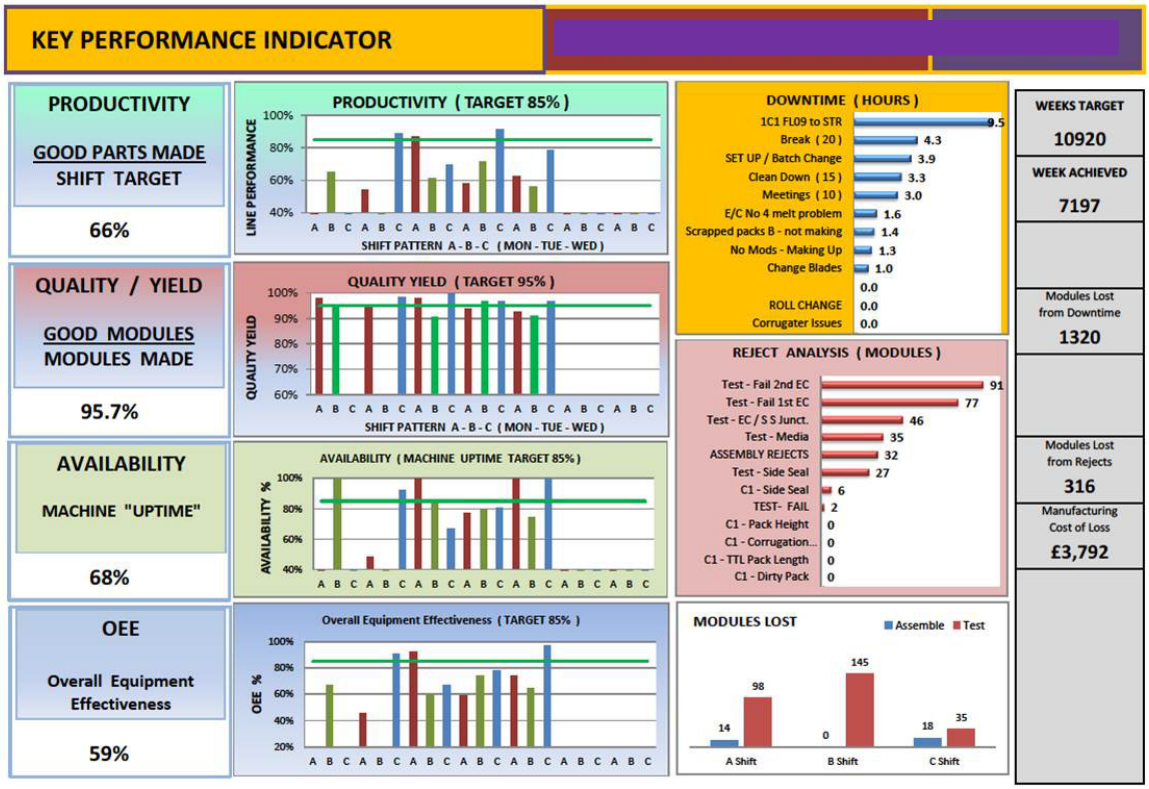
THE OPPORTUNITY

Visual Management Controls / KPIs:

- Visual Management is about finding out what is happening with the business.

- Production Numbers –
- Product Quality Yield –
- Machine Breakdowns -
- Tooling Change-Overs –
- Downtime -
- Rejects –
- OEE

If you don't have the information - you don't have control of the business…
This will result in the business losing money…



2.8 LEAN MANUFACTURING AND *6 Sigma*

THE PROBLEM

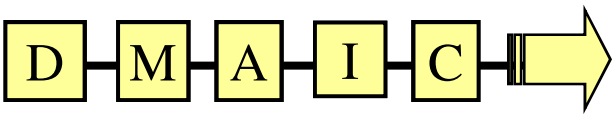
Over the years people in business "JUST DO THINGS" day after day...

- People will do the same thing tomorrow as they are doing today...

SO: What can we do to Change ? Where is the Opportunity ?

THE OPPORTUNITY

6 Sigma is an LEAN Improvement tool,
How Do We Implement It :-



Stage 1

Define……	**Identify The Opportunity For Improvement**
Measure……	**Document & Understand The Present Process**
Analyse……	**The Present Process (Non-Value / Value Activities)**

Stage 2

Improve……	**For Future State (Process, Quality, Customer Service)**

Stage 3

Control / Monitor……	**The New Process & Output (Procedures / Checks)**

Things don't happen on there own - Someone has to do something

Kaizen
"go to Gemba" and observe the process

2.9 LEAN MANUFACTURING AND *5S*

THE PROBLEM

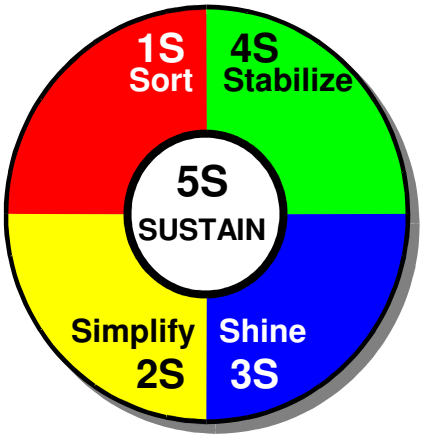
Over the years people in business "JUST DO THINGS" day after day...

- People will do the same thing tomorrow as they are doing today...

SO: What can we do to Change ? Where is the Opportunity ?

THE OPPORTUNITY

5S is a LEAN Tool.	**Housekeeping Methodology,**
Sort -	**Remove what is not needed,** **Keep what is needed.**
Simplify -	**Organise What Is Needed. (Future State)**
Shine -	**Tidy Up / Clean Workplace and Keep Clean.**
Standardise -	**Make Cell Lean.** **Organise Inventory (Kanban).** **Benchmark Times.** **Document Standard Work Procedures.**
Sustain -	**Maintain, with Visual Quality Controls…**
SAFETY -	**6th – Implement Health and Safety**
SELL -	**7th – If You Don't Need It – Sell It**



2.10 LEAN PROCESS IMPROVEMENT

THE PROBLEM

Waste in manufacturing evolves from many different areas... ***NON-VALUE / REJECTS / ENERGY***

1. Transport – Movement around the floor
2. Inventory - Warehouse Organisation
3. Motion - Work Operation
4. Waiting – Idle
5. Over-Processing
6. Over-Production
7. Defects - Scrap

INDEX

- Admin
- Non-Value Waste
- Process Operations
- Rejects / Scrap
- Business Profits
- Business Improvement

Order | Non Value | Work | Waste | Profit | LEAN Improvement

THE OPPORTUNITY

Below is an illustration of LEAN Process Improvement.

Example 1 of production today..

Order | Non Value | Work | Work | Work | Waste | Delivery CUSTOMER | Payment | Profit

Example 1 of production tomorrow..

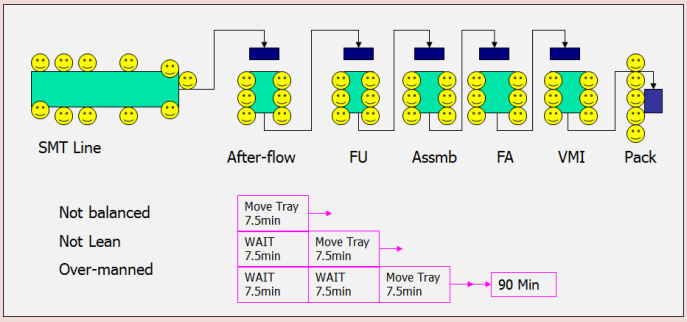
Order | Work | Work | Work | Deliver CUSTOMER | Payment | LEAN Improvement | Profit

Example 2

This is how it could be done today

- End-To-End = 90 minutes
- Operators = 46

More People
Does NOT Mean More Production...

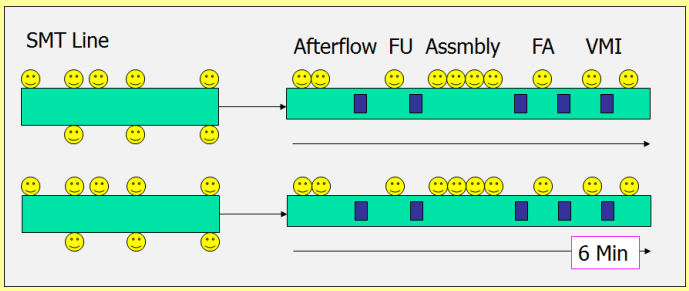


This is how it could be done tomorrow

- End-To-End = 6 minutes
- Operators = 18+18 = 36

BENEFITS

- A 2nd Line could be introduced...
- Cost Savings could be made...



2.11 ENERGY WASTE and MANAGEMENT

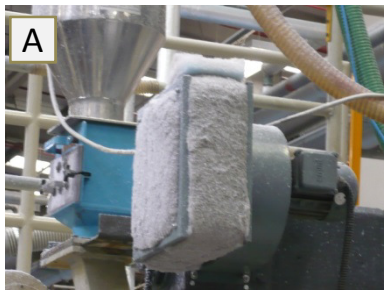
THE PROBLEM

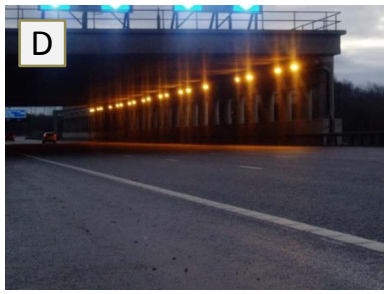
You Can't See ENERGY WASTE or Can You...

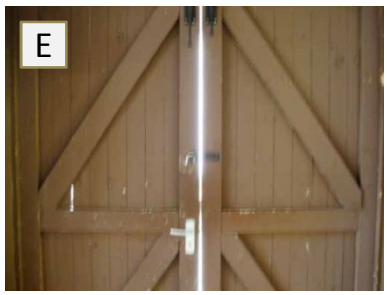
What do you know about the root cause of ENERGY WASTE ?

ENERGY WASTE

- Machine Filters Clogged Up (A)
- Lighting ON when NOT required (B)
- Over-lit areas - This is the NHS Preston (C)
- Over-lit roads – This is the M61 at Worsley (D)
- Gaps in doors – Doors open when the heating is ON (E)

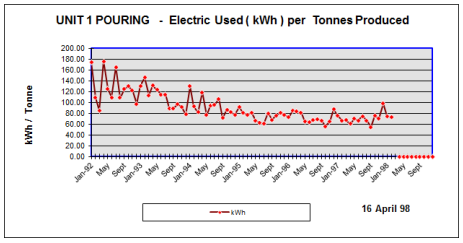






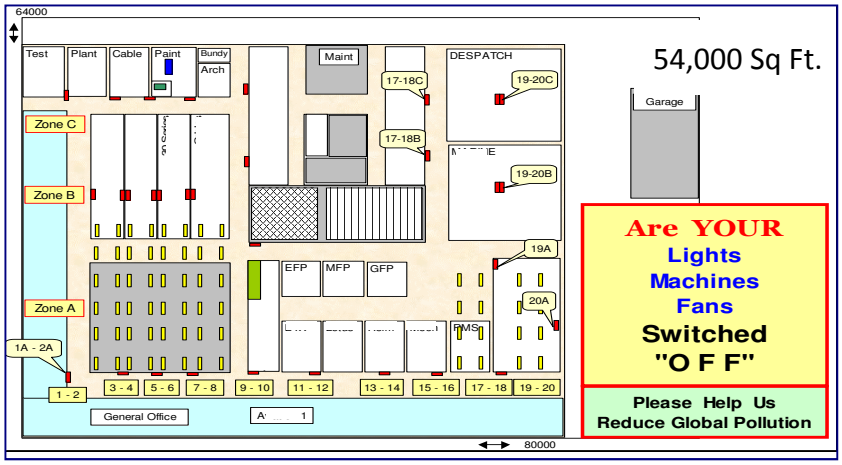
THE OPPORTUNITY / To Do:

1. Monitor Energy Use – Gas, Electric, Water
2. Monitor Heating Temperature and Lit rooms
3. Turn OFF machines and lighting when not in use
4. Listen for AIR LEAKS and WATER DRIPS and repair
5. Close windows and doors when the heating is on
6. Train your people – Energy Waste Awareness....



1. Monitor Electricity
2. Monitor Production
3. Analyse Parts / Kwh
4. Benefit from £ Savings

Simple Controls Make Savings - E.g. £9,600 / yr



2.12 WAREHOUSE ORGANISATION

THE PROBLEM

Many people in business don't think about the warehouse layout – But it can make the difference between a business ***"making money"*** and a business ***"losing money"***...

The Illustration below indicates how a warehouse or stores should NOT be...

- Time Lost - Damage to Stock - Profit Lost will be the result in these situations....

THE OPPORTUNITY

A tidy well organised warehouse or stores will:

1. Reduce Putting Away and Picking Time
2. Reduce Product Damage
3. Reduce Inventory Costs
4. Improve Productivity
5. Improve Cash Flow

THE ACTION PLAN

We Have To
Build A Better World

WE CAN HAVE OUR CAKE AND EAT IT...

3.1 THE OPPORTUNITY

There Are FOUR Types of People:

1. **Those Who Make Things Happen...**
2. **Those Who Watch Things Happen...**
3. **Those Who Wonder What Happened...**
4. **Those Who Say – *"You Can't Do That"*...**

SO: What Next:

1. **Embrace LEAN Manufacturing Principles**

2. Embrace **SIMPLE**
3. Embrace **STANDARDISATION**
4. Embrace **REDUCTION OF VARIATION**

5. Employ Quality Awareness
6. Employ Quality Training

7. Reduce Non-Value Waste
8. Reduce Mixing Materials and Land-fill

9. ***TALK TO THE CUSTOMER...***
   What Quality Standards are Acceptable...

9. **IF SOMETHING WORKS...**
   Don't Re-design it... Just because it's 2022
   Don't Redesign something that is <u>worse</u>...

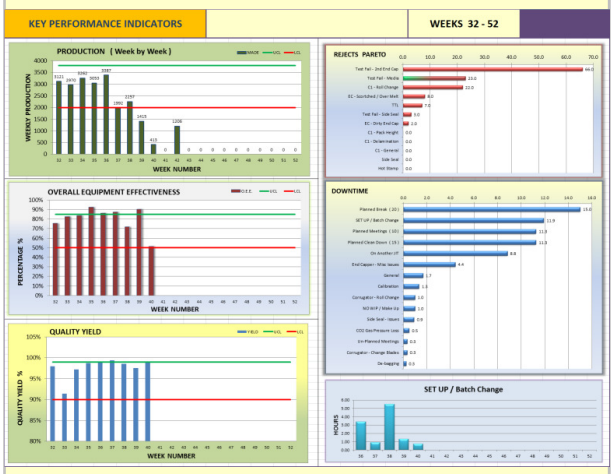
10. **OPPORTUNITY AND ATTITUDE...**

- ✓ **Things Don't Happen on there own...**
- ✓ **You Need To "Make Things Happen"**

This Design Is "Over The Top"

KEEP IT SIMPLE to REDUCE COSTS

LEAN Manufacturing - KPI Tools and Savings Made



FINANCIAL BENEFITS / ANNUM	
Fail Rate Reduction - Saving	£15,000
Daily Meetings – Reduction – Saving	£187,000
Machine Calibration – Re-alignment – Saving	£187,000
Repairs Reduction – Saving	£14,000
S.P.C. Introduction – Saving	£90,000
Capitol Investment - Saving	£75,000
Machine Downtime Reduction – Saving	£169,000
T.P.M. Introduction – Saving	£190,000
TOTAL COST SAVING For One Company	**£927,000**

3.2 IN CONCLUSION - THE ACTION PLAN

IN CONCLUSION

I don't have all the answers. But we can do something...

SO WHAT ARE WE GOING TO DO ABOUT IT ?

What Can We Do In Manufacturing ?

Are we the "Last Generation To Do Nothing"

Or are we the generation to do something...

To create clean growth and a clean Earth for our children's children...

10 POINT PLAN		OPPORTUNITY	PRESENT ISSUE	FUTURE ACTION
1		Management Controls	SAME PROBLEMS Day after Day	Implement LEAN Process Improvements Eliminate Non-Value Waste
2		Process Control	Present State WHAT - WHERE - WHEN HOW - WHO - TIME	Map The Present LEAN Process Improvements Control The Process
3		Product Design	TOO MUCH PRODUCT VARIATION	Talk To The Design Team Simplify - Standardise Reduce Variation
4		Process Methods	NOT LEAN	Introduce LEAN / 7S / TPM
5		Product Quality	REJECTS AND SCRAP	Investigate Methods Investigate Operator Training Investigate Machine Operation
6		Producy Quality	SHORT MOULDING	**Talk To The Customer** Review What Is Acceptable Review Quality Standards
7		Product Quality	PRODUCT VARIATION	**Talk To The Customer** Review What Is Acceptable Review Quality Standards
8		Plant & Equipment	MACHINE BREAKDOWNS	Review OEE Root Cause Analysis Implement Total Planned Maintenance
9		Energy Waste	HOW DO WE REDUCE CARBON EMISSIONS	Improve the Lighting (LED) Switch OFF - If not in use
10		Environmental	DESIGN OUT END-OF-USE LAND-FILL... RECYCLE - RE-USE - UP-CYCLE	DESIGN PRODUCT Using Natural Resources PAPER - WOOL - COTTON Sand For Glass