World Class Manufacturing

Il percorso verso l’eccellenza

Luciano Massone
Range di prodotti
1. La **Sicurezza** a livello World Class è il **fondamento** di Performance a livello World Class

2. I **leader** del WCM hanno una **passione** per gli **standard**

3. In una Azienda World Class la **voce del cliente** può essere **udita** nello stabilimento

4. Il WCM **non accetta perdite di alcun tipo** (l’obiettivo è sempre Zero: incidenti, difetti di qualità e di servizio, scorte, guasti)

5. Un’ **applicazione rigorosa** dei metodi WCM garantisce l’eliminazione delle perdite
6. In uno stabilimento World Class **tutte le anomalie** sono immediatamente **visibili** (Polvere e fonti di contaminazione, schemi di controllo, ...) 

7. Il WCM **si realizza nel posto di lavoro**, non in ufficio 

8. Il WCM si impara mettendo in pratica le tecniche con i team di stabilimento 

9. La **forza** del WCM deriva dal **coinvolgimento delle persone** 

10. Le Aziende World Class sfruttano l’**energia di una crisi per ottenere un successo continuo**
Struttura WCM
Struttura WCM

10 Pilastri Tecnici in un approccio a 7 steps

- Safety
- Cost Deployment
- Focused Improvement
- Autonomous Activities
- Professional Maintenance
- Quality Control
- Logistics & Customer Service
- Early Equipment – Product Management
- People Development
- Environment

10 Pilastri Manageriali

- Management Commitment
- Clarity of Objectives
- Roadmap to WCM
- Allocation of Highly Qualified People
- Commitment of Organization
- Competence of Organization
- Time & Budget
- Level of Detail
- Level of Expansion
- Motivation of Operators

Sistema di Audit

Pilastri: 0-5 punti
- Bronze: 50-59 punti
- Silver: 60-69 punti

Plant: 0-100 punti
- Gold: 70-84 punti
- World Class: 85-100 punti
10 Pilastri tecnici in 7 steps
WCM Focus

- Tutti i dipendenti
- Sprechi e Perdite
- Standard e Metodi
Approccio

1. AREA MODELLO
2. AREE DI ESPANSIONE
3. STABILIMENTO
Risultati WCM

Safety

Tychy Plant (FGA)

Fatal

Injuries

-70% (2006 vs 2009)

Near misses

Unsafe acts & Conditions

More than 23,000 preventive actions

Fiat Group safety (Frequency Index 2006 vs 2010)

-44%

Best sector in the Group

-53% reduction in frequency index
Focused improvement

Brainstorming

Diagramma di Pareto

5W e 1H

5 Perché

Diagramma a radar

4M analisi

World Class Manufacturing
## Focused improvement

<table>
<thead>
<tr>
<th>№</th>
<th>METHODS/TOOLS/ APPROACH</th>
<th>DESCRIPTION</th>
<th>PILLAR</th>
<th>Radar chart Items</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5G</td>
<td>It is a tool used to describe a loss phenomenon (defect, breakdown, working abnormality, etc.) Good for simple sporadic and chronic loss types</td>
<td></td>
<td>X X X X X X X X X X X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5W1H</td>
<td>Used to clearly define the problem. (What, When, Where, Who, Which, and How)</td>
<td></td>
<td>X X X X X X X X X X X</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5 Why</td>
<td>Root Cause Analysis method by asking why a number of times.</td>
<td></td>
<td>x x x x x x x x x x x</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4M</td>
<td>The tool analyzes any problem and its potential basic families.</td>
<td></td>
<td>x x</td>
<td>7 WCM Tools</td>
</tr>
<tr>
<td>5</td>
<td>1)Prioritization,</td>
<td>Find out important problems.</td>
<td></td>
<td>x x x x x x x x x x x</td>
<td>7 WCM Tools</td>
</tr>
<tr>
<td>6</td>
<td>2) Systematic, logical and detailed deployment of objectives into right means and right solutions, and measurement of the results against the objectives and targets</td>
<td>The importance of using focused activity to address the problem.</td>
<td></td>
<td>x x x x x x x x x x x</td>
<td>7 WCM Tools</td>
</tr>
<tr>
<td>7</td>
<td>3) Problem description with sketches</td>
<td>Understand the importance of using visual hand sketches to help describe or display the problem.</td>
<td></td>
<td>x x x x x x x x x x x</td>
<td>7 WCM Tools</td>
</tr>
<tr>
<td>8</td>
<td>4) 5W + 1H (2H) with the 5G principles</td>
<td>Grasp the current situations Two tools used to clearly identify the problem and see the physical results of the problem.</td>
<td></td>
<td>x x x x x x x x x x x</td>
<td>7 WCM Tools</td>
</tr>
<tr>
<td>9</td>
<td>5) Root-cause analysis</td>
<td>A method of analysis to identify the true cause(s) of the problem.</td>
<td></td>
<td>x x x x x x x x x x x</td>
<td>7 WCM Tools</td>
</tr>
</tbody>
</table>

**Più di 250 strumenti utilizzati a oggi**
<table>
<thead>
<tr>
<th>N°</th>
<th>METHODS/TOOLS/ APPROACH</th>
<th>DESCRIPTION</th>
<th>PILLAR</th>
<th>Radar chart items</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>VA/VE</td>
<td>Value Analysis/Engineering is a systematic and organized procedural decision-making process. It has been used in almost any kind of application. It helps people creatively generate</td>
<td>CD</td>
<td>QC</td>
<td>7NEW QC Tools</td>
</tr>
<tr>
<td>44</td>
<td>Affinity diagrams</td>
<td>Unearthing problems by organizing data on chaotic situations. The affinity diagram organizes a large number of ideas into their natural relationships. This method taps a team’s creativity and</td>
<td>QC</td>
<td>QC</td>
<td>Simple analytical techniques</td>
</tr>
<tr>
<td>50</td>
<td>ANOVA</td>
<td></td>
<td>FI</td>
<td>FI</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Correlation analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>DOE (Design of Experiment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>TAGUCHI Methods</td>
<td>Taguchi methods are statistical methods developed by Genichi Taguchi to improve the quality of manufactured. Taguchi Method treats optimization problems in two categories: 1) to minimize</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>92</td>
<td>PPA (Process Point Analysis)</td>
<td>A 7 Step method to break a machine down into technical sub-systems to measure and return the ideal conditions of each sub-system/components.</td>
<td>FI</td>
<td>FI</td>
<td>X</td>
</tr>
<tr>
<td>130</td>
<td>DFMEA -DESIGN FMEA</td>
<td>The Design FMEA is used to analyze products before they are released to production. It focuses on potential failure modes of products caused by design</td>
<td>EPM; QC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>159</td>
<td>Theory of Constraints</td>
<td>Is a management approach to improving the output of a system by identifying, resolving and managing the constraints of a system.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>220</td>
<td>Binomial probability paper</td>
<td>This note attempts to describe a graphic tool that can assist supervisors to compare the performance of interviewers, and to discover if any restraining or replacement is necessary to insure</td>
<td></td>
<td>FI</td>
<td></td>
</tr>
</tbody>
</table>

**World Class Manufacturing**
Workplace Organization
Workplace Organization

Prima

Dopo
Workplace Organization

Prima

Dopo

World Class Manufacturing
Workplace Organization

PRIMA

DOPO

World Class Manufacturing
Workplace Organization
Workplace Organization
Workplace Organization
Workplace Organization
Workplace Organization

PROBLEM
LEVEL 1 MURI EXIST ON OPERATION FOR INSTALLING THE HOODSTAIL, GRILLE

PHENOMENA
HEIGHT OF WORKER TO FLOOR IS TOO LOW AND EMPLOYEE HAS TO BEND TO REACH THE BEAK OF THEIR OPERATION

SOLUTION
PARTS PRESENTATION IMPROVED THROUGH REBALANCING OF ELEMENTS ELIMINATES LEVEL 1 MURI

PROBLEM
A LEVEL 1 MURI EXIST ON OPERATION

PHENOMENA
OPERATOR REQUIRED TO BEND OVER TO INSTALL SATELLITE ANTENNAS MODULE ON RIDGE OF CAR

SOLUTION
ASSEMBLY REACH ASSIST TOOL IMPLEMENTED TO PERFORM INSTALL WITHOUT BENDING MORE ELIMINATED

PROBLEM
LEVEL 1 MURI EXISTS ON OPERATION FOR WINDING OF WORKING ARM (OVER THE SHOULDER)

PHENOMENA
HEIGHT OF ENGINE TO FLOOR IS TOO HIGH AND EMPLOYER WORKS AT THE TOP OF THE BARING TO PERFORM ELEMENT OF OPERATION

SOLUTION
WORKING WITH THE ARM BELOW THE SHOULDER
Workplace Organization e Logistics

Prima

Dopo
Workplace Organization e Logistics

PRIMA

DOPO
Workplace Organization

**LOSSES**
- Technical efficiency
- Waste/Rework
- Line Balancing

**NVAA (**)**

**VAA (***)**

-30%

Golden zone & one-piece flow application

Riorganizzazione del posto di lavoro per ridurre la movimentazione non necessaria e aumentare la produttività

(*) NVAA: Not Value Added Activities; (**) VAA: Value Added Activities

World Class Manufacturing
Evoluzione del JUST IN SEQUENCE

1° GENERAZIONE
- Doppia movimentazione
- Posizioni di presa materiale differenti

2° GENERAZIONE
- Nessuna doppia movimentazione
- Stessa posizione di presa
- Miglioramento ergonomia

3° GENERAZIONE
- Nessuna doppia movimentazione
- Ottimizzazione ergonomia di postazione
Logistics

Fork Lifts

Transportation of materials to the line side, one part number at a time

Tuggers

Multiple part number transports to the line side

Sequenced Material

Automated guided vehicle

AGV transporting the car kits to the line side

Kitting transportation

World Class Manufacturing
Logistics

Transportation & Handling

- Methods' Standards
- ICT Standards
- Operational Standards

Re-engineering del processo di handling sulla base degli Standards sviluppati

Automatic Guided Vehicles

Logistics Cost
FGA European plants

-34%
2010 vs 2006

Contenitori abbattibili per migliorare il coefficiente di utilizzo del trasporto
Professional maintenance

Raccolta dati macchina e analisi

Analisi e Contromisure

Gestione Ricambi

Attività Periodiche

Stato iniziale

Condizioni ripristinate
Professional maintenance

MANUTENZIONE PREVENTIVA
Preventive Schedule

Frequency

Time

ANDAMENTO GUASTI

RIPRISTINO
CONDIZIONI DI BASE

SUGGESTED CHECKS BY THE MANUFACTURER;

CHECKS RESULTING FROM BREAKDOWNS ANALYSIS

CHECKS FROM EXPERIENCE IN SIMILAR EQUIPMENT;

85

24

12

0% PRIMA DOPO

World Class Manufacturing
Professional maintenance

PRIMA
CONDIZIONI DELL’IMPIANTO NASCOSTE

DOPO
MODIFICA IMPIANTO PER SEMPLICITA’ DI ISPEZIONE

IMPIANTO RIPRISTINATO ALLE CONDIZIONI DI BASE
Quality

Quality gates

Counter-measures

Prompt feedback

80% riduzione dei costi di garanzia dal 2006 al 2009
Quality
Quality

4M analysis

- Machine
- Material
- Environment
- Maintenance
- Wear
- Source
- Sampling
- Operator
- Accuracy
- Bias
- Recipe
- Measurement
- Method

ANDON BOARD

Go to WS

Operator goes to Gate to understand problem

Operator repairs defects

Control of other WS to check whether the defect is present, and repair

World Class Manufacturing
Environment

Energy Reduction

**Electrical energy**
- Electric motors controlled by inverter
- Substitution of old motors

**Compressed air**
- Leakage reduction
- Pressure optimization

**Heating – Cooling**
- Insulation
- Heat recovery from exhaust gas

**Green energy**
- Purchase of green-certified electrical energy
- Photovoltaic generation
- Use of other green energy sources such as landfill gas

- WCM contribuisce al piano di sostenibilità in maniera importante
- 21% di riduzione nell’utilizzo delle energie dal 2006 al 2010 (GJ/vehicle)
- 23% di riduzione di CO₂ dal 2008 to 2010 (tons/vehicle)
People Development

Collection & evaluation
- Targets
- Weekly evaluation
- Feedback

Manufacturing training system
- Quality Gates
- Focused training
- Suggestions generated

Team conventions
- Periodic workshops
- Focused discussion
- Suggestions generated

Recognition & rewarding
- Plant Manager review
- Best proposals
- Best benefit/cost ratio reward

Risultati

- 1 milione di suggerimenti (4x 2006 level)
- 10 proposte/persona all’anno (15 nei migliori plant)
- Assenteismo ridotto del 14% vs. 2006
Melfi Campus

World Class Modeling
World Class Quality
World Class Environment
World Class Assembly
Knowledge Management
Dalle best Practice agli standards
WCM Integration

More than 4,800 Members

CONNECTIVITY
WPI - Work Place Integration

The best of Fiat knowledge

Optimization of every single workstation

All the Fiat Best Practices analyzed

World Class Manufacturing
WCM Development Center
Sviluppo delle risorse umane strategiche
... espansione ai fornitori (WCM Suppliers) ...

Come?
World Class Supplier Program
Applicare/Allineare la Metodologia World Class ai sistemi di produzione dei fornitori
Specific Supplier Program and Alignment of Production System for all new contracts

~20% APV
WCM Program for Specific Supplier Plants

~60% APV
Production System Alignment Agreement for all new sourcings

Support FIAT Group Plants

~60% near to Fiat Group plants
WCM Chrysler

May 16th 2009: WCM kick-off

• WCM launched in 30 plants in USA, Canada, Mexico
  • Cost perimeter 2010: $3.2bn
  • Full UAW & CAW commitment
New Standards

- Butterfly concept
- Flexible framing
- Quality
- Simplicity

- Flexibility
- Ergonomics
- Decking layout

World Class Manufacturing
Elementi chiave

World Class Operations
bisogni:
• Leadership
• Roadmap
• Tools

Sistema di Audit
per verificare
• leadership
• chiarezza della rotta
• uso rigoroso dei tools
Grazie