



OWENS CORNING FIBERGLASS A.S. LTDA RIO CLARO GR PLANT

1. Organization Profile:

The story of Owens Corning began in the 1930s when a failed experiment with glass building blocks produced a surprising result - it revealed a way to make glass fibers in commercial quantities. That discovery launched more than a new product. It set in motion a remarkable series of events that included the birth of Owens Corning and the spawning of new industries related to the production of fiber glass materials.

From its inception in 1938, Owens Corning has leveraged the power of innovation to achieve its mission of delivering solutions, transforming markets and enhancing lives. And for nearly 75 years, Owens Corning has led virtually every major technological advance in glass fiber technology.

Through the years, Owens Corning innovations have ranged from military applications during World War II and the Fiberglas™ - reinforced 1954 Chevrolet Corvette to the manufacture of materials for Apollo space suits, insulation of the Trans-Alaska pipeline and the Fiberglas™ roof of the Haj Terminal in Saudi Arabia, to name but a few. This spirit of innovation continues today with revolutionary solutions such as Owens Corning's high-performance EcoTouch™ insulation, introduced in 2011.

Owens Corning Rio Claro began its activities in 1972 and it's one of the most strategic plants of Owens Corning in the world due to its product mix that made Rio Claro an important Multi-Category Plant. Its primary activity is Manufacturing /Assemble of Roving, T30, CSM (Chopped Strand Mat) and Duacs In Line Process (Chopped Fiberglass) and the exportation of their products all over the world.

Owens Corning Rio Claro operates 24/7 with 357 employees. The current achievements of the Plant are:

- ISO 9001
- ISO 14001
- ISO 45001
- 1st Place Award in Energy Saving in 2015 - Owens Corning Global Energy Efficiency
- Reduction in Recordable Incidence Rate (RIR) from 0.21 to 0.00 until October 2022
- More than 68% on Quality Complaints reduction
- More than 86% of Breakdowns reduction
- Customer Service Level around of 99%
- Excellence Awarded by JIPM on TPM Assessment in 2017
- Consistency Awarded by JIPM on TPM Assessment in 2020
- Regular Plant member of TPM Worldwide Academy in Owens Corning PM and FI Modules

2. Milestone on the Journey of Manufacturing Excellence

Owens Corning has been working with different continuous improvement methodologies which have been used in all its manufacturing centers. This led to a non-detailed manufacturing standards which started to cause forced deterioration at early stages of the equipments' lifetime. Forced deterioration started to become visible to the business when escalations (efficiency drop events) started to happen at all Owens Corning facilities. At this stage, 70% of escalations happening at Owens Corning were related to equipment breakdowns. Uncertainty of when an escalation may occur and its subsequent effect in Safety and Quality conditions, led to the organization to turn to TPM as the way in which Owens Corning need to perform in order to eliminate forced deterioration and search for the Manufacturing Excellence.

So, the Rio Claro plant as one of the strategic Owens Corning facilities started to implement TPM looking to gain a higher stability operations level at their manufacturing processes by decreasing the level of vulnerabilities that could create production stoppages. This journey started with a focused TPM on "A" Critical Equipment adding to them Batch House as the primary process of the chain. Batch house would become our pilot area as well and it was the first Area to achieve AM Step 7 between Owens Corning Facilities in the world.

With this strategy well aligned, a strategic team was formed by the Plant Senior Leadership, having the support of the company Senior Leadership as well. After this decision, a Master Plan was designed with the main reasons and an implementation path for the TPM program.

The work in this phase of our TPM Journey was focused to ensure a good level of restoration in "A" Critical Equipment in order to avoid production disruption in the plant productive chain. This work was done with great effect by AM and PM Pillars, supported by FI and Training and Development Pillar, too. The level of stability and control over the process increased a lot and with additional TPM initiatives.

The Rio Claro Plant also became one of the awarded sites with Excellence Award received from JIPM in 2017. The Rio Claro plant was quickly transformed in a methodology lighthouse for many other Owens Corning Plants across the globe, with its personnel supporting TPM implementation in Jackson, TN - USA and helping to design the Consistency path for Tlaxcala Plant Mexico and both plants also were awarded by JIPM in 2018. So, naturally, the Rio Claro plant started its strategy for Consistency Award, aiming a deeper approach on methodology for losses reduction and expanding this mindset to the Supply Chain.

In 2020, the whole world was damaged due to COVID 19 and because of this, we received a new challenge: how to keep our Plant running without Safety issues, Quality issues and delivering our results. Our EHS Pillar worked with a lot of preventive actions to try to reduce COVID impacts. Despite these challenges, we delivered our Priority Teams cases using virtual evaluation processes and restarted other activities such as AM genbas, increased our number of improvement suggestions, changed our Trainings methods (presential to virtual) and continuing our AM Step changes.

During this journey, we started to involve some Areas besides Manufacturing such as Supply Chain and Logistics, where we had some important cases. We started to share TPM Methodology with some Suppliers and Customers through TPM Multipliers Course and FI Workshops. TPM again was very important to cover all these items and in the same year we achieved the JIPM Consistency Award.

After that, in 2021, we started our Special Award Journey still with some impacts related to COVID. One of the main activities that our EHS Pillar did was to bring and encourage COVID vaccinations in our Plant. With this action, we covered 100% of our employees with the 2nd booster shot.

In the same year we updated our Plant Strategy to understand in more detail, what is innovation for us and how we could apply it in our processes.

As a part of this journey, our EM Pillar found new opportunities such as the use 3D simulators to find abnormalities in a virtual environment, our QM Pillar found opportunities to have more automatic inspections items in our Equipment, in AM, Operators started to use intermediate FI Tools, and our pilot Area started to work with AM Step 7 activities.

PM Pillar started using RCM and tools such as bath tube curve concepts to reduce maintenance costs, EHS Pillar started exploring opportunities in circular economy and to apply proactive approach in order to eliminate some risks about safety and our TPM Office started working on cases with Customers and apply processes mapping with VSM. T&D Pillar started finding new opportunities to prepare our employees with technical schools' partnerships and reduce human errors with TWTP/HERCA. All Pillars have been working with a new mindset to avoid losses using innovative approach.

3. Benefits Achieved

This continuous improvement journey opened space to develop other TPM approaches in the plant, so the implementation of the other pillars was needed, and they were successfully implemented. AM Pillar has transformed our Batch House in a "Dust Free Batch House" due to contamination sources elimination. It's a remarkable result, opening a new standard for Batch Houses inside the business worldwide, where many Batch Houses still need mask utilization inside their operations. We have had a lot of visitors (from other Companies, Customers, other OC Plants) to see all the work that the Batch House Operators have done. Now the Operators are working on AM Step 7. It's the first Area in Owens Corning in the world to achieve it.

In EHS, we continue working strongly to avoid accidents. Preventive approaches have been taken, such as Magic Seconds, Job Risks reduction and unsafe behavior campaigns. For Health, ergonomic improvements have been made mainly in the handling of drums, for example. For Environment, actions to reduce water, energy consumption and in some cases to reuse fiberglass waste to reduce Landfill impact. Another approach that we are working on is about circular economy, such as the bracket reuse and transforming waste in new products.

Regarding Quality dimension, Rio Claro Owens Corning has achieved more than a 60% decrease since the beginning of TPM Journey. We have worked with a more preventive approach, such as an increased number of Poka Yokes, with a workshop called Quality Day when our QM Pillar has worked together with our CTSO to give more details about our products and main quality defects that we need to avoid.

In Productivity and Service level improvement we have also achieved goods milestones: with AM Areas progress, the number of abnormalities is decreasing, and the number of improvements is increasing. Just in 2022 alone, there have been more than 500 improvement suggestions. Our PM Pillar is working to reduce breakdowns and to do this, we started to use new tools, such as RCM. The next step is working with an on-line equipment monitoring system. This is an innovative action for us.

In Cost reduction, our Office Pillar has worked with Loss and Cost Matrix and also VSM in order to find opportunities inside the Plant and end to end of the Supply Chain. We found 27 opportunities in Loss and Cost Matrix and around 55 opportunities in VSM working together with TF Plant. We are working with some of them in our Priority Teams program led by FI Pillar.

In People Development, we are continuing developing our employees in new tools, new ways of training and also forming our Leadership team in order to increase knowledge. For example, how to lead teams

to achieve goals. Another important progress that we are also seeing, is regarding Operator's development. Year by year we are increasing the number of TPM Multipliers through an internal capacitation program. As results of this, the number of FI Tools such as A3, SMED and QC Story applied by Operators has increased, too.

4. TPM Award Assessment Achievement Sheet

The table below shows how TPM continued bringing results towards Special Journey:

TPM Award Assessment Achievement Sheet

Company & plant name	Owens Corning Fiberglass S.A. LTDA
TPM Slogan/Objectives	" TPM: a journey towards victory. Together! ". Objectives: Zero Accidents, Zero Quality Defects and Zero Losses.

▼ Please fill in the range of data you are collecting ▼

Category	Index	Unit	BM (TPM Started or last time awarded)	Actual Status	Target
Enter the year →			2013	2023	2023
S	Number of work-related accidents requiring days off work	Cases/ year	1	0	0
S	Number of work-related accidents not requiring days off work	Cases/ year	1	0	0
S	Frequency rate	Number of occupational accidents with leave for 200 000 worked hours	0,21	0	0
Q	Number of customer complaints	Number/year	31	7	7
Q	In-line defect rate (scrap)*	%	0,12	0,58	0,36
P	OEE**	%	88,1	87,7	88
P	NE (Net efficiency)***	%	88,7	88,1	88,4
P	Productivity for main products****	Kg/Operator hours	73,1	62,6	88,5
P	Number of breakdowns	Average of breakdowns/ year	404	36	57
P	MTBF	Hour	259	867	800
D	Production Lead time	Days	3	3,5	3,5
D	Delivery performance	%	90,6	99,8	98,9
M	Number of Employee Suggestions	Number/year	16	2338	2297

Notes: * Scrap - Increase due to furnace adjustments.

** /***/**** - Some impacts in OEE, NE and Productivity due to furnace adjustments.

5. Key of Our Manufacturing Excellence

We want to continue to implement TPM as the way we run our operations in our Plant because we believe that through TPM we can face losses and market flotation in a better condition as we are supported by a going-through-maturity continuous improvement process, and by this model, influencing our Suppliers and Customers.

All efforts since our TPM implementation have brought to us competitive results in Safety, Quality, Productivity, Costs and Environment and we are achieving all of them through our People. They have been the difference in our TPM Program. They are working to be better every day through each AM tag opened and solved by PM, each OPL elaborated to transfer knowledge, each improvement suggestion opened and implemented, each equipment inspection, cleaning and lubrication. Each improvement case, each AM Step change that we have taken.

We believe that we will be stronger but without losing our humbleness, our essence, our Team spirit. In this way we can go farther. Our People are always ready to teach, but also to hear, and to learn new tools and new innovative ways, totally different than what we are currently doing.

We are proud for all that we have achieved so far but we know that we have a long way to go, and we believe that TPM is the only method to follow.

So, in this exciting spirit, we want to continue this successful and transformational journey. Thus, we are proud to challenge ourselves to go to the Special Award Certification and crown this 3rd part of our journey that belongs to all our Employees, each Supplier and each Customer, that together are making this more possible every day.