OWENS CORNING FIBERGLASS A.S. LTDA
RIO CLARO TECHNICAL FABRICS (TF) 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.

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 Technical Fabrics Plant began its activities in 2008 and it´s the only TF site in Latin America. Its primary activity is Manufacturing of Biaxial and Multiaxial Fiberglass Fabrics and Molding Mats and it exports their products all over the world.

Owens Corning Rio Claro TF operates 24/7 with 154 employees. The current achievements of the Plant are:

- Owens Corning ranked No. 1 on the 100 Best Corporate Citizens List for 2022 the fourth year in a row at the top.
- In 2021, for the 12th year in a row, Owens Corning earned placement in the Dow Jones Sustainability World Index in recognition of its sustainability initiatives.
- TPM Excellence Award Category B by JIPM in 2020.
- More than 90% on Quality Complaints reduction from Customers since TPM Journey started in 2016.
- Zero Recordable Incidence Rate (RIR) since 2016.
- ISO 9001 since 2011.

2. **Milestone on the Journey of Manufacturing Excellence**

The Technical Fabrics plant from Owens Corning in Rio Claro started its TPM Journey in 2016 and it was mainly impelled by the maturity enhancement of GRS Plant that started its own journey in 2013, obtaining remarkable results and consolidating itself as an excellent hub for TPM in OC Latin America operations.

So Technical Fabrics (commonly known in the company as TF) also started TPM aiming to leverage their processes of Technical Fabrics based on fiberglass, mainly produced for Wind Energy market players that were being established in Brazil in the Northern region and expanding their participation in the wind market aggressively. Thus, TF started the TPM strategy implementation in order to increase efficiency and reduce losses over a very critical manufacturing process. Our fabrics make up most of the wind blades in the world and almost all the market in Brazil.

The critical factor for such a type of manufacturing and product is about Quality and Cost, as even the smallest point of contamination can compromise the processing of a Customer's fabric roll, avoiding a perfect chemical reaction with resins, for instance. The length of the roll is inside specifications and is also a key factor. Over time, many of our Customers automated their wind blades molding process, not being possible manual adjustments and a small difference up or down can cause material loss and make an entire Customer's roll be wasted, therefore causing a potential loss of an entire blade.

Thus, having this as a current perspective, the Owens Corning TF leadership started the TPM program in 2016 using the most important machine for the volume of the Plant at that time, which is the MAX 2 line. It would be from then on our pilot line.

In 2017, the total demand for wind energy products dropped sharply due to a huge financial crisis in Brazil and remained until 2018, when the management organization was merged with GRS management Team, aiming cost optimization and reorganization. Once again, the TPM management model was tested as the vector to not only deliver results, but to help restructure an entire organization.

The result of this was the launching of all Pillars operating in the Plant and 100% of our lines working under AM Steps methodology, besides a continued strategy of machine restoration and a focused-on machine techniques training plan executed by T&D inside a brand-new Training Center launched in the beginning of 2018, which was during the hardest year of the crisis. The Leadership sent a message to our collaborators and all organization to clarify all this strategy and that so far, we are successful.

In 2020, due to the COVID 19 pandemic, we were challenged with the risks of stoppages in our operations, as occurred in several companies around the world and we received a task on how to keep our Plant running without Safety, Quality and Delivery impacts on our results. Once again, through TPM and their Pillars we achieved this. Through of the EHS Pillar's work, we contained the risks in our Plant with focused actions and monitoring. In addition, we remodeled our training processes from presential to a virtual method where all protocols were followed to the letter.

We have developed a Kaizen evaluation process and in a virtual way, we can hold our coaching sessions and as a result we have brought significant gains to the company.
Our AM pillar elaborated a virtual assessment model of changing AM steps, and we also were able to continue evolving with AM throughout the plant. At the same year we were certified in the Manufacturing Excellence award by JIPM. After the certification, the TF Rio Claro Plant started its strategy for the Consistency Award, aiming for a deeper approach on methodology for losses reduction and to disseminate this mindset to the Supply Chain in order to launch the TPM Office Pillar. At the same time we also launched the EM Pillar.

Both Pillars developed excellent work in the search for continuous improvement. Our TPM Office Pillar led the implementation of the Loss and Cost Matrix where we identified several opportunities and directed them to the Pillars to address them through kaizens. It also led the application of VSM where we connected the Plant operations in Brazil and several kaizens were also developed to reduce losses throughout our Supply Chain.

Our EM Pillar implemented machine improvement projects using the EEM methodology and developed new products together with our Customers using EPM, we learned many lessons and improvements in our processes that we were able to share with other Owens Corning Plants around the world.

Our T&D Pillar updated the Training Center together with the AM, PM and QM Pillars in order to provide the necessary resources for training people and thus being prepared to reduce losses and waste in a preventive way. It also implemented a human error capture model and thus, together with the other Pillars, developed increasingly robust processes to prevent accidents, it generated quality defects and machine breakdowns due to lack of skill.

3. **Benefits Achieved**

After this strategy was implemented, achievements such as the reduction of “short rolls” (non-conforming product) emerged and machine breakdowns began to lessen. All these aspects have prepared the Plant to be an export hub for other businesses and due to the increase in operational efficiency, to be competitive to serve the foreign market and to be prepared to absorb the volume demands in the domestic market.

Furthermore, following the example of what happened at GR Plant, the FI mindset became even stronger, as all the Pillars started to work with Loss Trees and define their projects called in the Plant such as “Priority Teams”. This process establishes that the main losses identified by the business in that year must be covered by Priority Teams cases.

Since 2021, another source of case generation is the use of the Loss and Cost Matrix and Value Stream Mapping prepared in conjunction with the GRS Plant. We found more than 50 cases opportunities.

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 A.S. LTDA
TPM Slogan/Objectives	"TPM: In this journey, we are stronger. In this journey, we are TF!" / 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 →	2016	2023	2023
S	Number of work-related accidents requiring days off work	Cases/ year	0	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 1 000 000 worked hours	0	0	0
Q	Number of customer complaints *	Number/year	22	3	1
Q	In-line defect rate (scrap)	%	2,1	1,2	1,33
P	OEE ** (or Overall Plant Efficiency)	%	65,6	66,1	65,0
P	Productivity for main products	Parts/Operator hours	292	320	319
P	Number of breakdowns	Average of Breakdowns/ year	19	10	12
P	MTBF ***	Hour	2400	351	338
D	Production Lead time	Days	3	0,33	0,33
D	Delivery performance	%	91,6	99,8	99,5
M	Number of Employee Suggestions	Number/year	0	1885	1728

NOTES:

*** Customer Complaits we hade some ponctual events**

**** News losses were included at OEE corporate standard at 2020 and this has reduced the result in comparison with 2016.**

***** MTBF - We change the way to calculate this KPI since begining of 2023**

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 can bring us into a better position every day supported by a going-through-maturity continuous improvement process. From the strong moment when we promoted a transformation in our operations due to benefits the TPM brought for us.

Rio Claro TF Plant is aware about being a positive and strong TPM Implementation case, that made its decision to accelerate TPM Implementation during the hardest financial crisis in Brazil ever, showing to our Employees, Leadership, Customer, Society and Corporate Stakeholders many benefits in Safety, Quality, Productivity, Cost and People Development.

So, in this exciting spirit, remembering and getting constantly inspired by what we have constructed since we started TPM in this Plant, we want to continue this successful and transformational journey. So, we are proud to challenge ourselves to apply to the Consistency Award Certification and crown this part of our journey that belongs to all Employee, Suppliers and Customers, that together are making this more possible every day.