

THE FIRST MAGAZINE DEDICATED TO THE FILAMENT WINDING MARKET

TOPFIBRA

MAGAZINE

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QUARTERLY
JANUARY 2019



**WHAT IS THE SECRET
OF EFFECTIVE FILAMENT
WINDING?** page 7



EFFECTIVE FILAMENT WINDING®

Make the right decision at the right time to make your filament winding project profitable

Applying our EFFECTIVE FILAMENT WINDING we can help you to:

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- * **Develop your new products and processes**
- * **Test your products with our state of the art laboratory**
- * **Optimize your process and certify your products**

Feel free to contact us in writing at support@topfibra.eu

We are ready to have A CONFERENCE CALL with you, COMPLETELY FREE OF CHARGE to talk about your next project.



Mauricio Facchinetti

editor and
Co-Founder Topfibra d.o.o.

Many years ago, when I started my career in the composite industry, installing Glass Reinforced Pipes, I wished to have the possibility to buy a specialized magazine in the filament winding market.

Several years passed since that day. I designed, manufactured and installed many Filament Winding Plants, followed the installation of different glass reinforced pipelines around the world and participated in complex R&D developments. But there still a lot to do, to improve, to change and to convert desires into reality.

There is no good result if there is no hard work! That's certainly true for the entire editorial team here, which has spent the better part of a year working tirelessly to prepare the first magazine dedicated to the Filament Winding Market.

I would like to thank my friend and partner Fabio Fracasso due to his enthusiasm, writing some articles and sharing his knowledge, always working to improve the filament winding technology.

In the magazine you will find the latest news, improvements and upgrades for continuous and discontinuous filament winding plants, R&D articles, tips for installations and our experience and feedback using different raw materials, consumable and spare parts.

I wish you good reading!

This is the email if you want to leave me your impressions and suggestions:
marketing@topfibra.eu

To the next issue!

TOPFIBRA MAGAZINE

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FILAMENT WINDING
MARKET

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- Don't you want to feel confident about your GRP project?



The new steel band optimized for the continuous filament winding process has been successfully tested

We have developed and successfully tested, a steel band with the unique edge processing to reduce the risk of overlapping.

During the pipe production we have verified an increased stability on the continuous filament winding machine mandrel due to the final steel band shape obtained with the post-processing.

Moreover thanks to the hydrogen quench and the high grade clean surface, we could test and record a longer steel band considering the production of diameters smaller than 600mm as well.

For more information contact us at support@topfibra.eu.

Leoma Diamant has entered the Effective Filament Winding world

Leoma Diamant has entered the EFW (Effective Filament Winding) world through a new agreement with Topfibra for custom developed, diamond coated tooling for Filament Winding production.

Diamond coating tooling is extremely important in the FW process because even minimal mistakes on the shape may cause problems in the joints of the pipeline. For example, if the final shape of a sleeve groove is not correct, the Reka gasket compression may change and the EPDM seal may be extruded during the pipeline operation causing leakages or even pipe failures.

With the new tooling we guarantee higher efficiency during the production and our support for higher joint performance. **Our technical staff is at your disposal to study and develop special tools to fit your specific needs.**

Contact us at support@topfibra.eu.



New CFW machine up to 4000 mm in Hatay province

Alfebor plant and Topfibra technology continue with the production of high quality FRP pipes worldwide.

Topfibra successfully finished the installation and commissioning of a Continuous filament winding machine to produce fiberglass pipes from 300 mm up to 4000 mm nominal diameter at Alfebor plant.

Established over a total area of 40,000 m², 7,800 m² of which is indoor area, ALFEBOR is located

in Hatay province at a strategic location to the southernmost part of Turkey. The current average production capacity of the facility with two production lines is 800 m/day of several diameters, and this capacity will increase with the addition of new production lines. We congratulate Alfebor for the highest standards in production and quality.



EFFECTIVE FILAMENT WINDING®

THE FIRST EVER METHOD DESIGNED
TO ENSURE PROFIT-MAKING IN
THE FILAMENT WINDING INDUSTRY

Feel free to contact us for more information writing to support@topfibra.eu

What is the secret of effective filament winding?

Author: Mauricio Facchinetti

No matter who you are, your investment goals are likely to be similar to those of the rest of us: you want to increase your profits.

I understand you very well. You work hard and you have to plan carefully how to invest your hard-earned money. We can all relate to that. No one wants their money to go to waste and, as we know, it could happen in a second if we make only one mistake.

On the contrary, if you want to reach this goal through your filament winding investment, do read on, because I will share with you how to easily navigate through this increasingly demanding and competitive composites market, thanks to the cutting-edge technology developed by our experts.

Throughout all the years of designing filament winding machines, preparing offers, consulting in turnkey pipeline projects, installing and commissioning manufacturing plants (more than 45), there was always something that concerned me.

I kept asking myself how to get immediate results and profit maximization without the need for elevated financial investment.

You probably have the same questions, because in our competitive and demanding market every upgrade must be carefully evaluated. However, at the same time, you know that you need to improve your manufacturing facilities, become more competitive and expand your product range.

But something holds you back: the fear of elevated investments, drastic changes within the company or the possibility of not getting the desired results.

You receive offers on a daily basis. You keep hearing about new opportunities. Companies producing long lists of references, beautiful brochures and detailed machine descriptions, making big promises of incredible results.

When you hear this, it makes you wonder, doesn't it? And several questions come to your mind once again:

- How do they intend to measure the results in my company?
- Where will the first checkpoint be after the plant installation or a new product design?
- Will I get the profit I expect?
- Will the investment pay off?

Let me ask you something. Do you want to know what matters the most?

It is the implementation. It is how you do it and how you measure the results step by step.

In other words, the investments you need to make must be well thought out, but having a clear strategy of the process and controlling the results daily will do the trick.

If you read this article to the end, I will reveal to you how to proceed and be sure at all times that

you are on the right track.

But first, let me illustrate a typical situation with an example.

“Do you want to know what matters the most? It is the implementation. It is how you do it and how you measure the results step by step.”

Resin or fiberglass suppliers come to you with new promising offers every day to save some cents/kg; spare parts suppliers assure you of better results with lower initial prices. However, you later find out that the production speed is lower than before, the product costs are higher, the amount of scrap grows or the downtime of your plant increases due to unplanned stops. It rings a bell, doesn't it?

And again, you ask yourself how you can avoid all



this trouble and how to be sure about your next step if you want your company to continue being in the leading position.

The method that you need to apply is called EFFECTIVE FILAMENT WINDING. Yes, I intentionally used the word "effective" and not "efficient".

In Filament Winding, where the raw material costs are high, you first need to be "effective" and only then can you work on the efficiency.

In order to become effective and get immediate positive results through small changes, you need to analyze the complete process and only then make the first move. Do not consider each stage separately.

When you do that, you can finally relax. You

will implement the first change and have a clear strategy of the next move. Your profits will start soaring and you will know exactly what to do next, what your costs will be and what optimization steps to take.

In addition to that, there will be no "surprises". You will have a clear picture of everything that is going on.

We are ready to have A CONFERENCE CALL with you, COMPLETELY FREE OF CHARGE to talk about your next project.

Feel free to contact us for more information writing to support@topfibra.eu



Boost your profit in filament winding

Author: Fabio Fracasso

When you are dedicated and passionate about investing in technology, you have a picture in mind and a strong desire for results which you could achieve within a certain period of time. You work hard, you are ready and prepared to take risks and every day you plan carefully how to invest your hard-earned money.

But investing money in new projects that don't bring good profit is a fear that we all experience on a daily basis. But do we have to live only with a desire and idea of good results, and fear of potential losses? Not at all.

Below, I will illustrate to you how to transform your projects into profitable success stories in the shortest time possible through our method, which I am going to share with you in this article and which has been tested over several years in more than 26 different countries in multimillion dollar projects, all successfully completed and approved.

If you continue reading this article, it's most probably because you have decided to become better than your competitors, increase your profits

and be sure about the next investment.

Our method, which we have named EFFECTIVE FILAMENT WINDING, has been developed to provide people like you, who are considering an investment in this technology, with a powerful tool to get the highest profit in the shortest time.

Our last customer reduced the overall GRP pipe production cost by 17% after applying the method for 1 week, and in another production plant, the efficiency of the fitting department increased by 52%.

How does it work? Very simple! We take you by the hand and guide you through this difficult path: to make the right decisions at the right time so as to



make your FILAMENT WINDING project profitable.

“ Each project in the filament winding technology goes through several stages and several strategic choices that, if implemented and made in the right way, will eventually enable you to make profit. ”

We take your idea and subject it to an in-depth and thorough ANALYSIS that will help us devise the right ACTION STRATEGY for you and enable you, through filament winding, to generate the highest possible PROFIT.

Let me explain why we recommend that you proceed with EFFECTIVE FILAMENT WINDING. Each project in the filament winding technology goes through several stages and several strategic choices that, if implemented and made in the right way, will eventually enable you to make profit.



Every product that you manufacture will obviously have to be ENGINEERED and produced through a PROCESS in which you will use MACHINES and MOLDS that require proper MAINTENANCE. You will transform the RAW MATERIALS, apply THERMAL TREATMENT and, in the end, verify the QUALITY of your product, and only then will you introduce it to the MARKET, earning your PROFIT.

As you can see, this is a set of MULTIDISCIPLINARY STEPS that need to be taken with the final objective: your PROFIT.

“ Every product that you manufacture will obviously have to be ENGINEERED and produced through a PROCESS in which you will use MACHINES and MOLDS that require proper MAINTENANCE. ”

The following paragraphs will help you better understand the importance of applying a method which guarantees results.

- **ENGINEERING:** A correct design of your product, whether it is a pipe or a more complex profile, can guarantee the best mechanical performance with the use of as little time and raw materials as possible. These are the two parameters that directly affect your final profit. An in-depth understanding of the filament winding technology during the engineering phase has in some cases doubled the profits compared to the manufacturing of the same component with different technologies or methods.
- **MACHINES:** The quality of components, the correct automation engineering and the training

“ Quality control is the most important stage, and the tools to implement it must be reliable and designed for your product and technology. Do not underestimate this aspect; it could be the last thing you do. ”

of your staff are all factors that can affect the profit through efficiency and reliability. Moreover, getting a good after-sales support service will guarantee high productivity.

- **MOLDS:** Molds must be designed and manufactured utilizing complete technical know-how. It may seem strange, but a poorly designed mold can cause a production waste of up to 20% due to bad reversal trajectories or difficulties in the demolding process.
- **MAINTENANCE:** Proper planning of routine maintenance tasks and careful management of the supply of spare parts can guarantee better response times in case of failure with a reduction of the equipment management costs of up to 15%.
- **RAW MATERIALS:** The filament winding technology is affected, more than any other technology, by the correct choice of raw materials. Choosing improper raw materials due to apparent savings in supply costs may result in production costs higher than 60% when compared with sensible management of raw materials.
- **THERMAL TREATMENT:** Chemistry is at the base of the transformation processes of raw materials. And as you know, chemistry

is influenced by temperature. The correct management of the temperature of fluids, raw materials, molds and polymerization processes can lead to higher production efficiencies of up to 20%.

“**The filament winding technology is affected, more than any other technology, by the correct choice of raw materials. Choosing improper raw materials due to apparent savings in supply costs may result in production costs higher than 60% when compared with sensible management of raw materials.**”

- **QUALITY:** Before placing your product on the market, you must be sure that it will enhance your reputation and the customer's trust in your company. As you know, building reputation takes a long time; on the other hand, one mistake is enough to damage it for good. Quality control is the most important stage, and the tools to implement it must be reliable and designed for your product and technology. Do not underestimate this aspect; it could be the last thing you do.

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Plug and play new supervisory system HMI (Human Interface) for your continuous winder



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- One click information demand for your control, even if you are in another location
- Diagnostic control via connection to TOPFIBRA Automation Department through a provided teleservice remote control

For more info contact us in writing to support@topfibra.eu

Do you wish to understand how to choose a grp pipe production line and immediately obtain maximum profit, minimizing the risks?

Author: Mauricio Facchinetti

If your intention is to maximize your return on investment in the composites market, utilising a filament winding technology, and you want all the elements necessary to accurately evaluate every phase of the decision chain, then this article is indispensable for you. It is important for you to know that at present, only half of the entrepreneurs involved in the production of GRP pipes are able to sell at levels which are equal or superior to the original average objectives.

Unfortunately, this is happening because they have got a CFW Plant that does not allow them to be competitive due to the high scrap levels during production and the impossibility to reduce it, or the inaccurate raw material dosing and even worse, due to the fact that they are producing with recipes or processes that are not optimized. With such initial conditions surely they can't reach their cost targets.

This data is evident in the most recent and accredited studies and on a worldwide scale in this sector. Furthermore, the most disconcerting

fact is that the world's economy can be defined as significantly unstable.

However, it is also true that companies which achieve their objectives are able to enjoy millions of dollars in profits simply by overcoming the difficulties which have always existed, probably fewer than those which exist today, but which are in any case increasing continuously as we speak.

If you feel that your company has the potential of entering the GRP pipe production market and you want to ensure that you benefit from a rapid return



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on investment through profit maximization, then you cannot refrain from reading on about:

- which steps you need to take to choose the correct CFW (Continuous Filament Winding) plant with the right capacity, avoiding futile, elevated investments and ensuring that every dollar invested will generate profits;
- which were the positive and negative consequences of decisions taken by some companies worldwide, in order to learn from mistakes made by others and to not fall into the same traps yourself.

“**The difference between success and failure does not only depend on a single decision but from a series of decisions taken in a different manner and at different moments in time during the decision chain.**”

Initially, I asked myself: why is it that some plants which operate in the same sector, with the same product and with the same raw materials, enjoy elevated success whilst others battle to survive?

After years of analysis, experience in the field with over 40 plants in many countries, I can confidently say that in the filament winding world, the difference between success and failure does not only depend on a single decision but from a series of decisions taken in a different manner and at different moments in time during the decision chain. These decisions also have to be taken in the correct sequence, always bearing in mind the final objectives that you want achieve.

The first question you need to pose yourself is: what type of plant must I purchase?

There are various choices one can make, for example those related to the production system, be it Discontinuous, Continuous or Centrifugally Cast, and for each production system there are variants.

I have drawn up some statistics of the request for quotations which I have received through the years for CFW plants, in order to understand how many of the plants sold were actually a true reflection of the original production system and/or configuration envisaged. The finding was unbelievable: only a mere 5%.

Let's look at an example:

Years ago, an important company invested heavily in an extensive composite pipe and tank production line, including know-how for the testing of the products.

During the negotiation, and not having had at their disposal any detailed information like that indicated in this report I have written for you, the entrepreneur concentrated all his efforts on obtaining a price reduction, after which he finally decided to sign the contract (with a renowned supplier of CFW lines).

“**If the right decision would have been taken from the beginning, the saving would be higher than 1 MIL USD.**”

The same entrepreneur phoned me two years later, asking me for a consultancy service because his company was continuously losing market quota, since his plant was unable to supply pipes with a higher-pressure range. When I analysed the problem, it was clear that he would have needed a higher-pressure range capacity right from the

outset, because the terrain in his country has extreme changes in level which required high pressure systems. The turnkey tenders required at the time, and to this day, called for high pressure certifications, which he did not have.

“**An investor who, in good faith, followed the incorrect advice offered by the supplier and now he is the one that have to face the market.**”

His request was for the implementation of the production “know-how” and offer assistance for the certification of the high-pressure classes, but after I had carried out an audit of the plant, I found problems which had to be confronted and resolved before the transfer of the said know-how for the higher pressures. Furthermore, all the downstream and testing equipment had to be modified in order to prepare the complete line for the upgrade, implying costs which were much higher compared to those which would have been associated with a correct initial evaluation and investment.

If the right decision had been taken from beginning the saving would be higher than 1 MIL USD.

This is a typical example of an investor who, in good faith, followed the incorrect advice offered by the supplier and now he is the one that has to face the market.

So, in order to respond to the question what type of plant must I purchase, you need to analyse two aspects:

- initially, in what type of market you want to position yourself, for example the civil infrastructure market, industrial market,

marine or oil & gas market, or a combination of the said. The defining of this market will help you to understand the product demanded by this market segment and to consequently choose the production system;

- based on the market you will choose, it will be important to understand the maximum and minimum diameters which are most requested and what the future demand prospects are for the said.

We can generally say that the marine, industrial and oil & gas markets demand small quantities of pipe, of medium to high pressures and with particular technical characteristics, so generally the pipes need to be produced with the discontinuous filament winding system. This concept is also applicable to the civil infrastructure market but is related to very small quantities and medium to high pressures.

If extensive lengths of pipelines are needed for civil infrastructure projects (over 1000 km), a CFW production line is recommended, also because the cost of produced pipe is 15-30% lower compared to that produced with a discontinuous or centrifugally cast line. If small quantities and low pressures are mostly called for by a particular market (for example sewer pipes for small works), a centrifugally cast line can be chosen, even though this system does not offer the flexibility of a continuous or discontinuous system.

I will now focus on the civil infrastructure market, for irrigation, potable water distribution, water feeding lines for hydroelectric power stations, etc. I clarified earlier on that for these projects, the recommended system is a continuous production line, be it for its high efficiency, be it for the lower costs of the finished product. New questions arise when one has to understand how this line should be configured, after receiving a multitude of answers and motivations by the suppliers of such systems.

I will spread some light on this last issue in this last part of this article. Let's make one concept very clear – a continuous pipe production line is composed of various machines:

- Pipe production machine;
- Ancillary machines for "off-line" processing;
- Laboratory machines for destructive testing of pipes;
- Pipe and sleeve hydro testing machines.

Three aspects have to be evaluated for the choice of pipe production and testing machines:

- The diameter, the stiffness rating and the maximum pressure rating of the pipes that these machines would produce and test, with the necessary fit outs and tooling;
- The fit outs necessary to carry out the testing of the various diameters of pipe;
- The efficiency of each machine.

“ If extensive lengths of pipelines are needed for civil infrastructure projects (over 1000 km), a CFW production line is recommended, also because the cost of produced pipe is 15-30% lower compared to that produced with a discontinuous or centrifugally cast line. ”

Before we go into specifics, let us look at an example:

If a supplier offers you a CFW 300-2600 line, equipped for an AWWA range of 600-2000, it

means that the production line could produce all the pipes with a diameter range which falls within this diameter interval of 300mm to 2600mm, whilst the fit out equipment which will actually be supplied for production and testing will only cover the following diameters (in mm):
600 – 700 – 800 – 900 – 1000 -1200 -1400- 1600 – 1800 – 2000

Understanding this concept is very important, because the diameter range capacity that this line should have is determined by the future prospects and demands from your particular market segment, whilst the fit out range depends on the current market demand and situation.

Seeing that the delivery lead time of a single fit out is relatively short (a couple of months), it is convenient that you accurately choose the initial fit out configurations, based on the current diameter demands, thereby reducing the initial investments substantially, purchasing other diameters only on a new project basis.

Once the capacity range and current demand fit outs have been chosen, the third task is that of carefully evaluating the know-how which has been included in the contract (if any), the pipe designs and recipes, pressure and stiffness ratings relative to each diameter, the basic certifications which will allow you to immediately start with industrial production of sellable pipe, as well as the necessary equipment to optimise your production plant and logistics related thereto.

This task is particularly intricate and critical, so it is extremely important to have as much information as possible, before purchasing anything related to the FW technology, because any mistake in this phase will put the complete investment in a high risk of failure. You could easily get into a situation where you invest on a complete plant but you cannot get the contracts due to the pressure

range, or because you must increase your prices to cover the scrap costs or plant inefficiency.

“ But all these risk can be avoided through a suitable analysis of your market and your investment. ”

If you want to avoid that:

- The pressure range of the tenders is higher than the pressure range included in the Know How you have received;
- The lower productivity of your plant forces you to increase your selling price or decrease your profits;
- You have invested in equipment that you will not need for the first years so you realize after some time that large amount of money is blocked in such parts;
- The type of the fittings that your market requires are not included in the Know How you have received;
- The pipes recipes are too expensive.

But all these risk can be avoided through a suitable analysis of your market and your investment.

I am ready to have a conference call with you, completely free of charge, to clear your initial doubts on all the aforementioned issues and tasks before you make the next move to avoid to put the complete investment in a high risk of failure.

To rapidly and easily book an appointment, all you need to do is to contact us through

www.topfibra.eu/contact-us/#



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WE ARE READY TO HAVE A CONFERENCE CALL WITH YOU, COMPLETELY FREE OF CHARGE, to clear your initial doubts before you do the next move, upgrading or investing in a new plant. Avoid the possibility of putting the complete investment in high risk of failure.

Feel free to contact us for more information writing to **support@topfibra.eu**

DO YOU WANT TO MAXIMIZE YOUR INDUSTRY AND ENSURE THAT YOU ON YOUR INVESTMENT?

The key is to focus on the optimal filament carefully calibrated for your business need.

PROFIT IN THE FILAMENT WINDING BENEFIT FROM A RAPID RETURN

winding process and production plant

Maximize your profit and avoid hidden troubles in your fiberglass company

Author: Mauricio Facchinetti

In this article, I will reveal how much money you could save by taking only one decision and eliminating hidden troubles forever. I know that it may seem strange to you to hear about something in your company that is not visible, something that consumes your profit and even causes problems to everyone on the worksite.

During my visits at different manufacturing plants and pipe installations, I have seen such situations several times and, unfortunately, also their negative effects because the team in charge didn't act in time. After seeing the consequences, I have decided to fight it back, investing all my time to eliminate the source of such harm.

In order for you to be able to cope with this issue, I will provide you with the explanation of this danger.

As you probably know, one of the main continuous tasks performed by your workers in the fiberglass plant or pipe installation is the manual cutting. Yes, it has always been a problem that you thought you need to solve due to its low efficiency, being

the most expensive and labor-intensive task in the supply chain or installation process.

If you think that low efficiency is the only reason I believe this to be true and that there is no other way to do the job, I have to tell you something: the danger is already there but it is hiding very well.

Performing the cutting manually is not only inefficient but it also poses hidden dangers that affects health and result in you losing a lot of money.

After installing the Fitting Cutting Station machine, you will get the following benefits:



“ Performing the cutting manually is not only inefficient but it also poses hidden dangers that could affect health and result in you losing a lot of money. ”

- Through its diamond cutting system, you will see how it is possible to cut larger pipes in minutes. The efficiency of your fittings department will immediately increase by more than 50%;
- The desired cuts can be programmed by drawing in a CAD – CAM software supplied with the machine or by importing the data directly into its Numerical Control so the marking task is not needed anymore. No more complicated templates to mark the pipes, while amazing precision and matching will become your daily routine;
- The software of the FCS can repeat the same

profiling jobs as many times as desired by the operator, whereby the repeatability is 100%. All the cuts will be exactly the same and the efficiency will increase amazingly;

- The water spray system of the FCS controls the fiberglass dust so you and your workers will be safe guarded from such a destructive threat;
- The software of the FCS performs the cut without the need for an operator. Since you are away from the cutting zone, there is no possibility of being injured by such a task. The cutting process will thus become simple and carefree.

“ Something in your company that is not visible, something that consumes your profit and even causes problems to everyone near the worksite. ”

THE UNIQUE WAY TO IMPROVE THE EFFICIENCY OF YOUR FITTING PRODUCTION BY MORE 50%, SAVING 15.000 EURO/MONTH.

FITTING CUTTING STATION – high precision slabbing and profiling for pipe industry

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I shall illustrate this with an example of a fiberglass pipe with a diameter of 2500 mm. To perform the manual cutting, these are the activities your workers need to perform:

| ACTIVITY | NUMBER OF WORKERS | TIME REQUIRED (min) |
|---|-------------------|---------------------|
| <i>Preparation of the template for the required cut</i> | 1 | 60 |
| <i>Marking of the cut on the pipe</i> | 2 | 60 |
| <i>Manual cutting</i> | 2 | 75 |
| <i>Correction of the manual cutting</i> | 1 | 30 |

Now we are ready to analyze the same task using the Fittings Cutting Station (FCS):

| ACTIVITY | NUMBER OF WORKERS | TIME REQUIRED (min) |
|---|-------------------|---------------------|
| <i>Preparation of the template for the required cut</i> | not needed | 0 |
| <i>Marking of the cut on the pipe</i> | not needed | 0 |
| <i>Automatic cutting</i> | 1 | 18 |
| <i>Correction of the manual cutting</i> | not needed | 0 |

FINAL COMPARISON FOR THE ND 2500 PIPE CUTTING

Manual cutting: 225 minutes – irregular cutting
 Fittings Cutting Station (FCS) cutting: 18 minutes – perfect cutting

Multiplying the average industrial costs (direct and indirect costs) of a medium-size manufacturing plant with the overtime due to the manual cutting, we are talking about savings of more than 500 euros per piece.

Considering that in one month, a fitting plant would need to produce 30 pieces, the result would be a saving of more than 15.000 € / month

“ Considering that in one month, a fitting plant would need to produce 30 pieces, the result would be a saving of more than 15.000 € / month (of course, not considering all the costs related to injuries and health hazards associated with the manual cutting). ”

(of course, not considering all the costs related to injuries and health hazards associated with the manual cutting).

“**The FCS can be customized to fit different cutting ranges. We can cut pipes of up to 4000 mm diameter easily.**”

I am sure that it is clear to you by now that the Fittings Cutting Station (FCS) enables you to save a lot of money.

Perhaps you are asking yourself: “But what if I have to perform curvilinear cutting? Is it possible to cut any type of fiberglass pipe? What about the pipe thickness?”



I can give you an answer right away:

You will be able to cut any types of fiberglass pipes, regardless of their thickness, rectilinearly, curvilinearly, at every possible angle, precisely and within minutes.

Before I conclude this article, I would like to give you another good piece of news.

The FCS may be customized to fit different cutting ranges, so you don't need to worry about whether your production range is too small or too big. We can cut pipes of up to 4000 mm easily.

Imagine how you would feel knowing that you are increasing your profit immediately after installing the solution by means of which you can avoid potential injuries and health hazards related to the manual cutting.

For better understanding, let me state some facts.

- Your team has difficulties assembling the GRP components due to uneven cuts. The GRP pipes with unevenly cut ends and cutouts are difficult to align and position. The job that your workers do daily to close the gaps is very difficult and time-consuming, especially with big diameters. Such a task often involves resin dripping inside the pipe or the movement of pre-assembled pieces, all resulting in the extension of time taken for the assembly and, consequently, in a big loss.
- Your workers may get injured. Manual cutting in fiberglass industry is a cause of a large proportion of work-related injuries, and we are all familiar with their enormous cost. But if you think that injuries and health hazards only affect your workers because they work with a manual grinder, you are simply wrong.

There is another threat, and it is the trickiest aspect of this story because its consequences cannot be seen immediately.

This destructive threat appears in the form of fiberglass dust that is generated all around you.

Your workers cut, chop, saw or trim fiberglass, and the dust produced contains small fibers. These fibers can come into contact with their skin and eyes, causing eye injuries or serious skin problems.

But what happens if you or your workers inhale such fiberglass dust?

“**Our workers cut, chop, saw or trim fiberglass, and the dust produced contains small fibers. These fibers can come into contact with their skin and eyes, causing eye injuries or serious skin problems.**”

Unfortunately, when the fiberglass dust is inhaled, larger glass particles may be trapped in the upper airway but smaller fibers may go deep into the lungs.

Imagine for a moment these small particles flying around, entering your lungs and remaining inside forever. Not a pleasant picture, isn't it?

The possible harm that the dust may cause is mostly determined by the amount of dust present in the air and the time of exposure to it. Anyone who is exposed to high levels of fiberglass dust may be affected – the longer you breathe in the dust, the greater is the chance that it will seriously affect your health.

There were several studies published in the British Journal of Industrial Medicine that explored the pulmonary effects of exposure to fine fiberglass, and the conclusion was that the exposure to fine fiberglass appears to produce human disease similar to asbestosis.

Don't worry, luckily for you, you've come to the right place. In this article, as I told you in the beginning, you will learn how to eliminate this threat and immediately increase your profit.



You can make your GRP cutting safe, hazard-free, efficient, rapid and precise, saving time and money through the application of the FCS (Fittings Cutting Station).

“**You can make your GRP cutting safe, hazard-free, efficient, rapid and precise, saving time and money through the application of the FCS (Fittings Cutting Station).**”

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A psychological approach to the composite CNG pressure vessel safety issues

Author: Fabio Fracasso

The transport industry has witnessed an ever-growing increase in natural gas vehicles due to a number of positive factors. Natural gas fuelled vehicles present advantages both from an ecologic and economic point of view, due to a lower environmental impact and the present-day cost of methane compared to traditional fuels.

However, a very frequent question that many people ask is whether methane fuelled vehicles are safe.

It is a fair question, especially if one considers that until today, all natural gas vehicles had the gas cylinder located under the driver's seat, so the thought of it was not very comforting, despite the guarantees offered by the suppliers and installers.

This fact also resulted in reduced trunk space, which was occupied primarily by the CNG cylinders, the prohibition to park the car in underground parking areas, the need to step out of the car for safety reasons during refuelling, as well as the scarcity of fuelling stations.

Today many things have changed and the prejudices have decreased considerably. Now all methane cars coming off the production line are bi-fuel, in order to guarantee the maximum possible autonomy even when the methane cylinder is empty. Methane fuelling stations increase in number from year to year, the cylinders are arranged in such a way so as to occupy the least possible amount of space, while methane fuelled cars are now allowed to park underground, lower levels included.

Despite all this, methane cars have not yet been cleared from fears and doubts of potential buyers, which is partly due to prejudices and partly due to misinformation.

“ Full composite cylinders, also called “Type IV”, are governed by the same or even superior safety standards compared to steel cylinders. ”

The repulse is greater when composite vessels for methane storage are offered. However, the current trend is the passage to high pressure storage systems that guarantee an elevated density of the stored energy (energy per unit of weight) where composite materials are the only solution. Considering an equal storage pressure, the composite cylinder can be up to 75% lighter than the steel equivalent.

But what effect does the idea of having a 250 bar “plastic” cylinder have on the end user?

Most car end users are not even familiar with the gas storage pressure. The difficulties begin when methane operating pressure is revealed. These are overcome as soon as one mentions steel cylinders, which are widely recognized as solid and secure. While one speaks of innovative light composite storage systems, the difficulties and doubts return, such cylinders are perceived as something too innovative, with too short a history and thus not as safe.

The purpose of the present article is to demonstrate that full composite cylinders, also called “Type IV”, are governed by the same or even superior safety standards compared to steel cylinders.

Composite Cylinder design

The design of a type IV cylinder involves a great number of issues, representing interdisciplinary activities, involving experience in metallurgy, composite material science, polymer material science as well as a solid mechanical engineering

basis. The designer of a type IV cylinder has to face a number of technological challenges that guarantee an equal or even higher safety level than that of type I cylinder, which boasts a long history, a failure-free performance and a solid reputation. Think of the following example: the problem of the wall permeability is inexistent for type I cylinders, while it is very important for type IV cylinders. Imagine what an old lady might think when entering her garage in the morning to pick up the car, she picks up the smell (even discreet) of methane gas. Of course, this would be a traumatic experience, possibly followed by a negative mass media impact on the reputation of the “plastic” cylinder.

A similar problem arises from the definition of the techniques that guarantee a perfect interface seal between the liner polymer and the metallic threaded insert serving as the valve attachment.

“ The current trend is the passage to high pressure storage systems that guarantee an elevated density of the stored energy (energy per unit of weight) where composite materials are the only solution. Considering an equal storage pressure, the composite cylinder can be up to 75% lighter than the steel equivalent. ”

Obviously, being the only point of material discontinuity, it represents a technological challenge, both mechanical in terms of the design of the coupling profiles and chemical in case adhesives are foreseen. These should be resolved

by the liner manufacturing process, which must be reliable and repeatable.

“ The designer of a type IV cylinder has to face a number of technological challenges that guarantee an equal or even higher safety level than that of type I cylinder, which boasts a long history, a failure-free performance and a solid reputation. ”

The international standards define the phase of the design approval of the cylinder prior to the product homologation. An inspector will analyze all of the design aspects such as stress analysis, tolerances for reference values and application specifications.

The designer defines the reference parameters that will be verified during testing before homologation. Some reference parameters are:

- Stress ratio for different pressures
- The expansions for different service pressures
- The design burst pressure
- Material properties
- Type of fire protection equipment

Design safety factors

What safety factors are used in the design of composite cylinders? In case of composite cylinders various coefficients are defined by the standard, depending on the type of fibres used.

It is important to interpret the table appropriately as it could be misleading. In the case of the carbon fibre, the cylinder should be designed in such a way so as to have the design burst pressure over

470 bar. This means that considering a service pressure of 200 bar, the safety factor for pressure is 2.35.

| FIBRE TYPE | STRESS RATIO | BURST PRESSURE |
|---------------|--------------|----------------|
| <i>Glass</i> | 3,65 | 730 |
| <i>Aramid</i> | 3,10 | 620 |
| <i>Carbon</i> | 2,35 | 470 |

Here we need to consider one aspect: the design stage should consider, using appropriate coefficients, the fatigue behaviour of the cylinder, the damage tolerance, the edge effects generated by the presence of the domes (with respect to conduct which a cylinder of equal diameter would have), which results in much higher safety factor than that required.



Bad failure

The recommended engineering practice suggests the study of the cylinder behaviour in order to obtain the fracture of the laminate in the cylindrical section, staying clear of failures occurring in domes



Good failure

or inserts, which are less controllable and therefore more dangerous. You can see an example below of stress in the laminate in different parts of the cylinder, where the peaks corresponding to the transition between the cylinder and domes can be observed. The design should be performed in such a way so as to limit such peaks. The ultimate stress should occur in the fibres of the cylindrical part before the fibres in the transition zone have reached the breaking point.

Composite cylinders production



Production a type IV Cylinder

The cylinder manufacturer that intends to market his composite cylinders should have a production cycle corresponding to very high-quality standards. This will allow an absolute repeatability of production and the correspondence with the designed parameters and calculation.



Curing a type IV Cylinder

The production cycle should be managed with the highest degree of automation possible in order to limit the incidence of manual operations. Moreover, the manufacturing parameters should be constantly monitored in order to ensure the said manufacturing conditions for all products introduced on the market.

Composite cylinders homologation

Compared to the homologation of the steel type I cylinders, the composite cylinders are required to pass many more tests. Just as a comparison idea, in the following table you can see the tests foreseen by the ISO11439 Standard.

It is easy to argue that in the case of composite cylinders, many tests have been thought previewing many possible negative conditions that the cylinder could encounter in its life cycle. Most of these tests are not required for steel cylinders.

| | Type I | Type IV |
|--|--------|---------|
| Tensile tests for steel and aluminium cylinders and liners | X | |
| Impact test for steel cylinders and steel liners | X | |
| Sulfide stress cracking test for steel | X | |
| Corrosion tests for aluminium | X | |
| Sustained load cracking (SLC) tests for aluminium | X | |
| Leak-before-break (LBB) test | X | X |
| Extreme temperature pressure cycling | | X |
| Brinell hardness test | X | |
| Coating tests | X | X |
| Leak test | | X |
| Hydraulic test | X | X |
| Hydrostatic pressure burst test | X | X |
| Ambient temperature pressure cycling | X | X |
| Acid environment test | X | X |
| Bonfire test | X | X |
| Penetration tests | X | X |
| Composite flaw tolerance tests | | X |
| High temperature creep test | | X |
| Accelerated stress rupture test | | X |
| Impact damage test | | X |
| Permeation test | | X |
| Tensile properties of plastics | | X |
| Softening temperature of plastics | | X |
| Coating batch tests | X | X |
| Boss torque test | | X |
| Resin shear strength | | X |
| Natural gas cycling test | | X |

ISO11439 Tests

Impact damage test

Composite cylinders are fragile! This is false. What does "fragile" mean? It means having a limited capacity to absorb the energy generated by impact, for example in case of an accident. The strength derives from the analysis of how dangerous a strong impact is for a cylinder, which might make it explode. The impact issue is very important and should be controlled by various techniques. Firstly, one should consider that the problem is transferred to the properties of fibres, which is especially the case of cylinders made with carbon fibre. Carbon is an extremely fragile fibre. Fibreglass, on the other



Impact damage

hand, has a better impact absorption. Therefore, one of the techniques used is the application of a outer layer in fibreglass for shock absorption.

One of the most delicate issues is the transition zone between the cylindrical part and the domes. In this area, shock absorbers should be applied to absorb the energy of an impact without compromising the structural laminate.

The standard tests impose the performance of the drop test, during which a cylinder filled to 50% capacity with water is dropped from a certain height at different impact angles. The impact surface on the ground should be a steel plate at least 40 mm thick, embedded in concrete, in order to ensure that the entire energy of impact is transmitted to the cylinder.



Failure

After that the cylinder should undergo a cyclic test: the cylinder shall not leak or rupture within the first 3 000 cycles but may fail by leakage during the next 12 000 cycles.

Bonfire test

In case of a fire caused by a bad car accident, the first thing that comes in one's mind is the explosion of the cylinders made of plastic material, therefore

less suitable for withstanding thermal stress. The standard imposes a very strict test for testing the cylinders under such conditions.

In such circumstances the valve should activate a pressure relief device before the cylinder explodes.

Some car makers have their own specific requirements for the tests which are different stricter for type IV cylinders than those required by the standard.

Temperature tests

During its lifetime, a cylinder can be utilized in the most varied climatic conditions. In some countries, during the summer months, temperature may rise up to 50° C, while in other areas, it falls far below zero during the coldest winter seasons.

This means that in operating conditions the cylinder

“The cylinder has to withstand the same stresses in the worst climatic conditions.”

has to withstand the same stresses in the worst climatic conditions. For instance, the resin, which is part of the laminate, is a polymeric material which undergoes changes in its mechanical properties due to temperature fluctuations. In such conditions, the cylinder can be stressed for a certain number of filling and emptying cycles, and the concern increases if we do a comparison with the steel cylinders, which appear to be more reliable from this point of view.

In this regard, the standards require a series of temperature tests that are NOT FORESEEN for cylinders type I:

Extreme temperature pressure cycling, whereby the cylinder shall be pressurized to a number of cycles equal to 500 times the life estimated for that cylinder. For example, if the cylinder's life is estimated to be around 20 years, and after undergoing these cycles, the cylinder shall be burst tested and must show a burst pressure of at least 85% of the design burst pressure.

High temperature creep test, foreseen for type II, III, and IV cylinders, if the resin of the laminate has a glass transition temperature less than 102° C. In this case, the cylinder must be pressurized to 260 bar and maintained for at least 200 hours at a temperature of 100° C. Then the cylinder shall be pressurized to 1.5 times the working pressure and its subsequent volumetric expansion shall be the same stated in the design. Finally, after a leak test, the cylinder shall be burst tested, and must withstand the design burst pressure.

“It is widespread belief that a “plastic” cylinder can be more easily attacked by external chemical agents, thus affecting its optimal performance.”

Accelerated stress rupture tests, is the last temperature test, whereby a cylinder is pressurized to 260 bar and maintained for 1000 hours at 65° C. Then the cylinder shall be burst tested, and must withstand a burst pressure of at least 85% of design burst pressure.

It is extremely important that in the operative temperature range the resin of the composite continues to show acceptable mechanical performance, such as elongation at break, tensile strength, etc.

Acid environment test

Another topic people get usually phobic about when comparing the steel cylinders with composite ones, is the chemical attack. It is widespread belief that a “plastic” cylinder can be more easily attacked by external chemical agents, thus affecting its optimal performance. Let us just imagine, as an example, that for some reason, a spillage of acid from the battery of the car occurs, with the acid pouring onto the cylinder!

“The test can be performed using different types of chemical agents and often the OEM themselves define internal protocols that are even more rigid than the standard ones.”

Actually, the relevant legislation provides for a specific test even for such a case. It is called Acid test environment and is suitable for all types of cylinders. The test involves pressurizing a cylinder to 260 bar, while a portion of its surface, equal to a circle of 150 mm in diameter, is kept constantly



Acid attack test

in contact with a 30% solution of sulphuric acid (battery acid). After 100 hours in this condition, the cylinder shall withstand a burst pressure of at least 85% of the design burst pressure.

“ **Composite cylinders have by nature a greater ability to absorb energy than steel cylinders.** ”

The test can be performed using different types of chemical agents and often the OEM themselves define internal protocols that are even more rigid than the standard ones.

Penetration test

What happens if while driving at considerable speed, my CNG car is hit by a small and hard body on the road? And what if that object has enough energy to puncture the cylinder?

This question is legitimate when we deal with vehicles with CNG high pressure cylinders, but particularly in cases where the above mentioned cylinders are not metallic. The general idea/concept is that composite cylinders would be much less efficient in such dangerous circumstances.

“ **The presence of scratches and flaws on a steel cylinder generally gives much less concern than similar those on the surface of a composite cylinder.** ”

However, it is not so! Composite cylinders have by nature a greater ability to absorb energy than

steel cylinders. This aspect has to be taken into account when the cylinder design is conceived, by means of an appropriate stratification of the laminate in order to prevent an explosion in case of penetration. With this regard, the standards impose a very strict test, whereby a gas cylinder pressurized to the working pressure is penetrated by a calibre 7.62 bullet. The test is passed only if the bullet goes through the cylinder without causing an explosion, and gradually releasing the gas through the holes caused by the bullet.

Flaw tolerance

The presence of scratches and flaws on a steel cylinder generally gives much less concern than similar those on the surface of a composite cylinder.

“ **The cylinder has to pass a conditioning cyclic test for 3000 cycles from 20 to 260 bar, without undergoing any type of loss or failure. This is followed by additional 12000 cycles, during which leakage is accepted, but not rupture.** ”

Actually a composite cylinder suffers a greater exposure to scratches, but this does not imply a reduction in mechanical properties. In most cases in fact the manufacturers of composite cylinders apply an outer layer, with no structural features, that acts as a sacrificial layer. The possible cracks are then absorbed by this layer, protecting the structural laminate.

The standards impose a test for composite cylinders only (Type II, III and IV), whereby the cylinder surface is scratched by a series of engravings of set shape and size (lengths from 25 to 200 mm

and depth from 0.75 to 1.25 mm). The cylinder has to pass a conditioning cyclic test for 3000 cycles from 20 to 260 bar, without undergoing any type of loss or failure. This is followed by additional 12000 cycles, during which leakage is accepted, but not rupture.

The experience we obtained from this type of test, involving composite tanks with sacrificial layer, has showed some failures of glass fibres in the engravings, but has proved that the tank has maintained the same properties. The thickness of the sacrificial layer has therefore to be sized appropriately, in order to confront the case study.

“ **Certainly the most puzzling issue regarding type IV cylinders is related to the fatigue cycles. How many times may we re-fill our car with CNG type IV pressurized cylinders and ward off any concern about a possible explosion?** ”

Ageing

Certainly the most puzzling issue regarding type IV cylinders is related to the fatigue cycles. How many times may we re-fill our car with CNG type IV pressurized cylinders and ward off any concern about a possible explosion? And what if we continue driving after 15 or 20 years? What is the risk?

The standards make no distinction between type I and type IV cylinders. For both types of cylinders, a cyclic pressurization test is foreseen, which simulates the fatigue of the cylinder. By defining the life of the cylinder, the manufacturer has

already decided how many cycles it will undergo. Actually, the regulation involves 1000 filling and emptying cycles for each year of life of the cylinder. But who would re-fill 1000 times per year? Even if we drive every day of the year it would mean re-filling almost three times per day! Moreover, in addition to the overestimation of the cycles during the life of the cylinder, we should also consider a safety factor of more than double the number of cycles that could lead a cylinder to failure. In fact, the regulation requires that for the first 20000 cycles (assuming 20 years of life for the cylinder) no failure or loss occurs, while during the next 25000 cycles a leak is acceptable, whereas a catastrophic failure is not.

This means that if we used the cylinder for 20 years, re-filling almost 3 times per day, we will have the certainty that no failure will occur. If, as absurd as it may seem we continue to use it beyond its expiry date, we would be granted additional 25 years, with 3 refilling per day, during which, in the worst case, we might only expect some loss of gas. As a result of this reasoning, it would be recommendable not to use a type IV cylinder more than 45 years!

Tests performed by TOPFIBRA D.O.O. showed that the cylinder is able to withstand 45,000 cycles without any failure or loss of fluid, maintaining a burst pressure which is than 80% higher than the design pressure!

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FRP poles, produced with the filament winding technology, save lives

Author: Mauricio Facchinetti

Have you ever seen a car crash into a steel or concrete pole, or perhaps a tree? We usually don't take the time to think about this until one of our loved ones is involved in an accident. Unfortunately, we are also exposed to this risk every day when we get into our cars. Is there any other solution? And if yes, why isn't it implemented?

I will tell you why – sometimes people hear some advice that's completely common sense, but somehow common sense isn't always common practice.

I'm writing this article to give you real, economical and practical solutions to these real, everyday problems. I'm talking about the FRP poles produced with the filament winding technology.

I would like to explain their characteristics to you, so you will be able to see the advantages of the FRP poles as regards their safety and cost effectiveness. The characteristics of the FRP poles produced with the filament winding technology are the following:

- Very safe due to the high passive safety level, so the impact is less dangerous for the driver; they can make the difference between life or death for the driver or passengers;
- Non-conductive and non-magnetic, so there is no risk of electric shock if the main electric cable touches the pole after a small impact, for example.

But what about the cost? You are probably thinking that the cost of the FRP poles is higher than that of wooden, steel or concrete poles. And this is understandable because there is an enormous lack of information about the FRP poles manufactured with the Filament Winding Technology. Considering transportation, installation and durability, the FRP poles are cheaper than poles made of other



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materials. And the final cost is not the only advantage.

If you want to know more about the FRP poles and about the hidden truth behind the pole industry visit our website [#](http://www.topfibra.eu)

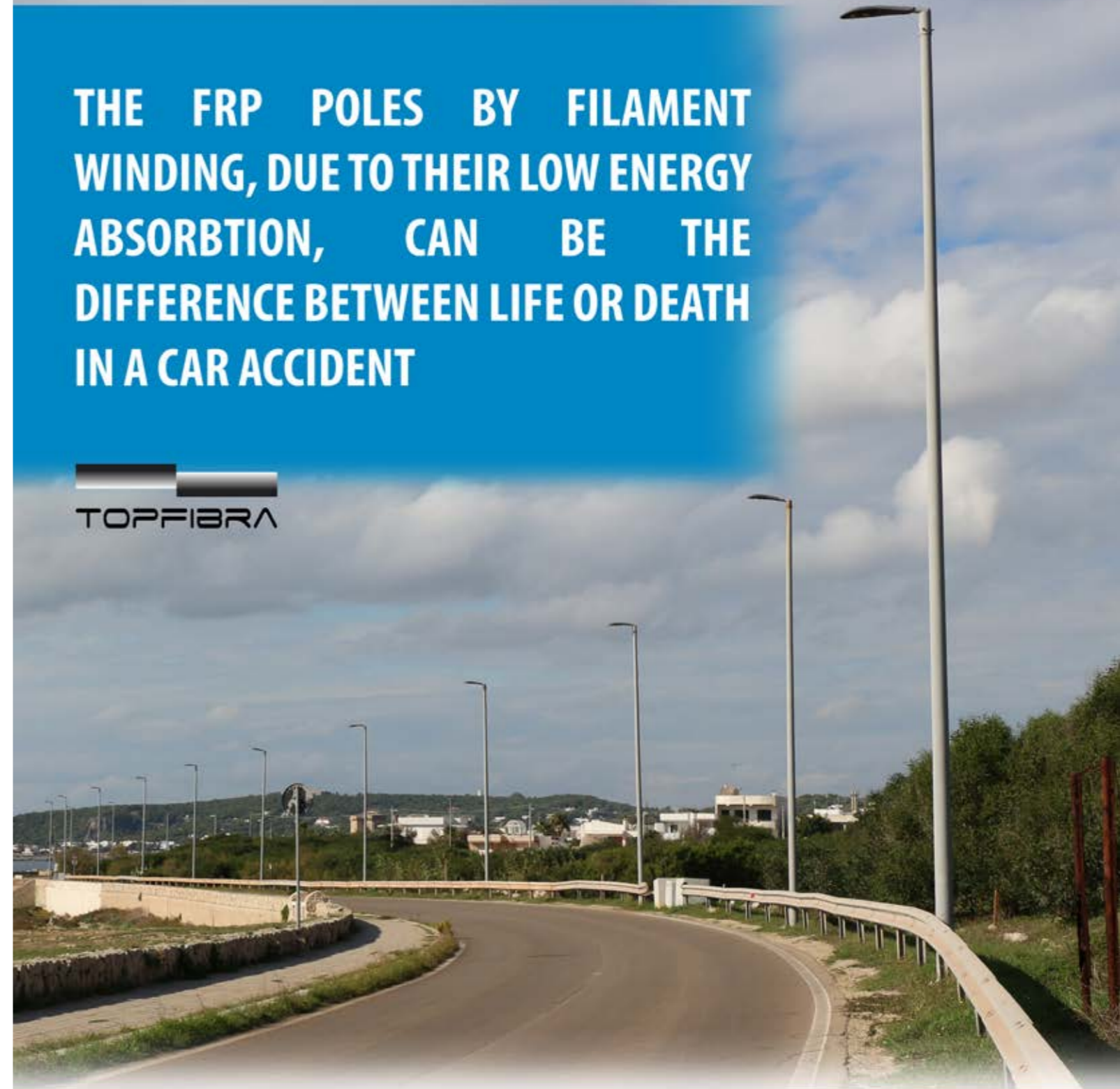
“ The FRP poles are cheaper than poles made of other materials. ”

Product evaluation

| Material | Concrete | Wood | FRP | FRP competitiveness |
|-----------------------------|----------------|---------------------------------|---------------------------------|---------------------|
| Lifetime | 25 yrs | 20 yrs | 80 yrs | ✓ |
| Weight | 990 kg | 300 kg | 130 kg | ✓ |
| Flexibility | ✗ | ✗ | ✓ | ✓ |
| Corrosion resistance | ✗ | ✗ | ✓ | ✓ |
| Pests and animal resistance | ✓ | ✗ | ✓ | ✓ |
| Environmental impact | Non recyclable | Toxic treatments; deforestation | Recyclable; no toxic treatments | ✓ |

Logistics & installation

| | | |
|--------------------------|---|------------------------|
| Transport cost per km | FRP poles are lighter = lower transportation cost | FRP more competitive ✓ |
| Use of lifting equipment | No need for lifting equipment | FRP more competitive ✓ |
| Foundation | FRP poles need smaller foundation = lower costs | FRP more competitive ✓ |



THE FRP POLES BY FILAMENT WINDING, DUE TO THEIR LOW ENERGY ABSORPTION, CAN BE THE DIFFERENCE BETWEEN LIFE OR DEATH IN A CAR ACCIDENT



UNI EN 12767 - Passive safety categories

HIGHER SAFETY
FRP POLES



NE = NO ENERGY ABSORPTION
LE = LOW ENERGY ABSORPTION
HE = HIGH ENERGY ABSORPTION



LOWER SAFETY
CONCRETE/STEEL POLES

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Don't you want to feel confident about your GRP project?

Author: Mauricio Facchinetti

When you start a pipeline installation project, you will undoubtedly be bombarded with numerous questions. The pipe installation company will keep asking you to make certain decisions, while the final result will depend on your answers. Do you know what these questions will be?

Don't worry if you are a little uncertain as to what I have in mind. I will explain. Many companies initiate projects without being aware of what lies ahead of them. They know the pipes are well-made, they know where they will be installed and who will install them. What they don't know is that they will be faced with difficult situations that need to be solved, and if the right solution doesn't come up, the pipeline installation project may go wrong in terms of defects, leaks, delays, complaints and similar.

Let me explain to you with an example what you can expect if you work alone, without a specialized and independent GRP pipe supervisor.

Based on my experience, I can tell you that one

of the first questions you will be faced with is the question of the backfill material. Backfill material has to meet certain requirements to be classified as suitable. However, it is often the case that material which would meet all the requirements and thus be completely suitable is difficult to come by in the vicinity.

The contractors will often ask you: "Can we utilize the material resulting from excavation, although it does not fully comply with the specifications?"

And then you may find yourself in a situation where the pipe manufacturer will suggest one thing, while the contractor will suggest just the opposite. And it is completely understandable that you should not have all the answers. You are managing the



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“And then you may find yourself in a situation where the pipe manufacturer will suggest one thing, while the contractor will suggest just the opposite.”

project and such specific questions should not be addressed to you. But unfortunately the final decision will be critical either to the economic final result or to the pipeline performance:

- If the backfill can be used and you decide against it, the cost of installation will be much higher.
- On the contrary, if you decide to use the backfill material and it turns out that it is not appropriate, the pipeline will not pass the field test and the consequences will be serious.

Throughout all the years checking and correcting pipeline installations, I have come across another situation that causes many failures: the angular deflection. Stories related to this issue are always very similar. The pipe manufacturer specifies the allowed angular deflection for pipes of various diameters and sometimes it happens that the requirements are not met.

Do you know what to say if the contractor asks you: “The theoretical angular deflection is not met. Should I disassemble the pipe and not meet the deadline or leave it as it is?” I have mostly seen 2 scenarios:

- I saw the pipeline completely damaged while the contractor tried to correct the angular deflection, although it was not really needed (the task to correct the deflection is very difficult and may damage the pipe).
- In some other cases, I found out that the angular deflection was not corrected and the final result was a pipeline explosion.

But make no mistake. If you turn to the parties involved in the project for advice, you have to be aware that each of them will act in their best interest.

Thus, supervisors of each party will provide you with a different answer and you will be even more confused. Why does this happen? This situation is very common because during the process of buying the pipes or choosing the civil contractor, each provider gives you a lot of suggestions and guarantees about their services, but they don't tell you that at certain points they won't be the ones making the key decisions.

“Do you know what to say if the contractor asks you: “The theoretical angular deflection is not met. Should I disassemble the pipe and not meet the deadline or leave it as it is?””

However, there is a shortcut to guaranteed success even if the project is technically demanding, far away from your office and implemented in the roughest terrain.

If you read this article to the end, I will reveal to you how to proceed and be sure at all times that you are on the right track.

Right from the beginning, you need to include 3 milestones in your plan:

- audit of the pipeline project by an independent GRP specialized company;
- examination of GRP pipes prior to delivery and by a company that is specialized in the manufacturing technology;



- involvement of a GRP pipeline supervisor from the day the pipes arrive on site (the first audit is done during the unloading).

But take care in choosing the supervision services!

The task that a GRP independent supervisor must accomplish is very demanding, and it is not enough just to have a lot of experience and knowledge about GRP pipes and installation.

The key to success is how the independent supervisor implements each small step that leads the project to guaranteed success.

The correct way to proceed is to analyze the

complete process, from the manufacturing tolerances to the handling, from the engineering project to the installation and tests, and only then make the first move.

“The task that a GRP independent supervisor must accomplish is very demanding, and it is not enough just to have a lot of experience and knowledge about GRP pipes and installation.”

The biggest mistake? To get a supervisor that considers each stage separately.

When you get the right independent supervisor, you can finally relax. You will have the time to focus on the big picture and develop a clear strategy of the next move. Your profits will start soaring and you will know exactly what to do next and what your costs will be from day one.

In the end, you will know that the pipeline was installed properly, that there won't be any unexpected troubles and complaints, and that you will be able to move on to other projects.

“ The biggest mistake? To get a supervisor that considers each stage separately. ”

Do you want to get a guaranteed success of your pipeline field test even if the project is implemented in the roughest terrain?

To discuss your project with us feel free to contract us for more information by writing to support@topfibra.eu. #



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OUR ENGINEERING SERVICES COVER A WIDE RANGE OF ASPECTS

- ❖ New Production Lines and Equipment up to ND 4000 mm
- ❖ Expansion and upgrade of any Filament Winding Plant or Process
- ❖ End product design and development
- ❖ Machine automation
- ❖ Process set-up & optimization

For more information contact us in writing to
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