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Press release

Hydrogen tanks by filament winding process for the mobility of the future

Machine concepts of Roth Composite Machinery

Steffenberg. New power train technologies based on hydrogen or natural gas, for example, are gaining more and more importance for resource-saving mobility solutions. For the economic storage of these fuels in vehicles, pressure vessels of type IV are suitable. They are based on a thermoplastic inner tank, also called liner, reaching the necessary pressure stability by fibre reinforcement using the filament winding process.

Type IV pressure vessels are characterized by their tremendous lightness and safety and are thus highly interesting for numerous applications in the mobility sector. Roth Composite Machinery from Steffenberg has the necessary expertise and experience in the development and building of machines for the manufacture of such vessels. Plenty Filament Winding Plants from Roth are used by all market leading

manufacturers producing pressure vessels for gases world-wide. Each production line is planned and designed to precisely fit the requirements of the customer's application. The advice given by the machine builder includes the sequence of single production steps, the material selection and processing, the automation level as well as the increase in productivity up to the commissioning and instruction in the operation of the production line.

Hydrogen tanks by filament winding process

Roth Composite Machinery has recently delivered a customized Filament Winding Plant for the manufacture of hydrogen tanks with three spindles. Dr. Andreas Reimann, General Manager of Roth Composite Machinery, explained: "A high-performance drive concept combined with a new machine frame structure enable performance improvements of about 40 percent compared to the international state of the art." The machine concept comprises five interpolating axes and additionally five CNC programmable axes. The set-up of the machine is suitable for series production as well as for development applications (R&D) using the traditional wet winding process. Through separation, the impregnating station enables an individual use of single spindles in order to avoid unnecessary consumption of resin. An NC-controlled doctor blade allows a precise and reproducible adjustment of the resin gap. The movable impregnating station is suitable for the processing of carbon fibres as well as for glass fibres and reduces the roving load due to decreased wrap angles. By means of the fibre storage device, even very low fibre tensions can be adjusted in line with the process due to the double cylinder control. Constant

fibre delivery speeds of up to 4.5 meters per second can be realized. The production line is prepared for a quick and easy change to the Towpreg winding procedure. Through the use of the ROTH RCA (automatic roving cutting and applying device), the automation level of the machine is increased. For the winding of pressure vessels, for example, the machine is equipped with an automatic pressurization and pressure measuring system which is able to create and regulate the necessary inner pressure of the liner during the winding process. The exceptional machine stiffness minimizes mechanic impact on the manufacturing process and ensures highest precision during the filament winding process.

State-of-the-art technology

When using Filament Winding Plants of Roth Composite Machinery, production processes in the traditional wet winding procedure as well as Towpreg applications are possible. For the described production line, Roth Composite Machinery has further developed the spool fixtures at the spool creel – they facilitate the placing of full spools as well as the removal of empty sleeves. A CNC controlled counter bearing guarantees the exact positioning when changing the setting, saves set-up times by this and can compensate length deviations of the plastic liners within the tolerance range. The clamping pressure of the sleeves is adjustable by proportional valves via the program. The new Filament Winding Machine is versatile in its design – it can be used for small light components as well as for large heavy parts and thus offers a wide scope of production.

High-performance and long-life production lines

Technology of Roth Composite Machinery is in the Filament Winding business now for almost 60 years. For more than 30 years market leading Filament Winding producers successfully rely on fully-automated production lines supplied by Roth Composite Machinery.

The handling of all kinds of fibres – from simple glass fibres to sensitive high-strength fibres – belongs to the company's expertise. As general contractor, Roth has the know-how for the conception of complete production processes from the filament winding technology to the demoulding. This includes the component design and development as well as the prototyping. Roth gives advice as regards the material selection – for example the use of fibres – as well as concerning all details of the manufacturing process. This results in high-performance, reliable and durable machines.

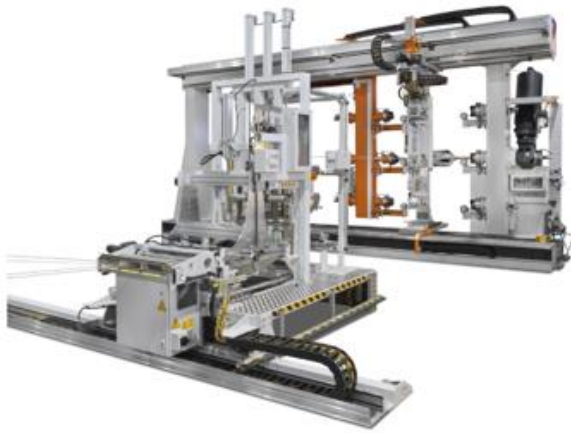


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Filament Winding Plant of Roth Composite Machinery for the production of hydrogen tanks.



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Besides R&D applications, the Filament Winding Plant can also be used for series production.

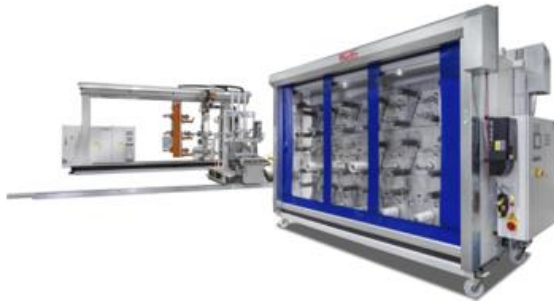


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For a user-friendly set-up, Roth Composite Machinery developed new spool fixtures at the spool creel.



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The control is effected via an ergonomic and user-friendly operating panel with two touchscreen displays for controlling the machine functions.

About Roth Composite Machinery

Roth Composite Machinery is an expert in the field of special machinery construction – the company develops, designs and builds components, machines as well as complete production lines in the business areas

- Filament Winding & Prepreg
- Pleating & Coating
- Brushes & Brooms

About Roth Industries

Roth Industries GmbH & Co. KG comprising various firms and around 1,300 employees all over the world is one of the most innovative companies in the areas

- Building Solutions - Divisions: Energy Systems, Sanitary Systems, Environmental Systems
- Industrial Solutions – Divisions: Composite Technology, Plastic Technology, Hydraulic Technology

The head office of the medium-sized traditional company is located in Dautphetal, Hesse. While the company's strategic direction, the controlling, auditing as well as the balance and financial planning is effected from there, the local employees are responsible for the development, production and marketing of the products.

28 production and sales companies of Roth Industries are acting all over the world - in core segments as world market leader.

Roth Industries bundles all activities of the companies belonging to the group in Germany and abroad. The company is owned by the Roth family to 100 %.

Competence in
● energy ● water ● plastics



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