

APPLICATION REPORT

Boenen / North Rhine-Westphalia und Altdorf-Landshut / Bavaria, September 2021



Photo: Döllken-Lighting

Fig.1: Doellken lighting solutions, shown here using the example of the exterior of a sailing yacht, offer not only safety but also attractive lighting effects and must in particular be seawater-resistant.

With the first injection molding machine to new shores

When a company that for many years has been one of the market leaders in extruded plastic profiles for the construction industry, for example skirting boards or technical profiles for industrial applications, orders and commissions its first injection molding machine, it must have very good reasons. The company is Doellken-Profiles GmbH in Boenen, North Rhine-Westphalia, and the supplier of the injection molding machine is LWB-Steinl from Altdorf/Landshut in Bavaria. The reason for entering plastic injection molding is the LED light strips developed by the Doellken-Lighting division, which have to be seawater-resistant for use on yachts, cruise ships or other outdoor areas close to water. As was to become apparent in the course of development, this can only be solved economically by using injection molding technology.

Skirting boards made of wood have been part of the interior design of buildings for many years, if not centuries. In addition, since the widespread introduction of plastics as an alternative to natural materials, increasingly came plastic skirting boards. This is mainly because extrusion molding can be used to produce hollow profiles or profiles with a complex structure on the outside, into which additional functions can be integrated beyond the design function, such as cable ducts and/or LED light strips. This is what Doellken Profiles GmbH, part of the German Surteco Group SE, specializes in.

With the building boom in cruise ships since the 2000s, there has been increasing demand for this, both for interior fittings and for exterior installations such as swimming pools or deck installations (Fig.1). As a result, water resistance, up to and including seawater resistance, became an issue. This meant not only that the LED light strips had to be tightly encased, but also that there had to be a tight transition from the profile to the cable connection (Fig.2). As an extrusion specialist, the company had its own solutions for the tight embedding of the LED strips, but not for the cable entry area.

The injection molding machine does it

The task was to develop the right technology and the right connection technique. But how to make the tight connection between the cable connection and the LED profile? One of the interim results of the test series was that an adhesive connection would not meet the requirements. Martin Kutzschebauch, sales manager at Doellken-Lighting, the Doellken division that focuses on this product group, had this to say: "We had a solution ready for the embedding of the LED strips based on our in-house know-how. But when it came to sealing the cable entry, we had to tread new ground. In the course of development, it became clear that this sealing could probably also be achieved by heating the partner parts and then pressing them together, or by using potting compounds, but that this would not be economically feasible beyond a pilot series production. We therefore had to examine other alternatives, in particular embedding by means of a plastic melt produced by injection molding, which had not yet been practiced in our company. Since one of our managing directors had already made positive experiences with LWB-Steinl injection molding machines in the past, we put these on our shortlist, along with those of other manufacturers, in the procurement process. After that, things took their course. LWB-Steinl was invited to get involved in the development process and design the appropriate injection molding machine for our job, which was positive throughout."

At the end of the selection process, a machine from the proven C-frame series for rubber processing was selected. Specifically, a version derived from this for thermoplastic processing with the type designation VCRS 300 / 36 I - tc P. It stands for a tie-bar-less vertical 300 kN clamping unit in combination with a likewise vertical 36 cm³ thermoplastic plasticizing and injection unit. "tc" stands for "Top closing" and "P" for the "Performance series" with an enlarged mold installation space and increased drive power (Fig.3).

C-frame provides free space for profile handling and a heating device

Analogous to the C-frame machines for rubber processing, with which, for example, sealing profiles are assembled by injection molding to form a circumferentially closed automotive window or door seal, in the application in question one to four LED profiles are inserted into the injection molding tool together with the connecting cables and overmolded at the profile end. In order to make this connection tight and force-fit, thermal activation of the profile contact surface was provided before injection molding. This is done using a linear handling device installed between the C-frame elements of the machine and carrying a radiation heating element. The latter is positioned above the profiles for a certain time after the profiles have been inserted and the cycle start triggered by the operator, in order to superficially heat the individual components. After retraction of the heating element, the mold is closed from above and the cable entry area is overmolded (Fig.4a+b).

The result is convincing

What seems so simple and self-evident at first glance is the result of several months of intensive cooperation between the product, machine and tool designers and, last but not least, the application engineers of both companies, as Doellken-Lighting sales manager Martin Kutzschebauch comprehensibly demonstrates using examples from the development diary (Fig.5).

The result of this cooperation has meanwhile proven itself on numerous ships, yachts, but also around pool facilities of hotels or in private reports.



Figures:



Photo Döllken-Lighting

Fig.2: LED strip lights are a growing business area for the profile manufacturer Doellken. An important feature is the tight (waterproof) connection between the light profiles and the power cable connection.



Photo: Author

Fig.3: The tie-bar-less vertical LWB-machine type VCRS 300 / 36 I TC P is the combination of an ergonomic 300 kN C-frame clamping unit with a 36 cm³ thermoplastic injection unit.



Photos: LWB-Steinl

Fig.4a+b: To create a tight connection between the molded-on TPU connector and the housing profile as well as the LED carrier strip, the components are surface-heated via a heating unit on a LWB linear handling device.



Photo: Author

Fig.5: Doellken-Lighting sales manager Martin Kutzschebauch (left) and LWB sales representative Stefan Nestele present the result of their intensive technical development cooperation.

about Doellken-Lighting



Döllken Lighting

Doellken-Lighting is a division of Doellken-Weimar GmbH specializing in the production of professional lighting solutions. Thanks to decades of experience in the extrusion of plastic skirting boards and technical profiles, it has been possible to develop LED strips that set a new standard both technically and practically. Highly resilient, waterproof and endlessly extrudable!

Doellken-Weimar GmbH is a plastics processing company that supplies the construction sector and the industry with technical profiles and skirting boards and is one of the market leaders in this segment. Since 2002, Doellken has been a strong and successful company under the umbrella of SURTECO SE.

SURTECO was formed from a merger of complementary German companies with a combined experience of over 400 years in the manufacture of decorative furniture surfaces and related products. SURTECO is represented on four continents with production sites and sales offices and employs more than 2,700 people worldwide.

About the Steinl-Group

Founded in 1962 by Alfred Steinl, the company is now managed by the second generation of the Steinl family and is one of the world's leading manufacturers of rubber presses and injection molding machines. The product portfolio includes the complete range of rubber and plastic injection molding machines, from vertical C-frame machines to vertical 4-column or plate frame machines, to horizontal machines in column and C-frame design.

LWB-Steinl currently employs around 250 people and builds around 500 machines per year.

In total, the Steinl group of companies currently consists of eight companies, which are divided into four divisions. The largest division is Mechanical Engineering, consisting of LWB Elastomer Injection Molding Machinery, LWB Automation the batch-off cooling system manufacturer Prodicon Ind. Srl and the injection molding machine manufacturer URP (United Rubber & Plastic Machinery Ltd in Langfang/China. In the stamping technology division, STG-Carrier GmbH produces metal scaffolding strips for automotive sealing profiles. The third division is Sealing and Bonding Technology with Drei Bond GmbH, a manufacturer of adhesive systems and the necessary application technology. The fourth division is biomaterial production with the company Biofibre, in Altdorf and the sister companies Naftex GmbH in Wiesmoor / Lower Saxony.

More under: www.lwb-steinl.de

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