The percentage of the total system cost represented by mounting systems – Influencing factors from the point of view of a metal-working company

Subject 4: Components for PV Systems; subsection: 4.2 Balance of system components

welser profile

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Introduction

Steel and stainless steels are widely used in CPV, CSP and PV applications, particularly in the base constructions of large-scale plants. The advantage of these materials is their worldwide availability, the possibilities of large-scale industrial production and their positive material properties.

The photovoltaic industry has grown into a multi-billion euro business worth around 65 billion euros. The manufacture and distribution of BOS (balance of system) components is an important part of the supply chain, but as modules become more cost effective, it also represents an increasingly large share of the overall costs. Mounting and installation alone accounts for one third of the total costs. These costs are to be kept to a minimum by selecting the most suitable materials when developing the mounting systems, using efficient production techniques or improving ease of installation by reducing the installation time.

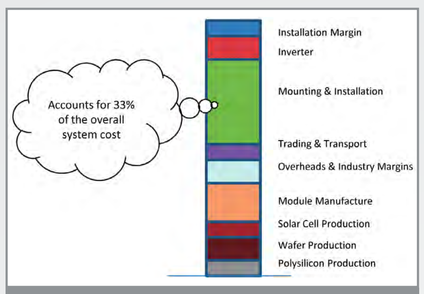

Fig. 1: Percentage distribution of the system cost

Requirements

The following basic requirements are taken into consideration when selecting the most suitable material for such sub-structures.

- **Static requirements:** If a tilt angle is required, it should be able to withstand different loads such as, snow, wind and the weight of the construction.
- **Operational site and environmental conditions:** Rate of precipitation, air temperature, humidity, coastal regions and various ground conditions.
- **Life cycle of the construction and measures against corrosion:** Use of alloys, surface treatment using alloys, protecting slit edges, strip edges and punched out areas, preventing contact corrosion of joints and support surfaces.
- **Ease of installation**

Cold Roll-Forming

The advantage of cold roll forming processes is an economic production for sub-constructions and for large scale CSP or PV power plants. Inline processes like punching or welding are used and state of the art. Special sections with integrated mounting supports reduce the installation time.

New Dimensions of Cold Roll-Forming – Optimization of the Strip Thickness integrated into the Production Process

The new brand ‚SmartXcellence' from Welser Profile also includes a new roll forming process, which is the answer to many requests and gives positive arguments for our customers:

- **Weight saving** due to the variation in wall thickness, optimized to meet the specification of the component.
- **Significantly reduced carbon footprint** over the complete supply chain.
- **Improvement of existing and integration of new functions**, due to thinning and thickening of the material in the cross section, such as optimization of the weld seam rating, design of the running surface ...
- **Optimization of mechanical properties:** Increased surface hardness, which in turn improves the longevity of running surfaces and telescopic profiles and tubes. An increase in strength makes the profiles more stable and increases load bearing capacity.
- **New optical design possibilities** of special sections with complex designs. The optimization of the strip thickness integrated into the process allows for a different design to opposite faces: Grooving or beading on the top face no longer excludes a flat bottom face.
- **Maximum protection against imitation** due to the exclusive design possibilities of the patented Welser forming technique: this makes it difficult to copy your products and distinguishes them from the competition.

The basis for the newly developed process was the increasing pressure in all areas of the economy in respect of conserving resources and reducing cost, as well as the search for diversification on the market with end products.

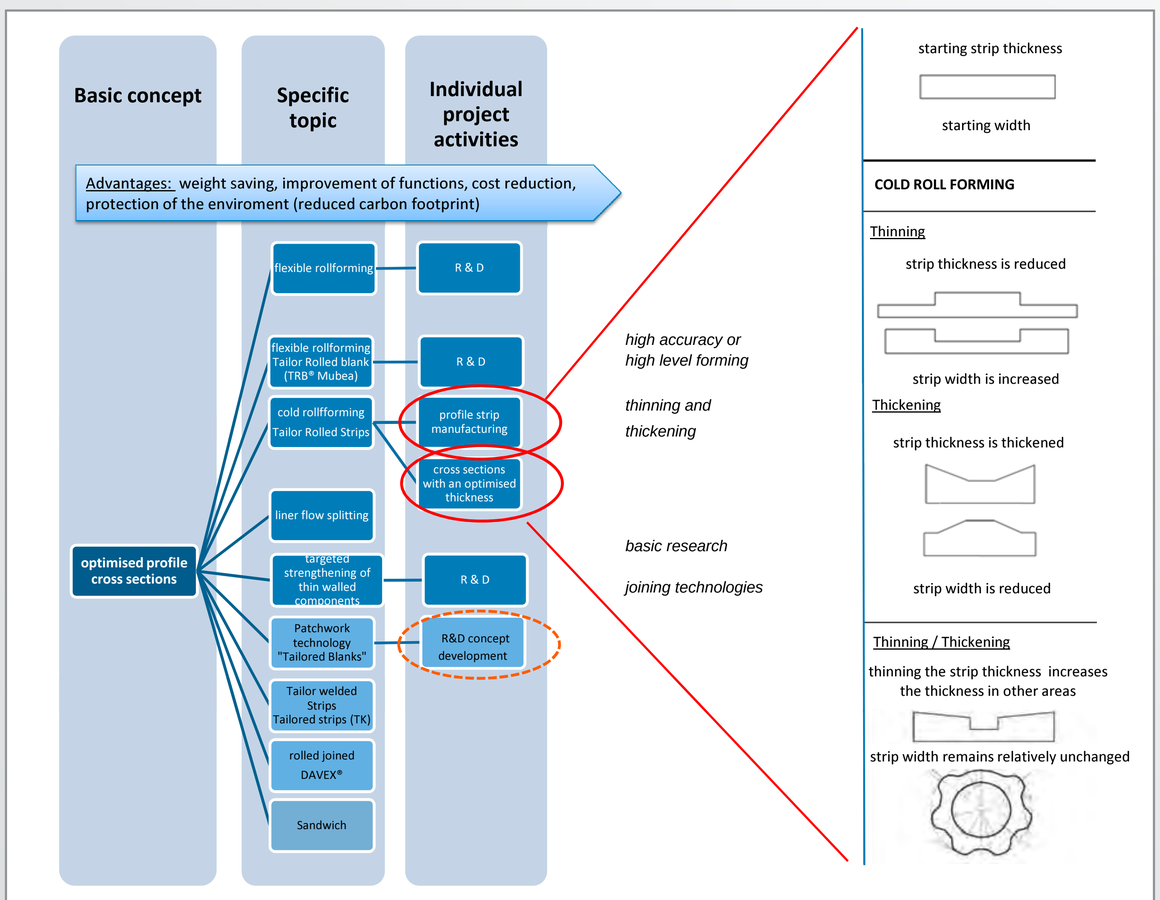

Fig. 6: Possibilities for optimization of mechanical properties and functions *(Source: Welser Profile)*

Fig. 2: Different sections for ST- and PV applications

Fig. 3: RP Technik BIPV Steel Façade system *(Source: RP Technik GmbH Profilsysteme)*

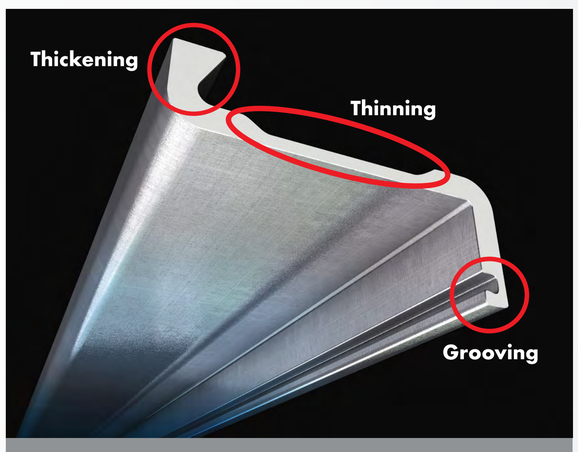

Fig. 4: Steel profile with varying wall thickness *(Source: Welser Profile)*

Fig. 5: Roll forming machine *(Source: Welser Profile)*

In the case of roll forming technology, a profile cross section can be optimized using a variety of techniques. The first stage is altering the material grade and dimensions. If such measures of optimization are not extensive enough, a solution could possibly be found by altering the cross section. The graph highlights how strip material with the same strip thickness can be varied. Some of them are widely available on the market, while others are more bespoke and only apply to niche markets and some are still in development (Fig 6).

Market view and conclusions:

Economical solutions can be developed for large free-standing PV structures, particularly with steel, due to the large production quantities. In this case, roll forming would be the best option, because it is the most economical production process. The material cost of a mounting system generally accounts for around 70-80% of the overall system cost, regardless of which pre-material is used. As a result of the high level of automation in the European industry, significant cost reductions can only be achieved by introducing measures to increase efficiency, such as tightening up lead times and increasing production quantities.
In countries with ambitious development plans involving renewable energies, local production is often a requirement, thus influencing their attractiveness. Also in some cases, punitive tariffs are imposed on imported products, special certificates and permissions are required or on the other hand, subsidies are offered on exports in core countries. If a European supplier of system solutions opts for local manufacturing in these countries, the quality level of Europe should also be transferred to the host countries as a seperate claim for the reliability of the finished products. Problems arise here that have influence over the whole supply chain and can even affect aluminium and steel pre-materials.

Fig. 7: Dual-axis tracking system *(Source: FH FJ Wieselburg)*

The high level of quality required by the customer and long functional life required of the photovoltaic systems should also be taken into consideration, so that a structure with mounting systems made in Europe in the short and mid term is still an advantage. The most common challenges include different quality standards and tolerances, insufficient pre-material availability, inadequate production facilities – tooling, precision, general production feasibility and reliability of the partner on site.