



ANALYSIS

The Choice: The Ecological Transition and the HangOn Green Effect

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Today, the issue of energy savings achievable through maximum efficiency of production processes in general and of the coating department in particular is more topical than ever. In this detailed analysis, Adriano Antonelli, the sales manager of Ibox Srl – Tecno Supply, explains how carefully designing a workpiece hanging system can help reduce the energy resources consumed for the coating phase, cutting costs and increasing the lines' efficiency.

An era of checks and balances is ending that has allowed the international economy to operate in a stable socio-economic environment until recently, providing the conditions for steady and progressive growth over the long term. Above all, Europe was able to receive raw materials such as natural gas and oil at competitive prices from Russia and North African countries. The absence of turbulence allowed for adequate supply without the need for new providers and

infrastructure. The Chinese market enabled us to buy many products as if we were in a deflationary condition. Low-value-added products such as textiles and components, for example, were relocated to exploit cheap labour and loose regulations compared to those in the EU. The US' supremacy and international policy maintained a balance in the most unstable areas by avoiding possible military interventions. The climate issue, even if it already existed, was not as pressing in public

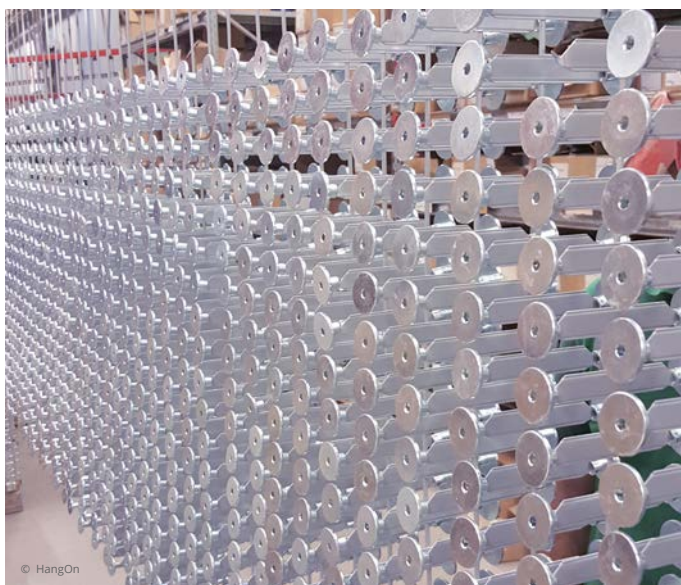


Figure 1 - Part hanging density can be decisive in achieving significant savings in the coating process.

opinion and did not affect the lives of citizens and businesses at a regulatory level.

All this seems to have crumbled in just a few years. The Chinese market's growth is considered weak: China's aggressive international policy implemented through state aid has flooded the European markets with its products. Unfortunately, these are no longer only low-end products but mainly value-added goods such as solar panels and, soon, electric cars – two significant examples of how below-cost selling supported by state subsidy is destroying long-standing and strategic national industrial fabrics in Europe. American policy seems to have changed, focusing more on national borders than on international ones. The previous President's slogan, "America First", drew a clear dividing line with the past: no more investments to act as "the international sheriff" but projects to support the country's own economy and domestic affairs. The withdrawal of troops from countries needing to be stabilised and, above all, from international cooperation projects are the consequences of the new administrations' choices. Failure to desist from military interventions has resulted in the start of micro-wars in strategic areas such as Russia-Ukraine and the Middle East. Sanctions imposed on some countries and government instability have reduced the supply of vital raw materials for our economy.

The climate issue and its related political choices are leading to some questionable regulations. Imposing the use of electric cars by a specific date without the possibility of developing alternative technologies to achieve the same objective, i.e. reducing emissions, could mean completely passing the ball to the Chinese market for the next few decades, which is far ahead of the Western market. This would result in



Figure 2 - The HQW D frame is designed to be used when a sudden need arises and to avoid hanging hook after hook.

losing jobs and skills in many fields and market segments. Some warning signs are unnerving the financial markets: the risk of recession looks just around the corner. Until recently, for example, one would have predicted a soft landing for the US economy, keeping the cost of money almost stable and with a strong labour market at its peak. However, this has been disregarded by the latest surveys, which, together with the percentage reduction in American buyers' purchasing power in the last quarter, were further signs that destabilised the stock markets.

At the same time, climate change calls for further corrective actions in our companies. Reducing emissions, making production more efficient, and starting the transition are now compelling objectives. They are demanded by regulations, markets, and customers, as well as the possibility of increasing profits. Future partners will be selected based on environmental efficiency passports.

Energy efficiency is actually a topic that goes beyond purely environmental issues, especially because it has become a significant part of European and national regulations. For example, not to be underestimated and to be studied in detail is the Transition 5.0 Plan recently launched by the Italian government. The programme aims to support investments in the green transition through tax credits. The companies that successfully reduce their production units' energy consumption will be rewarded. In addition, investments in the self-production of energy from renewable sources and staff training to consolidate green knowledge and technologies will be supported. The Decree is intended to help companies in the challenges of digitalisation and sustainability, two areas in which international economic balances

are likely to be redrawn. Finally, tax credits will be granted for investments in production facilities within the Italian borders that are innovative in terms of consumption of energy resources.

Maximum efficiency in coating

Let us look at the latter aspect, starting with how a coating department can be efficient and

sustainable. The aim should be to increase density and thus fill the production line. Before describing some solutions to improve the efficiency of a coating operation, let us analyse the consumption and CO₂ values of surface treatment processes, although we can only do this in a general and approximate way in the space of this article. A coating line emits CO₂ due to energy consumption in the various

phases of pre-treatment, coating, baking, etc. The energy source can be electricity, a combination of electricity and gas, diesel, or LPG. The environmental footprint changes dramatically depending on this and on how such energy is produced. Coal-fired electricity, for example, produces over 30 times more CO₂ emissions than hydroelectric power. Powder coatings can play a decisive role in calculating the CO₂ produced by the treatment cycle, depending on the hanging density (**fig. 1**). Finally, hanging with hooks and other equipment can result in entirely different emission rates. The use of suitable tools, therefore, can change the line's efficiency and, thus, its results.

The HangOn Green Effect

So, what is the HangOn Green Effect? It is the idea that a smart hanging solution ensures maximum density, enabling to achieve the goal of filling the line and increasing the amount of parts that can be coated in one cycle. It should be considered that 80-90% of energy consumption in a coating cycle is constant, regardless of the amount of coated workpieces. That means that increasing the hanging density reduces CO₂ consumption per painted product, thus reducing costs and, consequently, increasing profits.

Frames

What types of hanging systems can be implemented to bring about a green transition in a coating department? One example is our HQW D system, a 2 mm-diameter tree-shaped frame with fixed hanging points (**fig. 2**). The range is vast, so every customer can choose its ideal pitch. To have a compact frame (also in terms of packaging, like a box of hooks, for example), the top hanging must be done using a separate hook. This frame is designed to be used when a sudden need arises and to avoid hanging hook after hook. This is key because "chain" hanging results in longer hanging times and significantly fewer pieces than the HQW D solution. At www.hangon.it, you

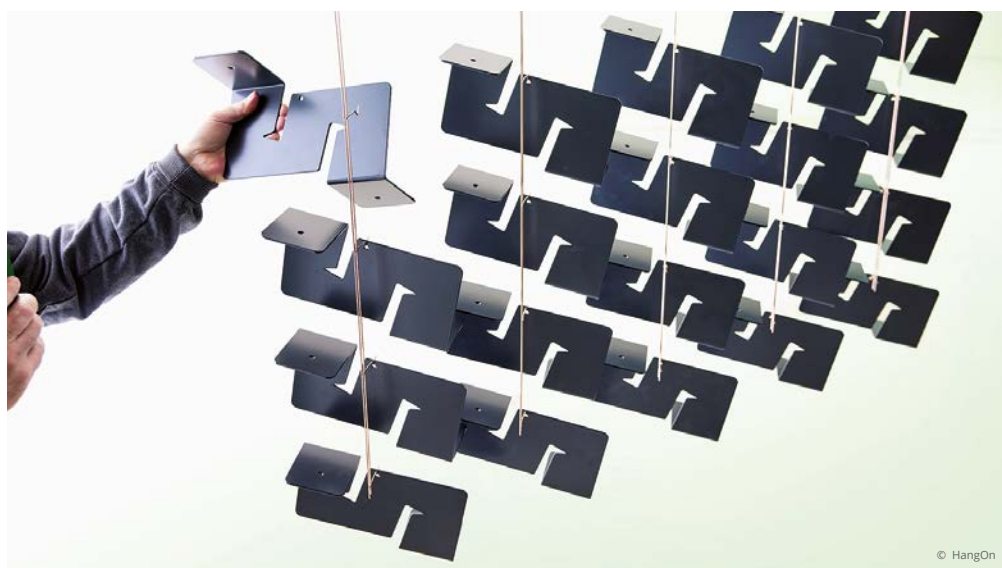


Figure 3 - The new HQW S system has an upper hook oriented at 0 and 90°.

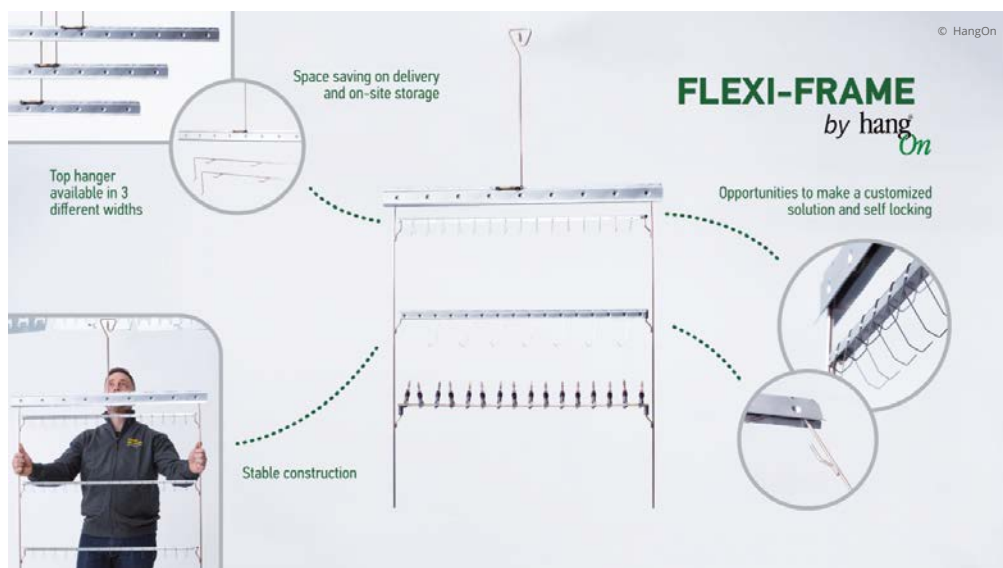


Figure 4 - The Flexi-Frame system's diagram.

can find some spreadsheets to test the savings you can achieve by entering your data, but also videos that give you an idea of how this application works. The cost per hanging point is similar to that of a single hook (the total is less than 1 Euro), so the issue of regeneration does not arise.

On the other hand, the new HQW S system (**fig. 3**) is complete with an upper hook oriented at 0 and 90°, and the hooks have a variable distance. This economical frame avoids improvised hanging with hooks, which can lead to a loss of density and efficiency. The 2 mm-diameter hook and the reinforcement along the frame's entire length guarantee hanging stability.

A further solution that ensures maximum flexibility is the Flexi Frame system (**fig. 4**). Its core concept is a frame that can be completely disassembled and stored on a shelf. The frame consists of a T-shaped bar housing two horizontal bar holders. HQL, HCL BHL, H11B, and HQS bars can be accommodated. This system is designed to be stocked and then used in case of urgent need.

It guarantees several advantages, including as follows:

- saving storage space and reducing storage problems;
- lower transport costs, including one-off ones;
- easy handling;
- flexible and compact design;
- self-locking;
- customisable as required;
- reduced cost.

The newest addition: the HQS frame

The HQS frame (**fig. 5**) features metal slats for hanging elements from individual parts to profiles. The central 4 or 5-mm hook guarantees an overall frame resistance of up to 100 kg. This frame model has been recently launched on the market with various types of hooks, with which each customer can find the best configuration for its specific use. The tree can be up to 2,400 mm long, whereas the slats are 1.0 mm thick and 18 mm high. It is possible to create different slat configurations, e.g. sheared (i.e. on one side only), zigzag-shaped, or bent from 0 to 180°. This type of frame was designed to avoid using individual hooks. It is manufactured automatically, guaranteeing a low cost equal to single hooks. The new configurations made available allow the users to find the appropriate hook shape for every workpiece to be hung. Another innovation is the adapter that enables HQS frames to be extended using standard or currently available hooks. The HQS frames can be used for hanging small parts, but also workpieces with varying weights, including profiles.

Bars

The HQL bar (**fig. 6**) is produced fully automatically, reducing costs and eliminating the need for regeneration. Hooks with a diameter

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Figure 5 - The HQS frame features metal slats for hanging anything from single workpieces to profiles.

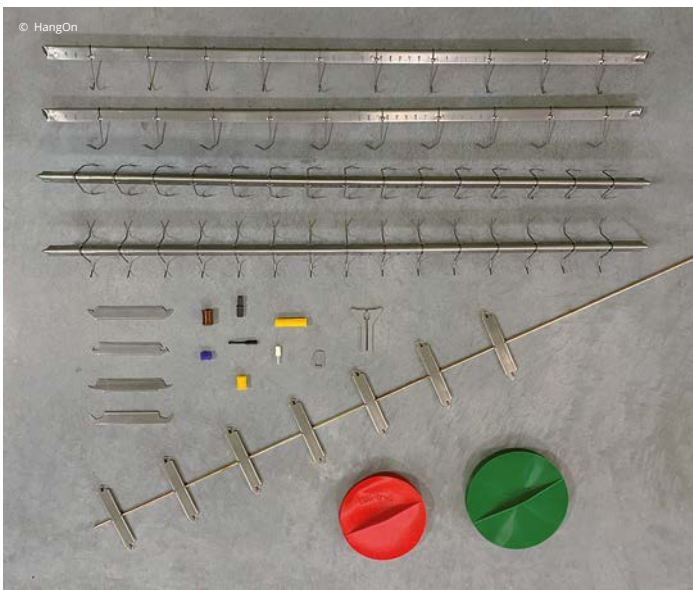


Figure 6 - The HQL bar is produced fully automatically: here, hooks with a diameter of 1 mm can be inserted on both sides to hang the workpieces symmetrically.

of 1 mm can be inserted into it on both sides to hang the workpieces symmetrically. For example, the 800x33 HQL bars accommodate 46 hooks over a length of 800 mm. The bars can be inserted into the HCF universal system. This makes the system modular and enables bars to be inserted according to the length of workpieces. Moreover, the HQL G6 caps guarantee perfect electrostatics. 1.5 mm-hook bars in spring steel are also available for small, heavy parts. Different configurations are available in the range, including the triple-bend one, which provides more secure anchoring for light workpieces that could be lifted into the air during pre-treatment. HQL bars for single-sided hanging are also available, in case it is necessary to hang parts only on one side and thus avoid any shading effects and other issues.

The advantages of using this bar are numerous:

- time savings: it is possible to achieve a speed that is 30 times higher than with single hooks;
- the hooks leave only a slight mark on the coated parts;
- spring steel material;
- possibility to configure the bars with special hooks;
- smart packaging to reduce transport costs.

A more robust version of the HQL bar is the HQC one. It accommodates hooks with a diameter of 1.5 mm, but only on one side. Its coupling allows hooks to be inserted into a central 10 mm-diameter one. The R 58 bar holder enables the bar to be stable and easily removed, also thanks to the BH G 20 cap. The resulting frame is economical and flexible, as it is also possible to avoid filling all the levels. The hooks have a pitch of 50, 75, or 100 mm. This bar type was also designed to avoid using individual hooks, dramatically reducing the operators' hanging time. Indeed, the availability of a ready-to-use frame eliminates the need to handle single hooks. In addition, it allows for easy offline pre-hanging. Another advantage is that it can be used for multiple hanging configurations. This bar's production technology makes its cost similar to an individual hook's. Therefore, there is no extra cost for purchasing frames rather than standard hooks. Finally, to make this frame even more versatile, a new metal adapter was launched that also allows H11B bars to be inserted. This way, using the same central hook, a bar can be accommodated that allows hooks up to 4 mm in diameter to be inserted, thus achieving horizontal flexibility.

The H11B bar is a punched bar inside which hooks are lodged. That ensures clean and protected contact points as well as the flexibility to change the hanging hooks whenever necessary. Standard or twin hooks can be used with the same bar, fitting between the two punches and remaining fixed. As far as twin hooks are concerned, any configuration can be chosen for even greater flexibility. This bar is highly durable (HangOn has assessed and wrote a report on the weight it can support depending on the length). Even more robust H2B, H25B, and H3B versions are also available. These bars can accommodate hooks up to 10 mm in diameter. Hooks can be welded at their ends to obtain a T-shaped frame. That guarantees part stability, whereas the system's modularity allows hooks to be inserted where needed without

losing conductivity.

The HCL bar has housings for inserting springs or hooks made from round rods or sheet metal. Its ends are protected with silicone caps that allow easy removal and ensure conductivity. It can have single or double housings to increase hanging density. It is, therefore, extremely flexible, eliminating the need to build a different frame for every part to be coated. Special accessories can be created depending on the workpieces. Two springs can be accommodated inside the hook holder with a 4-end outlet. This bar can also be used for cataphoresis processes thanks to a cap system that protects its ends and prevents the coating product from climbing up.

The flexibility of the HCF universal frame allows using interchangeable bars and, in some cases, bars with accessories that can be inserted depending on the workpiece to

be hung. This leads to a significant reduction in the number of frames required for the different workpieces processed, in the space needed for storage, and in the possible handling problems. The universal frame can also be used for cataphoresis operations: the structure remains the same, but the bars and accessories are changed to guarantee maximum conductivity. Already welded bars with universal hooks are available in the range, allowing for minimal contact. For greater flexibility, we also offer hook holders where universal accessories and, at the top, protective caps can be inserted.

Magnets

Another interesting application is the use of magnets (fig. 7). In cases where no metallic paint is applied and where it is acceptable to have an unpainted area on one of the two faces of the metal workpiece, magnets can be employed for hanging.



Figure 7 - In cases where no metallic paint is used and where it is acceptable to have an unpainted area on one of the two faces of the metal workpiece, magnets can be employed for hanging.

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Figure 8 - Besides the automatically produced and standardised HangOn range, frames, hooks, and systems can be tailor-made according to customer requirements.



Figure 9 - HangOn's trolleys are designed to be modular and flexible and to be combined depending on the type of frame used.

faces of the metal workpiece, magnets can be employed for hanging. That makes this delicate preparatory phase quicker and trouble-free, especially when there are no holes. Our range includes different magnets depending on the weight to be supported. Silicone masking systems always cover the magnets to prevent them from getting dirty. In addition to the automatically produced and standardised HangOn range, frames, hooks, and systems can be tailor-made according to customer requirements (**fig. 8**). One-step hanging and masking solutions reduce time and avoid excessive product handling so that the required quality targets are achieved without neglecting hanging density and speed.

Trolleys

Implementing trolleys offers the possibility of managing treatment processes even better (**fig. 9**), having become essential to reduce process times and increase density. In-line hanging may not be efficient in terms of density when it is not possible to adequately fill the m³ available within the line handling time. Trolleys allow pre-hanging and handling the parts to be coated within the factory. HangOn's trolleys are

designed to be modular and flexible and to be combined depending on the type of frame used. If switching among frames with different coupling devices or sizes, trolleys adapt to the various requirements to perform two functions: that of allowing pre-hanging and bringing all the frames on the coating line and that of storing unused frames in an orderly manner. Special trolleys can be designed according to the various requirements posed by the components' characteristics.

A new calculation tool

A tool that can be useful for moving from ideas to figures and comparing different hanging systems is the new CCC calculation system on the website www.hangon.it. Business data such as the cost of powder, the number of people employed on the line, machine costs, and process times can be entered here.

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