Batch size one: bespoke manufacture on a grand scale

The Orgatec left no-one in any doubt: Zero joint edge coating has already become the new standard in office furniture. Leading office furniture producers are currently upgrading their production to laser technology – or have already completed the transition. One of these is Palmberg, which has concentrated its efforts not only on laser edge technology but on rethinking its entire production process.

One-piece-flow, flexi production, batch size one – whatever name you give it, just-in-time production is increasingly becoming the solution of choice for producers required to complete bespoke one-off customer orders on a daily basis. Office furniture producer Palmberg recognized the trend from an early juncture, and began as early as 2008 with the first phase of a conversion process in the plant used to produce its in-house manufactured components. The process of conversion to this method of manufacture has now been completed in a second phase. “Flex 1” and “Flex 2” are the names given to the two production lines which have been implemented using components from the HOMAG Group, and encompass the entire flow from warehouse to stacking, including edging using laser technology.

The big day finally arrived on September 12, 2012 when the second Flex plant was ceremoniously inaugurated. This momentous day was preceded by a minutely planned and meticulously executed conversion process encompassing a total of 397 project points to turn old into new. During a core period of just three weeks in June, the machine dismantling and new installation process was completed. “It was hard slog, but thanks to a great joint effort which saw our employees pulling together with the HOMAG Group team, we were able to witness planned deadlines and milestones adhered to and fulfilled”, recalls Friedrich Henning, Head of Engineering at Palmberg.

Hard slog only inadequately expresses what it means to load and unload over

50 trucks laden with a total cargo weighing just under 400 tons, set up the machinery and then network the line control system. The installation process started on June 1st, 2012, and by July 16th the first part passed through the new plant. By September 10th, the day of our visit, just two days before the official inauguration ceremony, the production intranet had just registered a brand new output record of just under 510 parts per hour: A ramp-up curve which had significantly exceeded our plans.

Based in Schönberg in the region of Mecklenburg east of Lübeck, and only around five kilometers as the crow flies from the Baltic Sea, Palmberg must be one of Germany's most northerly furniture manufacturers. Its history stretches back to the year 1922, and was (naturally) shaped by the years under the GDR regime with its state ownership and affiliation initially to the furniture collective combine Möbelkombinat Nord and later to the Schwerin Furniture Factory. When the border was opened up in 1989, the former Technical Director Uwe Blaumann negotiated the release of the company by the trust from its affiliation with the Schwerin furniture plant, resulting in the formation of Palmberg Möbel GmbH on 1st September 1990 with Uwe Blaumann as its Managing Director.

HOMAG involvement from the "zero hour"

Precisely one year later, after switching its production from bedroom to office furniture – with the help of HOMAG – the company was privatized. "HOMAG was there right from the 'zero hour' and supplied Palmberg with its very first edge banding machine". Today, the Mecklenburg-based firm is among German's top 5 office furniture suppliers, employs a staff of 440 and still swears by machines from the HOMAG Group. Henning explains the reasoning behind the decision to go with a single-source supplier: "Given the enormous degree of networking required with this number of different plant components, using a single manufacturer simply offers us greater security as regards data flow and all the different processing steps involved".

With an engineering graduate at its helm, the course charted by the company was always going to be technology-driven. The ever growing number of

individual customer demands were the underlying factor behind Palmberg's decision to invest in its first batch size 1 plant in 2008. Even back then, the HOMAG Group with BARGSTEDT (storage, transport and stacking), HOLZMA (sawing) and HOMAG (edge processing) supplied the production technology at a total investment volume of around three million Euro. Internally manufactured components with panel thicknesses of 25 mm and 19 mm have been produced here ever since in a 2000 sq.m. hall, since February 2011 also including laser edge technology.

"The fact that we were able to gather experience with the first Flex plant was an invaluable bonus", explains Head of Production Klaus Lutz. "This high degree of networking takes a lot of courage. But the good process reliability, availability of up to 90 per cent and, importantly too, the impressive level of edge quality achieved with the zero joint, where what persuaded us to also convert the remaining section of our component production using hot-melt glue for longitudinal edge processing over to flex production with laser edge for the panel thicknesses 19 and 16 mm, as well as 8 mm for back panels." This change meant investment of a further 7.5 million Euro for Palmberg.

But this was easier said than done, as the geometry of what was known as Hall 2 with its area of 3800 square meters did not permit the same U-shaped formation to be planned as was used in the Flex 1 plant. The solution was found by HOMAG Group Engineering with Project Manager Andreas Holz and Roland Dargel working in cooperation with the Palmberg Plant Management in the form of a large flat "S" shape which meanders through the hall from the warehouse through the sawing and edge banding machines to the stacking station.

The saw is controlled by the storage system

The two BARGSTEDT area storage systems are loaded via two storing place and work according to the "storage system controls the saw" principle. The dual-axis area storage system "TLF 610 Profi Line" makes available the up to 7000 19 mm panels in 62 storage locations, while no more than 4750 panels with a thickness of 8 mm are distributed over the 17 storage locations of the

single-axis storage system “TLF 411 Optimat”. Every week, Palmberg processes around 5000 half-format panels with a distribution of over 96 different types. Waste pieces which are returned to the warehouse for chaotic storage are generally given a barcode label. Absolute panel availability is ensured by a permanent automatic inventory of all storage systems – just one of many functions performed by the storage control system “wood**Store**”, which also takes care of preparatory raw panel sorting.

Two “HKL 380 Profi Line” angular plants from HOLZMA are used for dividing the 19 mm panels, and are capable of cutting 8500 parts in two shifts. In the majority of cases, only one panel is cut per order in line with the batch size one principle, although the plants are capable of cutting complete books at any time. The pre-stacking table ensures a free-flowing infeed process into the saw, and the rotary fixture simplifies the process of performing head cuts. Both cross-cutting saws are also equipped with the HOLZMA “**power**Concept”. These separately traversable collet chucks allow several strips to be simultaneously divided into different lengths. The parts are automatically labeled at the pressure beam of the two cross-cutting saws. As each part is assigned to a production order and can be identified at any time throughout the entire production process, the label is responsible for the fully automatic triggering of downstream processing steps.

A HOLZMA “Profi HPP 380” stand-alone saw processes the 8 mm thick panels, both individually and also in books. This is used predominantly for sizing the back panels of cabinets and subsequent sawing of missing parts. This allows Palmberg to maintain a constant material flow in the angular plants. “A batch size 1 plant stands and falls by the organization of missing parts, as our in-house part production works entirely without a storage system”, explains Friedrich Henning. “The parts are produced specifically to order with a lead time of no more than one or two days”. At Palmberg, missing parts can be cut to size without interrupting production and then introduced into the standard process at any time. This system now works so well that the quota of complete deliveries leaving the factory is almost 100 per cent – a remarkable achievement given the

daily cargo of around 350 desks, 300 pedestals and 800 cabinets which roll out of the factory every day in the company's own fleet of 20 trucks to sales regions in Germany, Benelux, Austria and Switzerland.
The parts cut to size in the Flex-2 line are manually removed from the angular saws and transferred to transport lines, collated at the end into 2.5 m long layers and then fed directly for edge processing by a transfer gantry, or entered into a BARGSTEDT chain lift storage system with capacity for around 100 parts. "This decouples the sawing process from the edge processing operation, and allows the plant to take a breather", says Lutz. "After this, things really speed up with a feed rate of 30 m/min." The parts destined for the processing center and the waste pieces are returned to the storage system via the transfer gantry or are diverted via the storage system.
Part sizes can range between 100 x 300 mm and 1200 x 2500 mm. Klaus Lutz explains one of the benefits offered by the four one-sided "Power KLF/KFR 610" HOMAG edge banding machines: "This part diversity allows us to put through practically any special-purpose production order as standard, as all parts are treated equally".

Four single-sided laser edging machines in series

They are linked by double angular transfers, transfer and rotating stations and each fitted with a **laser**Tec gluing unit. All four machines work with an "MF 21" multi-trimming unit for different profile formation at the edging materials. Any required grooves are trimmed into the material using "SF30" automated standard trimming units. Machine1 is additionally fitted with a reference edge router to create a parallel edge and a depth cutting unit. This exerts a positive impact on the optimization result and processing time required by the cutting saws. "FK 31" profile trimming units in machines 3 and 4 take care of corner copying functions – coupled with short resetting gaps during profile resetting. The final finish is imparted in all four machines equally by "MN 21" multiple scraper blades.
The S shape described by the four edging machines is the special feature of the

plant. This allows edging magazines positioned opposite each other to be set up with 24 coils each in only two locations within the 180 degree curves. “This offers a tremendous bonus for the operator”, explains Lutz. Our IT specialists have also developed an edge preview which is perfectly coordinated for our needs, allowing us to master the wide variety of available decor finishes and matching edges. This is a great example of how the machines reflect the needs of the organization at Palmberg rather than the other way around.”

Once the longitudinal edges have been approached, the zero line changes over from left to right by transportation over an inclined roller conveyor. The rotary transfer rotates the workpieces by 90 degrees. Special stop rails in the infeed system (“SI14”) of machines 3 and 4 take care of angular accuracy, and transverse edge processing can begin. Because the processed edge of the parts is now shorter, the feed rate changes to 20 m/min. At the end of the processing line, the finished workpieces are intercepted by two robot cells which are responsible for around 90 per cent of the stacking. The remaining 10 per cent of parts travel to a porcupine buffer storage system which, like the robot cells, is supplied by LIGMATECH. The next station with its 345 storage locations is then the stand-by and order picking area for assembly.

After only a few weeks, the Technical and General Management at Palmberg are already delighted with the results. “The investment has paid off and the concept has achieved everything we had hoped”, sum up Klaus Lutz and Friedrich Henning. “Material stocks and storage costs have shrunk, cutting waste has been minimized, part production flexibility has maximized and importantly too, the quality of our products has been significantly further improved. The zero joint is undoubtedly here to stay”. At the Orgatec office furniture fair in October 2012, this prediction was shown to be accurate as the collections presented by the leading office furniture manufacturers were already sporting zero-joint laser edges.

Copy and pictures courtesy of HK 6/2012, Editor Carsten Krüger

Fig. 1:
Graphic depiction of batch size one: Every item of furniture is treated equally in production, different parts follow in sequence.

Fig. 2:
A specially developed edge preview takes charge of handling the wide selection of different laser edges.

Fig. 3:
Head of Production Klaus Lutz (left) and Head of Engineering Friedrich Henning at the monitor of the BARGSTEDT storage system.

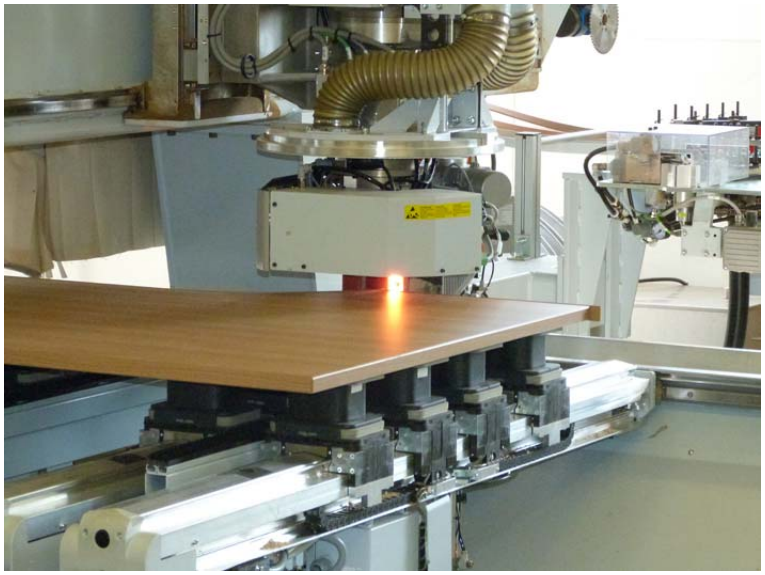

Fig. 4:
The freeform sides of the furniture components are also given laser edges at the processing centers.

Fig. 5:
View of one of the 180 degree curves in the S-shaped production line where two edging magazines are positioned opposite each other.

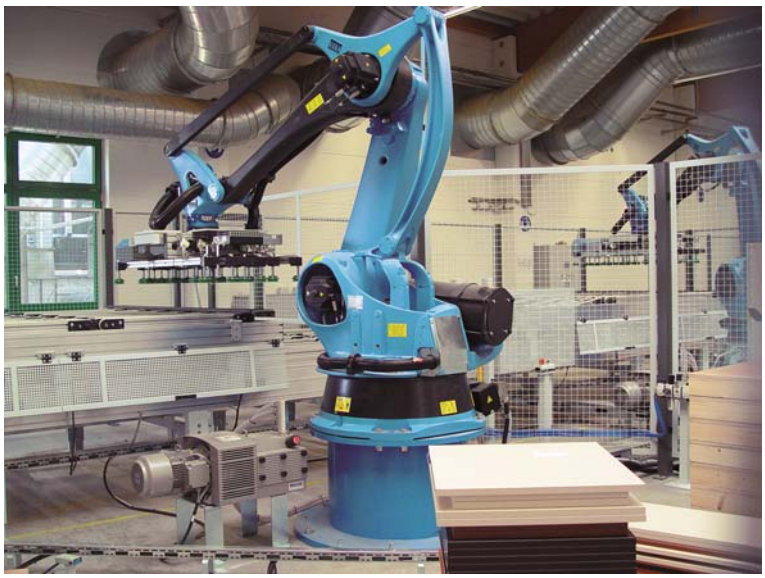

Fig. 6:
Two robot cells take charge of stacking the furniture components at the end of the production line. Only around one in ten parts travels into the porcupine buffer.

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