

**HARMONY REDUCES LEAD  
TIMES IN THE  
GOLDMANUFAKTUR**



**CUSTOMER**

MONTBLANC  
22525 Hamburg

**PROJECT**

Reorganisation of production  
and material flow

**CASE STUDY**

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## ANALYZE - SIMULATE - AUTOMATE

The nibs in the expensive Montblanc fountain pens are truly handcrafted. But even in the noble manufactory, production processes have to be optimised and made fit for the future. In addition to reducing throughput times, a team of experts also reduced inventories and adapted the flow of materials.

Montblanc stands for quality and luxury. The company also wants to be top in its processes. After the production control of the gold feather manufactory was made efficient, transparent and clear through the introduction of electronic planning boards about two years ago, the next big challenge was now on the agenda: the reorganisation of production with the aim of greatly reducing throughput times and circulating stocks.

### Challenge

In order to achieve this goal, the

- the material flow and the department layout were completely redesigned and rebuilt,
- reorganised production into production segments (production blocks) and
- expanded production control to include a Heijunka component for levelling and smoothing daily capacity requirements against fluctuations in incoming orders.

The manufacturing process of the spring unit production is very complex. It resembles a manufactory with flow production. These spring units are manufactured exclusively by hand. The manufacturing process consists of up to 35 different work steps.

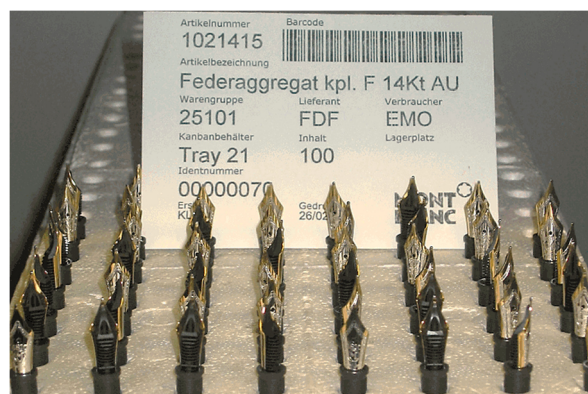
The high number of variants and the daily changing bottlenecks in production due to demand are now mastered quickly and efficiently by electronic planning boards. This was a basic prerequisite for the reorganisation of the Goldfedermanufaktur to reduce throughput times and stock in circulation.

### Material flow optimisation and layout planning in detail

Grown departmental structures at Montblanc and new investments in recent years had meant that the material flow in the department no longer met the requirements of uniform material flows. The challenge was to optimise the material flow of the three production groups within the existing, relatively cramped premises. What was to be achieved was:

Furthermore, some additional boundary conditions had to be taken into account, such as the expansion of the laser technology competence centre and the grouping of all hydraulic presses in a closed space (noise reduction). As a result, all requirements including the additional boundary conditions could be met. The new layout is much "tidier" and has also created additional free space.

The actual material flow in the three production groups was designed and implemented in a so-called U-layout. However, the initially favoured approach could not be realised in the existing Montblanc



*Image 1: Montblanc's fine fountain pens come with a gold nib. Logistics experts optimised the flow of materials in production with the employees.*

premises. When checking its feasibility in the layout planning, it quickly became apparent that the width of this layout was too large to integrate all three production groups into the existing premises. A material flow in a U-layout with a central material supply rail was therefore chosen.

#### About >>>

**Montblanc International GmbH** is one of the leading manufacturers of high-quality writing instruments, wristwatches, jewellery and leather goods. The company has its headquarters in Hamburg, where about 1,000 of the 3,300 employees worldwide work.

Although writing instruments are still the mainstay of sales, since the range was expanded in the mid-1990s, more than 40 per cent of revenues come from the leather goods, wristwatch, jewellery, accessories and perfume business.

[www.montblanc.com](http://www.montblanc.com)

This solution requires considerably less space than a "classic" U-layout approach. The material flow in the new U-layout begins in Montblanc's production at the welding workstation with the welding of an iridium ball.

After the production order has been processed at other workstations, the material leaves the department for the first time after the operation of setting. In the vibratory finishing department, the springs are tumbled (deburred). There are a total of three interfaces to external departments during the entire production process (vibratory finishing, rhodium plating, washing).

A central "goods issue" collection point was created for these goods issues. It is centrally located in the immediate vicinity of all three production groups and can be reached by a

short route. This collection point is divided into three areas: Each external further processing has its own area from which the employees collect the material independently.

### The new collection point: Montblanc goods entrance

After external processing, the material is transported from these departments back to the specially created staging areas (internal/external interface) in the gold spring manufactory (Fig. 2). These staging areas are located directly next to the subsequent operations, which means that the material awaiting further processing is immediately visually recognisable.

The supply areas and the central material supply rail thus ensure maximum transparency in the production groups with regard to the material waiting to be processed. Apart from the last operation, the so-called writing, where invisible ink is used to test whether the nib also glides "effortlessly" over the paper, only the polishing operation was not integrated into the U-layout. An integration would have forced a complete encapsulation of the plant within the U-layout and thus would have "blown up" the U-layout.

The central component in order to be able to greatly reduce throughput times and work-in-process inventories is the reorganisation of Montblanc's production into manufacturing segments. The new material flow and the new U-layout take this reorganisation into account and support it.

Compared to the previous workshop-oriented production, the production in segments (production blocks) could drastically reduce both throughput times and circulating stocks. The ideal situation would be to organise the

entire Montblanc production in just one segment. Following this approach, the aim was to keep the number of segments as small as possible and the number of operations per segment as large as possible. During the Montblanc manufacturing process, the nib aggregates have to leave the gold nib manufactory several times in order to be further processed in other departments.

This structure, which cannot be dissolved, determines the segment boundaries: they are always located where the spring units leave the spring production (end of segment) or are fed back into the spring production (beginning of segment). Between these "natural" segment boundaries, it was possible to design a continuous flow production.

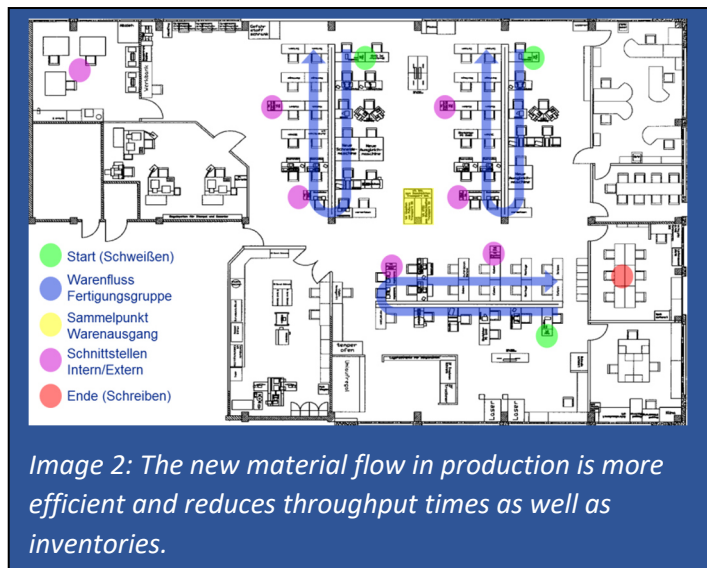
### Advantages for lead time and work-in-process (WIP)

The new Montblanc production structure thus has four internal and three external segments. A production order must pass through all the operations of a segment (internal or external) within one working day. The ideal lead time for a production order would thus be 7 working days instead of the previous average of 33 working days.

However, 10 working days is the target for the cycle time; buffer stocks are required within the segments at sensitive workplaces in order not to lose capacities at other workplaces within the process chain due to machine failures.

Here, Montblanc clearly prioritises employee utilisation and productivity over lead time and inventory reduction. The production segmentation clearly limits the circulating stocks in the gold nib production. In each production segment, there are only production orders in the amount of the daily capacity of the production group. The working capital is thus calculated from the net lead time of all segments multiplied by the daily capacity of each production group plus the buffer stocks.

Compared to the previous circulating stocks, between 50 and 65 % less material is now required in the process.



## Thanks to the Heijunka method: levelling of incoming orders

The 14- and 18-carat Montblanc gold nibs wait in polystyrene trays to be used at the tip of the fountain pen in the final assembly of the writing instruments. But before they get there, they have gone through a complex, multi-stage, time-consuming and manual labour-intensive manufacturing process. Against the backdrop of manufacturing complexity, optimising employee deployment (capacity utilisation) while simultaneously reducing throughput times and working capital stock posed a major challenge for the “gold nib” manufaktur's production control. In order to level out and stabilise capacity utilisation in gold nib production at Montblanc in the future, fluctuations in incoming orders (fluctuations in demand) must no longer spill over into the three production groups. To prevent this, the current production control system was expanded to include the element of a Heijunka control system.

The term heijunka refers to the process of smoothing required capacity demands. Smoothed production is considered the most effective and cost-efficient method of manufacturing. The analyses of the order entry data carried out at the beginning of the project showed very high fluctuations in the daily Montblanc order entry quantities within the production groups, ranging from up to seven times the daily capacity limit to no order entry at all over several days.

If an overall analysis was carried out across all three manufacturing groups, the periods with no incoming orders at all in particular were greatly reduced. It thus became clear that, in addition to levelling incoming orders and capacity utilisation within the manufacturing groups, Heijunka control essentially had to be used for balancing between the manufacturing groups. Each Montblanc manufacturing group has its own Heijunka board (Fig. 3). This is populated with the daily incoming orders by the production control.

The basis for the daily dispatching of production orders to the production groups from the Heijunka board is the weekly employee scheduling. From this, the daily available capacity is determined in the form of "number of employees" and "number of processable spring units" per production group. The number of processable spring units represents the rate at which daily production order quantities from the Heijunka board must be loaded into the first operation groups.

## Throughput times and circulating stocks documented daily

This "takt" is now followed by the production groups from production segment to production segment. With a lead time of one working day, the quantities are "clocked on" from segment to segment. The buffer stocks are taken into account. The organisation of work within the segments and the staffing of the corresponding workplaces is organised by each production group. The following aspects in particular must be taken into account in the control by the Montblanc production groups:

- Not every spring unit goes through the same workplaces.
- Each work step has sometimes very different processing times.

### *What is Heijunka?*



*It is a term from Japanese production concepts, e.g. Toyota Production System.*

*This is the process of smoothing and harmonising required capacity needs.*

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- Only some jobs can be filled at a time, as the ratio of jobs to staff is about 3:1.
- Despite very high employee qualifications, not every employee can process all operations or all operations at the same speed.

Throughput times and circulating stocks are documented daily for each production group, for each production segment and for each individual workstation, historicised and evaluated in monthly reports. If there are no more orders on the Heijunka board or if the Heijunka board is overflowing with orders, levelling within the production group is no longer sufficient. If this is the case, a levelling between the three production groups must be carried out. Each Montblanc production group manufactures a different product range. Because of this, the production orders cannot be exchanged at will.

There is only one product group that can be produced in all three manufacturing groups. This is a volume model with regular consumption behaviour and thus facilitates balancing. Balancing is always necessary when the order intake is so low that "lost" capacities must be expected in one group. In this case, orders of the volume model are transferred from the board of one production group to the other production group. However, it can also happen that a Heijunka board "overflows" due to a strong order intake. If the order backlog exceeds five working days, production orders are transferred to the other groups.

*Picture 3:*

*Stefan Friedrich, Deputy Head of the Montblanc Gold Nib Manufacture, can always get an overview via the planning board at the end of the project.*

