



## HARMONIE REDUCES PROCESS TIMES IN THE GOLD MANUFACTORY

**Customer:**  
MONTBLANC

**Project:**  
reorganization of production and  
material flow

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The nibs in the expensive Montblanc fountain pens are genuinely handmade. But even in the fine factory, the production processes must be optimized and made future-proof. A team of experts not only reduced the lead time, but also reduced inventories and adjusted the material flow.

Montblanc stands for quality and luxury. The company also wants to be at the forefront of its processes. After the production control of the gold nib factory was made efficient, transparent and clear around two years ago through the introduction of electronic planning boards, the next big challenge was now on the horizon: the reorganization of production with the aim of significantly reducing throughput times and inventory levels.

## Challenge

To achieve this goal,

- the material flow and the department layout were completely redesigned and rebuilt,
- production is reorganized into production segments (production blocks) and
- production control by a Heijunka-Component for leveling and smoothing the daily capacity requirements against the fluctuations in incoming orders.

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

The high variety 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 requirement for the reorganization of the gold nib factory to reduce lead times and inventory in circulation.



Image 1: Montblanc's elegant fountain pens come with a gold nib. Logistics experts worked with employees to optimize the material flow in production.

## Material flow optimization and layout planning in detail

In recent years, the growing departmental structures at Montblanc and new investments had led to the material flow in the department no longer meeting the requirements of consistent material flows. The challenge was to optimise the material flow of the three production groups within the existing, relatively cramped premises. The aim was to achieve:

In addition, a number of additional constraints had to be taken into account, such as the expansion of the laser technology competence center and the consolidation of all hydraulic presses in a closed room (noise reduction). As a result, all requirements were met, including the additional constraints. The new layout is much "tidier" and has also created additional free space.

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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.

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

After the production order has been processed at other workstations, the material leaves the department for the first time after the pre-setting process. In the vibratory grinding department, the springs are tumbled (deburred). There are a total of three interfaces to external departments during the entire production process (vibratory grinding, rhodium plating, washing). A central collection point "goods issue" was created for these goods issues.

## ABOVE

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

Although writing instruments are still the main source of sales, since the product range was expanded in the mid-1990s, more than 40 percent of revenues come from the business with leather goods, wristwatches, jewelry, accessories and perfume.

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

It is centrally located in the immediate vicinity of all three production groups and can be reached in a short distance. This collection point is divided into three areas: Each external processing area has its own area from which the employees collect the material independently.

## The new collection point: Montblanc goods receipt

After external processing, the material is transported from these departments back to the specially created staging areas (internal/external interface) in the gold nib factory (Figure 2). These staging areas are located directly next to the subsequent work steps, so that the material awaiting further processing is immediately visually recognizable.

The supply areas and the central material supply rail thus ensure maximum transparency in the production groups with regard to the material to be processed. In addition to the last work step, the so-called writing, in which invisible ink is used to test whether the pen glides "effortlessly" over the paper, only the polishing work step was not integrated into the U-layout. Integration would have made complete encapsulation the system within the U-layout and thus "blown up" the U-layout.

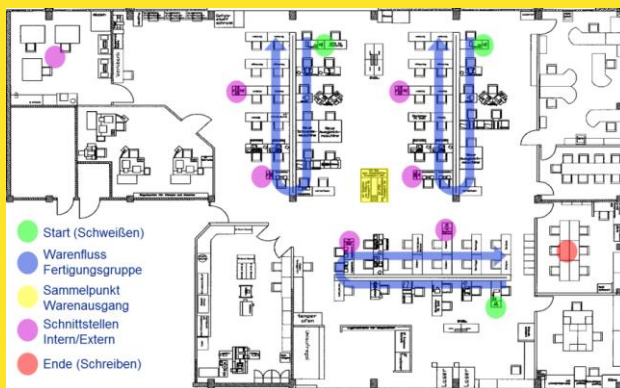


Figure 2: The new material flow in production is more efficient and reduces throughput times and inventories.

The key component in being able to significantly reduce lead times and circulating stocks is the reorganization of Montblanc production into production segments. The new material flow and the new U-layout take this reorganization into account and support it. Compared to the previous workshop-oriented production, both lead times and circulating stocks could be drastically reduced by producing in segments (production blocks). The ideal situation would be to organize the entire Montblanc production into just one single segment.

Following this approach, the aim was to keep the number of segments as low as possible and the number of work steps per segment as high as possible. During the Montblanc manufacturing process, the nib units have to leave the gold nib factory several times to be further processed in other departments.

This non-resolvable structure determined the segment boundaries: they are always located where the spring units leave the spring production (segment end) or are fed back into the spring production (segment start). Between these "natural" segment boundaries, it was possible to create a continuous flow production.

### **Benefits for lead time and work in progress (WIP)**

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

However, the target for the throughput time is 10 working days; at sensitive workstations, buffer stocks are required within the segments in order to avoid losing capacity at other workstations within the process chain due to machine failures.

Here, Montblanc clearly prioritizes employee utilization and productivity over lead time and inventory reduction. Production segmentation clearly limits the circulating inventory in gold nib production. Each production segment only ever contains production orders equal to the daily capacity of the production group. The circulating inventory 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 previous inventory levels, between 50 and 65% less material is now required in the process.

## Thanks to Heijunka method: leveling of incoming orders

The 14 and 18 carat Montblanc gold nibs wait in Styrofoam trays for their use at the tip of the fountain pen in the final assembly of the writing instruments. Before they get there, however, they have gone through a complex, multi-stage, time-consuming and manual labor-intensive production process. Given the complexity of production, optimizing employee deployment (capacity utilization) while simultaneously reducing lead times and inventory in circulation represented a major challenge for the production control of the gold nib factory. In order to level and stabilize capacity utilization 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 was expanded to include the element of a Heijunka-Control expanded.

The term Heijunka is the process of smoothing out required capacity requirements. Smoothed production is considered to be the most effective and cost-effective method of production. The analyses of the order intake data carried out at the start of the project showed very high fluctuations in the daily Montblanc order intake quantities within the production groups from to

### What is Heijunka?

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

This refers to the process of smoothing and harmonizing required capacity requirements.

Up to seven times the daily capacity limit to no orders at all for several days.

When an overall analysis was carried out across all three production groups, the periods with no orders at all were reduced significantly. This made it clear that the Heijunka-Control had to be used not only to level incoming orders and capacity utilization within the production groups, but also essentially to balance between the production groups.



Each Montblanc production group has its own Heijunka-Board (Figure 3). This is populated with the daily orders received by the production control.

Basis for the daily dispatch of production orders to the production groups from the Heijunka-Board is the weekly employee deployment planning. From this, the daily capacity available is determined in the form of "number of employees" and "number of workable spring units" per production group. The number of workable spring units represents the rate at which daily Heijunka-Board production order quantities must be assigned to the first operation groups.

### **Lead times and inventory levels documented daily**

This "cycle" is now followed by the production groups from production segment to production segment. With a lead time of one working day, the quantities are "continued to clock". Buffer stocks are taken into account. The organization of work within the segments and the staffing of the corresponding jobs is organized by each production group. The following aspects in particular must be taken into account when controlling by the Montblanc production groups:

- Not every spring unit goes through the same work stations.
- Each work step has very different processing times.
- Only a few jobs can be filled at a time, as the job-to-employee ratio is approximately 3:1.
- Despite very high employee qualifications, not every employee can complete all work processes or all work processes at the same speed.

Lead times and inventory in circulation are documented daily for each production group, each production segment and each individual workstation, recorded in a history and evaluated in monthly reports. If there are no more orders in the Heijunka-Board available or is the Heijunka board is overloaded with orders, the leveling within the production group is no longer sufficient. If this is the case, a comparison must be made between the three production groups. Each Montblanc production group produces a different product range. As a result, the production orders cannot be exchanged at will.



There is only one product group that can be produced in all three production groups. This is a volume model with regular consumption behavior and thus makes balancing easier. Balancing is always necessary when the order intake is so low that "lost" capacity must be expected in a group. In this case, orders from 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 high order intake. If the order backlog exceeds five working days, production orders are transferred to the other groups.



Image 3: Stefan Friedrich, deputy head of the Montblanc gold nib manufactory, can always get an overview at the end of the project using the planning board.