SECRET TO SUCCESS

The processing route for one of the key components, the pneumatic engine body frame, was used as a basis to revise the production process as a whole. The TPS tool known as the added value flow chart was applied. This revealed a mismatch regarding how the process should flow and its actual state.

The added value flow chart is a schematic representation of each stage of the material and informational flow, as required for the consumer’s order execution.

Having analyzed the sequence of body frame manufacturing operations (from the warehouse to its delivery to the customer) as well as operational parameters (production time and waiting periods, the length of the route and the time required to cover it, changeover time, etc.), the team then visualized the received information on the stand.

The result was a current added value flow chart that helped to see the production process as a whole, identify bottlenecks and, consequently, eliminate losses at source.

Map the current state of the value stream

![Added value flow chart](image)

**Your idea of the process** | **Actual process** | **Ideal process flow**
--- | --- | ---

**Inputs flow**

- Time useful from the customer’s point of view = 5 hours
- Total lead time = 36 days
- Downtime, waiting time
- Useful value adding time
- Stocks

**Pure Maths**

- The lead time for the body frame previously was 36 days, while its mechanical processing took only five hours. During the entire period (over 35 days), the item was stored, as it awaited the next operation, was controlled, or traveled over the production area. The total number of intermediates produced daily was 25, while 30 pieces were required for delivery as planned.

The company was therefore actively seeking out new opportunities for advancing its production and increasing sales. A large portfolio of orders had resulted in negative consequences. Manufacturing capacities were insufficient to fulfill all the orders with only 84 percent delivered on time.

Attempts to reduce the processing and check time resulted in defective products being delivered to consumers. Eventually, these faulty products had to be replaced.

It became clear that output capacities had to be increased through (i) purchasing new equipment and/or (ii) increasing efficiency.

One of the obstacles to installing new equipment was the lack of free working space. The only solution was to find internal resources. Current manufacturing processes had to be reviewed and losses identified and eliminated.

In other words, products were waiting in the workshop for more than 12 days as a work-in-progress. The funds in a work-in-progress which could be efficiently used by the company:

- \$80 (average item cost) x 12 (days) x 321 (total stocks) = \$384,000

**Case Study**

**Company**

Russian-American manufacturing company Instrum-Rand was founded in 1993. It designs and manufactures pneumatic tools, as well as pneumatic motors and pneumatic pumps. The company supplies both Russian car manufacturers and foreign markets with its products.

A number of methods used within TPS are already in place at Instrum-Rand. Raising productivity has become a priority for the company, partly because of an increased number of orders that have proved difficult to fulfill on time.

**Challenge**

ENSURE THE COMPLETE AND TIMELY FULFILMENT OF ORDERS AND EXPAND PRODUCTION WITHOUT USING ADDITIONAL SPACE

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**Best Result by Smart Approach**

How do you increase productivity with no additional investment while expanding workspace?

In the early 1950s, representatives of Toyota Company visited the plants of their rival Ford and were surprised to find that staff there worked significantly faster than their Toyota peers. The visit inspired a productivity enhancement idea, which became the basis for the Toyota Production System (TPS) or lean management idea.

**Vadim Sorokin, CEO, Instrum-Rand**

«For the company to survive, it needs to ensure a steady decline in production losses while increasing quality and productivity.»

The company managed to fulfill 100% of deliveries on time and release 25% more workspace.
With management facing the need for urgent action, a task force was set up comprising nine people: the CEO, HR Manager, Quality Manager, Head of Production, Chief Mechanic, Head of Purchasing Department, two technologists, and a designer. The new task force elaborated and implemented measures aimed at identifying internal reserves and eliminating bottlenecks to improve productivity. The program banked on the PDCA cycle and covered:

- training on the use of lean production tools;
- preparation of actual added value flow charts (current state);
- analysis of the technological operation time;
- analysis of the change-over time, waiting time and downtime;
- consideration of possible options for production site layouts;
- weekly meetings on key items to discuss detailed reports and approve corrective measures;
- implementation of improvement measures.

Based on the review of the production process, the following recommendations were developed:

- eliminate or minimize losses identified in the production process analysis;
- optimize the detail workflow;
- revise the production site layout.

Not everything went smoothly from the onset, with the task force having to overcome some resistance from their colleagues. For example, according to the technologists, all existing processes had been properly designed and adjusted and there was no room for improvement. The situation changed after the team, following the come-and-see principle of the TPS, visited the workshop to measure time with stopwatches and then record their observations. Findings included long waiting periods due to lengthy change-overs, the inefficient transportation of parts from one operation to another, and a lack of appropriate containers for many types of products. All of these helped to identify unused capacities. The equipment layout was changed with minimal costs using the same foundations, hydraulic and electrical outlets.

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**PRODUCTION EFFICIENCY**

Calculations based on orders for body frames

**BEFORE**

- Orders delivered on time: 84%
- Order lead time: 36 days (8 hours x 36 days = 288 hours)
- Mechanical processing time: 5 hours
- Cycle efficiency: 5 hours/288 hours x 100% = 1.7%
- Operation sequence: non-organized
- Time of change-over: more than 4 hours

**AFTER**

- Orders delivered on time: 100%
- Order lead time: 12 days
- Mechanical processing time: 5 hours
- Cycle efficiency: from 1.7% to 5.2%
- Operation sequence: well-organized
- Time of change-over: 15 minutes
- Space released: 68.7 m²

**OUTCOME**

As a result of the efficient use of the added value flow map, technological chains were streamlined, equipment layout optimized, transportation time reduced and a quick change-over introduced, resulting in the following performances:

- orders delivered on time: 100%;
- production cycle efficiency tripled;
- 25% of working space was released – about 68.7 m² – where the new equipment was subsequently installed.