IFC International Finance Corporation
WORLD BANK GROUP

ECA RESOURCE EFFICIENCY PROGRAM

CASE STUDY

This case is based on materials provided by the Prioritet Group and production company Instrum-Rand, Russia. IFC was not involved in the project and outlines this case study to illustrate the real outcomes that can be obtained when lean production tools and a resource-efficient approach are applied.

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.

COMPANY

PNEUMATIC INSTRUMENT MANUFACTURER

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

The company was therefore actively seeking out new opportunities for advancing and improving 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.

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

Vadim Sorokin, CEO, *Instrum-Rand*

The company managed to fulfill 100% of deliveries on time and release 25% more workspace.

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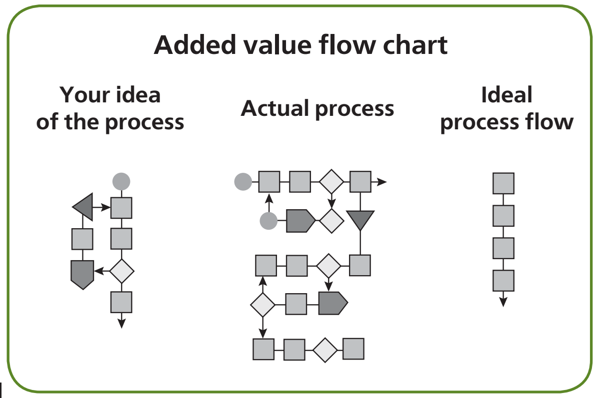
SECRET TO SUCCESS

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.

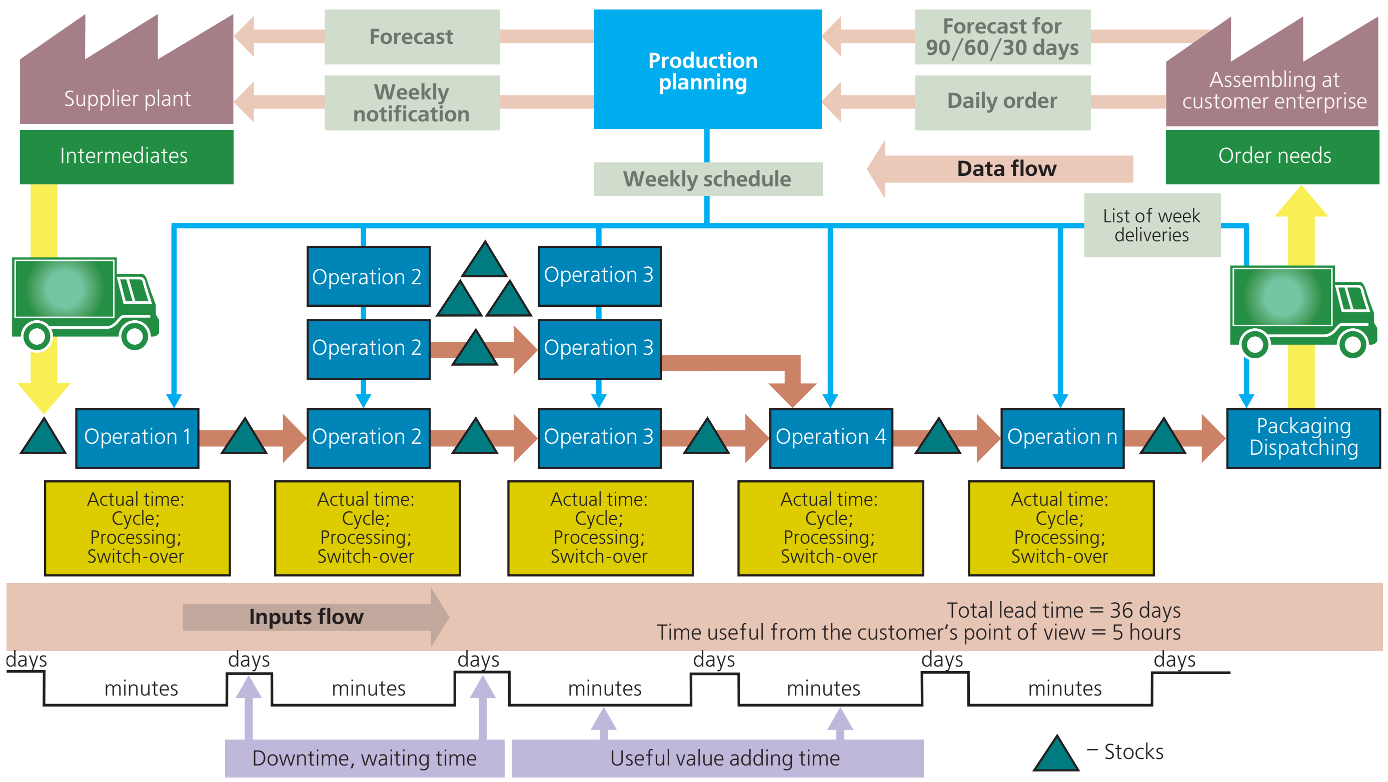
The added value flow chart is a schematic representation of each stage of the material and informational flow, as required for the consumer's order execution.



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



PURE MATHS

The lead-time for the body frame previously was 36 days, while its mechanical processing took only five hours. During the entire remaining 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 task force then reviewed the buffer stocks. They accounted for 71 pieces at route section 1 and up to 250 pieces at the following ones; total stock comprised 321 pieces. Thus:

321 pieces : 25 pieces per day = 12.84 days

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**

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ACTION PLAN

BUILD A TEAM

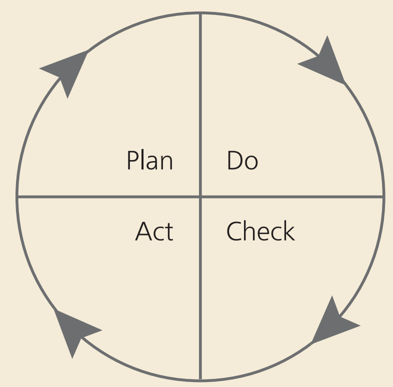
With management facing the need for urgent action, a task force was set up comprising nine people: the CEO, HR Manager, Quality Manager, Head of Production, Chief Mechanic, Head of Purchasing Department, two technologists and a designer.

DEVELOP A STRATEGY

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.

PDCA Cycle



The PDCA Cycle (Deming Cycle) is a recurring decision-making process used in quality management. This tool allows building up a proper sequence of actions and reaching a new round of improvements.

FORMULATE TACTICS

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.

COME-AND-SEE PRINCIPLE

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 experiment showed that productivity could be increased several times over. When the operations chain was optimized and the production equipment layout changed, the volume of output increased and all outstanding orders were delivered on time.

The equipment layout was changed with minimal costs using the same foundations, hydraulic and electrical outlets.

PRODUCTION EFFICIENCY

Calculations based on orders for body frames

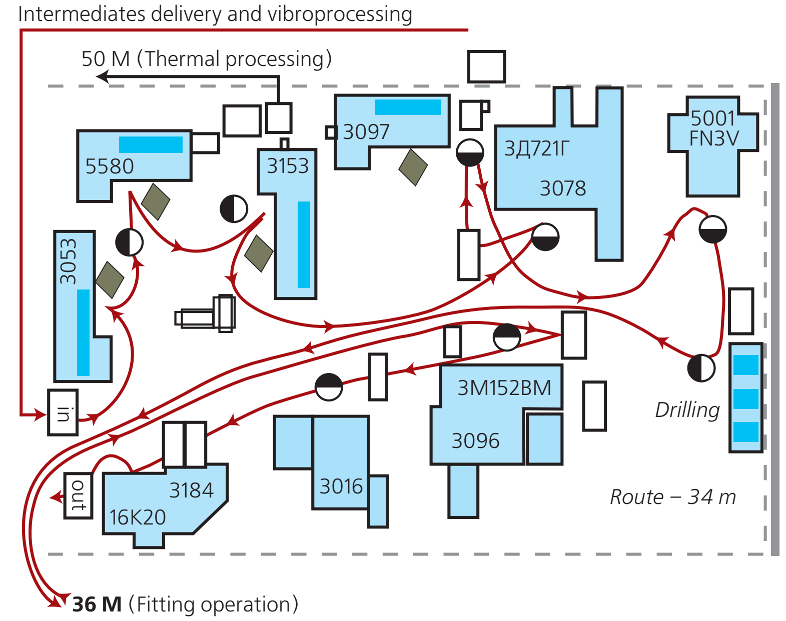
BEFORE

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-optimized
Time of change-over: more than 4 hours

Cycle efficiency rates by different types of processing (international practice)

Type of processing	Cycle efficiency
Mechanical processing	20%
Welding, painting and thermal processing	25%
Assembling	35%
Non-production processes	50%

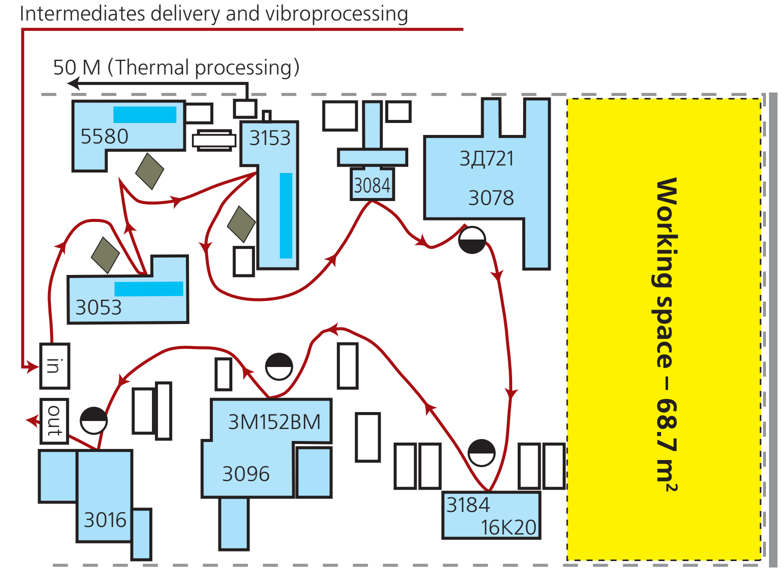
Layout before



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-ogranized
Time of change-over: 15 minutes
Space released: 68.7 m^2

Layout after



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 m^2 – where the new equipment was subsequently installed.