LCS 3 Programme – Case study 1

1. Executive summary

In my first job after leaving university I worked for the Quality and Process department of Pierburg GmbH in Neuss. Besides pure QM related tasks, this department was responsible for the implementation of process management in the central departments and all production sites. When my new boss joined the team - a former Consultant from McK's Lean Practice - he was searching for possibilities to establish a "Lean Lighthouse" somewhere in the organization. His intention was to show how Lean tools can be applied to increase process performance. This was where the problem started.

With only limited and mainly theoretical Lean background I was sent to a die casting plant and was positioned as the new "Lean Manager" - the right hand of the plant manager bringing some good ideas how to increase productivity with small "Lean projects" along the production processes. Looking back my role could be described as "the fixer"…and this is where the problem continued.

The maintenance department of the plant with approx. 35 FTEs was facing some severe problems and the plant manager already thought about shutting the entire department down: the maintenance process of the die casting tools never reached the needed lead time to deliver the tools in the right quality at the right time to the production. My first Lean project was born.

As the Lean project manager I initiated several work streams focusing on implementing tools like Lean Layout, Visual Management, 5 S, KanBan system an some more. When we closed the project the success was very obvious: the lead time was reduced from 26 to ~15 days - we even overachieved the target.

The problem ended when I learned two years later (I already left the company), that the department couldn't sustain the implemented improvements and was finally shut down and tooling maintenance has been outsourced.

My key learning from this case: don't implement Lean because you want to implement Lean. Implement Lean because you want to develop people, processes and systems for the purpose of meeting customer needs while consuming the fewest possible resources. I forgot about the people - only people can make improvements sustainable, not the tools or methods.

2. Introduction

Context

As part of the Rheinmetall Group, Pierburg was one of the leading automotive suppliers for engine related components in 2007. In several production sites all over Europe Pierburg produced various products such as oil pumps, water pumps, air intake manifolds and EGR system components. Pierburgs organization structure was centralized, the head quarter was located in Neuss (NRW/Germany). In 2006 I joined the central "Quality & Processes" department. In parallel to my job I was part of a dual MBA system at the Steinbeis-University of Berlin.

After some smaller projects for the central organization I became part of a bigger project which was initiated to transform Pierburgs purely functional oriented organization structure into a more process oriented one. This was the time when I initially got in touch with process management and questions around how to optimize process performance. One of my first project-related tasks was to develop a concept for a Process Performance Management System (figures 1 and 2 show examples of project related deliverables/results).

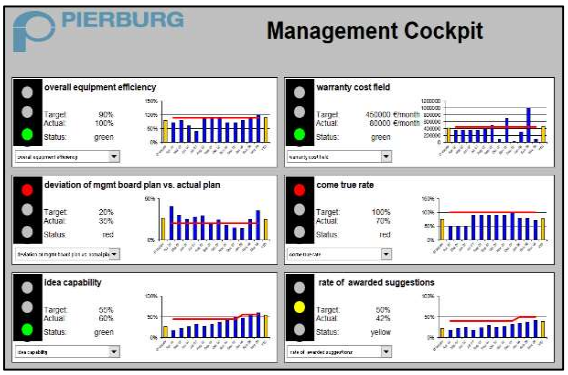

Figure 1: Process Performance Cockpit

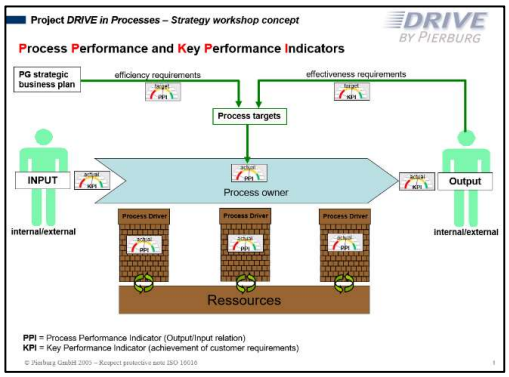

Figure 2: KPI vs. PPI

In parallel to the implementation of the Pierburg Process Management System my boss had a very strong interest in building a central pool of experts that should help the organization to improve low performing processes and/or areas. Due to his individual Consulting background in McKinsey's Lean Practice he implemented the **"Lean Toolbox"** as a starting point for all potential future assignments. For each of the Lean tools (see figure 3, page 3) we had a couple of PowerPoint slides to explain the main intention, contents and some practical examples.

During my engagement in the Process Management Project I got in touch with the newly assigned Plant Manager of one of Pierburgs die casting site in Nettetal who was very emphasized for the overall topic around Process Management and performance improvement. Facing some severe economic challenges in Nettetal he approached my boss and requested some additional support from our team. As my boss was still looking for a location to run a proof of concept (**"Lean Lighthouse"**) to generate some financial quick wins and to do some marketing for Pierburgs "Lean Toolbox" he proposed to start a Lean project

at the Nettetal site. This was the point in time when I was officially assigned to be the Lean Manager and the right hand of the Plant Manager of Pierburgs die casting site in Nettetal.

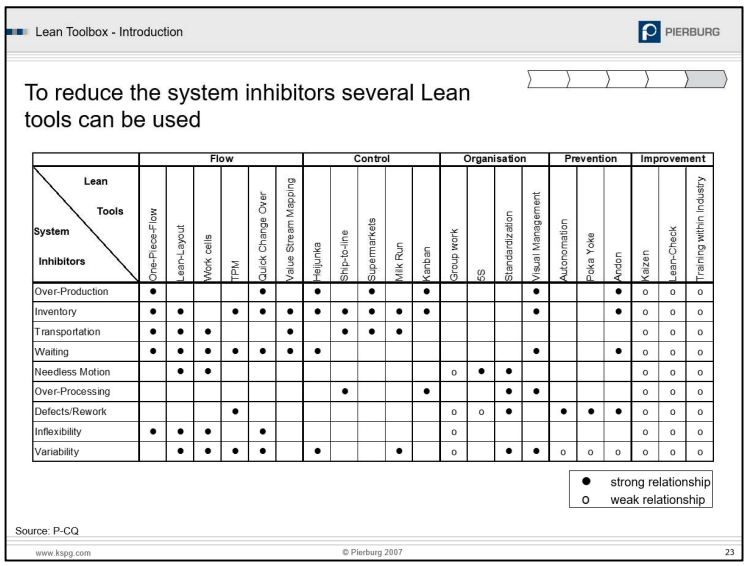

Figure 3: Pierburgs Lean Toolbox

Objectives

The main pain point on the list of priorities of the new Plant Manager was one specific area called **"Tooling Maintenance Department"**. This area caused a lot of problems, such as production down times and many quality related complaints during the final assembly process. Due to this the resigned Plant Manager was about to almost shot down the entire department and to source out all tooling/maintenance related tasks to an external service provider. As a final chance the overall objective of the Lean project was to analyze the situation, understand the problems, utilize Lean tools to generate some financial benefits and to safe the job of approx. 35 employees in the Tooling Maintenance department.

My role

When I was assigned to be the Lean Manager of Nettetal, I was still in a "dotted-line-reporting-relationship" with my former boss in the central "Quality & Processes" department. The intention was for him to act as my coach during the Lean project helping me to overcome my lag of experiences in the area of Lean Management. As the Plant Manager and production expert my new boss was assigned as the accountable Project Manager.

In a nutshell: My designated role in the Lean project was to act as a kind of a Lean Consultant supporting all phases and individual work packages of the project. In reality I had only limited experiences in Project Management, Lean Management and industrial production processes

in general. The expectation from the Management Team was to gain some **short term financial benefits and performance improvements** by applying Lean Tools.

3. Method and approach

As one of the first steps of the project we aimed to get a better understanding of the current situation and complication. Based on several Go & Sees, interviews and analyses of the existing data systems we figured out, that the avg. lead time for the "100% die casting tool repair" is always longer than scheduled in the production plan. The consequence was, that either the production plan was adjusted several times with a lot of scheduling issues for the following process steps or the tools have been brought to production without being 100% repaired. This resulted in a lot of "out of spec" quality issues/claims.

As shown in the analysis chart below we figured out that the avg. lead time was more than 26 days for one tool repair (figure 4 – most slides from this project are in German, if needed you can find the main context translated and highlighted in grey text boxes). The avg. lead time requested by the production planning department was below 18 days including some flexibility/buffer – therefore the starting point for the Lean project was to close a gap of approx. 8 days for an avg. tool repair process.

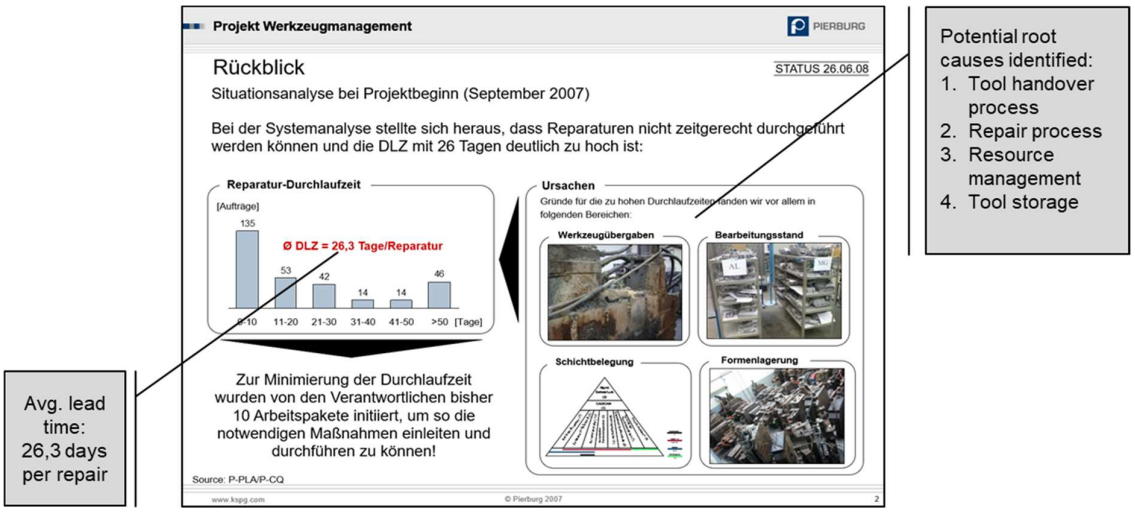

Figure 4: Initial analysis

During the diagnostics we immediately came up with some very obvious "root causes" for this gap:

1. The handover process of the tool and the according repair order from production to the Tool Maintenance Department was very ineffective
2. The repair process itself had a lot of very obvious non-value-adding steps

3. The tooling experts (resources) have not been managed very efficiently
4. The areas for storing the repaired/unrepaired tools caused a lot of non-value-adding activities

Based on this high level understanding of the main problem and potential root causes we initiated ten work packages/fields of action with individual leaders/responsibilities (figure 5):

1. Maintenance planning process
2. Data handling
3. Tool supply
4. Resource Management
5. Procurement process
6. Procurement (SAP)
7. Technical Change Management
8. Tolerances
9. Excellence in Tool Maintenance
10. Quality Management

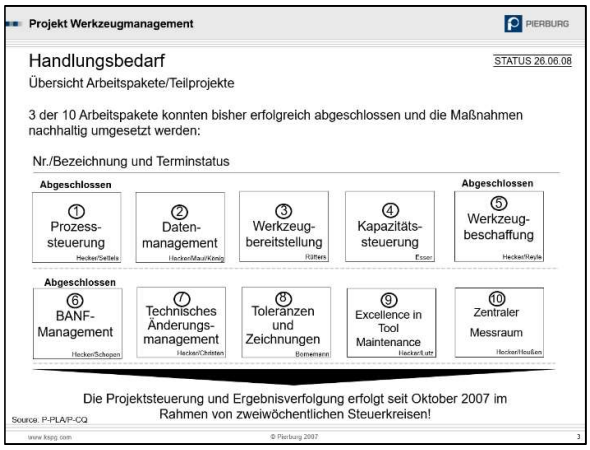

Figure 5: Work package overview

The status and results of each work package have been reported in a bi-weekly Project Steering Committee meeting. For this we used a one-pager that helped to streamline reporting efforts and information flow (figure 6):

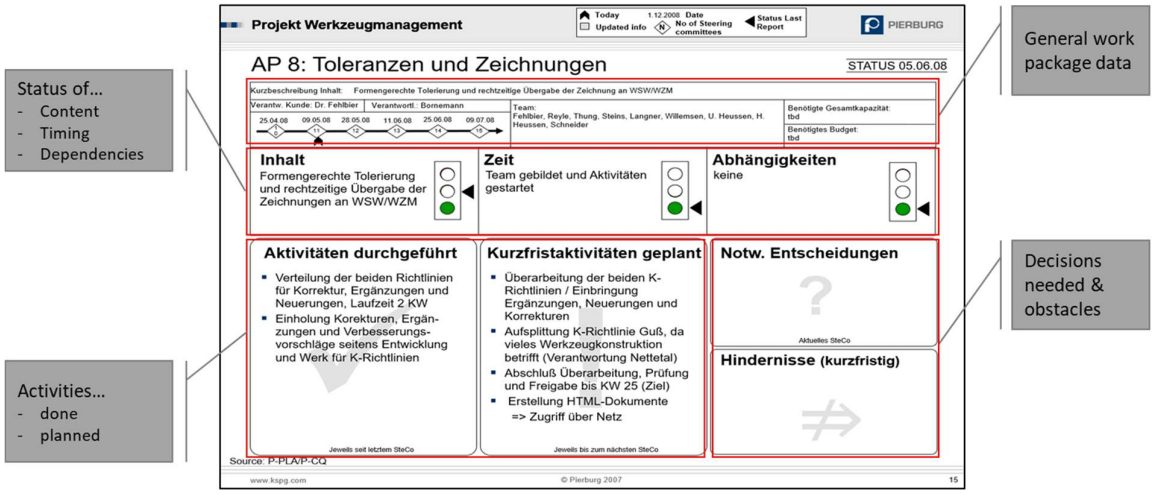

Figure 6: SteeCo work package one-pager

In an nutshell: in the eyes of an unexperienced, young engineer we have done a great job during the set up and the diagnostics of the Lean project. Everything was well understood, activities initiated and responsibilities assigned - in 2007 that made me feel happy. Today, looking back, I understand why this was the foundation for the Lean project to fail – I will elaborate on this in chapter 5.

4. Results and sustainability

In the following chapter I will mainly focus on the results of work packages 1. "Maintenance planning process" and 9. "Excellence in Tool Maintenance". I was responsible for these two packages and -according to our Lean tool box approach and my role as Lean Manager- I tried to utilize as much Lean tools as possible.

When we started our work in both work packages I conducted a kind of "creativity work shop" to gather ideas from the shop floor colleagues about what and how to improve. As a starting point I opened the workshop providing our perception of all the things that are obviously not "in best-shape", what we think needs to be optimized (may be already some solutions that we had in mind) and what the clear direction and expectation of the Management team is. I was very surprised about the participants being very quiet, not very constructive or creative at all, or even rude when it came to discussions. Anyway, I was strongly convinced that Lean (or my understanding of Lean) will for sure help them to improve their daily business. Maybe they all just needed some time to accept it – and hopefully me.

Work package 1 initially focused on optimizing the planning and processing of die casting tools that needed to be maintained or repaired. In a quite intensive session we mapped the process of a tool starting from creating a maintenance order (planned or unplanned) until the tool is finally maintained/repaired and ready to be handed over to production again (figure 7).

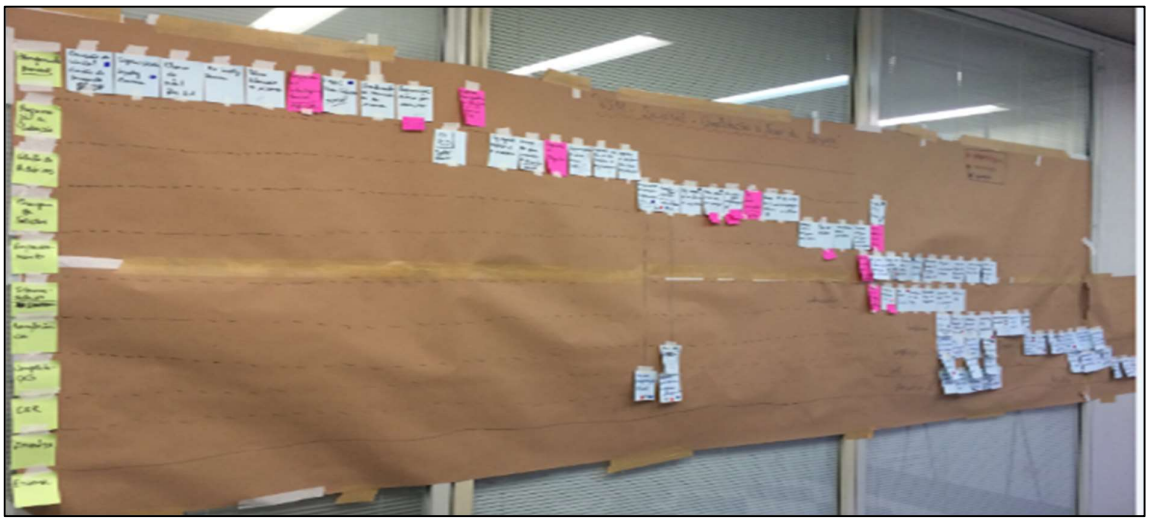

Figure 7: Map of Maintenance order process

During the analysis we figured out that there were five main areas/issues where waste (mainly waiting time and rework) was generated in the process. The following figure 8 provides an overview about the main measures we implemented to close these more or less obvious performance gaps:

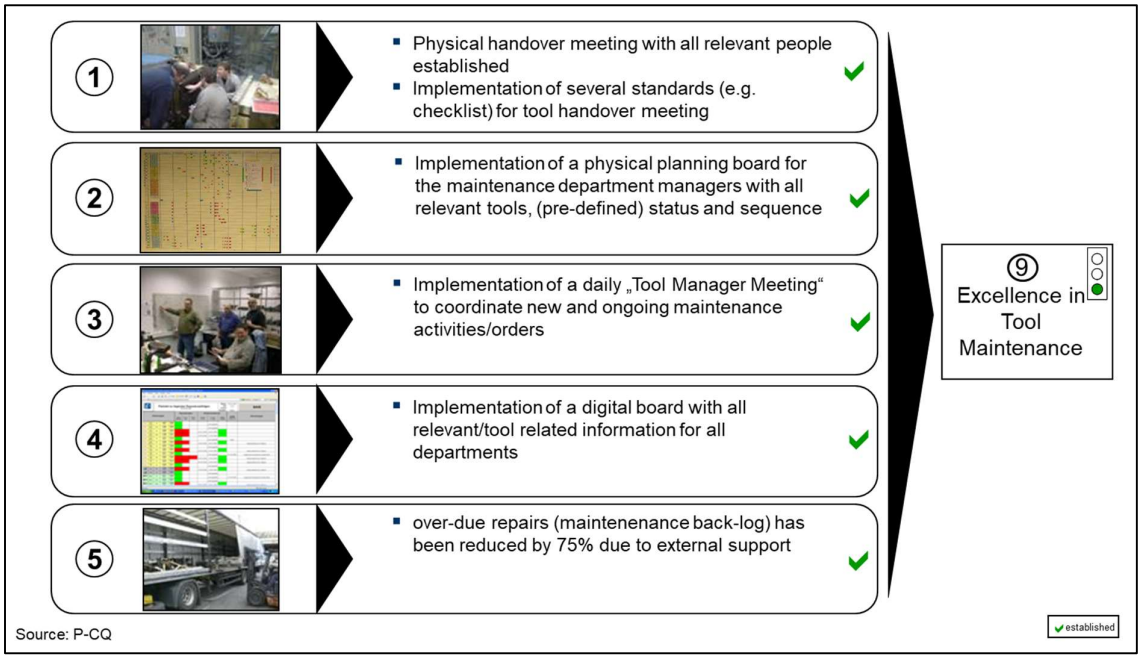

Figure 8: Implemented measures of WP2

Together with the department managers we established a “communication corner” with several visual management elements and a KanBan order management system (see figure 9):

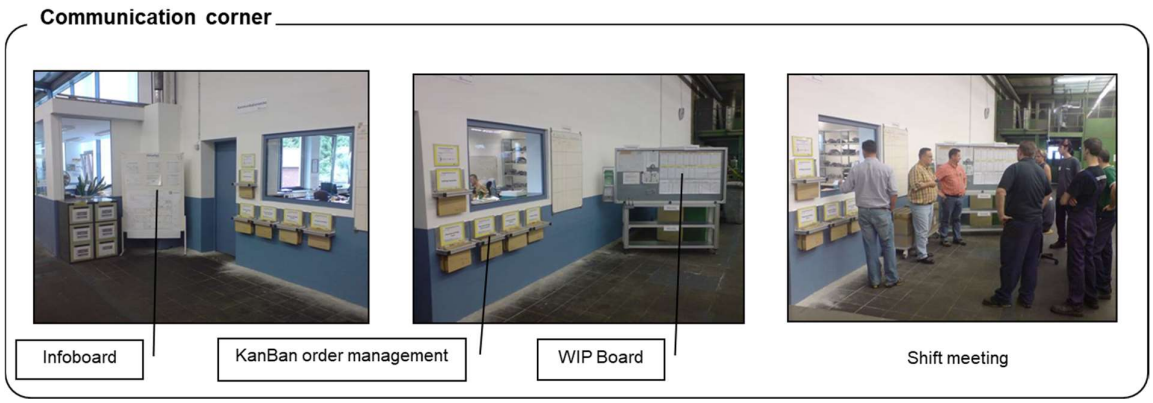

Figure 9: Communication corner

After we had fixed the “low hanging fruits” of the supporting processes in work package 1 it was necessary to get a deeper understanding of the core process on shop floor level, focusing on the improvement potentials of the maintenance and repair activities itself. Therefore we

started **work package 9 "Excellence in Tool Maintenance"**. This work package was split into four main fields of activity (see also figure 10):

1. Benchmarking, simulation and employee survey (9.1)
2. Shop floor layout (9.2)
3. Shop floor organization (9.3)
4. Concept for CI (9.4)

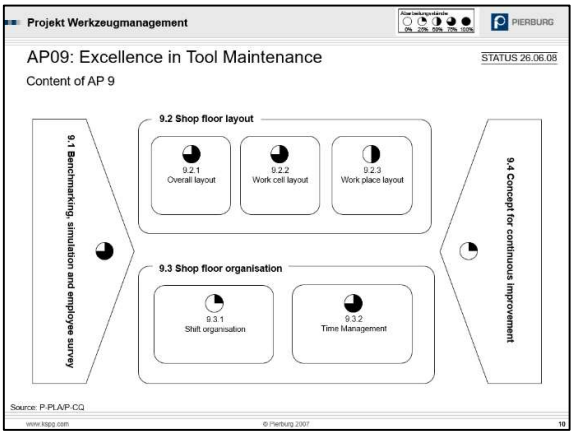

Figure 10: Fields of activity within WP9

As the initial starting point of work package 9 we conducted several Go & Sees and diagnostics on shop floor (e.g. Spaghetti Diagram, Day in Life Of observations and others) together with the involved blue and white color employees. The first visual impression entering the maintenance area was quite terrifying: the building was very dirty and dark; there was no obvious structure about what is work in progress, what is the WIP status and who is doing what; tools where standing around without any logic; spare parts were stored on the oily ground…to sum it up: it was a complete mess (see figure 11):

Figure 11: BEFORE - Shop floor layout

The high-level analysis of the maintenance process brought up, that more than 90% of all activities were non-value adding due to horrendous amount of movement, transportation, waiting, rework and other types of waste. The most surprising insight was that none of the involved employees was aware of the improvement potential – they have just accepted the as-is as a nonnegotiable "given". To get an even better understanding of the existing bottlenecks and constraints and to be able to optimize the shop floor processes we utilized a simulation software. The process with all its in- and output variables was transferred to the software-model with a maximum level of detail. Based on this we simulated several scenarios: the simulation brought up, that the main constraint was the missing number of work places, the long distances between the fixed work benches and the maintained tool as well as the missing energy supplies for the repair activities. Based on these insights we started to develop a new **Lean layout for the maintenance department**. The new overall layout was in line with the physical flow of the die casting tool according to the repair sequence/process (figure 12).

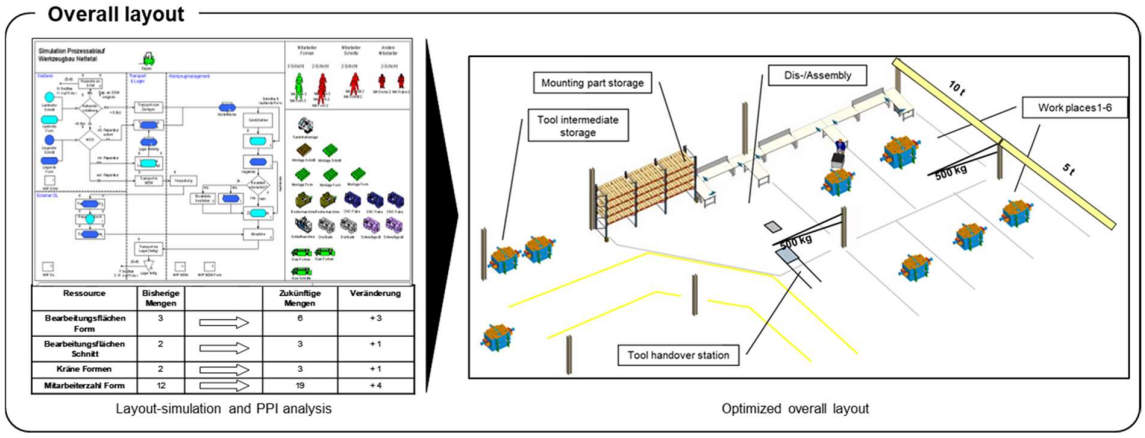

Figure12: Simulation and optimized overall layout

Once the overall layout was defined we started to conduct several workshops with the shop floor employees to define the new **work place layout** focusing on minimizing the movement needed to process the repair/maintenance activities. The biggest limiting factor was a very emotional one: in the old set up of the shop floor organization each employee had his own work bench in a fixed and therefore very inflexible structure. Due to their heavy weight some of the die casting tools needed to be dis- and assembled in the center of the shop floor where a big crane was available for transportation purposes. In many cases this resulted in a back-and-forth movement of the employees due to missing tools or other needed stuff. Unfortunately the employees had a very strong emotional bond with their "own" work bench – some of the benches have even been decorated with very personal things like pictures or cards. To overcome this challenge I started one of my workshops with showing a video from a Formula1 pit stop. This was a kind of "eye opener" to all participants in the room. Based on this we had some very creative discussions about how to optimize the existing issues. Finally we agreed to implement the following optimization measures (see also figure 13):

1. tool trolleys for each employee with a standardized tool set
2. non-individualized work benches
3. energy supply for all work places
4. WIP status boards for each work place

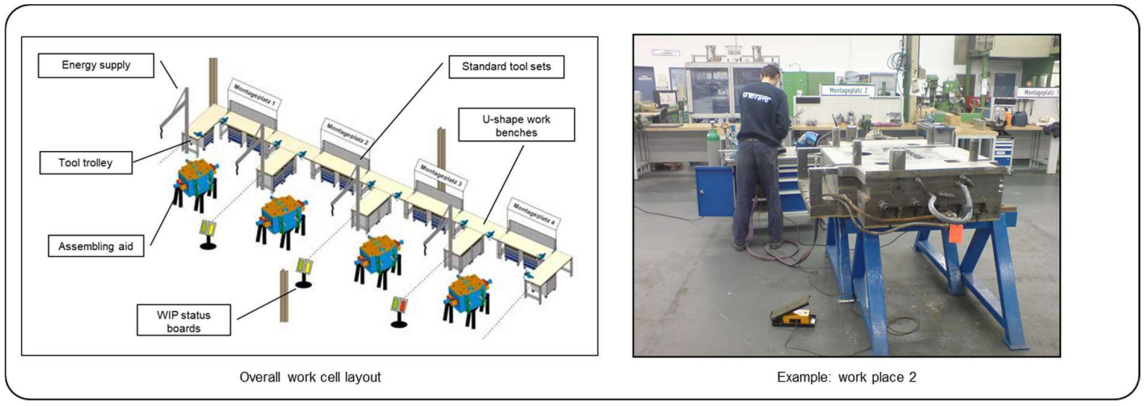

Figure 13: Optimized work place layout

To enable a better planning and scheduling of the maintenance and repair orders and to set a solid foundation for further improvements another important prerequisite needed to be implemented in work package 9: **standard times** for each type of work content. With the help of the employees and based on a very detailed analysis of the IT data base we categorized all potential activities of the entire department and defined a first set of targeted standard times. The overall intention was to make major deviations visible and to highlight process areas with improvement potential (figure 14).

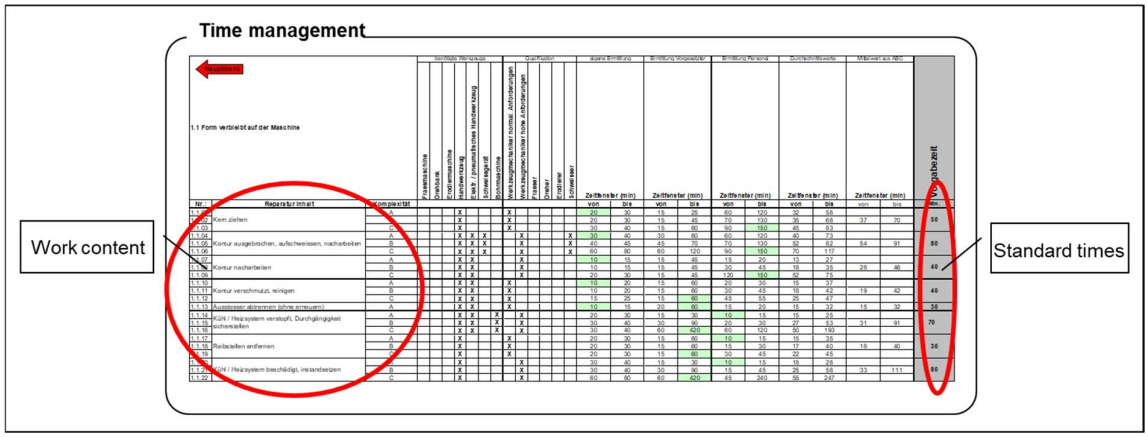

Figure 14: Standard times

After all defined measures of work package 9 have been implemented the avg. **Lead time of the process was reduced to 14,6 days in avg**. - this a very big success for the entire Lean project and the department. To maintain the positive momentum and engagement of the involved staff and project team members we defined a **continuous improvement framework**.

Besides regular meetings with different frequencies (daily, weekly, bi-weekly and monthly) and different participants to talk about improvement activities we spread responsibilities for specific topics to the core team members (figure 15).

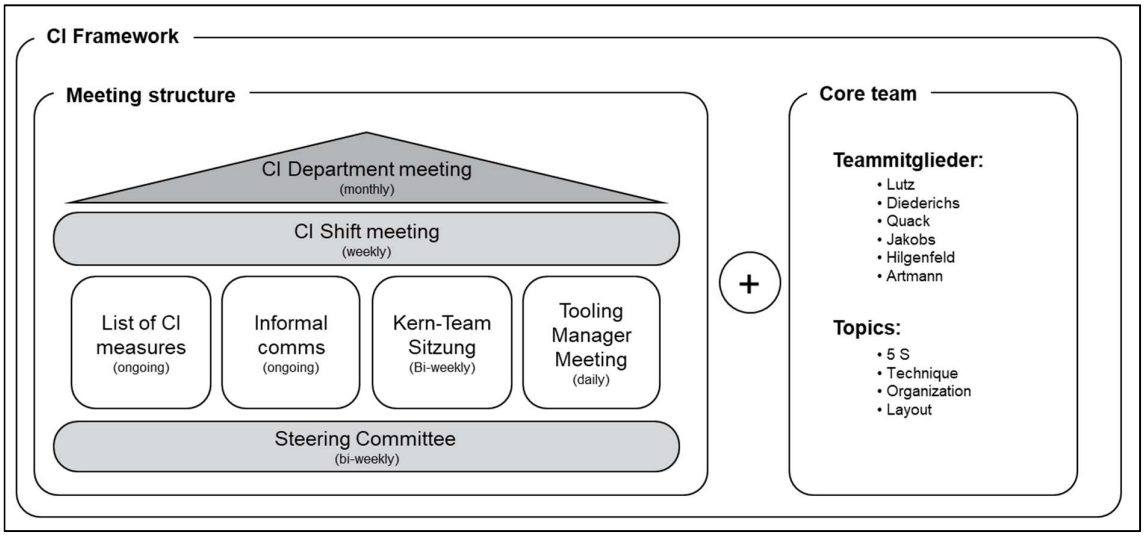

Figure 15: CI framework

In a nutshell: looking on the results we achieved within one year the Lean project – especially work package 9 – was very successful. The overall appearance of the facility was very professional, the layout completely adjusted to minimize movement and waiting times and the **lead time finally reduced by ~45%**. The management team was fully satisfied and closed the project.

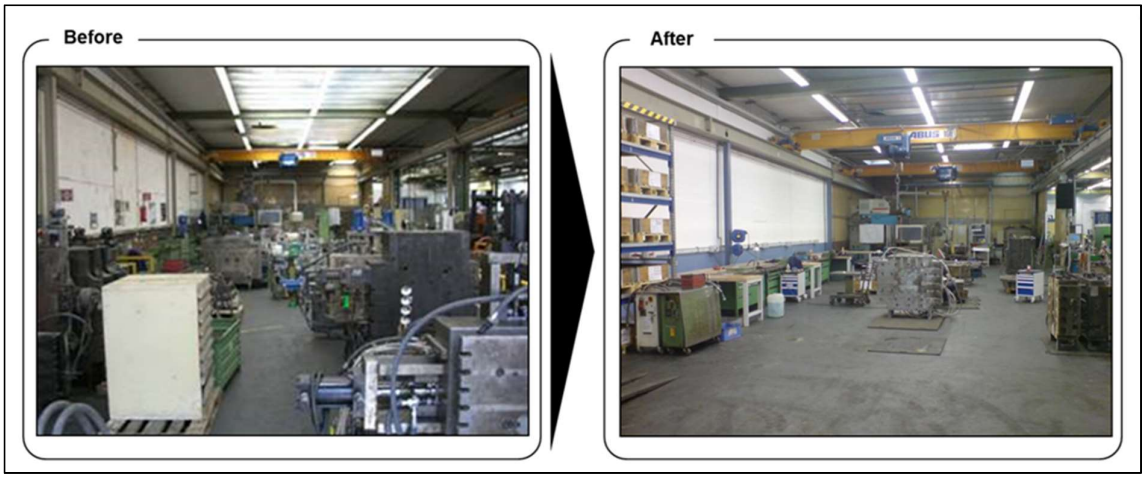

Figure 16: Shop floor layout BEFORE & AFTER

The maintenance department team was very emphasized and the atmosphere on the shop floor completely changed during the one year of the project. Some teams and sub-teams created their own T-Shirts & logos and finally the department decided to apply for a national award for tooling companies at RWTH Aachen, one of the most famous technical universities

in Europe. When I left the company due to an offer from a Management Consultancy I was very proud and satisfied with the result of my first “Lean project” – misleadingly…

Figure 17: Final impressions

5. Reflection and key learnings

When I learned about the further development of Pierburgs Tooling Maintenenance department in Nettetal some years later I was very disappointed: despite of the positive results of the Lean project the Tooling Maintenance Department was shut down and all tool maintenance related activities have been sourced out to an external service provider. My project failed!

Looking back and reflecting on the entire project with now more than 13 years of Lean/CI/OE experiences there are for sure some very good parts in it but mainly a lot of opportunities for improvement and potential root causes why the Lean project in Nettetal finally failed:

1. **My personal learnings – what I would do different today:**
    a. As a quite young engineer I had almost zero experiences in Lean Management, facilitation/moderation of workshops and handling people. Especially the last point is key to make improvements sustainable.
    b. Starting the project Kick-Off meeting with my perception of “whats wrong” and providing my (green-horn) improvement ideas upfront was probably the worst way of starting the work with the project team and involved employees.
    c. I understood Lean as a set of tools helping to make processes more efficient and to generate financial savings/benefits.
    d. We immediately came up with potential solutions without even doing some root cause analysis and according problem solving afterwards; due to this we probably worked more on symptoms than on root causes.

2. **Senior Leadership engagement – what Pierburg should do different:**
    a. The management team was only interested in figures and financial quick wins which led to a completely wrong perception and even fear/resistance against the Lean project on shop floor level.
    b. The only real engagement of the leadership team was to attend the Lean Project Steering Committee meetings where they mainly judged, punished and asked for more on time deliverables and financial impacts.
    c. There was no role modelling on leadership level regarding CI mindset & behaviors.
    d. There was no ambition to really initiate a cultural change towards a continuously improving organization.

3. **Implementation & sustainability – what needs to be different in the approach:**
    a. The changes we initiated in the Tooling Maintenance department always had the character and perception of a project. We never really achieved the state where it was positioned, seen and understood as part of a culture change journey.
    b. Implementing a Lean tool box works fine for consulting projects and in case you don't care about sustainable improvements or impact. As an internal group which is responsible for sustainable performance improvements this is completely the wrong approach.
    c. The CI framework was just a theoretical concept that was never really brought to life.
    d. The Lean principles and tools have never been trained to neither me nor the project team.
    e. The shop floor employees have never been enabled to sustain their successes and improvements or even to continue the journey on their own. They have just been part of the project - I assume they never accepted the results as "their new ways of working".

If I would be in the shoes of the Plant Manager with my nowadays knowledge I would focus on developing my area towards a continuously improving organization not on financial quick wins. This comes along with a big cultural change – change needs time and a role modelling leadership. I have chosen this specific project as case 1 because it had a big impact on my further career development:

- It was the first time I got in touch with Lean Management components and it made me "hungry" for more!
- I learned that listening to the ideas of my partners (the "Voice of the Customer") is THE key success factor for continuous improvement!