

**DEVELOPING THE COOPERATION BETWEEN
PRODUCTION AND MAINTENANCE TEAMS**



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TIIVISTELMÄ

Tämän tutkimustyön tavoitteena oli löytää keinot kehittää tuotannon ja kunnossapidon tiimien välistä yhteistyötä Saint-Gobain Finland Oy:n Isoverin Forssan toimipisteessä.

Isover Forssan tehtaan tuotannon ja kunnossapidon osastojen välistä yhteistyötä haluttiin kehittää työhyvinvoinnin, tuottavuuden ja laitteiden luotettavuuden parantamiseksi. Tutkimustyötä tehtäessä tiimien välistä yhteistyötä oli mahdollisuus seurata osallistuvan havainnoinnin kautta ja yhteistyön toimivuutta tutkittiin avainhenkilöiden haastatteluin sekä henkilöstölle tehdyin kyselyin marraskuussa 2017 ja 2018. Konzernin hyviä käytäntöjä tiimien väliseen yhteistyöhön liittyen kartoitettiin benchmarkkaamalla Saint-Gobain Finlandin toimintoja Gyprocin Kirkkonummen tehtaalla, Weberin Kiikalan tehtaalla sekä Isoverin Hyvinkään tehtaalla.

Tyytyväinen henkilökunta, joka on tietoinen vastuistaan ja roolistaan työyhteisössä, on tuottavampi työssään ja tehokkaampi osana tiimiä. Kun tiimi toimii hyvin ja tiimissä on hyvä henki, se on valmiimpi osallistumaan yhteistyöhön toisten tiimien kanssa. Tärkeimmät kehitystoimenpiteet tiimien välisen yhteistyön parantamisessa ovat kommunikoinnin parantaminen ja vastuiden tarkentaminen niin tiimin sisällä kuin tiimien välisessä yhteistyössäkin.

Joitain kehitystoimenpiteitä toteutettiin tutkimustyön edetessä ja toimenpiteet johtivat hyviin tuloksiin. Yritykselle luotiin kehityssuunnitelma ja toimenpide-ehdotukset tiimien välisen yhteistyön kehittämisen jatkamiseksi.

Avainsanat Yhteistyö, viestintä, tiimityö, kommunikointi, työhyvinvointi

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ABSTRACT

The aim of this research was to find out how to develop the collaboration between the maintenance and production teams in Saint-Gobain Finland Oy Isover Forssa.

In Isover Forssa the cooperation between maintenance and production departments needed to be developed to increase well-being at work, productivity and reliability of machines. During the research the cooperation of the teams was monitored by the participating observation and the situation was researched by the questionnaire surveys in December 2017 and in December 2018. Good practices were explored by benchmarking other Saint-Gobain Finland's factories in Gyproc Kirkkonummi, in Weber Kiikala and in Isover Hyvinkää.

Satisfied employees who know their responsibilities and role in work community are more productive in their work and effective as a part of a team. When the team is well functioning and has a good spirit, it is also better participant in cooperation with other teams. The key development actions to improve the collaboration between teams are improving the communication and make the responsibilities in and between the teams as clear as possible.

Some development actions were made during the research period and there were good results achieved. A development plan and suggestions were made for the company to continue the good and productive work in developing the collaboration between the teams.

Keywords Collaboration, cooperation, teamwork, communication, well-being at work

Pages 46 pages including appendices 5 pages

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1 INTRODUCTION

The topic of this thesis was to research how to develop a cooperation between maintenance and production teams in the target company. The cooperation between the departments affects the productivity and also the job satisfaction. In this research the collaboration between the departments has been considered as a cooperation between teams.

The subject is current, because the assigning company of this research wants to develop the procedures and get the best out of the collaboration. There has been challenges in the communication and cooperation between these two departments and by improving the collaboration, the efficiency and the reliability of the process would increase.

1.1 Assigning company

The commissioning company of the thesis was Saint-Gobain Finland Ltd.'s Isover Forssa plant, which operates in the construction products sector and produces basically insulation materials from glass wool. It is part of the international Saint-Gobain Group.

The Saint-Gobain Group is present in 67 countries and it has over 179 000 employees from over 100 nationalities. The group provides a range of solutions for buildings and also for industrial and consumer markets like automotive, aeronautical, health and energy industries. Saint-Gobain was founded over 350 years ago and has for example, built the Hall of Mirrors to the Palace of Versailles and delivered the glass to the Pyramid of the Louvre. It delivered the fiberglass to strengthen the bitumen in Eurotunnel's docks. It has equipped the water delivery pipes in the world's 80 capital cities and in 1000 metropolis. Saint-Gobain delivers the glass to 40 % of the European cars and manufactures 30 billion glass bottles and jars per year. It insulates 20 % of the detached houses in the United States and produces the crystals that are used in airport's security check sensors. In 2017 its sales were 40,8 billion euros. The innovation and product development in Saint-Gobain is very active. There are eight research centers in Saint-Gobain and more than 23 % of Saint-Gobain sales are generated through products which were developed less than five years ago. (Saint-Gobain 2018a and 2018b. Isover 2018.)

Saint-Gobain's values are energy saving, state of being environmentally friendly, being innovative and safety. The strategy of Saint-Gobain is to design, manufacture and distribute materials and solutions which are key ingredients in the wellbeing of each of us and the future of all. Those materials and solutions are used in our living places and in our daily lives

in buildings, transportation, infrastructure and in many industrial applications. Those solutions and materials provide comfort, performance and safety to the destination. At the same time, they respond to the challenges of sustainable construction, resource efficiency and climate change. (Saint-Gobain 2018a. Saint-Gobain 2019b.)

Saint-Gobain Finland Ltd was established in 2017 to bring five well-known product brands (Ecophon, Gyproc, Isover, PAM and Weber) together into one company. Saint-Gobain Finland Ltd employs 680 persons. The revenue was 214 million euros in 2017. (Saint-Gobain 2018d.)

Isover has 10 000 employees worldwide in 40 countries and 1600 employees in Northern countries and is a worldwide leader in insulation solutions. It was established in 1937. Isover provides sustainable and innovative insulation solutions and it produces mineral wool, foams and airtightness systems and moisture management systems for building insulation and technical insulation. (Isover 2018.)

In Finland Isover started in the 1930's and their own production was started in 1941, when the Karhula glass wool factory was established. Saint-Gobain came along in 1958 when Isover's current owner Ahlström made an agreement to use Saint-Gobain's TEL-glass wool process in Finland. Nowadays, there are two Isover factories in Finland, one in Hyvinkää and the other one in Forssa. The Hyvinkää factory is bigger and has higher volumes. Instead, the Forssa factory produces special insulating products with a short cycle and is able to fulfil customer's needs rapidly. In the Forssa factory it is also common to try new innovations and make production trials with customers to develop new solutions in cooperation. In the same premises in Forssa there is also another company from the Saint-Gobain Group, Ecophon, which produces acoustic materials for buildings and use Isover products as a base material for their articles. (Saint-Gobain 2018d.)

The mission of Isover is to develop, produce and market high quality thermal and sound insulations and sound insulation products and to support the appropriate usage of those products to minimize the negative environmental effects in the different stages of the products life cycle (Isover 2018).

In Isover Forssa there are 59 employees and 38 in Ecophon Forssa. The maintenance department services both companies as seen in figure 1.

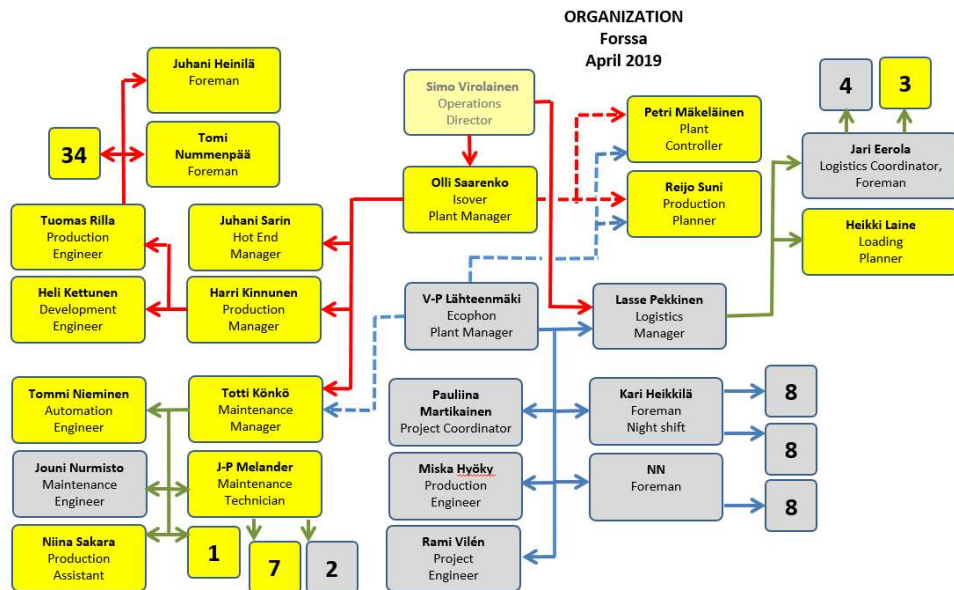


Figure 1. Saint-Gobain organization in Forssa: Isover with yellow, Ecophon with grey (Saint-Gobain Finland 2019).

There are five attitudes that Saint-Gobain has defined that reflect both a new style of management and state of mind that unites all Group employees. Those attitudes are Cultivate customer intimacy, Act as an entrepreneur, Innovate, Be agile and Build an open and engaging culture as seen in figure 2.



Figure 2. Five attitudes of Saint-Gobain employees (Saint-Gobain 2018c).

Saint-Gobain makes systematic actions to improve the job satisfaction in the company. In January 2019 Saint-Gobain was certified Top Employer Global by the Top Employers Institute. This was the fourth consecutive year and only 14 organizations in the world have been presented with

this certification. According to Benoit Montet, director of Top Employers France, the justification for this label were the overall openness and mobility between persons, human resource innovation and learning organization in Saint-Gobain. The Saint-Gobain attitudes concurrently reflect to the company's decentralized method of management, working closely with people on the ground and customers. (Saint-Gobain 2019a.)

This thesis is part of building an open and engaging culture, when the target is to develop the cooperation between maintenance and production departments with innovative agile ways. (Saint-Gobain 2018c).

1.1.1 Glass wool process

To be able to understand the vocabulary and concept in the thesis, it is beneficial to figure out how the glass wool process works. In figure 3 there is Isover's summary and presentation about the glass wool process.

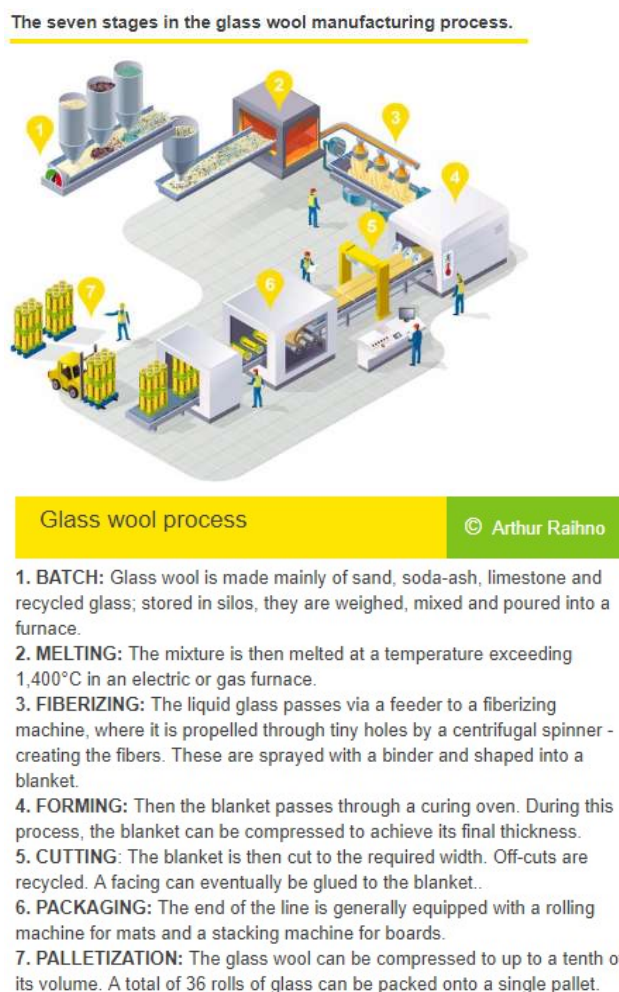


Figure 3. The glass wool process described by Arthur Raihno (Isover 2019).

The area of the factory, where the glass and raw materials are melted is called Hot end. Part of that is also the fiberizing area. Forming happens in curing oven. Different cuttings are done on the TEL line area and the packaging and palletization is done in the packing area.

1.2 Concepts

ERP system = Enterprise Resource Planning system. Information system that is developed to plan and manage company's actions and recourses. It can include many parts like accounting, invoicing, stock management, production management and management of processes, materials and recourses. (Oracle 2017.)

WCM = World Class Manufacturing is a tool for continuous development and improvement. WCM offers lean, efficient, cost-effective and flexible manufacturing practices to the organization. The main idea in WCM and its techniques is to concentrate to the operational efficiency, reducing wastage and creating cost efficient organization. World class manufacturing is a compilation of concepts that give standards for production and manufacturing. The approach in WCM is process driven and different techniques and philosophies are used in different combinations. (Juneja n.d.)

EWO = Enhanced Work Order. The process of investigating and analyzing breakdowns.

1.3 Research question and objectives

This thesis brings out new knowledge about how to improve the cooperation between two departments in Isover Forssa factory and what kind of development actions need to be done. This kind of development has been seen important in the company to improve performance and collaboration in the Forssa factory.

The objective was to find out how the collaboration between departments could be developed, by getting acquainted with the theories and research of collaboration and team work and also see what kind of practices there are in company's other sites and what there would be to learn. The objective was also to describe and analyze the current situation of the collaboration in the production and maintenance departments and what runs well and what are the challenges in cooperation nowadays. After analyzing the strengths, problems and challenges, there were recommendations given and a development plan made for the company, in order to develop the collaboration and get the cooperation between the departments flow better than earlier. The main theories exploited in this research were the theories of collaboration and team work.

The target in development process which will be done on the basis of the development plan is to achieve better results in daily work and increase the efficiency and the reliability of production and maintenance.

Developing the collaboration will improve also the well-being at work. To be able to utilize the development plan in action, the plan was attempted to make as practical as possible and to collect there the most important and executable actions.

The most important research question on the basis of the objects of the thesis was: How to develop the cooperation between production and maintenance departments?

2 WELL-BEING AT WORK, TEAMWORK AND COLLABORATION

2.1 Definitions

In this thesis the concepts of well-being at work, teamwork and collaboration are in the focus. The definitions of the focus areas are opened in follows.

2.1.1 Well-being at work

Well-being at work is positive quality of working life. It is affected by anything that relates to the work, to the employee, to the management and leadership, to the work community and to the organization. Relevant for the well-being is the relation between work and human being. Well-being consists of entirety of employee, work, work community and management. When these parties fit together and are in flexible interaction together, it benefits the well-being. (Kaivola & Launila 2007, 128.)

2.1.2 Teamwork

Team is a group of few people who have complementary skills and common targets and purpose, and who are mutually committed to achieve and work towards the target (Smith 2007, 24).

Team organization is lower model than the traditional organization. There is not so much superior work in team organization and the teams take responsibility about wider and longer parts of the total process. Teams might do different tasks that normally belong to many separate units. (Shonk, 1994, 12.)

2.1.3 Collaboration

Cooperation is something that is done together. The meaning in collaboration is common understanding about the target and result that satisfies everybody. Collaboration means the ability of the work community to act towards the same target. When the collaboration of the work community is good, all the individuals have the same goal. Good collaboration can lead the work towards the vision of the company, but it is not always absolutely so, because the target of the work community might differ from the vision of the company. (Kettunen 2018, 2. Takalo 2010, 56.)

Cooperation gives moral support for the work community and in that way assists the commitment to the common targets and promotes to help each other. Cooperation helps the group to see new approaches. The productivity increases via cooperation, because in that way the forces and resources like know-how and organization and communication skills can be joined to the one group. (Willman 2001).

2.2 Theory about well-being at work

It is important to pay attention to well-being at work, because healthy work community is productive organization. Well-being at work increases quality and customer satisfaction. It also improves the competitiveness by the better motivation and innovativeness. Well-being at work effects positively to the image of the company and also to the attractiveness to be the place of employment or the cooperation partner. The actual assets of the organization may be utilized only if the employees do well. (Kaivola & Laurila 2007, 133.)

Well-being at work is generated from the work and its consequences. Work well done and practical work community are important facets that can develop well-being at work. There is no such thing as general well-being at work, rather it is part of organizations every day actions and every level of the company, and everybody has to take part to it. (Kaivola & Laurila 2007, 128.)

It has been noticed, that employees who can have an influence on their job and regulate their effort, cope with more load and stress than those, whose terms of work and way of actions are dictated upfront. One of the most common reasons to be dispositioned is that there is no possibility for the employees to act with the methods they want or to adjust their doings suitable for their own style and rhythm. Also the values of the organization and the employee must have consistence if considering well-being at work. (Kaivola & Laurila 2007, 129. Aro 2002, 108.)

The reasonableness and meaningfulness of work have been studied to be very important parts in well-being at work. When the work is experienced

to be reasonable, it rewards more than big payment and employees are willing to work more. If the employees are able to use their knowledge and competences in the work, and they feel that also the work community respect their competences, they are more satisfied and work better and more productive in their job. (Antila 2006. Colliander, Ruoppila & Härkönen 2009, 61.)

The biggest differences in the work being reasonable concern leadership. If the manager has constricted or insufficient social competences, that is remarkable problem which reflects negatively in employee's well-being. In generally the employees desire more feedback, openness and abetment from their managers. They also expect the manager to listen their proposals and ideas and that the manager treats them compassionately and rightful. In that way they can feel they have possibilities to influence on matters. (Antila 2006. Colliander et al 2009, 61.)

The work community can effect to the ways to bring well-being at work in the work-community and what kind of working culture they create to their working place. The atmosphere of the working community come about every day actions. The cooperation and interaction between employees effect conclusively to the atmosphere. The well-being at work is generated by the atmosphere itself when there is joyful feeling to work and innovative team spirit. The alternative could be for example serious-minded and substantial labour, which appears in rush and manic work addiction. (Kaivola & Laurila 2007, 132.)

It is important to remember that the role of a person is important when building well-being at work and good working atmosphere. If the employee does not want to take care of his / her well-being, it is impossible also for the employer. (Kaivola & Laurila 2007, 132.)

2.3 Collaboration and Teamwork theory

The collaboration in the work community means employees' common objective. It is possible to utilize collaboration when searching different ways to cooperate and trying to find common interests for the organization. When the management succeeds to lead the collaboration towards the vision, this will bring benefit to the whole company.

Professor Karl Smith (2007, 24) from University of Minnesota has researched teamwork and in his studies gathered a list of the characteristics of effective teams:

- Good participation
- Respect
- Careful listening
- Leadership

- Constructively managed conflict
- Fun, liked to be there
- Common goal
- Sense of purpose
- Good meeting facilitation
- Empowered members
- Members take responsibility
- Effective decision making

One main challenge in organizations is, that the cooperation inside the team works well, but it does not work with other teams. Easily the teams accuse other teams repeatedly about the problems or giving less effort to achieve the common goals. Organization consultant Pekka Järvinen (2017, 87 - 89) has listed some reasons why the teams try to find the scapegoat outside the team and how to prevent this happening. One of the reasons is that the team tries to keep in hiding the responsibility. If the employee or the team would think how they have performed or how they could resolve the problem, the recrimination might decrease. Another reason is that the teams do not know other team or their work or the division of the work and responsibilities is unclear. The team might not understand how their work affects to the work and processes of the other departments and teams. It helps if the teams will get acquainted with each other and their work and the responsibilities are clarified. It is also possible that the inflexibility and lack of joint liability causes trouble. It is important to emphasize the importance of gratuity and joint responsibility.

Functionality of a group requires that everyone in the group understands clearly and distinctly what are the targets in the organization, on the production sites and for the teams. It is also important that everyone understands their own responsibilities and roles in realization of the goals. Work community's functionality can be measured for example with six fields: leadership, structures, roles and responsibilities, common rules, professional interaction and constant evaluation. (Sitra 2016.)

2.3.1 Leadership

Group needs always a leader. It is essential, that the leader uses the power actively for the benefit of the work community. The leader has to have desire to listen and to utilize employees knowhow and opinions, but also to make distinct decisions and solutions when needed. (Sitra 2016.)

Business has been developing to the direction where the foreman is not the one who gives the orders, but the customer is. The production runs on the basis of the customer needs and the old roles are changing. That is why it is necessary that the leader makes it clear how to work and

behave in team, why the team exists and what determines team's tasks. (Spiik 2004, 181.)

In traditional working group the superior is the linchpin of the group. He/she gives the information, targets, tasks and schedules and does the planning, organizing, monitoring and divides the tasks. Nowadays the team work increases and if the foreman still leads a team, he/she keeps the keys in his/her hands just like as leading the traditional group, but the team does some cooperation by themselves and maybe are given bigger responsibility areas and can work more independently in those tasks. The superior will constantly monitor the work and gives more instructions. Instead, in partly self-oriented team the independence of the working couples and small groups increases. The superior might agree about working entities, targets and schedules with the group. After that the working groups and pairs act independently and they don't need external monitoring. The change in the role of the superior is described in figure 4. (Spiik 2004, 183 - 184.)

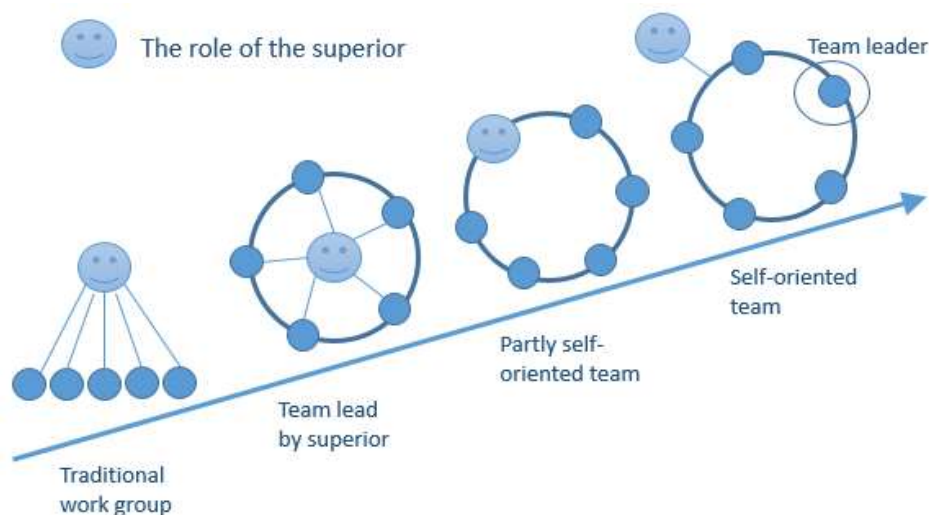


Figure 4. The development of the role of the superior, when the teamwork increases (Spiik 2004, 183).

Nowadays it is common to use the model where the superior is not in the team and the team leader is nominated among the group. The self-oriented team takes the full responsibility of the teams tasks. The superior takes care that the working conditions are good and the team gets the needed and necessary information. The team gets the tasks also from the external or internal customers and not just from the superior, who coordinates the process and the cooperation between teams. (Spiik 2004, 184 - 185.)

2.3.2 Structures

The meaning of structures in work community are to strengthen the fluency of cooperation and efficient and goal-directed actions. In small

units with only few members the separate structures are not necessary, but already in units with more than eight people, there is need to ensure workable structures like teams, meetings and structures for flow of information. (Sitra 2016.)

It is good to notice, that organizational structure can be burden when developing the procedures. Some employees keep their place in the organization very important and in changes they are not so concerned about what they are going to do in the future, but where and in what department in the organization they will do it. This is loading them especially nowadays, when the organizational structures change densely, because the operational environment of the company changes all the time. (Aro 2002, 43 - 44.)

2.3.3 Roles and responsibilities

For the functionality of work community, it is important to jointly clarify and designate the division of work, responsibilities and roles both in teams and in entire organization. The clearer the roles and responsibilities in organization are, the more rational and levelheaded the work is running. (Sitra 2016.)

It is important that the employee knows his/her main job and responsibilities and also the roles and responsibilities of the co-workers, because in that way it is possible to act answerably and goal-directed. If there is obscurity in roles and responsibilities, it can lead to impacts in cooperation and in to unnecessary recrimination of others. (Järvinen 2017, 90.)

There is always the risk that some of the employees stare blindly their own job description and task list, and do not participate in the tasks outside their responsibility. Because the workload is heavy and there are no excessive workers, it is important that the whole team understands that everyone needs to independently offer their help to the other workers or other departments if possible. Superiors need to highlight that in the end everyone is working for the whole company and not just to one department. If there are employees, who do not actively undertake new tasks, the superior needs to lead them to that. (Järvinen 2017, 89 - 90.)

2.3.4 Common rules

Common rules guide the daily business and give a frame where to work. It helps the employees to understand the expectations and regulations that concern their work. There are common rules in various levels: EU, national, corporate, work community and tasks (Järvinen 2017, 91). This kind of common rules can be for example working hours act, code of

conduct, company's internal standards, guidance for management and economy and common rules and principals in work community and in different actions and tasks.

Code of conduct gives the common social norms and rules to the ethics of the organization. The document brings up the most important ethically and socially proper procedures and practices that the company wants to comply. Code of conduct is main guidance that steers the more specific instructions of company's business and management. The employees of the company know what kind of expectations there are for them from the company. When the code of conduct is strong, it gives real value to the company. (Lunday 2018.)

The whole organization should take a part when creating the common rules, and those have to be discussed with regular intervals. In that way it is possible to also ensure the commitment to the rules. (Sitra 2016.)

It is supervisors job to take care of common rules and constraints in work community. It is important that there are these principals leading the operations. The supervisor communicates the common rules and monitors that those are obeyed. When employees can trust that everyone works according to common rules and the supervisor advocates the rules, it creates better work atmosphere. (Kaivola & Launila 2007, 52 - 53.)

2.3.5 Occupational interaction

Occupational interaction is a way to act to advance the fulfilment of the fundamental task of the company or the community. This means that the discussions made concern the work and things associated to that, but not about the issues concerning the personality of the people. It needs to be agreed that the people who are concerned by the matter take a part to the discussion and the speculations behind the backs are not tolerated. The awkward matters are raised into discussions in a constructive way. There is no need to be afraid of to take matters in to discussions, if it conduces the common target. (Sitra 2016.)

2.3.6 Continuous assessment

In an organization it is necessary to arrange common events to examine the past and to agree concrete steps to the next weeks and months (Sitra 2016). It is important to take employees to these events so they can be aware about the targets, the current situation and future plans. There are long term plans made for the company, but when those plans and actions are divided to smaller entities, they are easier to perceive and understand when the direction of the actions is right. There should also be smaller indicative targets which can be achieved during the way. In

this way the focus stays on the plan and there becomes feeling of the success from time to time and the employees are motivated.

2.3.7 Diversity

Different features and competences among employees are richness that companies need to learn to utilize, because the work community gets strength from the diversity. When the diversity of the employees and the team members is noticed and managers are able to use it to benefit of the company, it becomes real factor of productivity and innovativeness. Without management, the diversity can be even quite big disadvantage in the work community. (Colliander et al 2009, 75, 328.).

3 RESEARCH

The metatheory in this thesis has been subjective ontology. The paradigm has been interpretative and hermeneutic, since there has been research of meanings and culture so the human impact has been one factory. Approaches have been qualitative and the strategy of gathering information has been case study. The subject of the research has been the actions of teams in cooperation between departments. The methods have been half structured interviews, half structured theme interviews and questionnaires. That has been supported by committed observation.

The methods utilized in this research have been half structured interviews, half structured theme interviews and questionnaires, which have been supported by committed observation. In addition, there has been made benchmarking to the Saint-Gobain group's companies and the results of company's personnel survey have been explored.

With these methods the experiential knowledge was gathered to the basis of the development work. This kind of information were for example the company's working methods, development ideas for the cooperation between the departments and also good practices in teamwork and improving collaboration.

The benchmarking companies were chosen on the basis of good much-vaunted practices in Gyproc Kirkkonummi, the similar industry of Isover Hyvinkää and different perspective of thinking about these matters in Weber Kiikala.

After getting acquainted with theories of teamwork and collaboration, the most suitable models were picked up to utilize in Isover Forssa development process. The interviews of company's specialists, the questionnaires for employees, the benchmarking, the results in personnel

survey and the reports about the development done in other companies gave wider outlook and good pragmatic ways to improve the cooperation between teams in Isover Forssa.

From the basis of the analysis of the theories and primary data, the development plan was made for Isover Forssa to improve the cooperation between teams to increase the productivity and reliability of the process and to improve job satisfaction. In addition, during the research process, the most important and significant improvements were already taken in to practice and the effect of those changes can be seen in the higher satisfaction to the cooperation in the end of year 2018 compared to the results in 2017.

3.1 Research methods

The principles of triangulation have been complied with collecting the research material from many sources and there has been utilized many methods to reach the objectives. In this way the results can be considered reliable. (Anttila 2007, 143.) In addition to the questionnaires to the employees and interviews of the specialists, the results of company's personnel survey have been explored and benchmarking have been done in three internal companies about the cooperation between departments.

3.1.1 Theme interviews

Theme interviews are talkative and interaction will be emphasized in those interviews. The researcher has possibility to follow the phenomenon of behavior, like consciousness, intentions and experiences. As an interview and research method, the theme interview allows to the interviewee as natural and free reaction as possible. The feeling of discussion makes the examinee approve the research better and that way free and sometimes even deep discussions reveal matters that would not have found out otherwise. When theme interview is executed well, the person may be considered as a thinking and acting being. (Hirsjärvi and Hurme 2011, 7 - 8.)

3.1.2 Observation

Observation is a research method that can be utilized to get information about the object by monitoring and making observations. The observation is focused to the actions and behavior, for example to the usage of the research target and how the people act in interaction situations with the research subject. The observation technic may or may not be structured and it can be carried out as an outside observation or as an inside observation. The researcher might do the inside observation as a participant observation and work as a part of the situation and

community that is under observation. When the observation is made “in situ” it can be considered as field work. The observations can be documented for instance by making notes, photographing and filming. Observation as a research method may be considered expensive and time consuming and less accurate than questionnaire surveys. The researcher must pay attention to his/her role, to the research question and theory and also to the way that research material will be analyzed and results reported. (Colorado State University n.d. Kolehmainen 2018. University of Jyväskylä 2015.)

The researcher of this thesis works in Saint-Gobain Ltd’s Isover Forssa factory. That has given the possibility to observe the everyday work, behavior and cooperation in the assigning company.

3.1.3 Questionnaire surveys

The target of the questionnaire surveys is to examine how people act by themselves and what they think and feel about things privately. The aim is also find out about their experiences and believes. With the questionnaire survey it is possible to get wide research material and it can save time and trouble. When the questionnaire survey is planned carefully, the research material is easy to interpret and analyze. It is important that the questions are as unequivocal as possible. When using the questionnaire survey, the researcher does not affect to the answers with his/her essence or presence. (Boussalis 2012. Kolehmainen 2018.)

3.1.4 Benchmarking

Benchmarking means comparing company’s own methods to the actions of others, preferably to the best in the field. The idea of benchmarking is to search the best or at least better way of actions from where to learn in future. Benchmark is used to compare systematically for example organizational productivity, strategies, working processes and the efficiency of working methods. It is made in order to learn from others and to question company’s own manners. Benchmarking is also done to find out possible weaknesses so that it is possible to adapt new best practices to the company’s operations and in that way decrease the costs and increase the productivity. (Mikkelin Ammattikorkeakoulu n.d.; Lahden ammattikorkeakoulu n.d.)

There are five clear phases in benchmarking process that can be described in development circle (figure 5).

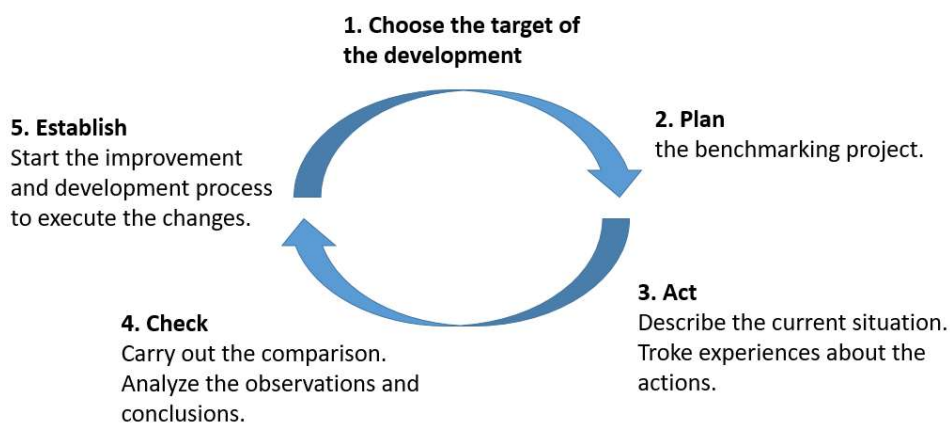


Figure 5. Benchmarking process (after Hotanen, Laine & Pietiläinen 2001, 14.)

In the benchmarking process the phases can follow each other again and again when developing the company's practices.

3.2 The local survey about job satisfaction

A local survey about satisfaction concerning few main topics in Isover Forssa was carried out in November and December in 2017. There were four main themes in the survey and one of the themes was the cooperation between production and maintenance departments. The research was addressed to the operators in production department. Questions were in Finnish and the original questionnaire can be seen in appendix 1. It was possible to answer anonymously.

In that phase this questionnaire was not carried out in maintenance department. The maintenance department was included in the wider questionnaire about the cooperation between these departments in November 2018.

The questions concerning the cooperation with maintenance department were as follows:

- In your opinion, how the cooperation between production and maintenance passes off?
- How would you be prepared to develop the cooperation?

(Saint-Gobain Finland 2017.)

In the first question five alternative answers were given, so the results were analyzed quantitatively. The alternatives were: Excellent, Good, In between, Need to be fixed, Poor. The second question was open. There were 24 participants in the meetings where this questionnaire was carried out with a form to fill. All of the participants answered to the questionnaire. (Saint-Gobain Finland 2017.)

As seen in figure 6, eight percent of the operators thought that the cooperation was excellent and 46 percent that it was good. 38 percent thought there was need to fix the cooperation and four percent thought the cooperation was poor. (Saint-Gobain Finland 2017.)

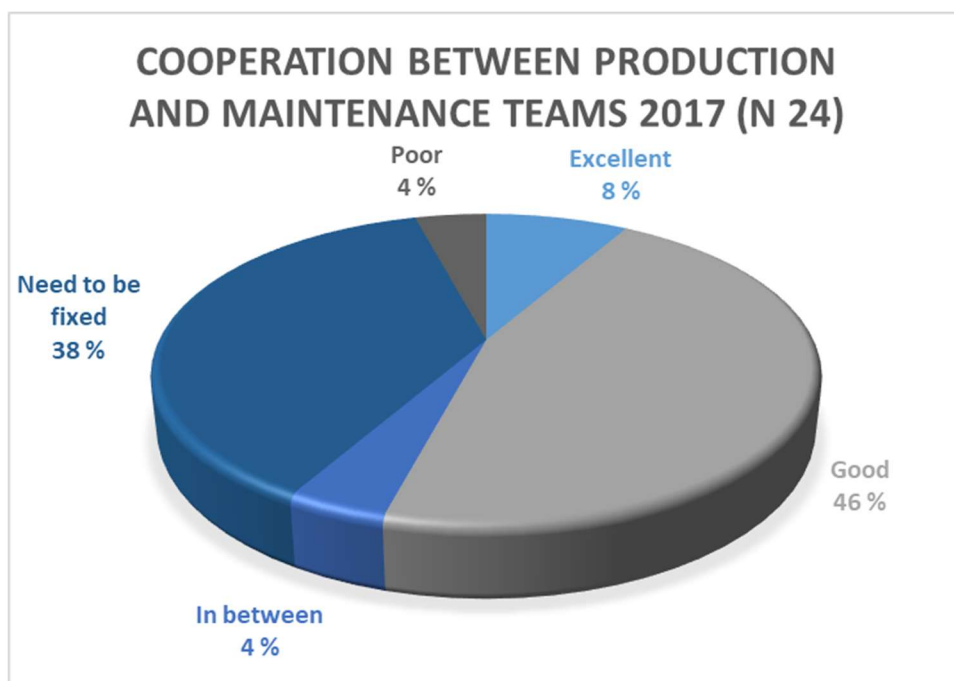


Figure 6. Results of the questionnaire about the cooperation between the teams in 2017 (Saint-Gobain Finland 2017).

To the open question the operators answered that they would prefer if there was more communication between departments and they would like to get the information when the job is done. Some of them have not been in any contact with the maintenance team. Others feel that the communication is open, but there could be common meetings between the teams where to discuss more about the matters. The operators hope that after the maintenance actions the production could be continued without any trouble. They think that the maintenance team should take care that the machines are in that condition when the job is done. (Saint-Gobain Finland 2017.)

3.3 The survey about cooperation between maintenance and production departments

The survey about cooperation between maintenance and production departments was executed in November 2018. It was addressed to the Isover employees, including maintenance department and was sent by e-mail. The answering time was first two weeks, but later continued with extra two weeks.

This questionnaire included one question with five alternative answers, and there were five open questions as seen in appendix 2. There was a

possibility to answer in paper form, by e-mail and by filling the Webropol questionnaire. It was possible to answer anonymously.

The challenge was to get answers to the open questions, so in the maintenance department six employees were interviewed to get answers. Also in production team most of the answers were interviewed with the questionnaire form by the researcher. In the end of the extra answering time, it was persuaded to answer at least to the question with the alternatives and leave the open questions out. This was done to increase the amount of answers to get more encompassing perception about the satisfaction to the collaboration between these teams.

14 answers were given by Webropol, 28 by interviews and two by filling the form. 12 of those answers were only to the question with the alternatives. Rest of the answerers replied also to the open questions.

As seen in figure 7, the cooperation between production and maintenance teams was estimated to be excellent with 28 percent of the answerers and good with 50 percent. 15 percent of the answerers thought that there is need to fix things and 2 percent thought the cooperation was poor. (Saint-Gobain Finland 2018.)

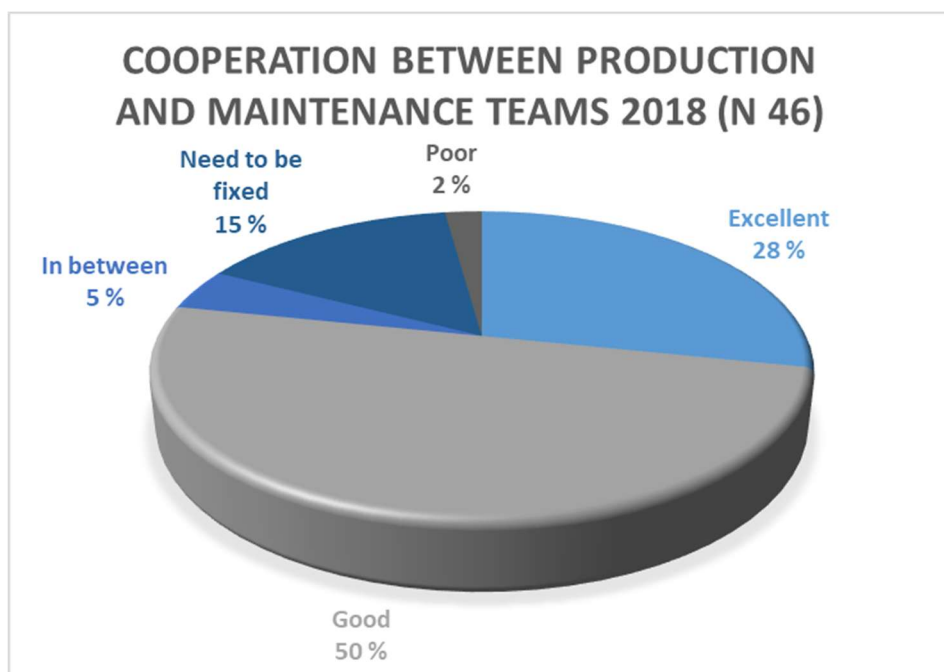


Figure 7. Results of the questionnaire about the cooperation between the teams in 2018 (Saint-Gobain Finland 2018).

Even though the satisfaction to the collaboration seemed to be high and there were many good examples about the practical ways to do things together, there were many development ideas given by the employees.

3.3.1 Experiences about the collaboration between departments

One of the open questions in the survey was to give some examples, good or poor, of the collaboration between the production and maintenance departments. According to the answerers, response time to the maintenance requests has shortened from what it was earlier. Common WhatsApp group of maintenance and production teams has been well functioning. Production team's employees think that it has been easy to get along with the maintenance team employees and the service has been good. It has been good practice that the maintenance department has guided the production team to do the amateur maintenance tasks in the maintenance stoppage day. In that ways they can nowadays focus to the professional maintenance. The spirit between the teams has been seen good and it has been easy to go through what has happened before the machine brake up and how the machine has functioned earlier. (Saint-Gobain Finland 2018.)

Everyday collaboration between production and maintenance departments works well and the spirit between the teams is good. The problems occur in bigger projects and investments, when production team wants everything to be done quickly and closes the project before trimming. Unfortunately, the maintenance team is the one finishing and fixing things after the actual project and even the expenses of that work burden the maintenance departments finance. Production team does not see the benefits of the careful and concordant documentation and in-line machine assortment and that does not support maintenance team's effort to develop the factory standard. Maintenance team's members feel that production team does not have perseverance, but rather pursue quick independent solutions without thinking the effect to the wholeness. (Saint-Gobain Finland 2018.)

Everyone in the maintenance team are not as capable as the others and that causes the custom to call to the employee that is most wanted to the specific work. Some of the maintenance workers do not have active attitude towards the maintenance tasks. If operator from production team tells about some problems in the machinery, the feeling of the response is sometimes impassive. That frustrates the other part. Some employees in production team think that it is not worth to do any maintenance requests to the ERP system. They think that only the most urgent tasks get done and are left to hang and wait to the system. This is why the requests are often done by calling straight to the maintenance worker, although the production employees know they should put the request to the ERP system. (Saint-Gobain Finland 2018.)

3.3.2 The maintenance team's employees' ideas to development

The maintenance workers thought that the cooperation between the departments works better in daytime and not so well in night time when

there is no foreman available. The tasks pointed to the mechanical maintenance are more precise and easier to follow than the requests concerning the electrical and automation tasks, which are sometimes very nonspecific. There are lots of “fast calls” where the maintenance workers are just asked to do some tasks promptly and there are no maintenance requests in the ERP system. This makes it hard to register the hours and spare parts and document the tasks done to the enterprise resource planning system, when the request is missing from the ERP system. Although the maintenance workers think that nowadays the maintenance requests are documented to the production diary or to the ERP system more often than earlier. (Saint-Gobain Finland 2018.)

The maintenance workers have noticed that there is unnecessary grudge about the tasks being delayed because of the need to wait the essential parts to the machines. If there would be procedures to document and also to follow the situation of each task to the ERP system, the information about the task to proceed or the reason to the delay would be easy to find. This information could be also in productions diary. The information should be communicated from operator to operator between shifts. (Saint-Gobain Finland 2018.)

3.3.3 Noticed development actions in 2018

During the year 2018 there were several actions done to develop the collaboration between the maintenance and production departments. In the questionnaire it was asked what kind of developing procedures the employees had noticed. (Saint-Gobain Finland 2018.)

The cooperation with the maintenance department in production departments projects was mentioned as a good improvement and also the common meetings between the departments. Some of the answerers thought that planning of the maintenance actions had improved and especially the tasks lists for the maintenance stoppage day had been a good improvement. Communication had improved because of two new foremen in maintenance, which has increased the resource in maintenance department. One thing to get the communication work better was the common WhatsApp group of maintenance and production managers and foremen, which was taken in very positively and actively. (Saint-Gobain Finland 2018.)

The WCM reliability pillar has done some good work for the machine reliability and the maintenance stoppage days are planned together with the maintenance and production teams. Some developing projects concerning renewing machines and developing old equipment have been done in cooperation with the teams.

3.3.4 New development ideas

In the answers to the open questions some development actions were suggested to carry out to improve the collaboration between departments. For example, the good experience about the amateur and professional maintenance tasks lists in the maintenance stoppage day would be preferred in every day work, not only in the maintenance stoppage days. In addition, the challenges in production and how to develop the process and solve the problems together were suggested to handle in a cooperation meeting between the departments. Orderliness of the maintenance could be developed more. Employees should be invited to take part to the meetings concerning projects, maintenance stoppage days and when going through the maintenance tasks about modifications. The maintenance employees who are standby in the evenings in the maintenance department premises and during the night time at home, are sometimes hard to catch and pitch up to the site. (Saint-Gobain Finland 2018.)

Communication and flow of information between departments is always one thing that can be developed, especially because some actions are made in silence or at least they are communicated so late that there is no room for developing ideas or comments. There should be open developing team, which would have clear one to five-year plan about the direction and steps of development. Also the communication about successful actions and development projects is important. (Saint-Gobain Finland 2018.)

The team that is responsible about the EWO investigations should be wider. Nowadays only couple people do the job and that burdens them and does not allow wider perspective to the investigation work. There might be found some handy employees in production team, who could help maintenance team in their work in maintenance stoppage days or in bigger reparations. They should be challenged to the work rotation or at least to work with maintenance team in outage. (Saint-Gobain Finland 2018.)

Clear and explicit suggestions and actions were expected to help to develop the cooperation between the departments. This might be possible to implement as a development plan. (Saint-Gobain Finland 2018.)

3.3.5 Employee's own effort for developing the collaboration

When asked in a survey about how employees would like to develop the cooperation by themselves, the need for the common understanding about the development plan for the machinery and the factory raised up. There could be together planned long-term efforts agreed for the machinery and equipment. Also the trust to other employee's

professional skills could be one way to improve own actions. Everyone could bother to give their own knowledge and information about the situation that concerns for example about a device damage, so it might be easier to fix the equipment. Discretion about hurry or stress is good to have to understand when it is better not to bring any further tasks to someone's table if not totally necessary. (Saint-Gobain Finland 2018.)

The maintenance department would be ready to take some operators as a maintenance work pairs for maintenance employees. In this way the operator could familiarize themselves with the machines more closely, get some variation to their normal working days and to their amateur maintenance tasks in the maintenance stoppage days. At the same time the communication about the usage of the machinery and possible improvements to the maintenance and settings of the machines and equipment would increase. (Saint-Gobain Finland 2018.)

3.4 The PeoplePower personnel survey

In February 2018 the PeoplePower personnel survey was carried out in Saint-Gobain Finland Ltd.'s places of business by Corporate Spirit Ltd. Response rate in Forssa Isover factory was 83 percent which means that 44 employees from 53 answered to the questionnaire. According to the survey, the people power index was 63,8 and peoplepower classification was AA, which means a good level and was on the same level as in other sites of Saint-Gobain Finland. (Corporate Spirit Ltd. 2018.)

According to the survey, the most important strengths are the possibilities to participate and make suggestions. The employer endorses to occupational development and the salary is competitive. To build up the engagement of the personnel and in this way also the productivity of the unit, the equipment should be improved, the work environment should be developed and the consciousness of the expectations concerning the work should be increased. (Corporate Spirit Ltd. 2018.)

3.5 Interview of the specialists

To find out the thoughts of the cooperation in Isover Forssa management, the plant manager Tommi Talonen, production manager Harri Kinnunen and the maintenance manager Totti Könkö were interviewed about the theme of cooperation between the departments. The main target of the interviews was to find out the current situation of the cooperation and the hopes for the development and for the developer. These interviews were carried out as half structured theme interviews. This way it was possible to keep the discussion open and free, but at the same time keep it in the adequate subject. The themes and questions can be seen in appendix 3.

Tommi Talonen was interviewed individually, because of the challenges in timetables. Harri Kinnunen and Totti Könkö were interviewed at the same time in order to get them to figure out their thoughts together and to hear about the challenges and hopes that the other department has concerning the cooperation. The new plant manager Olli Saarenko answered extensively to the survey about cooperation between maintenance and production departments, so he was not interviewed independently.

3.5.1 Interview of the site manager

The Site Manager Tommi Talonen was interviewed with half structured theme interview in March 2018. In the interview, Site Manager Tommi Talonen (2018) told that the cooperation between production and maintenance team could mean in practice that the operator and the maintenance worker would communicate together about the maintenance needs and issues. It would be good to learn from Gyproc's example, where the cooperation between amateur maintenance and professional maintenance works well. There the production team is interested of their equipment and machines and they inform about the troubles via ERP system or machine board, so that the next shift will know about the problems and the maintenance team can fix those. In Gyproc it is operators' responsibility to write the maintenance requests to the ERP system. And the maintenance worker marks to the ERP the tasks and actions done. So it doesn't need manager or clerk to do it.

Talonen (2018) believes, that if this kind of responsibility is given to the staff openly and with supportive spirit, they will be responsible and do their duty. They should also have the access to all the necessary equipment, spare parts and information to make the actions without their manager. They should be obligated to document the actions they have done, in order to ensure the communication for the team and to the production department. For example, nowadays the actions done in the weekends may be left out from the ERP system and the maintenance manager has to find out what has been done. The operators should be allowed to contact the maintenance worker directly, without any intermediary, also in daytime as they do in the evenings and in the weekends. They will simultaneously find out that the maintenance of the production equipment and even the collaboration between the departments is not so smooth and quick as they may have assumed. These kind of changes in responsibilities and procedures needs support and coaching from managers. And it needs to be developed in cooperation with the employees.

Talonen (2018) suggests that the workers on the maintenance department should have their own area of responsibility from the production line or itinerant area of responsibility in every week. For example, in Forssa factory those areas could be Roll-up machine, Single

packaging line, Hot End or Fiberizing. When the maintenance worker comes to work in the morning, he should check from the ERP system if there is any maintenance request on his area. He should also discuss with the operator if there is something to pay attention to and checks the WCM board of the area, if there are some needs written concerning the maintenance. The discussion with the operator should consider about the matters generally, if there have already been some actions done with the issues during the night or weekend, is the help of maintenance department needed or are the problems already solved. If there still is a need for help of maintenance team, they could agree if it is suitable to do the actions immediately or should the actions wait for more convenient time in production. If the maintenance worker and the operator cannot solve the problem together, they will contact the management. It should be agreed in the common procedures, who will write the maintenance request to the control system, who will check out needed spare parts from the control system, who will write down the actions made and hours it took to repair and who will close the maintenance work from the control system. Lots of these responsibilities could belong to the operator and the maintenance worker, like in Gyproc's factory in Kirkkonummi.

It is important that the operator and the maintenance worker discuss together, what has been done, what kind of problems there has been and also if the machines have functioned well. Nowadays the challenge is, that the operator says that there haven't been any problems, although some has been written to the production log or production diary. Also the maintenance workers don't find any maintenance requests from the control system, and interpret that there are no urgent tasks for them. This is why the maintenance worker should ask about those from the operator in the future. Talonen (2018) thinks that this would require more activity and responsibility from the maintenance workers and operators than the current procedures, as these matters are nowadays run by supervisors and managers. In future it could be foreman's responsibility to check from the ERP system or machine board, what actions have been made.

The machine boards could be placed besides each packing machine (single packaging, rolling machine, stacking machine, Premier Tech) and in the monitoring rooms in TEL process line and in Hot end. The development engineer would take care that the information will be updated to the machine board. Managers from the production and maintenance teams can together discuss about open issues beside the machine boards. (Talonen 2018.)

It also should be agreed together, when it is most optimal time to do preventive maintenance actions (both amateur maintenance and professional maintenance) (Talonen 2018).

3.5.2 Interview of the production and maintenance managers

Production Manager Harri Kinnunen and Maintenance Manager Totti Könkö were interviewed with half structured theme interview in April 2018. They felt that in practice the development of the cooperation between maintenance and production departments could be for example utilizing the methods of World Class Manufacturing (WCM) in professional maintenance (PM) and in amateur maintenance (AM). This would mean machine boards, meticulous enhanced work order with breakdowns and together executed well designed and scheduled advance maintenance. (Kinnunen & Könkö 2018.)

Kinnunen and Könkö (2018) think that the collaboration could be improved for example by doing safety issues and developing reliability in cooperation with the maintenance and production departments. Taking care of the basic circumstances of the factory's machines and equipment is important. The maintenance team needs the essential information about the machines and equipment from the production team to be able to take care of the reliability and create systematic preventive maintenance system.

The production team can do part of the amateur maintenance (AM) work, but they usually need some guidance from the maintenance team in able to do the work successfully. Nowadays there are some individual to-do-lists for some machines, but this is not a custom, although it could be. (Kinnunen & Könkö 2018.)

The production manager Harri Kinnunen (2018) thinks that the amateur maintenance work list brings too heavy workload for the production team in maintenance day, so some of the tasks that could be done during the production if possible. The cleaning processes could be developed and the machines covered so well that all the dust would not reach the sensitive equipment. Machine lubrication points could be brought out from the machine area to be able to perform the lubrication of the machine during the production. The contractors should be used to the most challenging and laborious tasks.

Also the professional maintenance work list for the maintenance day is long and that makes the day very busy for maintenance team. If possible, there could be some help from the production team to assist in professional maintenance tasks. Some of the tasks could be executed during the week instead of one day. (Kinnunen & Könkö 2018.)

The production manager Kinnunen (2018) hopes that the maintenance team could name the responsible persons for the most important machines or areas of the production and factory. These areas and machines could be for example the packaging, production line, fiberizing, melting, batch, waterworks, binder facility and assisting machinery like

dust intake. That person should be interested of the machine and its reliability as a part of the productive production. Kinnunen thinks that the communication about the maintenance requests would improve if there were the named responsibility areas. The maintenance manager Könkö (2018) thinks that named responsibility areas are hard when thinking the resourcing, because when the machine and the work concerning it is earmarked for a specific person, it makes things difficult when he/she is absent.

There could be machine board or maintenance task list on the board in addition to ERP system. This would make it easy to understand the entity and what kind of tasks there are coming. From machine board it would be easy to see what is the maintenance situation at the time without trying to find it from ERP system. (Kinnunen & Könkö 2018.)

The communication about maintenance tasks happens from the production employee to the production foreman and from production foreman to the maintenance foreman and from there to the maintenance employee. The communication would be smoother if it would happen between employees and after that the foreman would be informed about the situation if necessary. (Kinnunen & Könkö 2018.)

Kinnunen and Könkö (2018) considers that the collaboration could be improved by thinking the maintenance department and the production department as one big team. The cooperation in WCM Maintenance reliability programs would make the cohesion and togetherness better for employees when they would work together for the project. They would need to figure out together how to improve the machine and its reliability, productivity, usability and ease the professional and amateur maintenance work. This kind of WCM projects have been carried out mainly by the lead of the foreman, but the responsibility of the employees could be increased in future.

3.6 **Bechmarking of other Saint-Gobain factories**

As a part of the survey, there was some benchmarking done in other sites of Saint-Gobain Finland, to find out the best practices in cooperation between different teams, especially between maintenance and production departments.

3.6.1 Kirkkonummi, Gyproc

In May 2018 the researcher visited the Kirkkonummi plant and benchmarked the cooperation actions and collaboration of Gyproc. Paavo Tammi, the production manager of plasterboard production and Ville Lähteenmäki, the maintenance manager of Gyproc Kirkkonummi were interviewed during the visit and plant tour.

When visiting the site, it was obvious that the collaboration between production and maintenance teams worked very well. Some of the employees in production team had worked earlier in maintenance department, and that way work community in Kirkkonummi factory has grown together very well. The employees like to go to other department to help if there is need for that. (Tammi & Lähteenmäki 2018.)

Tammi and Lähteenmäki (2018) pointed out that there has been challenges in the collaboration of the teams because of interpersonal relationships of the team managers. There has been changes in the organization and nowadays the teams function very well together.

The stoppage days are planned together. The amateur maintenance task list goes to the maintenance department beforehand and the departments go the tasks through together to avoid possible collisions in the field during the day. The main principle is, that professional maintenance is number one and the production team evades if needed. (Tammi & Lähteenmäki 2018.)

3.6.2 Hyvinkää, Isover

The benchmarking of cooperation between departments was made in Hyvinkää Isover in June 2018. The maintenance manager Marko Laakso and the cold end manager Teemu Nieminen were interviewed about the practices and problems and success of the daily teamwork between the departments.

There are two Isover factories in Finland and Hyvinkää factory is larger than Forssa. There are also more employees. The cooperation between maintenance and production teams has not been actively developed and has some challenges, but there are also some good practices where to learn in Isover Forssa. (Laakso & Nieminen 2018.)

There is always one employee on maintenance department that listens the production team's radiophone channel. In that way the maintenance team is up to date with current situation and possible problems in production. (Laakso & Nieminen 2018.)

Like in Kirkkonummi, also in Hyvinkää there are employees in production team, who have earlier worked in maintenance team and that way they are capable to help maintenance team in stoppage days. They are usually working as a pair for maintenance employee or ensure on the door of the container. (Laakso & Nieminen 2018.)

3.6.3 Kiikala, Weber

The researcher did the benchmarking in the Kiikala Weber factory in December 2018. Compared to Isover Forssa the organization in Weber Kiikala is concise. There is one foreman in production department and one foreman in maintenance department. The production manager Juha Eriksson and the maintenance manager Olli Savioja were interviewed together. They feel they have well-functioning collaboration, but at the same time it is vulnerable. If other of them leaves the company, the team breaks and there is need to create totally new team, which is not easy and it takes resources from the one that stays in the company. In bigger teams it is easier to give up one team member, when there are still team members left and the workload is possible to divide for the familiarization period. (Eriksson & Savioja 2018.)

3.6.4 Observations in daily business

Cause the researcher works in the assigning company, it was possible to observe the customs and behavior in and between teams during the year of study. In the daily observation some notes had been made concerning the collaboration between the departments and some practical examples about the good practices and also about some problems were collected on the way.

Communication between the teams was sometimes quite difficult. For example, it should be custom to go through some facts when maintenance team comes to fix some problems in production machines. The employees should discuss together what has already been done and has some log out - tag out -procedures already carried out. One part of the communication is also documenting the made maintenance actions to the ERP system. That way the information is available to others. One challenge is the accessibility of the information, because there is lack of know-how when using the ERP system.

Amateur maintenance task list was put to use in the spring 2018. The task list should be go through together before the stoppage day to ensure that professional maintenance work is possible to carry out and the needed support from maintenance department is given to amateur maintenance tasks.

The production team can influence to the device damages when having the cooperation with the maintenance team. Proactive maintenance and predictive maintenance need these two teams to work together. Wearing, erosion, changes in machine's sound, increase in vibrations and things like that should be communicated to the maintenance team and analyzed together what are the reasons to those changes.

Well-being at work is issue that is not very much in formal discussions in the factory. The employees wanted to participate to the performance appraisals and those have now been offered to them. In those discussions it stands out that the common working environment is rather good in the factory, but there could be some effort to improve it. In Isover Hyvinkää factory there is a practice to talk about well-being at work together with the employees in afternoon meeting regularly.

4 ANALYSIS

Throughout the observations during the year of research, it occurred that the most common problems in cooperation between maintenance and production departments were due to insufficient communication. For example, the employees of the production department do the maintenance request to the ERP system and the foreman of the maintenance staff gives the job to one of the maintenance team members. The maintenance department checks the machine or instrument and might diagnose that there is nothing wrong or can't find anything to fix. Unfortunately, they don't ask additional information from the production team. And the person that has done the request gets no feedback of what has been done or pointed out or why there is not anything done. So the matter to solve here is, how to make sure that maintenance department understands the maintenance request that employees from production department have put in to the ERP system?

Another common problem was, that people in production team were not sure who to contact in the maintenance organization. Some of them contact the automation engineer instead of electrical engineer in electrical issues. Or some might contact the foreman of the maintenance staff and later continue to communicate about the matter with the maintenance manager. In worst case they both start to work for the case without knowing that they both are on it and they even might solve the case differently. So how to ensure, that the right persons are contacted and only one with the same matter?

Both in questionnaires and interviews it stands out, that there is lack of communication about the information when the maintenance tasks have been done and what actions there have been made. There are also some operators who have not been in any contact with the maintenance team. To ensure the communication and collaboration between teams, it is necessary to get the team members acquainted with the other team's members.

As the PeoplePower personnel survey and the questionnaire about the development between the maintenance and production departments indicate, there should be some actions made to ensure that employees

know the expectations towards their work and the meaning of their job. This is favored also by the research and theory about the job satisfaction and the productivity of the personnel. Regular discussions about employees well-being could be taken to new procedures as it is in Isover Hyvinkää factory.

There is a possibility to increase the responsibility and activity of the workers instead of the current way to act where the foreman takes care of communication, planning, documentation and so on. This would mean a change in culture and takes time, but there is lots of potential to exploit as the experiences from other sites show. The more explicit transform from groups to teams might be one way to resolve this.

4.1 The development actions in 2018

The first questionnaire to research the cooperation in the Isover Forssa factory was taken in the end of 2017. Due to answers and observation on field and feedback given by managers, some development actions were made to improve the cooperation of the maintenance and production departments. The questionnaire was remade in the end of 2018 to see how the development had influenced on the opinions of the employees about the cooperation between departments.

For example, the cooperation between the departments on maintenance stoppage day was improved by adding the amateur maintenance tasks to the ERP system and maintenance manager teaching the production team how to do the tasks. When listing both the professional maintenance and amateur maintenance tasks to the work lists of the maintenance stoppage day, both departments knew what tasks the other department is going to do during this busy day.

The development engineer from Isover production team and production engineer from Ecophon production team were invited to the WCM pillar meetings of maintenance reliability in the spring 2018. During the year the Reliability pillar team planned how to develop the reliability of machines in Forssa factory.

The information about the maintenance requests current situation was added to the daily memo of the morning meeting where those things were discussed through by the managers and foremen. This way the information was communicated better to the employees who read the memo after the meeting.

One action to improve the collaboration and communication between these departments were the meetings where the managers and foremen of the maintenance and production department got together to go through the open modification list of the maintenance requests. This helped both departments to understand why some modification tasks

were not proceeded expectedly. Also the communication about more precise desires and possible challenges was improved by these meetings. Some of the tasks got done even more promptly because of these meetings.

4.2 The influence of the executed development actions

When comparing the survey results of years 2017 and 2018 and the answers of the employees of the production team, it can be noticed that the satisfaction towards the cooperation between the departments had improved during the year (figure 8).

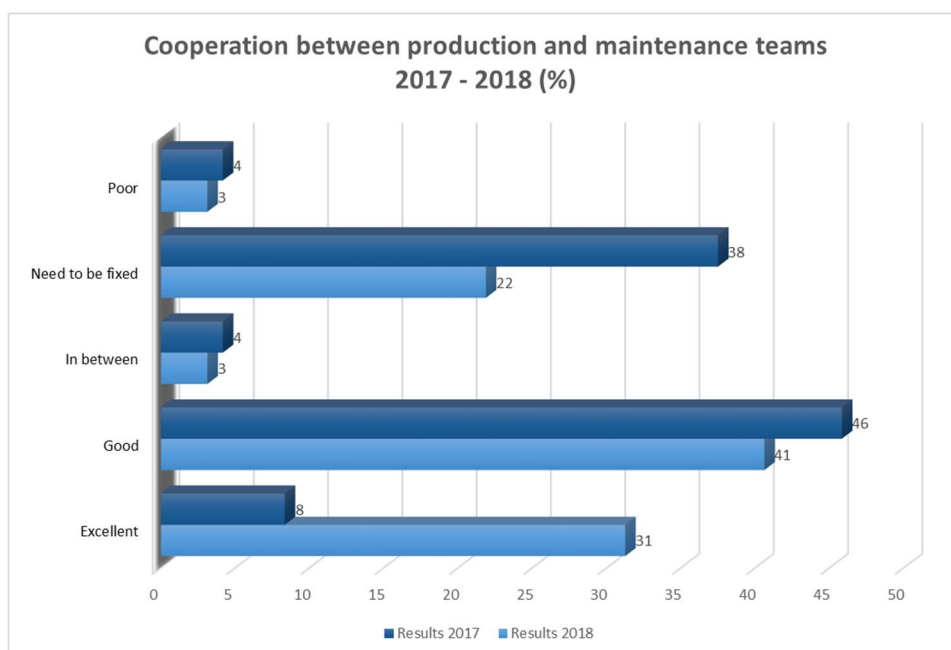


Figure 8. Improvement in the satisfaction of the cooperation between the departments (Saint-Gobain Finland 2018).

In 2017 four percent of the answerers thought that the cooperation was poor and 38 percent that there was need to fix things. After the improvements made during 2018 the corresponding answers were three and 22 percent. The distinct increase can be seen in satisfaction when examining the answers given to the category of excellent which increased from 8 percent to 31 percent of the answers. So we can make the conclusion that the developing actions were made to the right direction. (Saint-Gobain Finland 2018.)

5 RECOMMENDATIONS AND DEVELOPMENT PLAN

Based on research and theory, it can be stated that satisfied employees who know their responsibilities and role in work community are more productive in their work and effective as a part of a team. When the team is well functioning and has a good spirit, it is also better participant in cooperation with other teams. Clear common targets in the teams and in their common projects ease the cooperation. This can be visualized as in figure 9.

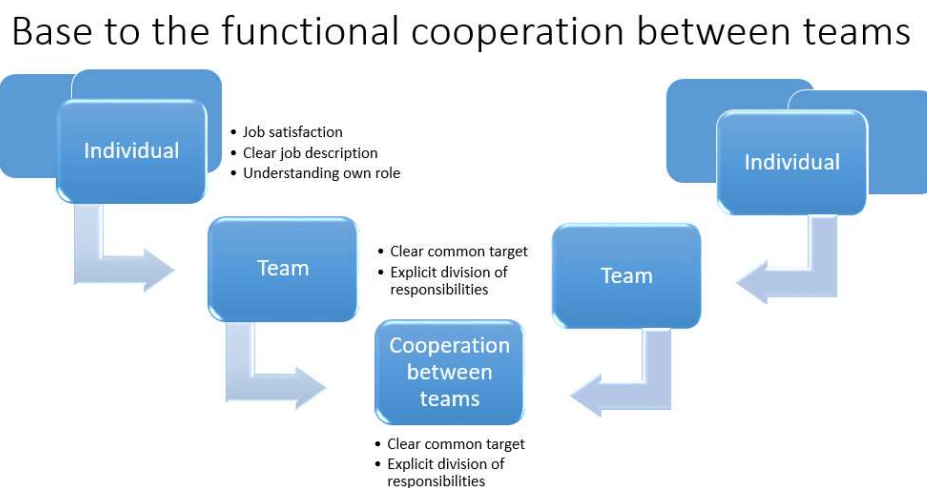


Figure 9. Base to the functional cooperation between teams.

When the base is in good shape it is possible to do separate development actions to improve the collaboration. Satisfied and motivated employees are likely to be good team members and from good teams it is easier to create good wider teams.

5.1 Development plan

Based on the observations, interviews and years 2018 cooperation survey, clear and explicit suggestions and actions were expected to give and carry out to develop the cooperation between the maintenance and production teams. This creates the need for development plan which is made as a part of this thesis. To the development plan the most important development actions will be specified and roughly planned how to put it into practice together with the maintenance and production teams. The development plan will be introduced to the maintenance and production teams in a development meeting and together the departments will agree how to proceed in practice. The summary of the development plan can be seen from appendix 5.

5.1.1 Communication

More active and responsible attitude towards cooperation and discussion between the departments is necessary both in production team and in maintenance team. This will be discussed in the development meeting together and possible actions planned together.

In the development meeting, it is necessary to discuss also how to make sure that the maintenance department understands the maintenance request that employees from production department have put in to system. Nowadays the maintenance department checks the machine or instrument and might diagnose that there is nothing wrong. And the person that saves the request gets no feedback of what has been done or pointed out.

Operators and maintenance workers need to be periodically in the same meetings. Nowadays this happens only with health and safety issues. In future there needs to be monthly meeting where the employees participate. In these meetings it is good to go through relevant subjects from both teams to increase the awareness of the other departments daily actions and challenges.

Development discussions together with maintenance and production team are needed. The biggest challenges in production and how to develop the process and solve the problems together should be discussed in a cooperation meeting between the departments. Employees should be invited to take part to the meetings concerning projects, maintenance stoppage days and when going through the maintenance tasks about modifications. This kind of meetings will be organized in the future four times per year and the participants will be plant manager, maintenance manager, production manager, maintenance supervisor, development engineer and from two to three employees from both maintenance and production departments.

There should be active discussion between maintenance worker and operator, about

- What kind of problems there have been?
- What has worked well recently?
- What has been done to the problems?
- When it is suitable to do preventive maintenance?

This kind of conversation should happen in daily business and this will be discussed in the development meeting with the team managers. They should encourage and lead the employees toward this practice. For example, it could be a daily procedure that maintenance worker comes to the production department and goes through these things with the production worker.

Electrical online WCM boards will be purchased near the machines. There will be updated amateur and professional maintenance issues and maintenance requests and their state on the board. These facts should be discussed besides the board by maintenance worker and operator. The development engineer will find out how to utilize the ERP system and FIOR to make these practical and easy to use. The implementation plan will be made in cooperation between the maintenance and production teams' workers.

The information about the tasks being delayed because of the need to wait the essential parts to the machines should reach the production team. Procedures to document and follow the situation of each task to the ERP system or machine board or diary will be planned together in the development meeting.

5.1.2 Process development and reliability

Process chart should be drawn up about the maintenance request process to help the development of the process:

- Operators observing the machines and equipment
- The maintenance request done to the ERP system if needed
- Maintenance worker checking from ERP if there are any maintenance requests.
- Maintenance worker checking from the operator if there are some needs concerning the maintenance.
- The discussion with the operator (should consider about the matters generally, if there have already been some actions done with the issues during the night or weekend, is the help of maintenance department needed or are the problems already solved).
- If there still is a need for help of maintenance team, they could agree if it is suitable to do the actions immediately or should the actions wait for more convenient time in production.
- If the maintenance worker and the operator cannot solve the problem together, they will contact the management.
- It should be agreed in the common procedures, who will write the maintenance request to the control system, who will check out needed spare parts from the control system, who will write down the actions made and hours it took to repair and who will close the maintenance work from the control system.

It is good to create more work instructions for amateur maintenance tasks for the most important machines. This should be done in cooperation with the maintenance and production teams.

The job descriptions should be made and updated to ensure that employees know their responsibilities. Also the knowledge about the expectations towards employee's work and the meaning of the work to

the profit center's should be increased for example by the development discussions.

Together with the maintenance and production teams it should be taken care of that the machine is ready to be in production after the maintenance actions. The test drive will be done together with the employees from both departments.

The reliability of the machines and equipment will be developed also in future together with the maintenance and production teams. Employees could be invited to the development meetings of the maintenance reliability WCM pillar.

5.1.3 Accessibility to the ERP system

There are some expectations towards the FIOR project, where the user interface to ERP system will bring reprieve to the usage and accessibility to the maintenance data. This will help to increase the employees' responsibility to register the data to the system and also find it from there.

FIOR brings the mobility to the usage of the ERP system because the access should be possible from the mobile phone and from the machine boards. It is also easy to customize the layout of the screens and information flows from the basis of the expectations. These possibilities should be developed and utilized together with the teams.

5.1.4 Work rotation

In the years 2018 survey about maintenance and production departments cooperation, someone suggested that because there might be some handy employees in production team, who could help maintenance team in their work in maintenance stoppage days or in bigger reparations, they should be challenged to the work rotation or at least to work with maintenance team in maintenance stoppage days. This was tried in one-month long outage in March 2019 and experiences were good. Few of the production team's employees were in maintenance tasks, because there as need for workforce and they had the skills. This should be done also in the future in one-day stoppages and in longer outages. Also the possibility to longer period work rotation should be offered actively to the employees, because nowadays it is very uncommon.

Foreman of the maintenance team and the production team could take part to the temporary work rotation in order to get better understanding of each other's work and responsibilities and that way to improve collaboration.

5.1.5 Organization structure and leading

The organization should be developed more from the traditional working groups towards the actual teams. The management in Forssa factory is rather archaic and drawn by superiors and foremen. When developed closer to the team organization the responsibilities could be divided more and the employees could be taken into the team work. At the same time the work load from some managers would ease a bit.

The common rules need to be created to the factory and daily work. It is important to explain to the employees why there are different rules and those should be documented in one place. Now many of the procedures and rules are commonly known, but the facts change in timeframes and the message might change. That is why it is important to have the rules in written and to develop them together with the employees.

Regular meetings to discuss the well-being of the employees will be taken in to practices. In those meetings the managers, foremen and workers discuss about how to improve well-being at work and the working atmosphere in Isover Forssa factory.

6 CONCLUSION

The aim of the research was to find out how to develop the collaboration between maintenance and production teams in Saint-Gobain Finland Oy Isover Forssa.

To be able to utilize the development plan in action, the plan was attempted to make as practical as possible and to collect there the most important and executable actions. This was done successfully and some development actions were made during the research process and there were good results achieved. A development plan and suggestions were made for the company to continue the good and productive work in developing the collaboration between the teams.

The execution of the development plan is necessary to improve the collaboration between the maintenance and production teams. The work is suggested to do in a cooperation and development meeting between the maintenance and the production teams to find the specific actions how to proceed and to divide the responsibilities.

The principles of triangulation have been complied with gathering the research material from many sources and there has been utilized many methods to reach the objectives. In this way the results can be considered reliable.

During the research the cooperation of the teams was monitored by the participating observation and the situation was researched by the questionnaire surveys in December 2017 and in December 2018. Good practices were explored by benchmarking other Saint-Gobain Finland's factories in Gyproc Kirkkonummi, in Weber Kiikala and in Isover Hyvinkää.

Satisfied employees who know their responsibilities and role in work community are more productive in their work and effective as a part of a team. When the team is well functioning and has a good spirit, it is also better participant in cooperation with other teams. The key development actions to improve the collaboration between teams are improving the communication and make the responsibilities in and between the teams as clear as possible.

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THE SURVEY ABOUT JOB SATISFACTION 2017

In November and December 2017 the survey about job satisfaction was made for operators in production. The questionnaire can be seen below.

TYTYTYVÄISYYSKYSELY

Miltä työaikajärjestelyt ovat sinusta tuntuneet?

Vapaa sana _____

Pitäisikö työn kiertoa vuoron sisällä olla enemmän? (Pakkamo-Linja-Kuidutus)

Vapaa sana _____

Mitä mieltä olet uudesta aloitejärjestelmästä? (Aloiteen teko, käsittely, palaute ja toteutus)

Vapaa sana _____

Miten tuotannon ja kunnossapidon yhteistyö sujuu mielestäsi?

Miten itse olisit valmis kehittämään yhteistyötä?

Jatka tarvittaessa kääntöpuolelle... Kiitos vastauksistasi!

ISOVER
SAINT-GOBAIN

(Saint-Gobain Finland 2017.)

THE SURVEY ABOUT COOPERATION BETWEEN PRODUCTION AND MAINTENANCE TEAMS (11/2018)



KYSELY TUOTANNON JA KUNNOSSAPIDON YHTEISTYÖN KEHITTÄMISESTÄ

Tämä kysely toteutetaan osana Saint-Gobain Finland Oy:n Forssan tehtaan tuotannon ja kunnossapidon yhteistyön kehittämistä. Lisäksi se liittyy kehitysinsinööri Heli Kettusen International Business -opintojen päätteeksi tehtävään opinnäytetyöhön, jonka aiheena on tuotannon ja kunnossapidon yhteistyön kehittäminen.

Vastaathan kyselyyn viimeistään 26.11. joko vastaamalla sähköiseen webropol-kyselyyn, lähettämällä tälle lomakkeelle täytetyt vastauksesi sähköpostilla Helille osoitteeseen heli.kettunen@saint-gobain.com tai täyttämällä vastauksesi tulostettuun lomakkeeseen ja toimittamalla täytetyn lomakkeen Helille. Voit halutessasi vastata kyselyyn nimettömänä, mutta mikäli jätät nimesi vastausten yhteydessä, voimme tarvittaessa käydä kehitysideoita ja vastauksia tarkemmin läpi.

KYSYMYKSET:

Vastaaja: _____

Miten tuotannon ja kunnossapidon yhteistyö sujuu?
Rastita kuva, joka kertoo parhaiten yhteistyöhön liittyvästä fiiliksestäsi.



Kerro esimerkkejä hyvistä ja/tai huonoista kokemuksistasi näiden osastojen välisessä yhteistyössä:

Millaisin toimenpitein tuotannon ja kunnossapidon yhteistyötä on kehitetty?

Millaisia toimenpiteitä yhteistyön kehittämiseksi kaipaavat?

Miten itse olisit valmis kehittämään yhteistyötä?

Vapaa sana:

Kiitos vastauksistasi!

QUESTIONS IN THEME INTERVIEWS

The following subjects were part of the half structured theme interviews made in May 2018:

- Cooperation in practice
- Challenges in cooperation
- Possibilities that will open due the cooperation
- What is functioning well already?
- What is not functioning so well in cooperation?
- Expectations towards the developer of the cooperation
- What kind of actions are already made to develop the cooperation?
- Expectations from the cooperation between production and maintenance teams

BENCHMARKING QUESTIONS

The following subjects were discussed in the benchmarking meetings with the specialists from other sites of Saint-Gobain Finland Ltd.

- What is functioning well in cooperation between production and maintenance teams?
- What is not functioning so well?
- What kind of actions are made to develop the cooperation?
- How are the notifications of maintenance need made at your site?
- What kind of process the is to do notifications about device damages?
- How are the maintenance days managed?
- Do you have common occasions and facilities for production and maintenance teams (break rooms, common info sessions, meetings, trips)?

THE DEVELOPMENT PLAN

The development plan is a summary about the actions that should be done to improve the collaboration between the production and maintenance teams in Forssa factory.

Action	Continuous practice	Development project
Communication		
More active and responsible attitude towards cooperation and discussion between the departments		x
Ensure that the maintenance department understands the maintenance request that employees from production department have put in to system		x
Operators and maintenance workers periodically in the same meetings.	x	
Discussion about the biggest challenges in production and how to develop the process and solve the problems together	x	
Active discussion about the daily matters between the employees from both departments	x	
Online WCM machine boards		x
Information about the situation of each maintenance request	x	
Process development and reliability		
Process chart about maintenance request process -> development of the process		x
AM work instructions		x
Job descriptions, responsibilities clear		x
Ensure that the machine is ready to production after maintenance actions	x	
WCM pillar work for maintenance reliability (together and with employees)	x	
Accessibility to the ERP system		
FIOR - employees have more responsibilities in documenting	x	
FIOR - developing together		x
Work rotation		
Employees working in different departments and teams in maintenance stoppage days	x	
Foreman of the maintenance and production team temporarily in work rotation		x
Organization structure and leading		
More from groups to teams		x
Regular well-being meetings	x	
Creating and communicating the common rules		x