

Pekka Virtanen

Operating Model for Case Company On-The-Job Training Using the TWI-Approach

Helsinki Metropolia University of Applied Sciences

Master's Degree

Industrial Management / Logistics Management

Master's Thesis

08 October 2020

I want to thank my employer, the case company of this study. Special thanks to the company Head of Quality and Operational Excellence Manager Tapani Salminen for giving me the support, critical insight, encouragement and development ideas during the whole process. I want to also thank the company's Operators for helping me for the piloting the model and giving feedback to develop the process. Also, I want to thank everybody who participated in the interviews for the current state analysis.

To the Metropolia faculty members, thank you all for the highly educational and motivating year and for helping me achieve this goal. Special thanks to Dr. Thomas Rohweder not only for your support and direction through the process, but also for the highly valuable business insights and Sonja Holappa for the guidance and insight with the text.

Pekka Virtanen

Rusutjärvi

October 08, 2020

Author Title Number of Pages Date	Pekka Virtanen Operating Model for Case Company On-The-Job Training Using the TWI-Approach 54 pages + 3 appendices 08 October 2020
Degree	Master of Engineering
Degree Programme	Industrial Management / Logistics Management
Instructors	Dr. Thomas Rohweder, Principal Lecturer Tapani Salminen, Head of Quality and Operational Excellence
<p>The objective of this thesis was to propose an operating model to on-the-job training, using the TWI-approach.</p> <p>The case company in this thesis is a Finnish company and focuses on Operations unit. It develops, manufactures and markets products and services to environmental and industrial measurements. The Operations is responsible for logistics and manufacturing globally.</p> <p>The Case company unit has decided to utilize the “Training Within Industry” (TWI) -approach in conceptualizing on-the-job training.</p> <p>The current state analysis describes how nowadays new hired employees will go through on-the-job training. The current state analysis was carried out by interviewing different employees in different positions in company.</p> <p>The conceptual framework and findings from the current state analysis were combined to build an initial suggestion for the operating model.</p> <p>The outcome is an operating model consisting of elements of TWI program and philosophy.</p>	
Keywords	Training Within Industry, TWI, on-the-job training

Contents

Preface

Abstract

List of Figures

List of Appendices

1	Introduction	1
1.1	Business Context	1
1.2	Business Challenge, Objective and Outcome	2
1.3	Thesis Structure	3
2	Method and Material	4
2.1	Research Approach	4
2.2	Research design	4
2.3	Data plan	6
3	Good practice concerning TWI in relevant literature and example company	11
3.1	Basics of TWI	11
3.2	Job Instruction in TWI	12
3.3	Job Method in TWI	16
3.4	Job Relations in TWI	18
3.5	Criticism of TWI	21
3.6	Good practice in an example company	21
3.7	Conceptual Framework	22
4	Analysis of case organization current on-the-job training practices	24
4.1	Overview of this data stage	24
4.2	Grounded description of how on-the-job training is currently done at case company	25
4.3	Gap analysis of case company way of operating as compared with TWI ideal	26
4.3.1	Job instruction strengths and weaknesses	28
4.3.2	Job methods strengths and weaknesses	30
4.3.3	Job Relations strengths and weaknesses	32
4.3.4	Summary of gap analyses	33
4.4	Summary of current on-the-job training practices in current company	34
5	Developing an operating model for on-the-job using the TWI-approach	36

5.1	Overview of this data stage	36
5.2	Developing Job Instruction stage of the operating model	37
5.3	Developing Job Methods stage of the operation model	40
5.4	Developing Job Relations stage of the operating model	42
5.5	Summary of proposed operating model	43
6	Piloting operating model	46
6.1	Overview of the Validation Stage	46
6.2	Lessons learned in pilot and possible improvements	48
6.3	Summary of operating model	49
7	Discussion and Conclusions	50
7.1	Executive Summary	50
7.2	Next steps towards implementation of operating model	51
7.3	Evaluation of thesis trustworthiness	51
	7.3.1 Good practice concerning TWI in relevant literature and example company	52
	7.3.2 Analysis of case organization current on-the-job practices	52
	7.3.3 Developing an operating model for on-the-job training using the TWI-approach	52
	7.3.4 Piloting operating model	53
7.4	Closing Words	53
	References	54

Appendices

Appendix 1. Stakeholders Interview

Appendix 2. Stakeholders Interview

Appendix 3. Stakeholders Interview

List of Figures

Figure 1. Research design of this study

Figure 2. Data plan for interviews

Figure 3. Campaign Process Map.

Figure 4. Job Instruction card

Figure 5. Job Methods card

Figure 6. Job Relations card

Figure 7. Conceptual framework.

Figure 8. 100 trainers on-the-job training hours

Figure 9. Process model in current company

Figure 10. JIB template in current company

Figure 11. Job Instructions strengths and weaknesses compared the TWI to current company way

Figure 12. Job Methods strengths and weaknesses compared the TWI to current company way

Figure 13. Job Relations strengths and weaknesses compared the TWI to current company way

Figure 14. Cap analysis of current way vs TWI

Figure 15. Approach model for operating model

Figure 16. Development for Job Instructions

Figure 17. Organization chart for TWI (proposal)

Figure 18. Roles and Responsible chart for TWI implementing (proposal)

Figure 19. Development for Job Methods

Figure 20. Development for Job Relations

Figure 21. Summary of the development

Figure 22. Piloting operating model plan

Figure 23. Parts that was used in pilot

1 Introduction

This thesis focuses on-the-job training in the case company. There is no standard way to do on-the-job training and it has an impact on quality and lack of training time. On-the-job training of newly recruited employees is not sufficiently conceptualized.

In this thesis, the focus is on Training Within Industry, TWI. (Graupp, Wrona, 2006) TWI was created 1940, in the USA. The concept of TWI was to create methods and a standard way to train untrained employees to manufacture military products in factories.

Therefore, it is important to understand the meaning of TWI-approach and how it can be turned to an operating model in Operations. This thesis includes a literature review on TWI knowledge and by gathering and comparing that information to the existing model in the current company, a proposal of the TWI model is built and then piloted in the factory floor.

1.1 Business Context

The case company of this Thesis is a Finnish technology company and a global leader in environmental and industrial measurement business. The company's annual sales are roughly 419MEUR and the company has approximately 1700 employees of which about 1100 are in Finland. The customers use integrated systems or fixed and hand-held measurement instruments as well as calibration services for temperature, humidity, dew-point, carbon dioxide, moisture in oil and pressure.

The company defines its business as high mix-low volume and most of its products are manufactured on an Assemble-to-Order basis. The products are highly configurable, and the product delivery times can be just one workday. The company's environmental business is not growing significantly due to limited markets and customers mainly from the public sector. The industrial measurement business has organic growth and the business continuously seeks new markets with new solutions resulting in an annual growth of over 10%. The company is innovation oriented with over 10% of net sales annual investment to research and development.

1.2 Business Challenge, Objective and Outcome

The business challenge is that there is no conceptualized way of the on-the-job training. The newly hired employee on-the-job training materials and practices are not standardized, and as the on-the-job training is not standardized, the quality varies. Different factories are doing the on-the-job training in different ways and the outcome is not high quality. The methods that are currently used in on-the-job training are quite general in nature and not specific enough.

With no standard way of on-the-job training for the operators, the whole process is not clear, and the methods and tools are not standardized. This lack of process has a big impact on the Operations unit, when you talk about newly hired employees. It takes too much time and resources to provide on-the-job training for a newly hired operator.

The Objective is to propose an operating model for the on-the-job training, using the TWI-approach. Using the knowledge on TWI in literature, the aim is to build a model how the Operations unit can use TWI. The TWI process gives tools for the trainers who are giving the on-the-job training. Following the methods of TWI ensures the newly recruited employee receives a standardized on-the-job training. The focus is on tools that are easy to implement and give the best benefits to on-the-job training. The on-the-job training should be efficient, and the time should be short so that the company gets the best benefits out of the newly recruited employee.

When the company can shorten the on-the-job training time to the newly recruited employee, then it is more efficient for the employee and company. Using best practices of TWI, and piloting the operating model, the quality impact is positive for everyone.

The outcome is an operating model, which is a model that has elements of both TWI and the common way to do on-the-job training. The Operating model should have the elements that will give tools for the trainers. The trainers will get training on how to do on-the-job training. On-the-job training operating model should be piloted in some part of the Operation unit and the result of that will give the keys to decide whether it should be implemented or not. The Piloting result should cover the gaps that exist now in on-the-job training.

1.3 Thesis Structure

This report is written in seven sections. Section 1 is the introduction. Section 2 presents the methods used for the study. Section 3 is a literature review on TWI model and practices that are used already in other companies. The case company current state is analyzed in Section 4 that ends with identifying the current process strengths and weaknesses. Section 5 focuses on developing the new operational model for on-the-job training, which is then reflected against the challenges faced by the case company. Section 6 gives an outlook on the aligned process proposal with managerial comments and feedback. The study is concluded in Section 7 with recommendations for next steps and reflections on validity and reliability of the study.

2 Method and Material

This section describes how this research is executed. The section starts by describing the research approach, secondly it introduces the research design and thirdly it explains how the data was collected and analyzed. This section ends by describing how the validity and reliability of this study is ensured.

2.1 Research Approach

The research approach of this study is an exploratory case study and it is qualitative in its nature. According to Eriksson and Kovalainen (2008: 4-5) a qualitative strategy is typically interested in the interpretation and understanding. In addition to that, the data collected and analyzed in qualitative studies is often context sensitive and aims at a holistic understanding of the issue. The case study is especially suitable if the research question is “how” or “why”, it relates to the present time and researcher has little control to event. (Yin,2002:9). The case study typically relies on multiple data sources and usually uses theoretical proposition to guide data collection and analysis (Yin,2002:14). However, creating a theoretical proposition is not necessary if the research is exploratory. Exploratory case study is striving to explore the topic of researching its context. Therefore, there is no already pre-supposed proposition of the end result. As there is no proposition to state the purpose of the topic, there should be a clear research design made, which will serve as a purpose and also as criteria of the study. (Yin,2002:22)

This study is striving to understand what kind of operating model of TWI-approach will be suitable for the case company and the data collected is context sensitive as it relates mainly to the case company. This study aims to answer how the operating model of the case company can be developed and there is no ready-made proposition of what kind of operating model would be the best for the case company. As there is no proposition, the re-search design will guide the data collection and analysis. The detailed research design is presented in the next sub-section.

2.2 Research design

Before a research project can start, a research plan needs to be made, in other words how to do things and in what order. According to Eriksson and Kovalainen (2008: 27), a

research design includes the basic ideas and the viewpoints for the case study framework. The research design of this Thesis is shown in Figure 1. It visualizes the four steps in the research, data inputs used and outcomes of each step. Gathering the knowledge on TWI is done by reviewing literature and articles from Metropolia library archives.

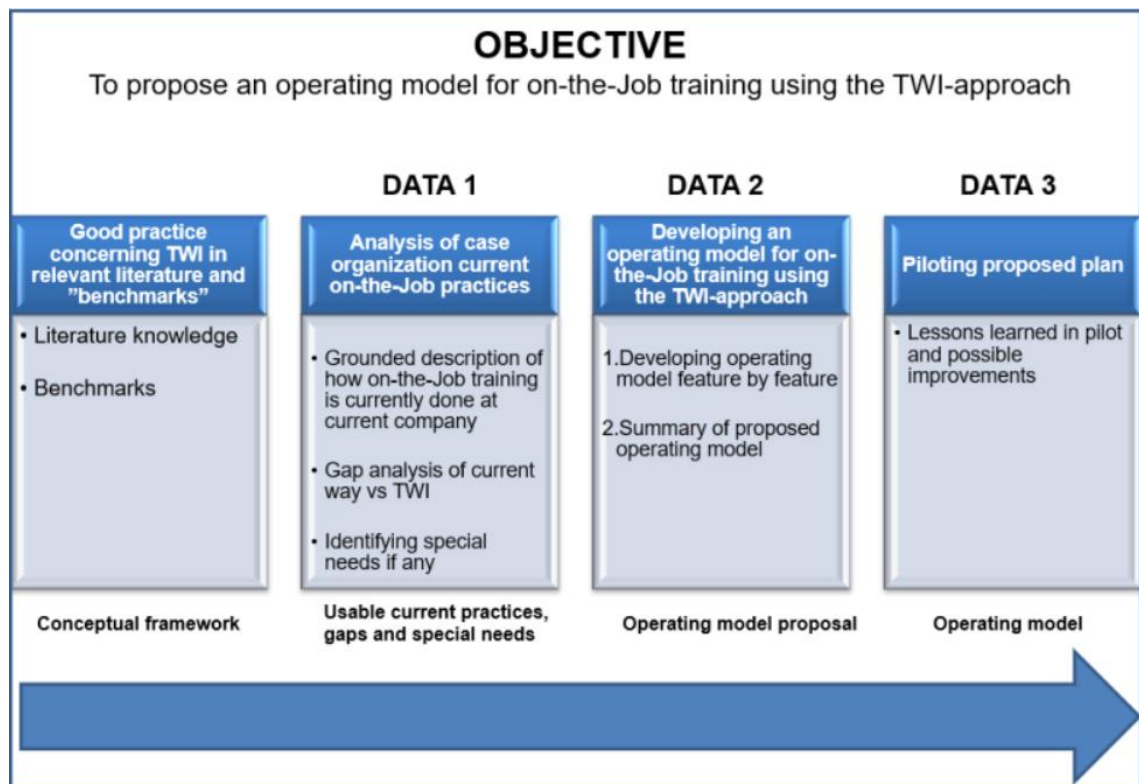


Figure 1. Research design of this study

As seen in Figure 1, the first part is to gather existing knowledge on the TWI model. The goal is to find good practices for developing an operating model and a way to present the identified key processes. The findings from this stage are used to guide the creation of the operating model proposal.

Data 1 relates to the proposal building step and is collected through stakeholder interviews. The strategic objectives are discussed with the key internal stakeholders within the case company. This includes Operative managers, Team Leaders, Senior operators and Quality manager. The purpose of the descriptions is to illustrate how the operating model is currently run.

In the second phase, Data 2 is where the proposal is developed. The proposal will consist of establishing the tools and design for the aligned processes and embedding the key strengths to the aligned process.

Finally, the proposed piloting plan is tested in the chosen department of factory floor. Collecting Data 3 is done through piloting the model and interviewing the trainer, supervisor and newly recruited employee.

The data is used to give guidance how to approach this TWI model and how to get the operating model for the factory floor. The final proposal for the operating model is presented to Head of Quality and Operational Excellence, Head of Factories and Head of Logistics and they will decide whether to implement the model or not.

2.3 Data plan

As shown in Figure 2, Data 1 includes an analysis of the case organization's current on-the-job practices. This stage uses interviewing Managers and on-the-job trainers and Team Leaders for doing the current state analysis and comparing the gap between TWI and the current way. This stage gives an overall view on how the on-the-job is done in the case company and how it should be done by TWI model. Gathering the information and knowledge from the used processes and tools and using this knowledge in the interviews, gives more detailed and customized questions to ask. Building the model and comparing the gap between already existing knowledge and the knowledge that exists in the current company will provide the model for building the on-the-job training model. These participants were selected because they have the most knowledge about the specific parts of the processes. The interviews and workshops are held in the case company premises.

Data 2 is for developing an operating model for on-the-job training using the TWI approach. This stage included comparing those processes that could be used in on-the-job training and which has to be implemented to achieve the model that works like TWI in the case company. Using the current processes that answer the need for TWI model gives the bigger picture of how much must be done to get the working model. Comparing the current status on factory floor, on-the-job training and identifying gap between existing model and the TWI model. The model is created to focus on the on-the-job training activity in the factory floor and developing or reshaping the existing tools and processes.

Data 3, piloting the proposed model is done in factory floor and analyzing the outcome from the pilot gives the final conclusions how the model should be shaped. Shaping this new model with the processes that support the TWI model helps gathering knowledge and ideas to build an effective model. The model is focusing on the operating process in the factory floor and considering on-the-job training. Focusing on the training and developing the process for the training will shorten the time to pilot the operating model and give more details to propose for the implementation of the operating model.

Analyzing every data stage gives the TWI approach model the right approach for the usable model in the case company. At the end of this thesis, the operating model should be checked, and it is going to be valued whether it is going to be implemented or not in the case company.

DATA PLAN					
	CONTENT	SOURCE	INFORMANT	TIMING	OUTCOME
DATA 1 Analysis of case organization current on-the-Job training practices	<ul style="list-style-type: none"> - Description of how on-the-Job training is currently done at current company - Gap analysis of current way vs TWI - Identifying special needs if any 	<ul style="list-style-type: none"> - Interviews of personnel - Genba on factory floor - Stakeholder interviews - Head of Quality and Operational Excellence manager brainstorming 	<ul style="list-style-type: none"> • Head of Manufacturing, Instrument Supply Chain • Materials Management Manager • Executive Vice President, Operations • Head of Weather Factory • Head of Quality and Operational Excellence • Team Leader, Packing & Dis-patch - Logistics Outbound • Senior Material Handler • Team Leader • Process Specialist 	JANUARY-FEBRUARY	Summary of usable current practices, gaps and special needs
DATA 2 Developing an operating model for on-the-Job training using the TWI-approach	<ul style="list-style-type: none"> - Developing operating model feature by feature 	<ul style="list-style-type: none"> - Head of Quality and Operational Excellence Manager weekly meetings 	<ul style="list-style-type: none"> - Head of Quality and Operational Excellence Manager - Lean Engineer 	MARCH-APRIL	Summary of proposed operating model
DATA 3 Piloting proposed plan	<ul style="list-style-type: none"> - Trying out if proposal works - Making improvements 	<ul style="list-style-type: none"> - Operator, Mentor and Team Leader 	<ul style="list-style-type: none"> • Trainer • Newly recruited employee • Lean Engineer 	MAY	Summary of operating model

Figure 2. Data plan for interviews

As seen in Figure 3, data for this project is collected in three rounds. The first round is for collecting Data 1 for the current state analysis and doing the interviews with the responsible persons. The interview questions focus on the current state on-the-job training, the methods and tools used and to identify the strengths and weaknesses and how they

should be developed? With this questioning, the analysis is put together and after checking the tools and processes for supporting the on-the-job training, the whole picture is created. The interviews are used to identify any gaps between the current way and TWI operating model.

Data 2 is built with the data from the interviews and already existing tools and processes. The proposal for the on-the-job training is put together feature by feature with help of Head of Quality and Operational Excellence manager.

Piloting the proposal in Data 3 stage is done in two phases. The idea is to first create a pilot plan and schedule. The pilot is done in order to find out if the proposal works and then get feedback from the Head of Current Factory, trainer and supervisor to see if any improvements are needed to the proposal. Figure 3 shows details of the interviews, workshops and discussions.

DATA 1, Analysis of case organization current on-the-job practices.					
	Participants / role	Data type	Topic, description	Date, length	Documented as
1	Respondent 1: Head of Manufacturing, Instrument Supply Chain - Equipment Manufacturing	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
2	Respondent 2: Materials Management Manager - Logistics Inbound	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
3	Respondent 3: Executive Vice President, Operations	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
4	Respondent 4: Head of Weather Factory - Sondes Manufacturing	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
5	Respondent 4: Head of Quality and Operational Excellence	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
5	Respondent 5: Team Leader, Packing & Dispatch - Logistics Outbound	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
6	Respondent 6: Senior Material Handler	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
7	Respondent 7: Team Leader	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes
8	Respondent 8: Process Specialist	Face-to-face Interview	The current state of on-the-job training in case company	Feb 2020, 30 minutes	Field notes

Data 2, Developing an operating model for on-the-job training using the TWI-approach					
9	Head of Quality and Operational Excellence Manager Lean Engineer	Developing piloting model	Proposal building, reshaping the process and tools.	April, 2020, 20 days	Field Notes
Data 3, Piloting proposed plan					
10	Responsible: Trainer Newly recruited employee Lean Engineer	Testing the model on factory floor, Interviews	Validation, evaluation of the Proposal	April-May, 2020 20 days	Field notes and recording

Figure 3. Details of interviews, workshops and discussions.

As seen in Figure 3, the biggest data analysis is carried out in Data 1, the current state analysis, where eight interviews with different informants were carried out to identify key weaknesses and strengths in the Operations unit regarding the current way of operation.

The next section discusses best practice on Training Within Industry.

3 Good practice concerning TWI in relevant literature and example company

3.1 Basics of TWI

Training Within Industry (TWI) was developed in the United States during the Second World War in the 1940's. The main reason for this was to hire unprofessional people to do the work in military production factories. All the trained work forces participated in the military actions, so the companies had to hire unprofessional people to the jobs.

The TWI process contains three important elements:

- 1) *Job Instruction Training (JI)*. This trains supervisors how to instruct employees so they can quickly remember to do a job correctly, safely, and conscientiously.
- 2) *Job Methods Training (JM)*. Helps supervisors train how to improve job methods in order to produce greater quantities of quality products in less time by making the best use of manpower, machines, and materials now available.
- 3) *Job Relation Training (JR)*. Gives supervisors elements to lead people so that problems are prevented and gives them an analytical method to effectively resolve problems that do arise. (Graupp, Wrona 2011).

The most valuable philosophy of Training Within Industry is to train and mentor the people that are doing the on-the-job training for the newly recruited employees. Keeping up the knowledge and standardizing the methods and tools will bring more effort for any company and for the trainers and will impact results in metrics. Companies which decided to implement the on-the-job training where facing the fact that TWI is a cultural change, when starting to use TWI tools and methods. (Graupp, Wrona, 2006).

The companies must be willing to change their organization or creating new roles for employees who intend to start doing the on-the-job training. TWI is a tool that can be used for creating new methods and upgrading already in use ongoing processes. The whole process of TWI must be standardized, the roles and the tools that are used are clear to handle and the basic idea is clarified to everyone. Reaching the goals that the company will put on TWI, will pay back more than the inputs are. Each element (JI),

(JM) and (JR), have four steps. After the WWII, the TWI use was not any more active and it started to show signs of fading in the United States companies in 1944. Japan's industry was running less than ten percent of its 1935-1937 level. Fearing the rise of communism in Japan after the war, The United States started to help the industry in Japan, avoiding mass starvations and widespread unrest. Toyota implemented the TWI after the war, and TWI had a big impact on the creation of the Toyota Production System (TPS). Ideally, TWI could be used to transform Japan from an archenemy into an economic friend with The United State. (Graupp, Wrona, 2006).

3.2 Job Instruction in TWI

Job Instruction element includes four-steps, **Prepare the worker**, **Present the operations**, **Try out the performance** and **Follow up**. Present the operations step includes breaking down the job, which means to adding list of important steps and highlights the key points for each those steps. Breaking down the job should be divided maximum 10 steps. (Graupp, Wrona, 2006).

Advancing the work of the operation are a logical segment. Make or break the job, injure worker, or make the work easier are key points in each step. Reason is the most important key point in the job instruction breakdown sheet. Figure 4 shows an example of a Job Instruction card. (Graupp, Wrona, 2011).

HOW TO GET READY TO INSTRUCT	HOW TO INSTRUCT
<ul style="list-style-type: none"> • Have a <u>Time Table</u> how much skill you expect him to have, by what date. • Break Down the Job List important steps. Pick out the key points. (Safety is always a key point.) • Have Everything Ready the right equipment, materials, and supplies. • Have the workplace Properly Arranged just as the worker will be expected to keep it. 	<ul style="list-style-type: none"> • Step 1 – Prepare the worker Put him at ease. State the job and find out what he already knows about it. Get him interested in learning job. Place in correct position. • Step 2 – Present the Operation Tell, show, and illustrate one IMPORTANT STEP at a time. Stress each KEY POINT. Instruct clearly, completely, and patiently, but no more than he can master. • Step 3 – Try Out Performance Have him do the job – correct errors. Have him explain each KEY POINT to you as he does the job again. Make sure he understands. Continue until YOU know HE knows. • Step 4 – Follow Up Put him on his own. Designate to whom he goes for help. Check frequently. Encourage questions. Taper off extra coaching and close follow-up.
<p>Job Instruction Training TRAINING WITHIN INDUSTRY Bureau of Training War Manpower Commission</p>	<p>If Worker Hasn't Learned the Instructor Hasn't Taught</p>
<p>KEEP THIS CARD HANDY</p>	

Figure 4. Job Instruction card, (Dinero, D 2005)

The steps for instructing a worker shown in Figure 4 are explained in detail below.

Prepare the worker

Whom to train, Which job and What date? To get answers to this, it is important to make timetable for the on-job-training. People are, by nature, nervous and uncertain when they learn a new job. They may be afraid, that they are not capable of doing the job. This

means that the supervisor or instructor should motivate the employee or learner. Empathy and encouragement of questions will provide good ground for the learner. Support the learner and make sure she or he fully understand the job they are asked to do. Name the job and show the completed work sample. Finding out that the learner have done the similar job before.

In Job Instruction people must take interest in what they are doing and pay attention to details. This is to learn to do their job conscientiously. Make sure you place the learner in a position where they can best see and hear the instruction. This may seem obvious, but sometimes the obvious is the very thing supervisors neglect to do. Place the learner behind the instructor, looking over her or his left shoulder. Make sure that the learner will do the job exactly as shown. The best place to teach a job is at the actual spot where the work will be performed on regular basis.

Present the operations

The instructor gives a careful and detailed demonstration of the job to the learner, by telling, showing, demonstrating, so the trainee understands the job. Breakdown the job and make list of important steps of the job and identify the key points for each of those steps. It is a good idea to start out by telling the learner how many steps there are in the entire job. Showing the job one important step at a time, telling the learner what each step is as you do it. Using sketches and diagrams to illustrate the job.

Breakdown sheets will make sure that you present all key points in their correct sequence. Learner knowing the reason for key point, will better remember and execute that key point. Demonstrating the job for couple of times to the learner, this helps them understand what they saw and learned. Once the learner has an overall picture of what is going on from start to finish, they can increase the understanding of the work.

Try out the performance

This is the time for the learner to show you what she or he can do. Let the learner perform the job silently and observe carefully and stop the trainee immediately if she or he is doing anything incorrectly. Stay and observe until you are confident that the learner can continue doing the work without your assistance. Make sure that you have all the tools,

supplies and equipment's ready to help the instruction. Verification helps the learner to know that she or he is doing the job correctly. Performing this step-in low performance can impact in the authority of supervisor or effective work standard.

Let the learner do the job again, this time telling you the key points for each important step. Using the breakdown sheet making sure that all the key points were stated with the right step and in the correct order. TWI always starts at the simplest level and moved toward complexity. Try-out performance step, the instructor's job is to make sure the learner physically and mentally understands the job while demonstrating it. Let the learner perform the job so many times that she or he fully learn and can perform the job correctly. When the learner has completed doing the whole job, take a moment to pick up the completed work and examine it carefully, perform the audit.

Follow up

At that moment when the instructor transfers the job, it is the worker's responsibility to do the job correctly, showing that she or he knows the job is important. Following up gets the learner go through frequent examination of progress at first, gradually tapering off. The most important help for the learner comes from that person who teaches the work. Knowing how much work must be finished and by when will give the learner a sense of pacing, which is always a big concern when doing something for the first time. If you're not available to help, make sure that you appointed person to the learner, who can perform the job correctly and can instruct.

The key to encouraging questions is to create a stable, secure, and open work environment where people are not afraid to ask questions. If you have instructed well, you can assure that the work will be carried out properly and with fewer problems. Most errors occur soon after the learner starts doing the job alone for the first time. This is the time when the trainer should check back the learner frequently. To become experienced worker, it takes time. When the worker starts knowing the work better, you can check less frequently.

If the worker hasn't learned, the instructor hasn't taught!

3.3 Job Method in TWI

TWI categories three elements that involve in most jobs done every day, Material handling, Machine work and Hand work. Material handling is something that is done when picking up the copies, taking the washed sheets back to the linen closet, this is a common component of most people's jobs, no matter where they work. In TWI Machine work is a work that needs human assistant, assemble the wire, prepare the special order. There are still things that only human hands can do and it's called in TWI, Hand work. Hand work is shaving the rough edges, inserting the large and odd shaped components. (Dinero, D. 2005).

<p style="text-align: center;">HOW TO IMPROVE JOB METHODS</p> <p>A practical plan to help you produce GREATER QUANTITIES of QUALITY PRODUCTS in LESS TIME, by making the best use of the Manpower, Machine and Materials, now available.</p> <ul style="list-style-type: none"> • Step 1 – Break Down the job <ol style="list-style-type: none"> 1. List all details of the job exactly as done by the Present Method. 2. Be sure details include all: <ul style="list-style-type: none"> - Material Handling. - Machine Work. - Hand Work. • Step 2 – Question every detail. <ol style="list-style-type: none"> 1. Use these types of questions: <ul style="list-style-type: none"> WHY is it necessary? WHAT is its purpose? WHERE should it be done? WHEN should it be done? WHO is best qualified to do it? HOW is the "best way" to do it? 2. Also question the: <ul style="list-style-type: none"> Materials, Machines, Equipment, Tools, Product, Design, Layout, Work-place, Safety, Housekeeping. 	<ul style="list-style-type: none"> • Step 3 – Develop the new method. <ol style="list-style-type: none"> 1. ELIMINATE, unnecessary details. 2. COMBINE, details when practical. 3. REARRANGE, for better sequence. 4. SIMPLIFY, all necessary details: <ul style="list-style-type: none"> - Make the work easier and safer. - Pre-position materials, tools and equipment at the best place in proper work area - Use gravity-feed hoppers and drop-delivery chutes. - Let both hands do useful work. - Use jigs and fixtures instead of hands, for holding work. 5. Work out your idea with others. 6. Write up your proposed new method • STEP 4 – Apply the new method <ol style="list-style-type: none"> 1. Sell your proposal to the boss. 2. Sell the new method to the operators. 3. Get final approval of all concerned on Safety, Quality, Quantity, Cost. 4. Put the new method to work. Use it until a better way is developed. 5. Give credit where credit is due.
<p>Job Methods Training Program TRAINING WITHIN INDUSTRY War Manpower Commission</p>	

Figure 5. Job Methods card (Dinero, D 2005)

Breakdown the job

Job Methods starting point is to create job breakdown (listing all details of how a job is currently done). Job breakdown creates completed record of how the job is executed. More detailed and accurate they are, the improvements will be, completer and more effective. Job breakdown gives the supervisor the opportunity to review forgotten details or follow up the job performed operations by experienced workers.

Question every detail

Question all details is a success to improve the operations. 1. WHY is it necessary? 2. WHAT is it purpose? 3. WHERE should it be done? 4. WHEN should it be done? 5. WHO is best qualified to do it? 6. HOW is the “best way” to do it? This all details includes in question all. To achieved most off it by asking the questions, they must be asked in right order. There is very good reason for this. Asking HOW, before ask WHY. This may waste time to improve something and finding out that the details was not necessary after all.

Develop new method

Developing new method is a goal to avoid the unnecessary use of manpower, materials and machines and equipment’s. This will easily and quickly guide you to do a better way the work. When begging to *eliminate, combine, rearrange and simplify* the details of each job, will help companies to increase production or service output.

When the workers are involved in improving their own jobs may be the most important thing that affects the success of your improvement plan. The first principle is to put materials, tools and equipment into the best position and make sure that they are reachable for the operator. This is called simplify. Second principle to add gravity feed hoppers and delivery drop chutes to help the operator. The third principle is to help the operator to operate the work in both hands. This is commonly overlooked improvement. Final principle for simplifying the work by using the jigs and fixtures instead of hands. When people

develop the new idea and they are involved to proceed it themselves, will make it work better.

Apply new method

Apply new method includes five elements. You got to sell your proposal to the boss, new method to the operators and get the final approval on Safety, Quality, Quantity and Cost. Use the new method as long as the better way is developed. Give credit where credit is due.

To produce greater quantities for quality product in less time by using the best of Manpower, Machine and Materials now available. This is the purpose of Job Methods.

3.4 Job Relations in TWI

Get the Facts, Weight and Decide, Take Action and **Check Results**, these are the 4-steps in Job Relations. Whith these elements helps people to identify how to handle problem. This 4-step system helps supervisors to handle the problems and gather the facts of problem. (Dinero, D. 2005).

<p>JOB RELATIONS</p> <p>A SUPERVISOR GETS RESULTS THROUGH PEOPLE</p> <p>Foundations for Good Relations</p> <p>Let each worker know how he is getting along. Figure out what you expect of him. Point out ways to improve.</p> <p>Give credit when due. Look for extra or unusual performance Tell him while "it's hot"</p> <p>Tell people in advance about changes that will effect them. Tell them WHY if possible Get them to accept the change.</p> <p>Make best use of each person's ability Look for ability not now being used. Never stand in a man's way.</p> <p>People Must Be Treated As Individuals</p> <p>JOB RELATIONS TRAINING</p> <p>Training Within Industry Service</p> <p>BUREAU OF TRAINING</p> <p>War Manpower Commission</p>	<p>HOW TO HANDLE A PROBLEM</p> <p>DETERMINE OBJECTIVES</p> <ol style="list-style-type: none"> 1. GET THE FACTS. Review the record. Find out what rules and plant customs apply. Talk with individuals concerned. Get opinions and feelings. Be sure you have the whole story. 2. WEIGHT AND DECIDE Fit the facts together. Consider their bearing on each other. What possible actions are there? Check practices and policies. Consider objective and effect on individual, group, and production. 3. TAKE ACTION. Are you going to handle this yourself? Do you need help in handling? Should you refer this to your supervisor? Watch the timing of your action. Don't pass the buck. 4. CHECK RESULTS. How soon will you follow up? How often will you need to check? Watch for changes in output, attitudes, and relationships. Did your action help production?
---	---

Figure 6. Job Relations card, (Dinero, D 2005).

Get the facts

Talking with the employees will give supervisor's possibility to discover the critical elements that causes the problems in the first place. This means that the supervisors should review the records, find out the rules and custom apply. Be sure that you have the whole facts and story told. Dealing with the current problem, the supervisors needs to review the employee's previous record on job performance. Looking employee's career, achievement, attendance, problems and disciplinary actions. These guidelines help maintain fairness and equality in the workforce.

Weight and Decide

Job Relations important point is to know all the facts before drawing conclusions. Don't jump to conclusions, this is the common mistake for many supervisors. When doing analysis and review all the facts, this will help the supervisor's going on the best actions. Listing all the facts concerning the problem together in a logical pattern and start looking for gaps and contractions. This act helps you to consider what bearing they have on each other. In gathering facts together, the Job Relations method take into account company practices, policies and customs. This makes sure that every possible action complies. When putting the facts side by side may reveal something that you may not have figured out yet.

Take actions

Don't pass the buck – handle it yourself. This philosophy is a key idea for Job Relations element. Even sometimes the actions mean making someone sad or causing emotional upset. In some cases, the problem or issue is beyond your own authority, then you will need approval before you act on your supervisor's or manager.

It's also important that you directly and personally handle this very important responsibility and handle it well.

Check results

Job Relations is building a strong line with each of your people. This will increase the possibility to accept the action, when they trust you and believe that you are trying to represent the best interests of everyone. Getting the check result in Job Relations, is considering thinking, how often need to check and look for changes in output, attitudes and relationships. Did it help production. When people have problems and you are implementing the solutions, you need to make your first check soon as you can expected to see results, and not before. Even if the problem is a similar for another person, you may not be able to use the same solution on that, it doesn't necessarily work.

3.5 Criticism of TWI

When the company decides to implement the TWI model, the biggest issues will come on that the company doesn't know how to phase the process and it isn't necessary to copy everything that the books tells. TWI is a full development process that have been practiced over 60 years and it took greatly place in Japan industry. Japanese employees are very professional proud, and they don't want to lose their face in front of company. In this kind of environment, the radical TWI approach is easier to implement and take in use. Many Europeans companies have different kind of cultural habits inside the factories and in that's why it could be hard to take the TWI approach as it is. In nowadays often many companies have already implemented the Lean philosophy and that's why there are already useful elements that can be used to adjust the TWI format and modified those both for successful On-the-job training program and performance in the factory floor.

Biggest reason for TWI implementing failure is to try to get everything at the one point and get it run already good performance production. Companies have to reorganized and make major changes in the production lines and processes. Nobody doesn't own the TWI process and the implementation lacks and the interest of TWI increase. TWI model can have the same problems as 5S or PDCA process that it implemented in a rush and the companies goes tool first and doesn't understand to build up the knowledge and make clear for everybody why it should be implemented.

TWI is a cultural change and in many cases the companies doesn't put effort to people and give them the support that they need. TWI is a tool that helps companies to improve the employee's skills and hiring new manpower in short time and top-quality results. Without of this support the company's will fall and doesn't get result what they expected in the begging.

3.6 Good practice in an example company

Benchmark company is globally operating, and it has factory in western Finland. In this company the first step towards TWI was start Six Sigma green belt project. This project

scope was the TWI model and how it could be implemented in the factory. In this company the well-being on newly recruited employees and the good feedback from the on-the-job training is very important.

In this factory there is 300 employees and 20 of them are trained TWI trainers. In the factory facilities have 14 production lines. Each year about 100 employees goes through the TWI on-the-job training model. Typical orientation time is 5-20 weeks, depending the work contract. In year 2019 there was 6 starting groups. Each group have one day where they go through the company rules and basic information of the company.

Every new employee will start filling Learning diary and the follow up and approval will be done by trainer. Feedback from the progress to the employee comes monthly and this has increased efficiency by 10%. Approach to TWI model in production lines was choose the easiest learned production phases and the on-the-job training has been divided to 5 phases, like gate model. Each employee will go through interview where there is created model of work behavior model. With this model the company can make wider perspective how motivated and eager the new employee is to learn and work.

Current example company are implemented all the three "J's", Job Instruction, Job Methods and Job Relations. Job Instruction keep inside the breakdown sheets, Job Methods is implemented in company it is used for developing the TWI process for four time a year. Job Relations is used by teaching the trainers how to do the job better.

For me, this interview gives lots of ideas and perspective to approach implementing TWI and making the proposal of the TWI. In this benchmark company they put lots of effort to gathering the knowledge and it was HR which start this project.

3.7 Conceptual Framework

In this conceptual framework, as seen from Figure 7, the section presents the conceptual framework which consists of three parts; Job Instruction, Job Methods and Job Relations.

	Training Within Industry (TWI)		
	Job Instruction	Job Methods	Job Relations
The 4-step Methods			
Preparation	Prepare the worker	Breakdown the Job	Get the facts
Presentation	Present the Operations	Question Every Detail	Weight & Decide
Application	Try out the Performance	Develop New Method	Take Action
Testing	Follow Up	Apply New Method	Check Results
	<ul style="list-style-type: none"> • TheTWI Workbook (Graupp, Wrona 2006) • Implementing TWI (Graupp, Wrona 2011) • Training Within Industry (Dinero, D 2005) 	<ul style="list-style-type: none"> • TheTWI Workbook (Graupp, Wrona 2006) • Implementing TWI (Graupp, Wrona 2011) • Training Within Industry (Dinero, D 2005) 	<ul style="list-style-type: none"> • The TWI Workbook (Graupp, Wrona 2006) • Implementing TWI (Graupp, Wrona 2011) • Training Within Industry (Dinero, D 2005)

Figure 7. Conceptual framework

In this conceptual framework the knowledge was gathered on literacy of TWI. This approach was to made the whole picture on TWI-model and how it should be done by the books.

4 Analysis of case organization current on-the-job training practices

This section deals on-the-job training in the case company. The current state analyze is made by interviewing people who are in different position in case company, using face-to-face interviews to compare the gap between TWI model and current way. Case company already has similar TWI method as Job Instruction, which has used in Job Instruction Breakdown sheets.

4.1 Overview of this data stage

In this data stage has being used face-to-face interviews and gathering information current state analyze. Also brainstorming with the Head of Quality and Operational Excellence manager. Analyzing the output of interviews and reviewing processes the big picture was made by. Depending on the depth of interviews and role of the responders gives different kind of perspective to current on-the-job training situation. In the figure 8 is show the spend hours that trainers have been spend on-the-job training during years 2018 and 2019 departments. This diagram includes 100 employee that have been paid the extra training bonus. This diagram shows that the on-the-job training is not dedicated to the narrow group of employees, but it shows that the training is done by experienced workers, not only the trained trainers. This tells that the training is not organized and standardized, because it's so wide range of employees that are doing the on-the-job training.

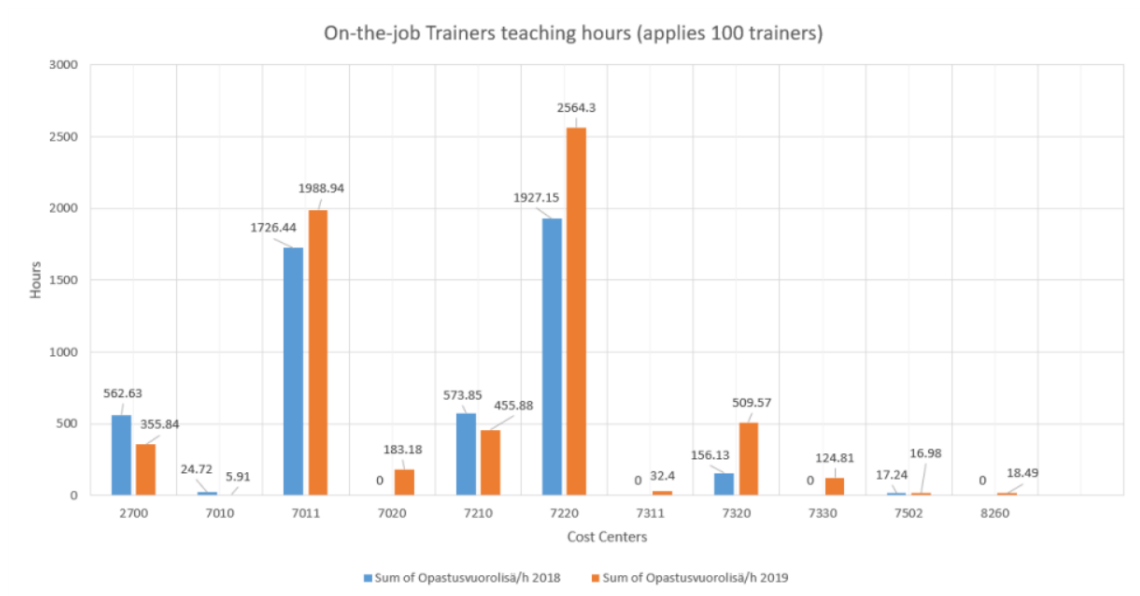


Figure 8. 100 trainers on-the-job training hours

4.2 Grounded description of how on-the-job training is currently done at case company

In the case company the on-the-job trainings are usually guiding by experience workers or seniors who are responsible for newly recruited employees. There is no standardized way to do the on-the-job training and, the result of training is not same. There are some basic instructions to team leaders what they must do, but not to the trainers.

It also depends on which part of the Operation unit the new employees are recruited in. Logistic Inbound department in operation unit has most advanced process for the newly recruited employee on-the-job training. Inbound has been using the audit as a part of the process and that's one good way to make sure that the new operator has understand the on-the-job training correctly. The audit is the final step in each process in inbound. When the audit has been finished the records are saved in folders. There are also multi-skilled matrix excel in every department and team, where can be found the experience level from each employee.

In production the job is done in cells. The cell shape is normally U. Newly recruited employees will start their on-the-job training by observing experienced worker or senior for one week. After the week, new employee will start doing the simple assembly jobs at production. The on-the-job training will last totally four weeks. HR is having interviews with the new employees in time-to-time basic. In the case company there is a model and process to train employees how to do the on-the-job training. The reason why the trained guides changes often, is because there is possibility to do work rotation in production. This problem occurs often and effects on the employees who can do the on-the-job training to newly hired person. This is showed in Figure 8 that the range of on-the-job trainers are wide, and the training can executed many experienced workers. This reduce the standardized on-the-job training format and the quality on training will also reduce. The outcome from every newly recruited employee will be different, because the training will be performed not trained employee.

4.3 Gap analysis of case company way of operating as compared with TWI ideal

As showing in the Figure 9, already existing process model and the green area indicates the on-the-job training where the current state analyze is done. Focusing on the process and reflected already existing training model and records. All the interviews with the personnel focused on the green area and the outcome was to identify the strengths and weakness ongoing processes and to improve it. The Upper level on the process model is focusing on the supervisor actions for the newly recruited employee process. This process model shows the hierarchy in the training process and what is the roles and responsible between supervisor and on-the-job trainer. The supervisor is responsible for saving the training records and showing the general info from OPS training and other things that involve the common training knowledge for newly recruited employee. One of the biggest helps to identified the gap between TWI model and the current way, was to brainstorm with the Head of Quality and Operational Excellence manager.

Process Model

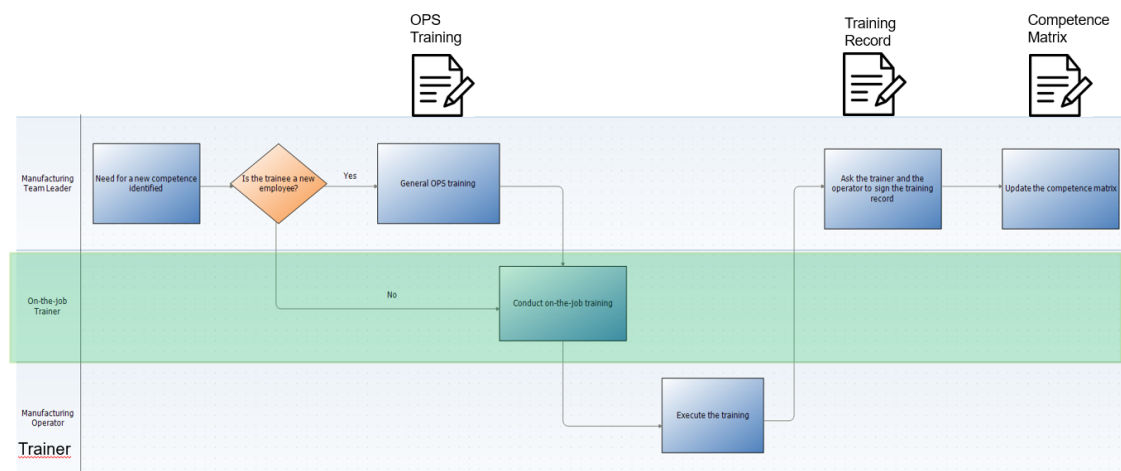


Figure 9. Process model in current company

Current company production model is high mix and low volume, so the variation of the production is wide. Making the already existing Job Instruction breakdown sheets (JIB's) shown in Figure 10, is difficult because the variation of product that are manufactured in work cells, are wide. This procedure by filling or using the already existing JIB's is one part of the existing training for the on-the-job trainers. The JIB's provide good guidance and basic ground for the training plan and what to teach to newly recruited employee.

Job Instruction Breakdown Sheet (JIB)						
Description of the task:						
Parts:						
Tools & supplies required:						
Safety equipment required:						
Important Steps		Key Points		Reasons		Training Aid: (pictures, diagrams, etc.)
WHAT?	A logical segment of the operation when something happens to advance the work	HOW?	Things in important steps that: 1. are Critical to Quality 2. may injure the worker / impact product safety 3. make the work easier	WHY?	List the reasons for the key points	
1						
2						
3						

Figure 10. JIB template in current company

4.3.1 Job instruction strengths and weaknesses

The 4-step methods	Job Instruction	TWI model	Current Company	
			Strengths	Weaknesses
Preparation	Prepare the worker	In this step is important to make timetable for the on-the-job training. Timetable should answer questions, whom to train, which job and what date. Preparation by the supervisor or instructor is for motivation of the employee or trainee.	<ul style="list-style-type: none"> This is done by the supervisor There are named trainer for the newly recruited employee Sketch of training time is provided, but not saved 	<ul style="list-style-type: none"> There is no saved record on the training time plan Training starts and there are variation of ways how to performance the training
Presentation	Present the Operations	This part is for breakdown the job and make list of important steps of the job and identify the key points for each of those steps. Presentation on how a task is accomplished includes telling, showing, demonstrating, and explaining the sequence and steps so the trainee understands the job	<ul style="list-style-type: none"> Job Instruction Breakdown sheets are existing Using Procedure Instructions and standardized work sheet to create basic level for the training 	<ul style="list-style-type: none"> No systematic way to create or use JIB's Not in active use Not standardized way to do the presenting
Application	Try out the Performance	Get everything ready. Have all the tools, materials, supplies and equipment ready to aid the instruction. Lack of this step can effective on poor work standard and undermine the authority of the supervisor.	<ul style="list-style-type: none"> 5S is implemented Progress of the 5S is followed and audited <ul style="list-style-type: none"> Weekly operators Monthly Supervisors 	<ul style="list-style-type: none"> Lack of effortless towards 5S reduces the cleanliness and tidiness
Testing	Follow Up	Following up gets the trainee flying solo through frequent examination of progress at first, gradually tapering off. From the moment the instructor transfers the job, it is the worker's responsibility to do the job correctly each time, showing that she or he knows the job is important.	<ul style="list-style-type: none"> In every training there are the final step that the newly recruited employee will start to work independently 	<ul style="list-style-type: none"> If instructed part how the work should be done, is not done correctly the outcome of individual working, is low quality and slow

Figure 11. Job Instructions strengths and weaknesses compared the TWI to current company way

As shown on Figure 11, by comparing in each 4-step method the strengths and weaknesses, there are a basic level activity already ongoing and in use. Comparing this element and the demands how the operating model should be working and how it's done in the current company, the biggest difference is that, there are no standardized way to do the on-the-job training. The existing procedures and instructions doesn't support the trainers and they are too common to use for specified training. Preparing the newly recruited employee for the training, happens many times Ad-Hoc approach way and the

on-the-job trainers are gathered in rush and many times those doesn't have the time to perform the on-the-job training. That's why the number of trainers is large, and many experienced employees is doing the on-the-job training. This activity lowers the quality on-the-job training, because all the trainers aren't trained to perform the on-the-job training to newly recruited employee. Basic level of the 5S is in good condition and this gives the good impression of the working place to newly recruited employee. This helps the on-the-job trainers show how the work is done and what tools and tester are needed. In every training for the newly recruited employee, there are at least two steps in training. First step is to follow up how the work is done by trainer. Second stage is that the newly recruited employee starts to work individually. There is no standardized way to make sure that the newly recruited employee has learned the work and can start to work independently. After all the responsible of that the newly recruited employee can perform the work, safely, high quality and standardized way, is on the trainer and supervisor.

Strengths in current company is that there are already usable tools and processes to achieve the model of TWI. 5S is a good standard layer to present the work cells and equipment's and tools. JIB's have been created earlier and taking those in active use, will give very good standard for the on-the-job training, liked it performed in TWI.

Weaknesses are that the current company does the on-the-job training very often like Ad-Hoc approach and because of that, there are no trained trainers do the on-the-job training for the newly recruited employee. Variation of the training are wide, because so many different employees performs on-the-job training. Many times, the follow up from newly recruited employee performance isn't actively followed and supported.

4.3.2 Job methods strengths and weaknesses

The 4-step methods	Job Methods	TWI Model	Current Company Strengths	Current Company Weaknesses
Preparation	Breakdown the Job	Making a job breakdown (listing all details of how a job is currently done) is the starting point of all JM improvements. A job breakdown creates a complete record and accurate picture of how a job is executed.	<ul style="list-style-type: none"> JIB's have been done, but not effectively used 	<ul style="list-style-type: none"> Not in active use Not helping the on-the-job training
Presentation	Question Every Detail	<p>Success in improving an operation will depend on ability to question everything about that operation. Question all details includes six questions.</p> <ul style="list-style-type: none"> 1. WHY is it necessary? 2. WHAT is its purpose? 3. WHERE should it be done? 4. WHEN should it be done? 5. WHO is best qualified to do it? 6. HOW is the "best way" to do it? 	<ul style="list-style-type: none"> Operation process development happens on need or demand 	<ul style="list-style-type: none"> No standardized or conceptual way to improve process for on-the-job training
Application	Develop New Method	This will easily and quickly lead you to a better way to do the work. Companies increase production or service output when they begin to <i>eliminate, combine, rearrange</i> and <i>simplify</i> the details of each job. Notice that there is a definite order to these four items. The goal is to eliminate details to avoid the unnecessary use of manpower, machines and equipment, and materials.	<ul style="list-style-type: none"> Operation process development happens on need, demand or New Product Introduction 	<ul style="list-style-type: none"> No systematic way to develop process. Development need comes from demand or New Product Introduction process
Testing	Apply New Method	<p>Ensures the success of improvements because it turns ideas into action. Apply new method includes five vital elements.</p> <ul style="list-style-type: none"> Sell your proposal to the boss. Sell the new method to the operators Get final approval of all concerned on Safety, Quality, Quantity, and Cost. Put the new method to work – use it until a better way is developed. Give credit where credit is due. 	<ul style="list-style-type: none"> All the development are estimated and decided if it ready to go or rejected. 	<ul style="list-style-type: none"> There are no validation on the proposals and no need to sell the idea to operators.

Figure 12. Job Methods strengths and weaknesses compared the TWI to current company way

Displayed on Figure 12, comparing the TWI model and Current company model and reflecting those by strengths and weaknesses. In the current company there are standardized process how to make development proposal. This process is a familiar for the employees and it's used everywhere. The development process doesn't support the method improvements. There are no trained employees that are focusing to improve the work methods or tools. Many times, the development happens on need, demand, customer complaint or new product introduction process. In the current company there are

no standardized way to do the method development. In the literature of the TWI, the company's should have trained personnel to operate the method developments and the employees are familiar the method development, so they can used it in the development process. When the current company doesn't have standardized way to do the work methods development, the improvements are due the compulsion. This element needs lots of support and mentally change, by the employees and managers, to achieve this model in TWI.

Strengths from this method in current company is that, there are already PDCA (Plan, Do, Check, Act) process, that can use to develop working methods. Employees are familiar with this process and providing more information on method development to employees, the result from that will increase by time.

Weaknesses in the current company are there are no standardized way or approach to develop current processes or work. Many times, the development impulse comes from quality issue, or new product introductions. These aren't straight development proposals to improve process or work. That's why the work methods development comes more like a side effect than organized approach.

4.3.3 Job Relations strengths and weaknesses

The 4-step methods	Job Relations	TWI Model	Current Company	
			Strengths	Weaknesses
Preparation	Get the Facts	Is stage where supervisors should review the records, find out what rules and customs apply. Talk with individuals concerned. Get opinions and feelings. Be sure that you have the whole story and facts. To understand a current problem, the supervisors needs to review the employee's previous record on job performance, career, achievement, attendance, problems, disciplinary actions	<ul style="list-style-type: none"> • There are training's for the supervisors, where are parts how to handle people and how to face the problems by other persons 	<ul style="list-style-type: none"> • Not so often arrange the trainings for the supervisors.
Presentation	Weight & Decide	Where the facts should fit together and consider their bearings on each other. What possible actions are there, check practices and policies and consider objective and effect on individual, group and production. Don't jump to conclusions, that's the common mistake for many supervisors.	<ul style="list-style-type: none"> • Normally size of the supervisor amount of employees are 10-15 operator • Easier to communicate and handle this size group or individuals. 	<ul style="list-style-type: none"> • There are not enough time to weight and decide the issues or problems.
Application	Take Action	Should consider who will take the responsible on the issue(s). Who is going to handle it, do it need help from outsider, should it refer to upper level on organization and consider the timing of the action. Don't pass the buck – handle it yourself.	<ul style="list-style-type: none"> • The organization structure is good for the supervisors to handle the employees as individuals. • Small number of employees in the team, makes the supervisors problemsolving job easier. 	<ul style="list-style-type: none"> • When it is hurry and the supervisors face the problems, there are no time to handle problem right away • In the worst case the supervisor have to delegated the issue to someone else
Testing	Check Results	Final step in Job Relations is to there should check the follow up and the frequency, how often need to check and watch for changes in output, attitudes and relationships. Did it help production. An action that was successfully used with one person in the past will not necessarily work on another person, even if the problem is similar.	<ul style="list-style-type: none"> • Many problem an issue are handled in that situations and it done more like Ad-Hoc type of approach. • Employee satisfaction survey is held once a year. 	<ul style="list-style-type: none"> • No time for long time problem solving of the employees issues. • Employee satisfaction survey is held only once a year.

Figure 13. Job Relations strengths and weaknesses compared the TWI to current company way

The third compare element is Job Relations between TWI model and current company way. As shown in Figure 13 there are compared the strengths and weaknesses between TWI model and current company. This figure opens the gap between current way and

TWI model in the current company. Supervisors have the basic level training of the supervisor job and in that training they handle the issues how to deal with problems from employees. This training is performed at one time and the rest of the competence comes in practical work. Supervisors will handle the employee problems by their unique way and there is no standardized way to do it. This will have an impact on the operators, because they can feel that the supervisors aren't fair and they don't handle the problems in the same way. This will cause problems and bad feelings on the employees. When the processes and behaviors are standardized and rules are the same for everybody, the outcome is more positive, and employees are more committed to the current company.

Strengths of this element in the current company are that the teams in the current company are normally small, 10-15 employees per supervisor. This helps the supervisor to approach every employee individually and can focus on the issues and problems better. When knowing the employees personally and recognizing the individual needs will provide a good relationship between employee and supervisor.

Weaknesses in the current company are that the change of supervisor happens quite often and this makes the relationship between employee and supervisor quite short. When there are also lots of hourly workers in the production cells, the supervisors have to remember even more employees and their issues and problems. No standardized way to approach problems or issues in the current company, this makes the issue handling more variable and not equal.

4.3.4 Summary of gap analyses

When analyzing the strengths and weaknesses in the current company, the major issues are those that there is no standardized way to perform the on-the-job training and the tools that aren't used, JIB's. The organization in the current company doesn't support the approach of the TWI model on-the-job training. Each factory has its own organization and the on-the-job training is normally done as an ad-hoc way, in need or demand. This system makes it difficult to organize and have one uniform approach to on-the-job training. In the interviews from the personnel came up the proposal to develop the organization to support the TWI on-the-job training. This means that the already existing organization should be reorganized and new roles and responsibilities indicated to personnel.

Work method development system does not exist in the current company and many times the impact to that comes from other issues. There are already existing tools and processes to implement this method in the current company processes. This approach needs training to the personnel, how to perform it and give proposals. The relations method will need reshaping the approach and methods how to handle the employees and what kind of tools it needs.

4.4 Summary of current on-the-job training practices in current company

As seen in Figure 14 the strength and weakness are compared in table chart and whit this analyze can show that the main issues are in practical level of the on-the-job training and how it should be performed and operated. Personnel should be trained, and roles must be clear and responsible write down. Clarifying the process and responsible for the employees will give most effect impact and reshaping the organization for already exist- ing trainers and provide them new training that are indicated to TWI-model training.

Many of the tools or processes are already existing in current company and the biggest focus should put on the Job Instruction phase. Whit this development and implementa- tion process gives standardized way do the on-the-job training and the training time will reduce and quality increase. Major development will focus on to support the trained train- ers and provide them newly shaped training that even more support the TWI model for on-the-job training.

Special needs for the process and model that should be implemented is to standardize the on-the-job training and give the trainers high quality training. Support for the trainers should also be implement and those roles must be recognized and approved by mana- gerial level. For this the organization that exists already, is already organized so that the support will be wide.

Analysis of current organization current On-The-Job training practices			
Strength	<ul style="list-style-type: none"> • Job Instruction breakdowns is done in current company. • This part is the most advanced step in TWI model. • Nowadays training model for on-the-job training haven't support the TWI model, but gives good tools. 	<ul style="list-style-type: none"> • PDCA cycle can be used to improve the training, but it's not used for that. • Improving methods and tools are ready to use, but must connected to TWI model. 	<ul style="list-style-type: none"> • This part of TWI is nowadays combined in Operational team leading and Daily Management routine. • Model for Job Relations is ready, but it should activate and take part as an TWI model.
TWI	Job Instruction	Job Methods	Job Relations
Weakness	<ul style="list-style-type: none"> • This part is implemented in some point in Current company history, but it never really kick off and took part as cultural change in factory floor. • Job Instruction breakdowns takes time and effort from employee's. 	<ul style="list-style-type: none"> • In the current company this method haven't ever link to on-the-job training program. • PDCA cycle is used in every part of factory floor, but it haven't connected to on-the-job training. • The training doesn't give tools or perspective to improve the on-the-job training. 	<ul style="list-style-type: none"> • For on-the-job trainers should tailor the training so that they know how to guide the newly recruited employee's. • Changing the existing routines isn't easy and it's take time and effort.

Figure 14. Cap analysis of current way vs TWI

5 Developing an operating model for on-the-job using the TWI-approach

This section starts by explaining how on-the-job training operating model building phase was carried out and continues by explaining each work stage in more detailed way. At the end of this section the proposed on-the-job training operating model is introduced.

5.1 Overview of this data stage

The proposal of operating model is built on the results of the current state analysis and existing knowledge. The current state analysis identified the key weaknesses of the current operations and to tackle these weaknesses, best knowledge was searched from the existing knowledge and operating model was reflected on the current operating model in the current company. In the Figure 15 shows how, the model was planned to develop with the Head of Quality and Operational Excellence Manager. There was weekly meeting and sparring with the model and ideas.

On-the-job training model TWI (=how we do on-the-job training at the current company)

TWI model	The Current Company Model
<ul style="list-style-type: none"> • How to instruct: Job Instruction <ul style="list-style-type: none"> - ~10 step Trainer's instruction JIB's - Important step, Key point and Reasons - Make structured and planned training schedule for newly recruited employee • How to improve: Job Methods <ul style="list-style-type: none"> - Trains supervisors how to improve job methods in order to procedure greater quantities of quality products in less time by making the best use of manpower, machines, and materials now available - Leveling up the Quality of training • How to lead: Job Relations <ul style="list-style-type: none"> - Trains supervisors how to lead people so that problems are prevented and gives them an analytical method to effectively resolve problems that do arise 	<ul style="list-style-type: none"> • How to instruct: Job Instruction Breakdown <ul style="list-style-type: none"> - will be implemented in the current company - Job Instruction Breakdowns are done for selected existing cells / task (critical to Quality, lots of job rotations, customer complaints, etc) - Job Instruction Breakdown to be added as deliverable to NPI process - TWI-approach On-the-job training should be provide to the trainers - JIB is done by trainer and TWI Leader • How to improve: PDCA process and Kaizen(no changes to current process) <ul style="list-style-type: none"> - Trainer thinks how the job could be done better, improvement ideas to PDCA process - All the changes or methods can be improve in PDCA process • How to lead: Daily Management / Operational Team Leading (no changes to current process) <ul style="list-style-type: none"> - Daily Management and Operational Team Leading - Systematic problemsolving (A3, 5xWHY & 8D) - Lean leadership + current company Leadership principles - Continuel Improvement forums the TWI model will be go through and process maps and metrics are viewed and audit findings checked

Figure 15. Approach model for operating model

The first week meetings were to use to create the concept of the proposal operating model and try to identify the main focus, reflecting on the existing TWI model, see Figure 15. Comparing the already existing processes and what the company already had and what must be developed and improve.

The second phase of the development process was to focus on the key roles and responsible definition. Approach to this was to compare the existing process and roles how the on-the-job training is done and organized. When the current state analysis interviews were done, issues were that, the responsibilities are un-clear, different units are doing same things but missing best practice and information sharing. The developing of the existing proses was low and there was no named owner of the process.

Whit this two-step approach to develop the on-the-job training model, the conclusion was that the new recommended process focusses on the on-the-job training in factory floor and to provide high quality training for the trainers.

5.2 Developing Job Instruction stage of the operating model

For implementing the Job Instruction element into the on-the-job training operating model. Using the analyze of the strengths and weaknesses, Figure 11, the interviews with the personnel in the current state analyze phase and the development meetings with the Head of Quality and Operational Manager weekly, sketching the approach model how to implement that develop the operating model for the on-the-job training, Figure 15. There was gathering the already good practices, that was operating in different part of current company. Figure 16 shows the approach for the Job Instruction element model that was created in the weekly meetings. This data gives the direction for the creating on-the-job training operating model.

The 4-step methods	Job Instruction	Current Company		Development stage
		Strengths	Weaknesses	
Preparation	Prepare the worker	<ul style="list-style-type: none"> This is done by the supervisor There are named trainer for the newly recruited employee Sketch of training time is provided, but not saved 	<ul style="list-style-type: none"> There is no saved record on the training time plan Training starts and there are variation of ways how to performance the training 	<ul style="list-style-type: none"> On-the-job trainers should arrange quality operated training Organization should build that way its supports the operating model
Presentation	Present the Operations	<ul style="list-style-type: none"> Job Instruction Breakdown sheets are existing Using Procedure Instructions and standardized work sheet to create basic level for the training 	<ul style="list-style-type: none"> No systematic way to create or use JIB's Not in active use Not standardized way to do the presenting 	<ul style="list-style-type: none"> JIB's are already done in the current company, but its not effectively used The JIB's must be taken in to active use and part of the on-the-job training model
Application	Try out the Performance	<ul style="list-style-type: none"> 5S is implemented Progress of the 5S is followed and audited <ul style="list-style-type: none"> Weekly operators Monthly Supervisors 	<ul style="list-style-type: none"> Lack of effortless towards 5S reduces the cleanness and tidiness 	<ul style="list-style-type: none"> Keep up the 5S standards and progress that have been achieved already.
Testing	Follow Up	<ul style="list-style-type: none"> In every training there are the final step that the newly recruited employee will start to work independently 	<ul style="list-style-type: none"> If instructed part how the work should be done, is not done correctly the outcome of individual working, is low quality and slow. 	<ul style="list-style-type: none"> Make the training period planned and organized, so the newly recruited employee knows what will happen and when.

Figure 16. Development for Job Instructions

With this development comparing to the existing status and literacy knowledge, was used to compare the elements that need to improve to achieve model that have on elements from the Job Instruction part in TWI model. This part of the TWI is the most valuable part and it will be the basic level to create the proposal model for the on-the-job training.

To improving the JIB's and increasing the number of those. These should be added as a deliverable into the New Product Introduction (NPI) process. This process is the first step to implement new product into the production and need of new working cell. In this part to create JIB's and standardized working sheet will give really good basics to perform on-the-job training to newly recruited employee, in the future. When the NPI process deliverables are JIB's, the effectiveness of JIB's increase in the current company production.

Normally the training for the new work phase or process takes 1-4 week. To reducing the time on training and increasing the quality of the on-the-job training, it was clear that

the training for the trainers should be improved and change. Nowadays the training was focused on ergonomic and how to handle persons, not so much how to do the standardized and top-quality on-the-job training, to newly recruited employee.

Using the 5S process to help the on-the-job training trainers to provide clear and clean work environment, for the newly recruited employees. This will provide positive feeling and gives the newly recruited employee impression that the production cells work professional and high-quality process.

Recognizing the weaknesses in current state analyze phase and discussions with the Head of Quality and Operational Excellence manager weekly, raise up the development issue that has to propose. This was the new organization for the TWI approach on-the-job training roles and responsible. Also, the training for the on-the-job trainers, should provide TWI model standardized and supported training. To achieve this, the nowadays training program must be reshape or changed and newly organized.

In Figure 17 is a proposal how the Organization should be arranged to support TWI model on-the-job training in current company and in Figure 18 is explained the Roles and Responsible. When applying this kind of roles and responsible, the current company will have organized and standardized on-the-job training operating model.

Organization for On-The-Job Training TWI

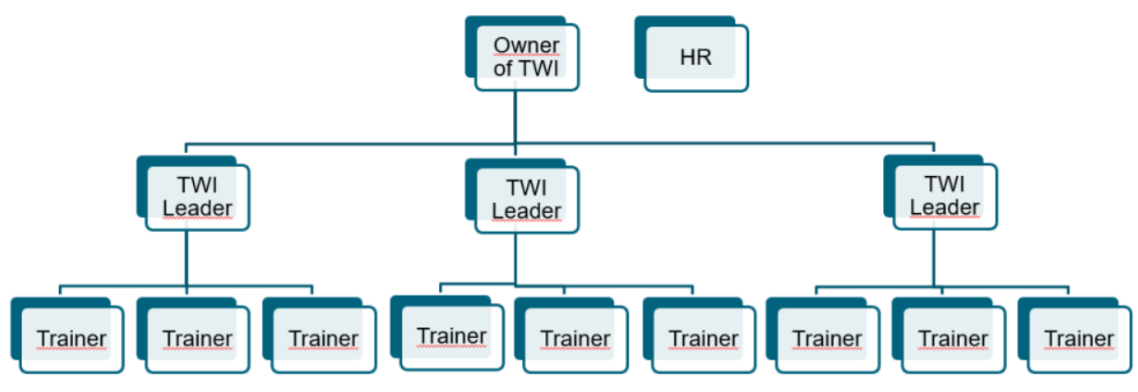


Figure 17. Organization chart for TWI (proposal)

Roles and responsible for TWI

HR	<ul style="list-style-type: none"> Human Resource personnel Responsible for General Orientation days
<u>Owner of TWI process</u>	<ul style="list-style-type: none"> Lean Engineer / Q&OE Responsible of the process development of on-the-job training (CIF) Coach TWI Leaders Responsible of TWI Training for the TWI Leaders and Trainers
<u>TWI Leader</u>	<ul style="list-style-type: none"> Team Leader or Process Engineer Create and maintaining of the JIBs with Trainers Coach Trainers Trained for TWI (external training)
<u>Trainer</u>	<ul style="list-style-type: none"> Senior or Experienced Operator Responsible of on-the-job training using JIBs Do the on-the-job training with the new employee Trained TWI instruction (external training)

Figure 18. Roles and Responsible chart for TWI implementing (proposal)

5.3 Developing Job Methods stage of the operation model

In the weekly meetings with the Head of Quality and Operational Excellence manager, the Job Method TWI model for implementing, offers the development tools and methods how to improve the process and tools in the current company. Comparing the strengths and weaknesses in the current company and reflecting those to develop TWI model Job Methods element, into the on-the-job training operating model. This is showed in Figure 19.

Discussions with the Head of Quality and Operational Excellence manager and planning the model to the current company, seen Figure 15. For this reason, the Job Methods was decided to implement for already existing process PDCA (Plan, Do, Check, Act), Kaizen and Continual Improving processes. With this Continual Improvement process the on-the-job training process is reviewed and improved annually. These already existing process gives good ground for the development and methods development. With these processes the on-the-job training operating model will be continuously improve and have a standardized way to develop the new on-the-job training model.

The 4-step methods	Job Methods	Current Company		Development stage
		Strenghts	Weaknesses	
Preparation	Breakdown the Job	<ul style="list-style-type: none"> JIB's have been done, but not effectively used 	<ul style="list-style-type: none"> Not in active use Not helping the on-the-job training 	<ul style="list-style-type: none"> JIB's are already done in the current company, but its not effectively used The JIB's must be taken in to active use and part of the on-the-job training model
Presentation	Question Every Detail	<ul style="list-style-type: none"> Operation process development happens on need or demand 	<ul style="list-style-type: none"> No standardized or conceptual way to improve process for on-the-job training 	<ul style="list-style-type: none"> Implementing this as part of already existing process PDCA
Application	Develop New Method	<ul style="list-style-type: none"> Operation process development happens on need, demand or New Product Introduction 	<ul style="list-style-type: none"> No systematic way to develop process. Development need comes from demand or New Product Introduction process 	<ul style="list-style-type: none"> Taking it as part of the development process and with the on-the-job trainers training, can add parts that's covers the method development.
Testing	Apply New Method	<ul style="list-style-type: none"> All the development are estimated and decided if it ready to go or rejected. 	<ul style="list-style-type: none"> There are no valitation on the proposals and no need to sell the idea to operators. 	<ul style="list-style-type: none"> This will continuously improve the work and on-the-job training process or model.

Figure 19. Development for Job Methods

Giving even more effect to the on-the-job training operating model. This should be implemented also already existing process, New Production Introduction process. When the deliverables of the NPI process are JIB's. When the JIB's are created in the begging, the improvement and methods improvement are easier to recognized and develop.

The Job Methods element should be implemented also into the on-the-job training for the trainers. Having this element as a part of training, will give the trainers more awareness how to do method development in the future.

5.4 Developing Job Relations stage of the operating model

Using the already existing knowledge in the current company, that was gathered by the interviews and discussions with the Head of Quality and Operational Excellence manager in the weekly meetings, the approach how the Job Relations element could be implemented in the current company on-the-job training operating model.

With these discussions and interviews, the model in Figure 20 was created and comparing the TWI model and what to implement in the current company, showed in Figure 15. For Job Relations element implementing into the on-the-job training operating model, to be as a part of already existing processes. The existing model in the current company already did have elements in, Daily Management and Operational Team Leading. With this already in used processes will give really good support for the Trainers and helping the supervisors getting the facts and handling the problems with the employees. Employees personnel issues or problems can be handled by supervisors and support of Human Resource department. Every supervisor has been given the training for supervisor work and given tools to handle different kind of people. The Trainers are experienced workers and they do not have the supervisor authority, that's why the teamwork between Trainer and Supervisor is essential. To implement this element as a part of the on-the-job training operating model, it's needs to implement this as a part of the newly reshaped or change on-the-job training to trainers. This training should have one part used to demonstrate and give tools for the on-the-job trainers, how to handle the problems and issues with newly recruited employees.

The 4-step methods	Job Relations	Current Company		Development stage
		Strengths	Weaknesses	
Preparation	Get the Facts	<ul style="list-style-type: none"> There are training's for the supervisors, where are parts how to handle people and how to face the problems by other persons 	<ul style="list-style-type: none"> Not so often arrange the trainings for the supervisors. 	<ul style="list-style-type: none"> The trainings for the supervisors are good and in the future, this could be a part of on-the-job trainers training.
Presentation	Weight & Decide	<ul style="list-style-type: none"> Normally size of the supervisor amount of employees are 10-15 operator Easier to communicate and handle this size group or individuals. 	<ul style="list-style-type: none"> There are not enough time to weight and decide the issues or problems. 	<ul style="list-style-type: none"> Existing model and organization supports the TWI model implementation. Clearing the roles and responsibilities for the on-the-job training performance, will reduce time that supervisors need to spend on newly recruited employees basic training.
Application	Take Action	<ul style="list-style-type: none"> The organization structure is good for the supervisors to handle the employees as individuals. Small number of employees in the team, makes the supervisors problemsolving job easier. 	<ul style="list-style-type: none"> When it is hurry and the supervisors face the problems, there are no time to handle problem right away In the worst case the supervisor have to delegated the issue to someone else 	<ul style="list-style-type: none"> This will be implemented in the daily actions. Daily Management and Operational Team Leading will support the daily issue handling. The presents of the supervisors in the production cells, happens more often
Testing	Check Results	<ul style="list-style-type: none"> Many problem an issue are handled in that situations and it done more like Ad-Hoc type of approach. Employee satisfaction survey is held once a year. 	<ul style="list-style-type: none"> No time for long time problem solving of the employees issues. Employee satisfaction survey is held only once a year. 	<ul style="list-style-type: none"> When the responsible and roles are clarified, the time for the supervisors to handle the problems or issues will increase.

Figure 20. Development for Job Relations

5.5 Summary of proposed operating model

Collecting the data's and information in the Figures, 19, 20 and 21. This gives the good guidance and direction how the on-the-job training operating model should be built. Comparing the strengths and weaknesses in each TWI element and reflecting those already existing processes and elements in the current company.

The 4-step methods	Job Instruction Development	Job Methods Development	Job Relations Development	Development Result
Preparation	<ul style="list-style-type: none"> On-the-job trainers should arrange quality operated training Organization should build that way its supports the operating model 	<ul style="list-style-type: none"> JIB's are already done in the current company, but its not effectively used The JIB's must be taken in to active use and part of the on-the-job training model 	<ul style="list-style-type: none"> The trainings for the supervisors are good and in the future, this could be a part of on-the-job trainers training. 	<p>Organization for On-The-Job Training TWI</p>
Presentation	<ul style="list-style-type: none"> JIB's are already done in the current company, but its not effectively used The JIB's must be taken in to active use and part of the on-the-job training model 	<ul style="list-style-type: none"> Implementing this as part of already existing process PDCA 	<ul style="list-style-type: none"> Existing model and organization supports the TWI model implementation. Clearing the roles and responsible for the on-the-job training performance, will reduce time that supervisors need to spend on newly recruited employees basic training. 	
Application	<ul style="list-style-type: none"> Keep up the 5S standards and progress that have been achieved already. 	<ul style="list-style-type: none"> Taking it as part of the development process and with the on-the-job trainers training, can add parts that's covers the method development. 	<ul style="list-style-type: none"> This will be implemented in the daily actions. Daily Management and Operational Team Leading will support the daily issue handling. The presents of the supervisors in the production cells, happens more often 	<p>Roles and responsible for TWI</p>
Testing	<ul style="list-style-type: none"> Make the training period planned and organized, so the newly recruited employee knows what will happen and when. 	<ul style="list-style-type: none"> This will continuously improve the work and on-the-job training process or model. 	<ul style="list-style-type: none"> When the responsible and roles are clarified, the time for the supervisors to handle the problems or issues will increase. 	

Figure 21. Summary of the development

In the Figure 21 shows the summary result of development. Main focus for building the on-the-job training operating model for the current company, will have to have newly organized training for the trainers. The training for the trainers should have more approach to TWI model and it's should support the on-the-job training operating model to the current company. New roles and responsible, this part is shown in chapter 5.2 developing Job Instruction stage of the operating model, Figures 17 and 18, should be reorganized and put in action. Training for the trainers should also have elements in Job Methods and Job Relations. These elements should be part of the training where the trainers are introduced how to handle different kind of peoples and also the knowledge of the basic work method development. Improving the developed on-the-job training operating model, can be used already existing improvement processes.

Getting the on-the-job training operating model in early stage of production process, New Product Introduction. This is the first part for the production and this phase the JIB's should be created as a part of deliverables. Making the JIB's in the early stage of the process, will increase the quality and standard of the on-the-job training to the newly recruited employee.

With the support of the supervisors the on-the-job trainers will get good and solid base for training. Building the new model of the organization and responsible, will clarify the practices in production and the newly recruited employees will have standardized and organized on-the-job training.

6 Piloting operating model

The pilot department was chosen by that fact there are three newly recruited employees starting in May. In this department the 5S is in good level and the Trainer is experienced worker who has completed on-the-job training. In the first step where created the Job Instruction Breakdown sheets in one process step. Lean Engineer was responsible to create the JIB's with Trainer and Process engineer. The piloting is running for 4 weeks and it's end in May. In this pilot is only used the TWI Job Instruction method and it's focusing only for the operator's level. In this pilot was planned to test the proposed plan how the TWI should be implemented in current company. This pilot result was show that the basic level TWI in factory floor will give the most impact result to company.

6.1 Overview of the Validation Stage

The piloting was focusing on the Job Instruction part and mainly on-the-job training and giving support to the trainer and supervisor. Whit this pilot was created JIB's and in the same time the Production Instructions was read through and updated by Process engineer. Timetable was created and support was given every week by Lean engineer. Whit the help of highly trained trainer who was pointed to participate this pilot, was extremely helpful and easy to achieve the targets on pilot. Pilot was only 4 weeks and end of the pilot give the company some kind of result how the TWI model should be implemented. The expectation on this pilot was to show what kind of support the trainer and supervisor will need, if the current company choose to implement the TWI model. As shown on Figure 22, the green square is the part that will be the piloting model and analyze the main focus on TWI model. The Organization and Roles didn't get approval from managerial level yet. That's why those are proposals still.



The 4-step methods	Job Instruction Development	Job Methods Development	Job Relations Development	Development Result
Preparation	<ul style="list-style-type: none"> On-the-job trainers should arrange quality operated training Organization should build that way its supports the operating model 	<ul style="list-style-type: none"> JIB's are already done in the current company, but its not effectively used The JIB's must be taken in to active use and part of the on-the-job training model 	<ul style="list-style-type: none"> The trainings for the supervisors are good and in the future, this could be a part of on-the-job trainers training. 	<p>Organization for On-The-Job Training TWI</p>  <p>Roles and responsible for TWI</p> 
Presentation	<ul style="list-style-type: none"> JIB's are already done in the current company, but its not effectively used The JIB's must be taken in to active use and part of the on-the-job training model 	<ul style="list-style-type: none"> Implementing this as part of already existing process PDCA 	<ul style="list-style-type: none"> Existing model and organization supports the TWI model implementation. Clearing the roles and responsables for the on-the-job training performance, will reduce time that supervisors need to spend on newly recruited employees basic training. 	
Application	<ul style="list-style-type: none"> Keep up the 5S standards and progress that have been achieved already. 	<ul style="list-style-type: none"> Taking it as part of the development process and with the on-the-job trainers training, can add parts that's covers the method development. 	<ul style="list-style-type: none"> This will be implemented in the daily actions. Daily Management and Operational Team Leading will support the daily issue handling. The presents of the supervisors in the production cells, happens more often 	
Testing	<ul style="list-style-type: none"> Make the training period planned and organized, so the newly recruited employee knows what will happen and when. 	<ul style="list-style-type: none"> This will continuously improve the work and on-the-job training process or model. 	<ul style="list-style-type: none"> When the responsible and roles are clarified, the time for the supervisors to handle the problems or issues will increase. 	

Figure 22. Piloting operating model plan

6.2 Lessons learned in pilot and possible improvements

First the proposal was tested and piloted in chosen department and after the pilot the trainer was interviewed and with this the proposal was improved. The JIB's was created for the work phase that was trained. The proposal was developed and timed with trainer and supervisor. First step was to create JIB and timetable for the training. With the support of the supervisor, the trainer was able to have enough time to do the on-the-job piloting model. The JIB was used as a help for the pilot and the pilot was handwritten how it should go and what happens in what part of the training. All of this pre-work before pilot, was help the trainer understand the purpose of this and showing the tools that already exists in current company, how those should be used in training. Newly recruited employee was also interviewed and ask how the first week on-the-job training have been is it been clear and organized. The feedback from new employee was good and positive. Employee learned quickly the basic work phases and was able to work independently faster than it was planned. It is always individual how the person learns something new. That's why it is important to focus on that fact in the trainers training.

After the pilot, the trainer and supervisor were interview and the feedback used to improve the model. With this stage the final proposal for the TWI model to the current company is more ready and standardized level. The JIB sheet was also updated and transformed to excel format, this makes the JIB easier to format and print out. Organization chart proposal was updated to support the TWI model and the roles and responsible write down.

6.3 Summary of operating model

After the pilot and building the TWI model for the current company, the approaching will but more effort on Job Instruction phase and for the high-quality training for the new trainers or already existing trainers. Creating JIB’s for the processes or work phases will help the trainer maintaining focus on the right issues and the training for the product assembly is more standardized and learning time shorter. Standardizing the model for TWI and giving tools for the trainers and realistic timetable, this will increase the quality and decrease time that will spend on training. Newly recruited employees will get more out of the training when it’s standardized and good organized. All the effort that are put in the on-the-job training and develop it, will give biggest payoff from newly recruited employee. As shown on Figure 23 is highlighting the part that was focus on pilot and the customized way to approach the operating model.

The 4-step methods	Job Instruction Development	Job Methods Development	Job Relations Development	Development Result	
Preparation	<ul style="list-style-type: none"> On-the-job trainers should arrange quality operated training Organization should build that way its supports the operating model 	<ul style="list-style-type: none"> JIB’s are already done in the current company, but its not effectively used The JIB’s must be taken in to active use and part of the on-the-job training model 	<ul style="list-style-type: none"> The trainings for the supervisors are good and in the future, this could be a part of on-the-job trainers training. 	<p>Organization for On-The-Job Training TWI</p>	
Presentation	<ul style="list-style-type: none"> JIB’s are already done in the current company, but its not effectively used The JIB’s must be taken in to active use and part of the on-the-job training model 	<ul style="list-style-type: none"> Implementing this as part of already existing process PDCA 	<ul style="list-style-type: none"> Existing model and organization supports the TWI model implementation. Clearing the roles and responsables for the on-the-job training performance, will reduce time that supervisors need to spend on newly recruited employees basic training. 		
Application	<ul style="list-style-type: none"> Keep up the 5S standards and progress that have been achieved already. 	<ul style="list-style-type: none"> Taking it as part of the development process and with the on-the-job trainers training, can add parts that’s covers the method development. 	<ul style="list-style-type: none"> This will be implemented in the daily actions. Daily Management and Operational Team Leading will support the daily issue handling. The presents of the supervisors in the production cells, happens more often 		<p>Roles and responsible for TWI</p>
Testing	<ul style="list-style-type: none"> Make the training period planned and organized, so the newly recruited employee knows what will happen and when. 	<ul style="list-style-type: none"> This will continuously improve the work and on-the-job training process or model. 	<ul style="list-style-type: none"> When the responsible and roles are clarified, the time for the supervisors to handle the problems or issues will increase. 		

Figure 23. Parts that was used in pilot

7 Discussion and Conclusions

This section contains the conclusion of the findings of this Thesis. In addition, the thesis evaluation is carried out through examining validity, logic, relevance and reliability of the study.

7.1 Executive Summary

This thesis focused to reviewing and comparing the current way on-the-job training in nowadays versus TWI theoretical knowledge. With this knowledge and practical knowhow on company the model for the TWI approach was build and proposed. The biggest focus was to standardize the on-the-job training and improve the quality on training. There was already good practices in current company and some similar approach was in use already, that prefers to TWI model. The model was created and piloted in one part of production in current company.

The TWI theory was gathered by very good literacy books and Harvard Business Review articles. With this knowledge and information I was able to make whole big picture on TWI approach and what elements it includes and how the whole TWI process works. This reviewing helped me to do the current state analysis interviews with stakeholders.

Current State Analysis was done by interviewing stakeholders, team leaders and Senior operators. Interviews focused on nowadays operating on-the-job training and the tools that are used. Comparing the nowadays on-the-job training strengths and weakness was the approach to build the proposal of the on-the-job training model. On the interviews one question was, how the current on-the-job training should be performed and develop. This question was a good start to do the approach TWI model.

TWI operating model was built by focusing on the first part on TWI, Job Instruction. When narrowing the project scope to one part on TWI model and getting all the efforts on factory floor, the pilot planning was easier. When focusing on the operation on-the-job training in factory floor and improving the training in there, gives most of the impact to factory by quality and training time. Giving support for the on-the-job trainers and showing how to fill up the JIB's and create timetable for training, this motivated the trainers and increase the quality outcome from training. The main focus is on the trainers and how to support them and built the organization so that the company is involved on every level to proceed TWI approach and chosen operational model.

7.2 Next steps towards implementation of operating model

Every newly recruited employee are investments to company. That's why it is important to put effort for the training and the tools.

Reflecting on this the company should built strong process for the training and organization that supports the training. All effort that the company gives for newly recruited employees training, will payback double afterwards. Developing the process and clearing the rules and roles, the outcome for the proposal and on-the-job training program will increase the quality and reduce the time that will have to spend on-the-job training.

First thing that should do is to clarify the process and how the training for the trainers should be organized and scheduled. The focus on the training should be on the TWI approach and support the on-the-job training.

Second issue is to standardize the process and implement the tools that support the on-the-job training, that is similar to TWI training globally. Whit this the company will get the best results already improved and developed system and processes.

Third and the easiest step is to mold the improved process to already in used processes. PDCA, Daily Management, 5S and Operational Team Leading, will give effective tools and processes for to support the on-the-job training. Why to reinvent the wheel again.

7.3 Evaluation of thesis trustworthiness

This thesis is conclusion from practical and already tested and in use systematical on-the-job training in globally. The TWI model was already invented early 1940, so this thesis didn't improve or develop nothing new. Doing the current state analyze to the current company, brings up the issues that doesn't work or not in active use. Developing these things and standardizing the processes and reshaping the tools, gives the company good ground to proceed to next step of TWI model of on-the-job training.

The first thing was to do the literacy knowledge gathering and building up the concept of TWI model and methods. Whit this knowledge was easy to compare the situation on-the-job training performance in current company, by doing interviews with Stakeholders and operational personnel. Whit the interviews of current state analyze was done, then it was time to analyze the cap between TWI model and current way to operate on-the-job training. Comparing the cap and starting to build the proposal for model how to use and

implement the TWI operating model to the current company. Co-operating with my boss, Head of Quality and Operational Excellence, I was able to build up the proposal of the model how to implement and reorganization the operating level.

7.3.1 Good practice concerning TWI in relevant literature and example company

When approaching this part of thesis structure and starting to do evaluation from already existing literacy and articles from Training Within Industry, TWI. I didn't know much about the tools and methods of TWI, but reading books and articles from TWI, start to create the knowledge and giving the big picture what is the idea of TWI and what are the benefits from it. Because the Covid-19 situation, the interview of example company, was done by remote and with Skype. This interview gives me what is the amount of work should be used for building up good structured model and what its take to do the change and implementation. The process and change are not something you can do fast, or effectively, if you don't do your homework properly and refer on the knowledge that are already used and tested, almost 80 years.

7.3.2 Analysis of case organization current on-the-job practices

Current state analyze was done by interviewing different employees in different position in current company. There was different stage of on-the-job training practices in use by different part of operating unit. Comparing these on-the-job existing practices in different part of the current company operating unit, the whole picture was created. Many departments were already using advanced reporting and training schedules. Other departments is doing the training for the newly recruited employee as Ad-Hoc, in need. This variety of different stage on-the-job training practices show me that the knowledge and tools are more advanced stage that it seems outside. Gathering these information's and tools together and adding the interviews knowledge to this. This is how I was able to do the current state analyze on On-The-Job Training. Reshaping the already existing tools and practices, faster the process of building on-the-job operating model to the current company.

7.3.3 Developing an operating model for on-the-job training using the TWI-approach

Doing the developing phase, I did get lots of help from my boss, Head of Quality and Operational Excellence. With the help of my boss, I was able to create model that can

be present to the Head of Factory's and other stakeholders. The model was created by comparing the model of TWI and the tools that are used in there and then comparing the existing tools and processes what already exists in the current company. Some part of the TWI operating model was able to merge in already existing operating processes, as PDCA, 5S, Daily Management, Operating Team Leading. This part was covered the TWI model Job Methods and Job Relations. The proposal model focused more on Job Instruction part and adding value to the on-the-job training and trainers.

7.3.4 Piloting operating model

The department to do the on-the-job model piloting was given to me by the interviews. One of the Head of Factory's was telling that there are starting three new employees in May and it could be good place to try out the proposal model. I was able to discuss with the trainer that was doing the on-the-job training and we write down the JIB's and created the timetable for the training, for one newly recruited employee. Before the pilot start, I double checked that everything was clear, and the trainer understand why and how this is done. In the middle of the first week, I went to see the trainer and the new employee and ask how it is going so far and the on-the-job training been. The response was positive, and the trainer said that, it was easier to do the training, when it was time scheduled correctly and the JIB's helped the trainer to remember what to teach and why.

7.4 Closing Words

On-the-job training is the first touch on a newly recruited employee and that's why it should be done professionally and standardized way. Giving the person impression that everything is organized and standardized, the expectation for oncoming work career will be awesome. Giving the right tools for the trainers and giving them high quality training will motivate the trainers to improve the processes. The best knowledge how to use the on-the-job operating model, comes with the trainers and the responsible person, who are responsible to develop the process. This thesis gives me lots of new knowledge and something that I can use in my future.

References

- Graupp, P. and Wrona, R. (2006). *The TWI Workbook: Essential Skills for Supervisors*.
- Graupp, P. and Wrona, R. (2011). *Implementing TWI: Creating and Managing a Skills-based Culture*
- Liker, J. and Meier, D (2007). *Toyota Talent: Developing Your People the Toyota Way*
- Bicheno, J. and Holweg, M. (2009). *The Lean Toolbox: The Essential Guide to Lean Transformation* pp. 87, 110, 182 and 212.
- Dinero, D. (2005). *Training Within Industry: The Foundation of Lean*.
- Ballé, M., Jones, D., Chaize, J. and Fiume, O. (2017). *The Lean Strategy: Using Lean to Create Competitive Advantage, Unleash Innovation, and Deliver Sustainable Growth* pp. 56.
- Huntzinger, J. (2006) *Why Standard Work is not Standard: Training Within Industry Provides an Answer, fourth issue, pp. 8*.
- Dinero, D (2005). Case Company web-site. Title of the web-page. Available from: (Accessed 5 April 2019). - [Example of a reference to a web-site.](#)
- Kothari, C.R., Garg, G. *Research Methodology: Methods and Techniques*. New Age Publishers. Online educational text and reference material. Available from:<http://www.newagepublishers.com/samplechapter/000896.pdf>(Accessed:9.2.2018).
- Eriksson, P., and Kovalainen, A. (2008). *Qualitative Methods in Business Research*. Sage
- Yin, R. (2002) *Case Study Research Design and Methods*. Third Edition. Sage Publications, Inc.

Fieldnotes from stakeholder interview

DATE	3.2.2020
INFORMANT	Head of Factory
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	In the current company the on-the-job training is guided by Seniors or Experienced employees. The process is clear and easy. Most of the trainers have been go through the training program. Training program is 6 day long and its divided to 3+2+1 day program. Job Instruction Breakdown sheet have been created earlier, but the use is not effect. Standardized work implemented in factory floor, but it is not effectively used. The on-the-job training is lots of memorable issues and things. Training for the newly recruited employees is noticed on demand, not planned or organized. On-the-job training is more organized than white collar employees.
Strength	Standardized work is used there where it is able to use. Team Leaders are responsible for multiskilled matrix and training need for employees. Team Leaders teamwork is good, and communication is good.
Weakness	Lots of things that trainer has to memorized and no written rules write down. The focus is only on the own team or work, don't see the big picture and need of factory or Operations unit.
Development ideas	Roles and responsible for the trainers must be cleared. Action plans for training should be created. Support and follow up for trainers and training program Standardized way and method to do on-the-job training. Standardized way to train the trainers Newly recruited employees learning methods understanding for on-the-job trainers.

DATE	4.2.2020
INFORMANT	Inbound Manager
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	Inbound department have the most advanced on-the-job training in current company. In the department the work has been split in different phases. Each phase takes 1 week to learn and end of every learning phase there are approval phase. This system gives better quality and reduced time to spend on-the-job training. On-the-job trainers are trained and named to do the job. The on-the-job training is most of the time hands-on training.
Strength	Roles and responsible is clear. Approval steps end of every training phase. Every training is recorded and saved in archives.
Weakness	Lots of things that have to memorized and know in process. No standardized way to do the on-the-job training. Facing problem in on-the-job training, it's hard to find help or get standardized way help. There Is no possible to do the standardized way training, because there is no time to do it.
Development ideas	Standardized way to do the on-the-job training Give time to trainers, so they can do the training in enough time.

DATE	5.2.2020
INFORMANT	Team Leader, Logistic
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	On-the-job training how the trainers performed it, is good and effect. Training is done by Senior or Experienced employee.
Strength	<p>End of every on-the-job training phase there is approval step.</p> <p>End of every learning process the approval criteria is 1-3.</p> <p>Approval phase make sure that the newly recruited employee have been learned.</p>
Weakness	<p>This is not implemented to Outbound department in logistic.</p> <p>No standardized way to do the on-the-job training.</p>
Development ideas	Standardized way and clear rules and roles for training.

DATE	5.2.2020
INFORMANT	Team Leader, Production
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	Newly recruited employee will start the training by following up how the job is done by Senior or Experienced employee. Help on training is used Procedure Instructions. There are created some JIB's but they are not effectively used in on-the-job training. Basic learning will take about 1-4 weeks, depend the difficult level of process. Training is operated by showing how the jib is done and reading through procedure instructions.
Strength	There are trained trainers to do on-the-job training JIB's created.
Weakness	Standard work is not used in training There are no guide or text to the trainers. Everything must be remembered. There are JIB's done but not in use.
Development ideas	Newly recruited employee it's not hired for teams, but to the factory. From easiest jobs will be created JIB's. Reducing learning time for newly recruited employee, if the on-the-job training is concentrated to named group of trainers. On-the-job training checklist for trainers gives help to remember what to teach.

DATE	6.2.2020
INFORMANT	Executive Vice President
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	On-the-job training doesn't support the current company Lean process and chosen tools. Time spend on training is too long and the training is not effect. Roles and responsible is not clear and write down.
Strength	There are trained trainers in every part of Operations unit. They have similar tools to use.
Weakness	No clear process how the on-the-job training should last or where to record the training. No standardized way to do it. No JIB`s in use.
Development ideas	Should be connected to company's rules and tools, supporting Lean. On-the-job training should explain also what means Daily management and other daily methods and process. On-the-job training should be focus on those kinds of department where are lots of work rotation or high volume production. Increase method development by TWI training? Piloting the new proposal of on-the-job training.

DATE	10.2.2020
INFORMANT	Head of Factory
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	On-the-job training is normally badly timed, and the estimated time is normally less than it really takes. Seniors or experienced employees done the on-the-job training for newly recruited employees.
Strength	Seniors or experienced employees does the training. Some of the operators have trained the on-the-job training.
Weakness	incorrectly estimated training schedule time and time to spend on training. Lots of things that have to memorized.
Development ideas	Written card for on-the-job trainers and memory list. Recognized critical points: <ul style="list-style-type: none"> - Material flow - Resources - Supply chain critical steps On-the-job training should be better organized and standardized. All the trainings should be documented and archived. Validity time for trainer experience. Give time for trainers to performance the training to newly recruited employee.

DATE	10.2.2020
INFORMANT	Head of Quality and Operational Excellence
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	Quality control team have implemented the similar way on-the-job training as Inbound logistic. There are two named and trained trainers how can do the on-the-job training. Time for the training is not clear. There are no tools for the trainers, how to proceed the training.
Strength	There are trained trainers in current company Some processes are standardized but not so effect. JIB's created.
Weakness	JIB's not active in use. Not have standardized way in every part in current company do the training. There are no standard tools for trainers to use in training. Estimating the time to spend on-the-job training.
Development ideas	Unifies the process and tools for the trainers. Only trained on-the-job trainers performance training for the newly recruited employees. Support for the trainers and follow up the quality for outcome of training. Put effort on on-the-job training and increase the quality of it.

DATE	11.2.2020
INFORMANT	Team Leader, Production
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	There are no official on-the-job trainers in factory floor. Everybody can do the on-the-job training. All the training is happened on Procedure Instruction. Outsourced company gives the on-the-job training and its focus more on Ergonomics, learning methods, JIB's and finally the on-the-job training is filmed. This training is focusing more how to handle different kinds of employees.
Strength	There are employees that have been trained to on-the-job trainers. Some JIB's are done.
Weakness	Everybody can do the on-the-job training. No time to spend on training Quality is not standard Time to spend on training changes.
Development ideas	Clarifying the role of on-the-job trainers. Clear rules and roles for trainers. Checklist and Instructions must support the training and be clear and standardized.

DATE	12.2.2020
INFORMANT	Senior Material handler, Inbound
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	Every time there are newly recruited employee, the process is almost the same and every part of training there is an approval step. There are named trainers in Inbound. Process is standardized and the training is scheduled. Every phase in process takes three weeks. First week is done together, second week independently and third week is independently and approval.
Strength	<p>Process is clear and standardized</p> <p>Named trainers</p> <p>Approval step end of every training process.</p> <p>All the processes are written down and its followed.</p> <p>Instructions support the training</p>
Weakness	During the training for the newly recruited employee the trainer can change.
Development ideas	<p>On-the-job training rules and roles must be standardized</p> <p>Instruction must create for the trainers</p> <p>Time schedule must done for every training.</p>

DATE	17.2.2020
INFORMANT	Product Change Specialist
TYPE OF DATA COLLECTION	Interview
Current Status of On-the-job training	All the instructions are located in the workplace and those support the training. There are trained trainers in department and the process is written down and followed. This training process works at this work department.
Strength	Clear rulers and instruction how to do and what. Approval phase is in use
Weakness	Trainers doesn't have time to performance the training, then others must do the training for newly recruited employees.
Development ideas	Rules and Roles must cleared Standardized way to do the training Follow up and support for the on-the-job trainers