AN ON-THE-JOB TRAINING SYSTEM AT ALIAS PCB TECHNOLOGIES

Establishing a Structured
System of Operator
Training

By

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ABSTRACT

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This study, for ALIAS PCB Technologies, Inc., of Elsewhere, Minnesota, details the steps involved in establishing a structured system of on-the-job training for manufacturing employees. Chapter 1 is an introduction to the organization along with an overview of current training practices at the facility, as well as local historical perspective. The objectives of the study are multiple and include designing a system of structured on-the-job-training for all manufacturing operators, designing and validating training materials, and developing and implementing a system of recording and tracking employee certification status and training records. Chapter 2 describes the history of on–the-job training and reviews literature concerning components of structured on-the-job training, structured vs. unstructured on-the-job-training, and use of certifications, training materials, and performance standards in on-the-job training. Different manifestations of

on-the-job-training, or OJT, are also analyzed and compared. Chapters 3 and 4 details the research methodology used to collect the information needed to set up and implement a structured system of on-the-job-training, as well as the results of the surveys and interviews. These chapters also discuss the impact of training, or lack thereof, on organizational effectiveness and individual performance. Interviews were conducted at the supervisory level to determine support and understanding of the project and training system. The final chapter summarizes the research and details the components of the system set up at ALIAS-Elsewhere. Chapter 5 also includes recommendations for successful implementation of the system as well as detailing the next steps in the structured operator training plan.

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CHAPTER I

INTRODUCTION

Introduction to the Field Problem

The focus of this field problem is to establish a structured on-the-job training system at a printed circuit board manufacturing company. At the request of the company, the exact name is not disclosed. The company will hereafter be referred to as ALIAS PCB Technologies, Inc. There is currently no formal system of operator training, thus operators follow an unstructured plan of job shadowing. Properly structured and executed operator training can be an effective method to increase productivity, shorten learning curves, and lower scrap rates in manufacturing operations. This field study will discuss the steps required to establish a structured system of operator training.

Introduction to ALIAS PCB Technologies

ALIAS PCB Technologies is a manufacturer of printed circuit boards, specializing in over-sized boards featuring numbers of layers from six to sixty-eight. ALIAS is a division of A Larger Corporation, a global electronics manufacturing corporation. ALIAS PCB Technologies (hereafter referred to as ALIAS) was established in 1978. There are currently 10 manufacturing facilities around the world with over two million square feet of manufacturing space. ALIAS employs more than 6,800 employees. The Elsewhere facility, the subject of this field problem, was acquired in 1996.

Current Status of Training

There has been no training presence at ALIAS until recently, when a training manager was hired. One of the directives to training is to establish a formal system of operator training. There has been no formal training at the facility. When employees have taken

classes on or off site, record of the training has not been noted or tracked. Current certification checklists and training records are stored in the work area with no central location, organization, or tracking mechanism. There is no formal New Employee Orientation; new employees are given benefit information and then paired with another operator in the area. There is no system of support for new employees, as they do not always train with the same employee from work shift to work shift. Along with the lack of formal structured operator training, there is also no system in place to roll out new business initiatives that require training or communication to employees. There is no formal on site classroom training sessions.

In addition to the fact that there are no designated and trained trainers to implement structured on-the-job training, there are also no training materials with which to train the operator. There are a few outdated certification checklists in some areas, but they are rarely used and are not recorded or tracked effectively when they are used.

Problem Statement

The problem of this study is to design and implement a system of structured on-the-job training at ALIAS. The on-the-job training system will be comprehensive and be focussed on operators in the manufacturing areas.

Research Objectives

The objectives of this study are:

1. To design a robust system of structured on-the-job operator training for all manufacturing areas at ALIAS.
2. To design training materials for operator training.

3. To set up and implement a system of recording and tracking employee certification and training records.
4. To complete preparations for implementation of the system of training and the accompanying training materials.

Need Statement

The lack of a system of operator training can impact organizational effectiveness and individual performance. Specific impacts include such things as slow learning curves, a high incidence of operator error, inconsistencies between shifts and areas, and incomplete and ineffective training. All of these impacts can affect the morale of the employees and the overall functioning of the organization.

Definitions

The definitions that follow apply to terms used at ALIAS as well as operational definitions for the terms used in describing workforce training.

OJT- On-the-job training; refers to a structured or non-structured system of training that occurs in the workplace (Rothwell and Kazanaz, 1994). OJT may also be called job instruction training.

OJL- Knowledge learned on the job without assistance; what the learner does on his/her own to gain information and skills on the job. This is not structured and usually happens without a trainer or organizational control (Rothwell and Kazanas, 1994).

Unstructured on-the-job training - This is a more informal system of job shadowing where the trainee follows the trainer around and either observes the work or performs the work (Rothwell and Kazanas, 1994).

Performance-based certification- Employee certification based upon attainment of certain previously established performance standards (Hale, 1999).

Lead – an operator or employee who has been chosen to act as the supervisor in the supervisor's absence as well as performing other duties of increasing responsibility, including training and crosstraining of operators (ALIAS, 2001).

Supervisor- An employee who oversees the employees and workflow of a specific manufacturing area. Supervisors delegate authority to leads on the off shifts. Supervisors are responsible for area training, keeping of area records, and maintenance of area process procedures (ALIAS, 2001).

MPP - Manufacturing Process Procedures. These are the work instructions that outline the steps in the manufacturing process. Employees use these as a guideline for training and performing their jobs (ALIAS, 2001).

Performance Standards - Minimum requirements expected from experienced workers performing at a normal pace. Performance standards are used to hold employees accountable for behavior and to give trainees the minimal goal to attain in performing their job (Rothwell and Kazanas, 1994).

Performance Objectives - Detailed statements of what the learners will be able to do and/or know when they complete a lesson. Performance objectives are written using language that describes observable and measurable behavior (Kelly, 1995).

Lesson Plans - "Detailed outlines intended to guide instructors through group or individualized instructional activities" (Rothwell and Kazanas, 1992, p. 212).

Training and Certification Guide - "A training checklist that is used to guide on-the-job training by outlining the training expectations and providing a measurement of learning

and skills acquisition." The trainer follows the Training and Certification Guide until the trainee is ready to be certified and is able to perform each task to the performance standard (Galindo, 1999).

Nominal Group Technique - A ranking technique used with a group to achieve consensus and rank issues, problems, or solutions in order of importance. Nominal Group Technique, or NGT, allows both individual and group ranking (Brassard and Ritter, 1994).

Force Field Analysis - A technique used to compare the positives and negatives of a situation and look at all the possible advantages and disadvantages. It helps in reinforcing the positive aspects and openly identifying the negative aspects so they can be reduced or eliminated (Brassard and Ritter, 1994).

Limitations

The research will be completed in a relatively short period of time; less than six months. That will not be an adequate time to determine whether the materials created or the system designed are truly effective. More research will be necessary to determine the impact of the new system and materials. Change factors and other variables not considered in the study may impact the results of the study. Random sampling was not used , nor was an experimental design. The research will be conducted at only one site in one organization- ALIAS in Elsewhere, Minnesota.

Assumptions

The basic assumptions of this field problem are that the results will reflect only the functioning and effectiveness of the Elsewhere ALIAS facility and should not be generalized to other facilities or types of businesses without further study and research.

CHAPTER 2

Review of Literature

Introduction

The second chapter of the study will discuss the role of training in the workforce, specifically on-the-job training, hereafter referred to as OJT. The historical background will be discussed as well as the different manifestations of OJT. Other topics explored in the research will be the differences between structured and unstructured OJT, components of OJT, implementation of OJT, and barriers to successful implementation.

Historical Perspective

The role of training in the workplace has enjoyed a long and colorful history; riding ebbs and tides of popularity along with other systems in the workplace. Training has been just as subject to trends and fads as any other aspect of business. The current business climate is increasingly becoming more receptive to training. The training industry is responding to the change in climate by becoming more business oriented, embracing technology and becoming increasingly more likely to evaluate training rather than train for the sake of training. Business is expecting bottomline impact from training interventions and training professionals must find ways to meet those expectations. Training has always had a presence in the workplace, even if it has not always been a formal presence. In the days of earliest man, parents taught their children the skills and tasks needed to survive the life of an adult. As humankind developed, so did the nature of work and training. As tools were created, so was the need to learn how to use them. As more and more tools, weapons, machinery, language, housing and shelter were created, and civilization became increasingly more complex, training needs evolved as

well. (Anderson, 2000) One of the systems of training that evolved was that of the master craftsman and the apprentice system. In this system, an apprentice, or possibly several, served a period of time with a master craftsman, learning the craft under the master's tutelage. In this form of OJT, no reading or writing or formal materials or system were used. The term of apprenticeship usually lasted a very long time as well, before the apprentice attained the skill level of the master. This system broke down when manual labor and craftsmanship began to be replaced by more and more automation and machinery and large numbers of goods quickly produced. With this change, the need for a different type of training became apparent (Galindo, 1999).

The huge demand for products generated by the onset of the world wars brought an accompanying need to rapidly train workers to meet these demands. These methods developed into a method of systematic training that appeared around the time of World War II.

Development of Modern OJT

During the development of systematic training, a four-step method of training evolved. The steps included:

1. SHOW or prepare
2. TELL or present
3. DO or apply
4. CHECK or inspect.

This four step method was developed by Charles R. Allen to train shipbuilders during World War I (Sleight, 1993). These steps still form the basis for many forms of OJT.

Army research as well as Allen's work led to several principles of instruction. Training should be carried out by supervisors who are also trained to train. Groups of nine to eleven employees should be trained at a time. An analysis of the job should be completed before training is done. Training on the job reduces break in time, and employees develop feelings of loyalty from personal attention given during training (McCord, 1976, p. 32-6).

During World War II, the need for rapidly trained workers became more urgent and a systematic method of training called JIT or Job Instruction Training, was created. JIT followed a four-step method of instruction and was most effective for simpler, more manipulative tasks (Sleight, 1993). The four steps were as follows:

1. Prepare the Learner
2. Present Instruction
3. Try out performance
4. Follow up.

The effectiveness of Job Instruction Training was diminished when applied to more complicated tasks. As a result, as job tasks became more complicated in the time following World War II, this method lost its popularity. Although the use of traditional Job Instruction Training as originally developed has virtually disappeared, the movement signaled a move away from the more traditional on-the-job training or job shadowing to more formalized, planned, and organized training.

One landmark study examined the effects of on-the-job training. In a study conducted at Bowling Green University in Ohio in 1975, two groups of employees were trained by two very diverse methods. The groups consisted of twenty workers in each group. The

workers were trained to operate a manufacturing process. One group used unstructured OJT, called the "buddy system" by the researchers (Swanson, R.A., and Sawzin, S.A., 1975). In this method, the first worker was trained by the supervisor. This first trainee then trained the next trainee, and so on until all twenty were trained. The members of the second group, on the other hand, although trained one at a time like the first group, were each trained by the supervisor. The supervisor used a structured program to train each person individually. The supervisor trained group, the second group, reached the desired skill and productivity level in roughly a quarter of the time it took to train the "buddy system." Not only that, but the structured group had 76% fewer rejects (Sisson, 2001). This study was the first time the term "structured on-the-job training" was used. Before this study, there was an implication that on the job training was largely unstructured as opposed to the more formal classroom training. After this study, the structure of the training became more important than where the training took place, whether it was in a classroom or while performing the job.

Different Manifestations of OJT

On-the-job training has evolved into a diversity of manifestations. In an overview of comprehensive workplace training, on the job training still figures prominently. These range from the traditional job shadowing to highly sophisticated systems that include interactive CD-ROM training as well as on-line training and traditional classroom instructor-led training.

In addition to the Job Instruction Training detailed previously, there are several other general types of on-the-job training. Whereas Job Instruction Training is distinguished by its simplicity, the others have more complexity (DeSimone and Harris, 1998). Job

rotation is another manifestation of OJT. In job rotation, the employee is assigned to different positions and possibly different departments for pre-arranged periods of time. The combined evaluation of the different work experiences determines the employee's final job assignment. A third form of OJT is coaching. In coaching, the trainee must already possess some level of skills and knowledge at a job. The trainer acts as a coach to facilitate learning and guide learners rather than instruct or train them (Sullivan, 1998). Mentoring is very similar in that it calls for a higher level of initial skill and job knowledge, as does coaching. The mentor is generally a supervisor or manager rather than a co-worker. The intention of mentoring is to support the employee, help orient them to the job and work environment and "prepare the employee for increasing responsibility" (DeSimone and Harris, p.145).

Traditional, or unstructured and unplanned OJT, in spite of some of its failings, does provide certain advantages that accounted for its continued popularity in spite of its inconsistencies, inefficiencies and overall ineffectiveness. OJT is very hands on. This makes it very appealing to many people involved in the process- the end result is the trainee doing the real job. This is the element of realistic practice. Rather than worrying about skills transfer from simulator or lecture, the trainee learns on the actual equipment or machinery involved, performing actual job tasks (Sisson, 2001). Unstructured OJT is a simple approach which lends itself to the small changes that occur in a dynamic economy. Business today operates at high speed, with constantly changing technologies, customers, and products. Those companies not prepared to change will have a decided disadvantage. Unstructured, unplanned OJT is easily adapted to the smaller everyday

types of changes that may occur, albeit rather ineffectively. These reasons account for the continued popularity of unstructured OJT (Sisson, 2001).

Structured vs. Unstructured OJT

As the history of OJT suggests, it is found in every workplace to some degree of formality or informality. As soon as one employee asks another, "do you know how to…" OJT is about to occur. What most people think of however, when they think about OJT, is the less structured job shadowing or "sit by Joe" type of training (Rothwell and Kazanas 1994). According to Sisson, unstructured or traditional OJT has four telling characteristics. It is focused on the work- the trainer is primarily a worker and the work is the first priority. Training is lower on the list of priorities and often no allowance is made for the implicit slowdown of production that must inevitably come with training. The second characteristic is that the only structure for the training is the work itself. The sequence of job tasks learned depends on the flow of work in the area. Since the work provides the structure, some tasks may get lost if they do not happen during any of the training sequences. The third characteristic is that job skill and experience are generally the factors used to pick an employee to do training. Job skill does not necessarily mean training skill and few OJT trainers are given any types of materials or standards to use for training, making it a random and haphazard affair at best, and ineffective and non-productive at worst. The fourth characteristic of unstructured OJT is that the instructor chooses his or her own methods for teaching the skills inherent in the job. Generally this is showing and telling. Some may do a lot of telling and then leave the trainee to his or her own devices. Some may do a lot of showing and never allow the trainee an opportunity to practice the job skills. Unstructured OJT is inconsistent, inefficient and

ineffective. Inconsistent, because it is determined by the individuality of the trainer rather than influenced; inefficient because the process of learning is disorderly since it is controlled by available work; and ineffective because in the majority of situations, there is no way to measure what the trainee has learned or how well they can perform.

Structured training is differentiated from unstructured in a number of ways. The obvious difference is the structure, manifested by standardized training materials, OJT processes, selected and trained trainers, and performance checklists. (Levine, 1995) Other characteristics of structured training include consistency and accountability. The training materials provide some of that as do the performance checklists, based on clear objectives built into them. Further consistency is provided by the fact that those doing the training are specifically selected and trained trainers, who have expressed an interest in training and completed training in one-on-one training skills. Accountability is inherent in the system because trainers and trainees follow checklists and initial or sign for completed training- eliminating the excuse that the operator was never shown how to perform a certain task or aspect of a job. Accountability is also provided in the tracking and record system that is part of structured OJT. This also helps meet ISO standards. The formal documented processes detailing how OJT is structured, implemented and tracked also add to accountability by delineating areas of responsibility for training throughout the organization.

Components of Structured OJT

Although the different types of business, organizations and organizational structure lend themselves to an almost infinite variety of configurations of structured training, there do seem to be some common elements among successful structured systems. There is no

one right way to do structured training but the following components should be present in a structured system. The significance of each may be different in different organizations (Levine, 1996).

1. Management Support
2. Formal trainer support process
3. Checklists
4. OJT Training Materials
5. Train the Trainer Program
6. Tracking and Report generation

Management support is critical to the success of any OJT system. Without management backing, in terms of budget as well as priorities, the best OJT system is bound to fail, as other priorities will take precedence. As important as top level management is, the buy-in and support from the line supervisors is just as crucial. Area supervisors are the ones responsible for the day-to-day and shift-to-shift functioning of the manufacturing areas. The climate and priorities they establish will overshadow any other priorities. "Training takes time; if supervisors do not allow enough time for preparation and training, they will thwart any structured OJT effort. If you cannot gain internal support from the organization's managers and supervisors, don't waste time trying to implement structured OJT" (Levine, 1995, p. 1).

The second component, support for trainers, is an important aspect and also key to success. Supervisors cannot be the primary support persons for trainers for a number of reasons. One reason is that the supervisor's primary directive is to run production. They may or may not know anything about training or the ability to be a support person.

Successful systems generally have on OJT coordinator, a training manager, or some person outside the work area to provide the support necessary for a trainer. This may include a dotted line relationship to the training organization (Levine, 1995).

Checklists are also listed by Levine as an important and necessary component in an OJT system, along with OJT training materials. The checklists and training materials are a means of gaining consistency in training between shifts and also between trainers. If all trainers are using consistent, standardized materials and checklists, the training will have more consistency as well. Levine defines checklists as "the foundation of any OJT system" (Levine, 1994, p.6). They list the tasks that need to be trained as well as administrative information such as dates of training, trainee and trainer names and employee numbers, and certification dates. The checklists, whatever final format they may use, are based on a thorough analysis of the job, and include performance objectives for each task. The performance objectives state the intent condition and level of performance. A lesson plan should be developed to outline how the lesson will be taught and what will be included (Chase, 1997). According to some experts, the most important components of OJT are checklists with task lists, performance objectives, references, and a training schedule (Levine, 1996, Kelly, 1995, Rothwell and Kazanas, 1994). Another document included by some training experts is the lesson plan, a document intended to give direction in the training and improve the trainer's ability to instruct the trainee (Broadwell, 1986).

To ensure that those doing the training are the best possible for the job, a Train-the-Trainer program is also an important component of a structured system. The Train-the-Trainer program must include selection as well as training or the potential trainers. It is

not always the best worker that makes the best trainer. A desire to train is as important to the success of a program as is an effective train the trainer program. A consideration in designing or outsourcing or purchasing off-the-shelf program of trainer training is that OJT is, at its heart, a one-on-one system. Many trainer-training programs are designed more for classroom, group or traditional stand-up training, which involve a different skill set than one-on-one training. A Train-the-Trainer Workshop needs to be highly process oriented, rather than lecture based, because the trainers are learning new behaviors rather than just new knowledge. Levine believes a Train the Trainer session needs to include teaching training and learning styles and teaching one-on-one training techniques (Levine, 1995).

The last component mentioned by Levine is that of tracking and report generation. This is an essential element for business reasons as well as for managing the training function. Many businesses are investing time and money in their training organizations for business reasons such as customer requests or to fulfill ISO 9000 quality requirements. An effective tracking and report generation also provides valuable information to the stakeholders as well as providing a means of accountability.

Implementation of Structured OJT

Due to the increasingly complex and rapid manner in which new technologies and innovations must be applied in the workplace, as well as the attention given to quality initiatives and business needs such as ISO certification, structured OJT is become increasingly more common. This planned approach is on the cutting edge of training practice and is "moving to center stage as an effective tool to create learning organizations" (Rothwell and Kazanas, 1995, p.1).

However there are some factors to consider in the implementation of such a system. Levine lists several concepts important to remember in the implementation process. It is of importance to remember that the point of OJT is not to improve training but to improve quality and production. Also, as important as structured OJT is, it does take resources such as time, energy and personnel from other projects, including production. Sisson also lists characteristics of successful implementations, including the necessity of management support, making training accessible to the employees who need it, maintaining job documentation, keeping the system relatively uncomplicated and adding the dimension of professional trainers in at least a supportive role if not a managerial one (Sisson, 2001).

Barriers to Structured OJT

There are a number of barriers to successful implementation of structured OJT and surprisingly, one of the most common ones is that many in management and other key stakeholders in companies are not aware of alternatives to unstructured job shadowing (Rothwell and Kazanas, 1995). By not being aware of the difference between unstructured and structured OJT, new employees must learn their job functions by following other employees or just performing the work without training. Unfortunately, this not only results in employee error, slow production, but also has more disturbing long lasting effects such as increased turnover of employees, loss of customers or impaired customer relations, and lowered employee morale.

Another common obstacle to successful implementation is lack of expertise in the area of training. In organizations that lack training professionals who understand and are experienced with concepts such as task analysis and evaluation and are able to establish

training plans, training processes and schedule planned work experiences, the job of training often falls to subject matter experts. While they may be subject matter experts, they often have no interest or experience in instructional design.

Successful implementation of structured training calls for a large change in behavior, not only on the part of the employees who will be trained with new methods and materials, but every organizational level as well, from the newly selected and trained trainers to the supervisors who must support the new system, to the management who have proposed and implemented the system. This is perhaps the largest barrier to be overcome- enlist the support and buy-in of those who will be most directly impacted. Often the long-term benefits are difficult to see in the short term, particularly when such a large behavior change is requested. Supervisors are the key players in successful implementation; it is in their work areas that the training will take place. The environment they create or do not create will determine the ultimate success or failure of the structured OJT.

Summary

A thorough review of the literature and other studies reveals that OJT exists at some level in all companies, generally in an unstructured form. The benefits of structured OJT demonstrate it is a clear business advantage to implement, keeping in mind the components that reflect successful OJT systems. Significant barriers to implementation exist and means to overcome those barriers must be included in any comprehensive plan for structured OJT. Perhaps the most important barrier is the lack of supportive environment in which to perform the OJT. To overcome this barrier requires enlisting the buy-in and cooperation of the supervisory level of management.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The problem of this study is to design and implement a system of structured OJT at ALIAS. The lack of a system of operator training can impact organizational effectiveness and individual performance. Specific impacts can include such things as slow learning curves, inconsistencies between shifts and areas, higher incidences of scrap; particularly handling damage and operator error, and incomplete and ineffective training. Other organizational impacts include lowered employee morale and feelings of disenfranchisement on the part of the operators. The objectives of this study are to design a robust system of structured OJT for all manufacturing areas at ALIAS. The study will also include the objectives of designing training materials and implementing the usage of those materials. The system of operator training will include tracking of training and certification of operators to performance standards.

This chapter contains information on the research methods used to complete this study. Also included is information on the research design and rationale for the use of the design employed in the study. The various components of the operator training system will be explained and rationalized. Chapter three also addresses the population affected and the sampling method used in the study.

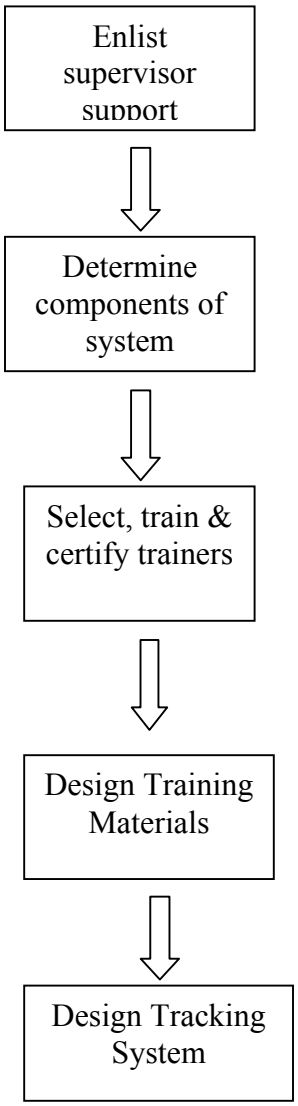
Research Methodology and Design

The research methodology used in this study was a descriptive study. The descriptive study was conducted to determine the level of support for training at the supervisory

level. The descriptive study included interviews of the supervisors and follow-up interventions to elicit opinions, ideas, feedback, and support.

There were several steps involved in the design of this study. (Refer to Figure 1) First, the support of the supervisors had to be enlisted. The second step was to determine the components of the system of training to be implemented at ALIAS. Next, the OJT trainers were selected, trained, and certified. The next step was to design the training materials. The final step was to design a system to track training records, certification status, and coursework attended on and off site.

Figure 1: Research Model



In order for training to be effective and successful, the environment of the organization must be supportive and accepting. The literature review in Chapter two clearly indicates that there must be support and buy in at all levels from the top management down to the givers and receivers of the on-the-job training. In order to ascertain organizational support and effectiveness, the research needed to include an analysis of organizational effectiveness.

One method of analyzing organizational effectiveness is using a diagnostic tool called the six box model. Weisbord's six box model, (1976) is a method of looking at an organization in terms of six different functional areas: purpose, relationships, structure, rewards, leadership and helpful mechanisms. If one considers the model as a radar screen, organizational problems can be seen as showing up on the screen in one or more of the different areas. In an analysis of ALIAS, it appears that there are some gaps or possible problems in more than one organizational area. In further analysis, the following is suggested or hypothesized:

1. Purpose: The goals of one area may not be the goals of another area. There is also some discrepancy of opinion on why there needs to be a more formal system of training. The General Manager wants it- Training wants it- but do the other areas really share these goals? Moreover, if they do support training, what are the reasons for the support?

2. Structure: Due to the structure of the company- mostly areas of specialty- but with overlapping general areas, there are existing conflicts inherent in making a major change to the system. The priority of training may not be a priority in another area. The needs and demands of one area are not the same for another area- the way training is handled or not handled varies from area to area. There is a great deal of resistance to change in

general in the existing structure. The changes necessary to establish a system of structured operator training, with all of the components of such a system, call for a large change in behavior. The behavior of supervisors, trainers, and operators will need to change, and each layer of organization will have new responsibilities. That amount of change is difficult in the best of circumstances.

3. Relationships: In order for training to be successful in a facility, there needs to be a good amount of interdependence. Trainers need to be able to work with the functional areas and need to enlist the support and cooperation of management in successfully accomplishing training goals. To be successful in creating training materials, input from operators, trainers, supervisors, and engineers is necessary. In order for the trainers to use the new training materials, there will have to be mutual trust and disclosure and relationship building between the trainers and training management. In addition, for trainers to be supported in using the new training materials, good relationships and shared goals and purposes between training management and supervisors is necessary. Upper management will need to continue to see the value of training and continue to give support.

4. Rewards: The area of rewards presents some problems, because there currently exists no reward structure, system, or recognition for completing or doing training, whether you are the trainer or the trainee. In order to effect a change to the system some sort of reward or incentive needs to be built into the system. What that may look like is unclear at this point and in fact will probably be multifaceted. At the current time, the rewards and incentives exist only outside of the realm of supervisors and trainers and operators. Management understands the benefits to be achieved from having a structured system in

place, in terms of ISO compliance and in delighting customers. Customers are impressed with certified operators, tracking of certification status, and performance and certification standards.

5. Helpful Mechanisms: There are a few helpful mechanisms in place to help drive system changes. The major helpful mechanism is the monthly Quality Systems Review, or QSR. At this review, each functional area discusses their quality issues, problems and accomplishments. There is some recognition given for achievements and there is accountability for lack of progress in areas designated as important or priority areas. There is also some healthy rivalry and competitiveness between the functional areas that can be used to one's advantage in achieving objectives. Other helpful mechanisms are not as helpful as they might be. For example, the system of email is good but insufficient in meeting the needs of training as the trainers do not have email or computer access. Out of 27 trainers, 4 of them have email. Many of them do not have computer savvy. Supervisors cannot be counted on or expected to be "message bearers"; trainers are on all shifts in all areas. Access to training materials is another lack in the "helpful mechanism" arena. A folder on a share drive exists for the placement of completed training materials and maintains the most current revisions. However, as already mentioned, only a few trainers have access to the network.

6. Leadership- The General Manager is quite good at defining purpose, keeping area supervisors accountable and heading in the same direction. There is NO failure of leadership to define purposes or how to achieve those purposes. The next level of management is equally clear in defining purpose and goals and holding responsible people accountable.

Data Collection Strategy

As a theoretical base, Weisbord's six box model, as described above, is a logical option to use for data collection and further analysis (1975). In going through the six boxes, problem areas were mentioned in a number of the boxes. In determining a focus, the most logical approach would be to look at the "Box" of Purpose. Without a common, shared clear goal and purpose, any progress in the other boxes will be constrained by this lack of direction and shared purpose. Further interventions will be planned to look at and correct the deficits or insufficiencies in the other boxes and will not be included in this study. For the exploration of unclear purpose, the six supervisors will be the subjects of the research. There will not be random sampling as there are only six supervisors and the support and input of all is necessary. The objective will be to determine their individual goals and purposes. The method used will be a formal interview process, supplying the supervisors with the questions ahead of time, and then meeting with them individually to determine their goals, priorities, attitudes, and ideas concerning training. The further objective of the research will be to obtain buy-in from the supervisors and help them achieve a clear and shared sense of purpose in supporting OJT. A multi-step process will be followed to acquire the needed information. The steps will be as follows:

Figure 2

1. Determine questions for interview of supervisors.
2. Send via email to supervisors for advanced preparation
3. Follow-up with supervisors to set time and place for interviews
4. Conduct interviews
5. Collate and summarize data and put in graphic form for feedback to supervisors.

6. Meet with supervisors to discuss data and process.

The supervisors will be introduced to the project via an initial email. A copy of the interview questions will be included for their advance perusal and preparation (See Appendix A). At the interview, the purposes of conducting this data collection will be explained, as well as emphasizing the need to uncover and respond to their goals and purposes toward training. Support from supervisors and the manufacturing floor is essential. By uncovering their goals, training goals and purposes will "speak" to the same issues and not be at cross-purposes.

After meeting with the supervisors, the next steps in the research are as follows:

Figure 3: Supervisor Intervention

1. Initially explore the first question responses.

What value or positive outcomes do you see from having structured on the job training?

2. Schedule meeting with all supervisors.
3. Meet and display responses to question number one only.
4. Brainstorm more positive outcomes and value of training.
5. At end of brainstorming, use Nominal Group Technique to select top five positive outcomes.
6. When selection is complete, use Force Field analysis to look at real and potential barriers to achieving those positive outcomes.
7. When complete, look at barriers and brainstorm ways to overcome or minimize barriers.

The rationale for the above research is to include the supervisors in every step because the supervisors are the driving force behind the positive outcomes and solutions to barriers. The steps outlined are highly collaborative and also strengthened relationships and interdependence between the supervisors as well as between the supervisors and the training function. There is also the decided advantage of bringing the training function into the picture as a fellow collaborator helping find a solution rather than trying to force ideas and structure on an unwilling group.

Components of the System of Training

The literature review and the researcher's experience, along with the feedback from the supervisors, were the influences determining the components of the training system at ALIAS. The components cited in the research included management support, formal trainer support process, checklists and training materials, train the trainer program and tracking and report generation. The system at ALIAS will include:

1. Trainers
2. Training materials
3. Tracking system.

Management support will be implicit in all of the components. Trainer support will be provided by the training department at ALIAS and will be on-going. The Training department will also provide an in-house Train the Trainer that will be detailed later.

Trainers

Trainers for each area will be identified by the supervisor of that area. This is the preferred method for a number of reasons. By choosing the trainer or trainers themselves, supervisor buy-in and support is enhanced. Further, supervisors are familiar

with the skills, personalities, and job experience of the employees in the area. To assist the supervisors in making their choices, an assessment is provided for the supervisors to help ascertain the suitability of the trainer incumbents (See Appendix B).

A fifteen-hour, three-session Train the Trainer Workshop will be used to provide training for the newly selected trainers. As suggested by the literature review, and based on the researcher's experience, the agenda for the workshop will include definitions of OJT, trainers' roles in successful training, training and learning styles, adult learning characteristics, questioning techniques, communication, creation of training materials as well as other topics (See Appendix C). To help transfer of training and provide support to the trainers, individual coaching will be planned and conducted with each trainer.

Training Materials

Research and advice from experts suggests that training checklists, certification checklists and lesson plans be used to provide structure for the OJT. Prior to design of the new system, each process or MPP at ALIAS included both a training checklist and a yes/no certification test. The new system will certify and train to "jobs" rather than "process procedures", thus simplifying, streamlining and giving logical structure to the training process. Each Training and Certification Guide will include all the tasks required to successfully perform the designated job. As part of the research design, supervisors were asked to divide their work area into logical job divisions and to list all the MPPs inherent in each designated job. The supervisor was once again the logical choice for the dual reasons of area and process knowledge and need to have ownership and buy-in at the supervisor level. The Training and Certification Guides are accompanied by Trainer's Notes, a "teacher's manual" for the trainer that includes all the

information in the Training and Certification Guide as well as information for the use of the trainer, as suggested as necessary for structure and consistency. Trainer's Notes are explained in greater depth in Chapter four.

Tracking System

For accountability purposes, as well as logistics, some mechanism for recording and tracking of training as well as report generation is necessary. The system chosen for ALIAS , based on benchmarking, research, corporate practice as well as the experience of the researcher, is an Access-based database, backed up by individual training folders. Hard copies of training records, completed Training and Certification Guides and other training documents, are stored for each individual employee.

CHAPTER 4

RESULTS

Introduction

This chapter explains the design and format of the components that will make up the operator training system at ALIAS. Chapter 4 also explains the results of the research conducted and how those results impacted the final design and implementation of the system at ALIAS. This includes an analysis of the interview results and the success of the succeeding steps. The benefits to the business as well as the employees directly impacted are explained in this chapter as well.

Results of the data collection

Collecting and summarizing the data was a productive task as well as enlightening (See Appendix D). Among the discoveries was that almost all the supervisors mentioned consistency as a positive outcome of training. That emerged as the most important outcome of structured on-the-job training. The majority of supervisors mentioned consistency among how people are trained as well as the information they are given and the manner it is presented. Lack of consistency was continually cited as the root of yield loss and operator error.

While there was some consistency among purpose and goal responses, results from the other questions varied a great deal. There was some consensus on optimal time to allow for training, plus the point that the supervisor needs to manage the training process for minimal production loss- although there must be anticipation of and plans for some production loss with new employees on the floor.

A surprising result was the diversity of opinions on the question of rewards for training- some feel training is its own reward and a paycheck is all that is required. Others felt that rewards or incentives of some sort are necessary and beneficial. The type of reward varied greatly as well: monetary, recognition, treats, and certificates were just some of the types mentioned.

Employee development was somewhat interesting as well. There is a lack of consensus concerning the definition of employee development. Most supervisors of them felt it is simply preparing the employee for the job they are doing; make them as good as they can be within the confines of the job. Some expanded that definition a bit to include cross training on other operator jobs in the facility, and one mentioned areas of personal development such as attitude and abilities to get along with others and take initiative on the job. Several mentioned the role of employee discipline in employee development.

Results of the Supervisor Intervention

The intervention outlined in Chapter 3 was conducted as planned. When the supervisors convened for the intervention facilitated by the researcher, a brainstorming session was conducted to determine positive or valuable outcomes. When the list was completed and no supervisors could add to the list, the five most valuable responses were selected using a ranking system. The counts were tallied and the outcomes narrowed to the five highest ranking. At that point, the supervisors used Force Field Analysis to look at the possible barriers to achieving those outcomes. The last step was in determining how to minimize or reduce the barriers to the desired outcomes.

Table 1:

Supervisor Intervention Results

Positive outcomes of Training (Ranked in order of importance)	**Barriers to Achieving Outcomes (Not Ranked)**	**Methods to Eliminate or Minimize Barriers (Not Ranked)**
1. Consistency of operator performance **2. Increased Production** **3. Higher yields/Lower scrap** **4. Improved Morale** **5. Increased Customer Satisfaction**	• Lack of Time • Getting proper input data • Problems in communication • Problems in Scheduling • Just "not doing" training • Lack of training materials • Outdated or non-existent job processes	• Better time and priority management • Making training a high priority • Assisting the training department in creating training materials • Updating and creating processes • Improving communication through email access for trainers • Creating approval loop for training materials to include trainers, supervisors, and engineers

By conducting this intervention, the foundation was laid for the inclusion and participation of supervisors in all levels of training.

Design of the Training Components

The training components consist of the Trainers, the Training Materials, and the Tracking System. The Training Materials were designed in a collaborative manner with the trainers, the researcher, and the engineer for the area and supervisor of the area acting as subject matter experts for reference and as part of an approval loop. This method was chosen to facilitate the most expedient method of getting the training materials to the trainers and to new trainees. In the Train-the-Trainer Workshop, the trainers were exposed to the concept of job or task analysis and given some experience with it. The

directive then was given to conduct task analyses on the jobs in their area. The researcher observed performance of area jobs and then collaborated with the trainers in creating the Training and Certification Guide. The Guide was then sent in an approval loop through other operators, the supervisor and the area engineer. The guide combines the elements of the training checklist and certification test in one document, as well as administrative information and possible future data collection points. (See Appendix E) The former system had a checklist (See Appendix F) and a certification yes/no test (See Appendix G). The former system had certification tests and checklists for each process procedure. This made for a complicated and cumbersome system with a huge paper trail to maintain. The new format eliminates the multi-document nightmare and combines all process procedures as well as all the other miscellaneous information such as production tracking into one comprehensive document. There are places on the front for administrative detail such as when training began and when the operator was certified. Also included is the current use of the Training and Certification Guide- was it a re-certification or was a new operator being certified, or did prior knowledge exist and the Training and Certification guide is just a formality ? The last instance will be the case with most of the new training materials at ALIAS, as there are experienced operators in place in most areas. The information on the front also would facilitate future research into average cycle times of training.

The format of the guide itself is three columns- the first states the task to be trained. The second column designates the criteria and standards to which the trainee must conform for certification. The third column has two checkboxes. The first is the "trained" box- has the trainee been introduced to this task and had some practice? The

second box is the "certified" box- can the trainee meet the criteria for this task? The design of the Guide makes it possible for other trainers to assist in the training, when necessary, without having to waste valuable time determining what the trainee knows and doesn't know.

The Trainer's Notes (See Appendix H) are an accompaniment to the Training and Certification Guide. They were designed based on the researcher's experience and research included in the literature in Chapter two. The Notes serve as a combination lesson plan/teacher's manual. Their function is to provide extra structure and support for the Trainers, acting as a "living document" as the Trainers add questions, hints, and ideas that have been successful as well as things that were not particularly effective. The design of the Trainer's Notes is similar to that of the Training and Certification Guides in that there are three columns, but the content is different. All the information from the Task and Criteria columns of the Training and Certification Guides is included in the first column of the Trainer's Notes. The second column lists methods, techniques and ideas to ensure the complete understanding of the task and criteria. This column also lists tips and hints to more effectively train as well as carefully planned questions. The Trainer's Notes, when completed, were sent in the same approval loop as the Training and Certification Guides. However, extra operators also reviewed the Trainer's Notes to add ideas, hints, and questions from personal experience.

Benefits

By focusing on the input of Supervisors, the benefits to the business were enhanced. The research in the literature review clearly indicated the necessity for management and supervisory support in successful implementation of structured OJT. Including the

Supervisors in all the stages of planning and implementation assured buy-in, support and enthusiastic cooperation in deployment and maintenance of the new system of training. Implementing certification by job rather than process procedure significantly reduced the paper trail and sheer volume of documentation previously necessary to certify an operator. This facilitated quicker, more expeditious certification of operators and more ease in maintaining and tracking the certification status. The materials enhanced training by providing hitherto unknown support and structure to the training process. Design and review by the subject matter experts assured that the content was accurate and included all the critical elements in each area. The custom training program designed for the trainers provided one-on-one training techniques and the type of information needed to do manufacturing training in the described setting. Providing designated and trained trainers allowed continuity in training and the establishment of a bond between trainer and trainee. By having consistent trainers for each area, all new employees will have the same training experience and learn the same information in the same order and manner.

Business benefits included more easily meeting the ISO standards for training as well as delighting customers by the thorough standardized system of training and particularly by having certified operators in all manufacturing positions.

Summary

Chapter 4 explained the design and format of the training components, specifically the Training and Certification Guides for each manufacturing area and the accompanying Trainer's Notes. The results of the research conducted confirmed that the inclusion of supervisors in the development and implementation of the training system enhanced the

chances for a successful outcome. Developing a common sense of purpose provided a good starting point not only for the completion of the training system but for future interventions as well. By including the Supervisors in every step, the resulting materials were more authentic and the trainers had established harmonious relationships with the respective supervisors.

Benefits to the organization were numerous and included both business benefits as well as personal and professional benefits to the employees impacted by the new system.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This field problem studied the advantages of implementing a system of structured on-the-job training in a manufacturing setting. In addition to studying the advantages of structured OJT, this study considered the components of structured OJT, steps in implementation, and barriers to implementation. Chapter 1 introduced the history and nature of the organization where the fieldwork was conducted, and included a problem statement, assumption and limitations of the study as well as the overall objectives of the study. Chapter 2 presented an extensive literature review describing the history of OJT as well as the differences between structured and unstructured OJT, and means of implementing such a system. The next two chapters, three and four, detailed the research and steps involved in the study as well as the results of the research. The final chapter, Chapter 5, summarizes the research, concludes the research project and suggests the next steps in the continued implementation of the system of structured on-the-job training.

Review of the Research Methods

As the process of implementing a structured system of on-the-job training was a directive mandated by the management of the company to the training organization, a descriptive study was selected as the research method of choice. The descriptive study consisted of supervisor interviews to assess the level of supervisor knowledge, understanding, and commitment to training and more specifically, to structured OJT. The interview process was followed up with an intervention to elicit and enhance supervisor buy-in, support and ownership of the training process for the operators in the

respective manufacturing areas. Supervisor, trainer, operator, and training department collaboration was employed to create the training materials for the manufacturing areas. Supervisors were also instrumental in choosing trainers for operator training.

Conclusions

This research project succeeded in the initial stages of planning, creation of the specific components for the training system as well as for the initial implementation of the system of operator training. The components were thoroughly researched and were created collaboratively to ensure both buy-in and accuracy of content. Management support, particularly at the supervisory level, was shown to be an important indicator of success of a structured system of operator OJT. By the inclusion of management throughout all the stages of planning, formatting, designing, selecting and training trainers, and implementing the system, the likelihood of sustained success of the new system was greatly enhanced.

The research project succeeded in meeting the objectives stated in Chapter 1. The first objective: "To design a robust system of structured on-the-job operator training for all manufacturing areas at ALIAS" was met successfully and completely. The following components were part of the system: Trainers, training materials and a system for tracking training records and certification status. The second objective was, "To design training materials for operator training." By drawing on company resources, researcher experience, and the research uncovered in Chapter 2, new formats were created to improve and streamline the previous system of certification. The new format also provided more content, structure and support than before and was created not only by

training and engineering professionals but the operators and floor personnel themselves, through the use of collaborative methods as well as the approval loop utilized.

The third objective was, "To set up and implement a system of recording and tracking employee certification and training records." This objective was only partially met due to the limitations of the study. While some of the training materials were created, there was not sufficient time to train and certify all existing employees within the confines of the time to conduct the study. The preliminary results indicate that with time, the tracking system will be successful in recording and maintaining employee certification records.

The final objective was " To complete preparations for implementation of the system of training and the accompanying training materials." This objective was only partially met due to the time limitations of the research project. Collaborative creation of training materials is a time consuming, thorough, exhaustive process when conducted correctly, and the limits placed on the study prohibited the completion of training materials for all areas. Creation of the training materials is ongoing and will be completed within the next several months. The last piece of the training materials is the Trainer's Notes, which can only be created when the Training and Certification Guide is complete, as all the content of the Training and Certification Guide is included in The Trainer's Notes.

Recommendations

Recommendations include continuation of the process of design and creation of Training and Certification Guides as well as the accompanying Trainer's Notes. As the literature review found, the training materials are the foundation of a comprehensive

system of OJT. Progress is good and the objective will be met if progress continues as planned. The original plan of collaborative creation with an approval loop should be continued as well for the creation of the remaining training materials. In addition to the training materials planned for the manufacturing areas, the researcher recommends that support areas such as laboratory, micro-section, warehouse, shipping, and maintenance also be included in the structured system of operator training. A further recommendation includes continuing to use the system of tracking set up for the project. Reports should be generated on an at least monthly basis and sent to the supervisors for updates on the certification status of all the employees in the manufacturing areas.

Further interventions could be planned with the supervisors based on the results of the interviews and the follow-up intervention. Possible interventions might include making available educational materials concerning employee development and rewards and incentives. A supervisory development plan might be a future consideration at ALIAS as well.

Further research might be suggested in the future to determine the benefits of using the new system. Benefits to the company as well as to the trainers and trainees might be explored in a future study. Some possible topics for future research might be:

1. Researching training cycle time.
2. Effect of structured training and designated trainers on employee retention rates.
3. Decreased scrap rate and operator error for employees trained with the new system.
4. Productivity and yield rates of the trainees while using the new materials.
5. Trainer satisfaction with the materials and support system .

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Appendix A: Supervisor Interview Questions

In order to gain a better understanding of the goals and purposes of on-the-job training, please take a few minutes to think about the following questions. If you want to jot something down, that will be fine, but not necessary- I would like to spend a few minutes discussing each of the statements on an individual basis. As always, thanks for your support and cooperation.

1. What value or positive outcomes do you see from having structured on-the-job training?

2. How much time do you think is optimal to allow for employee training? How would you accommodate that time?

3. Should there be rewards or incentives for training? If yes, what should they be?

4. How would you define employee development? How do you see your role in employee development?

I understand that by returning this questionnaire, I am giving my informed consent as a participating volunteer in this study. I understand the basic nature of the study and agree that any potential risks are exceedingly small. I also understand the potential benefits that might be realized from the successful completion of this study. I am aware that the information is being sought in a specific manner so that no identifiers are needed and so that confidentiality is guaranteed. I realize that I have the right to refuse to participate and that my right to withdraw form participation at any time during the study will be respected with no coercion or prejudice.

Note: Questions or concerns about participation in the research or subsequent complaints should be addressed first to the researcher or research advisor and second to Sue Foxwell, Research Administrator and Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects In Research, 11 HH, UW-Stout, Menomonie, WI, 54751, phone (715) 232-1126

Appendix B: Supervisor Assessment

Supervisor Trainer Assessment

_____ has expressed interest in becoming a Trainer. The following traits have been identified as attributes of a trainer. Please rate the trainer candidate in each of the following areas as a tool to use in selection of a trainer for your area.

1= weak 2= needs improvement 3= average 4= strong 5= outstanding

1.	Patience with repetition.	1 2 3 4 5
2.	Patience with slow learners.	1 2 3 4 5
3.	Willingness to help others.	1 2 3 4 5
4.	Understanding of area work processes.	1 2 3 4 5
5.	Up-to-date knowledge of job processes.	1 2 3 4 5
6.	Ability to operate area equipment to established processes.	1 2 3 4 5
7.	Precision and quality of work.	1 2 3 4 5
8.	Knowledge of and adherence to company policies.	1 2 3 4 5
9.	Familiarity with area training materials.	1 2 3 4 5
10.	Tact.	1 2 3 4 5
11.	Ability to demonstrate and explain tasks.	1 2 3 4 5
12.	Ability to explain articulately and concisely.	1 2 3 4 5
13.	Ability to rephrase and paraphrase.	1 2 3 4 5
14.	Willingness to repeat demonstrations and explanations.	1 2 3 4 5
15.	Ability to vary speed and level of explanations.	1 2 3 4 5
16.	Ability to evaluate trainee's skills.	1 2 3 4 5
17.	Attitude toward job.	1 2 3 4 5
18.	Attitude toward company.	1 2 3 4 5
19.	Friendliness.	1 2 3 4 5
20.	Courtesy.	1 2 3 4 5
21.	Respect.	1 2 3 4 5
22.	Enthusiasm.	1 2 3 4 5
23.	Listening skills.	1 2 3 4 5
24.	Organization.	1 2 3 4 5
25.	Flexibility of schedule.	1 2 3 4 5

Appendix C: Train the Trainer Workshop Agenda

Agenda for Train the Trainer:

Day I

- Learning
  - Learning Process
  - Learning Domains
  - Adult Leaner Characteristics
  - Principles of Learning
  - Setting Expectations
  - Chunking
- Learning Styles
  - Different learning Styles
  - Dealing with frustrated Learners
  - Recall and Retention

Day II

- Communication
  - Definition
  - Communication Cycle
  - Verbal and Nonverbal Communication
  - Communication and Culture
  - Barriers to communication
  - Feedback
  - Questioning techniques
- From the Trainer's Perspective
  - Qualities of Effective Trainers
  - Trainer Styles Inventory
  - Providing One-on-One Training
    - What is OJT?
    - Advantages and Disadvantages

Day III

- Training System
- Creating Training Materials

Appendix D: Supervisor Responses to Interview Questions:

Values and Positive Outcomes of Training	1. Consistency 2. Practice for employees 3. Ability to assess performance immediately 4. Real time training 5. Satisfy ISO requirements 6. Satisfy business and customer satisfaction issues 7. Key to achieving manufacturing consistency 8. Reduce variation 9. Defect reduction 10. Level playing field shift to shift, etc. 11. Everyone has the same training 12. Trainers don't have to wonder if things were covered or not 13. Gives Trainees a clearer picture of expectations 14. Improves employee morale 15. Increases employee retention 16. Helps supervisor with performance reviews 17. Aids in communication of same information to all employees
Optimal Time and Accommodation	1. Give time as long as there is improvement in performance, encouraging early hands-on and building confidence 2. Bi-monthly training sessions; rotate operators for training 3. Allow as much time as necessary; expect production slowdowns. Long term Benefit will be worth the short term loss 4. Difficult to answer due to so many variables; key is to be as flexible as possible because of difficulty in prediction of time needed 5. Make cross training a high priority- well worth the time investment 6. Time isn't the issue as much as the level of priority of training- training should be a very high priority; long term investment 7. Training should always be a visible priority in the area 8. Allow plenty of time- 6 months for thorough training. Start with the minor tasks, so there s always something for the trainee to do when the work area is really busy and production needs outweigh training

Rewards and Incentives	**1. Difficult to answer- rewards are most effective when they are internal, but how do you make that happen?** **2. Post charts with all employees' certification status- that should boost motivation** **3. Other rewards- no- training is part of the job. It's not something extra** **4. Absolutely should be monetary rewards tied to training. Effort above and beyond the basic job responsibilities should be rewarded.** **5. Should be a monetary reward for each certification** **6. Trainer's reward for training should be that they are paid extra and have extra responsibilities** **7. Trainee's reword is they become certified.** **8. No extra rewards- part of job. Should recognize exceptional effort though- pat on the back, treats, etc.** **9. Make it clear that the more training they receive, the more value they have to the company and that will be reflected in performance reviews** **10. Don't reward trainer- it's their job.** **11. Prefer to give group rather than individual rewards- for example bringing in treats for the whole group when they have performed well or accomplished an objective**
Employee Development and Supervisor Role	**1. It's the ability to perform task they are responsible for without help or much direction- try to create self-directed and self-motivated individuals. Supervisor's role is more of a coach and guide- let them push themselves. Just show them the way.** **2. Train an employee on as much as they can handle to develop well-rounded experience and increase their value to the area. Don't allow them to be button pushers; help them grow with on the job training** **3. E.D. is part of their progression. OJT is part of the stepping stones in getting where they want to be. Supervisors should be facilitators and mentors in that progression.** **4. Learning is employee development. It's an ongoing process; we should be developing every day. Supervisor's role is to keep people informed- they need to have the same information that I have. Takes a lot of time and energy to make that happen** **5. Help people get past the 8-5 daily grind and find the excitement in the work- look for opportunities to do that- once people find the excitement , it's the supervisor's obligation to develop the potential of every employee and facilitate their work toward development.** **6. Employee development goes beyond the scope of the job and encompasses other aspects of the person like personality and attitudes. Many won't step up to the plate when needed. Discipline ties into employee development too. The supervisor's role included encouragement and recognition.**

ALIAS

Training & Certification Guide

Pre-Clean/ Coat

Process Procedures Include:

MP05019 Resist Coat, Mach- 7201
MP05022 Surface Cleaning for Innerlayer Preclean

- ❑ Re-certification
- ❑ Used for certification purposes only; Prior knowledge and experience existed
- ❑ Used for Training & Certification

Training Record

Trainee Name: _____ **Employee #** _____

Training Start Date: _____/_____/_____

Trainer Name: _____ **Employee #** _____

Certification Record

To be completed when operator has been certified.

Certifier Signature: _____ **Employee #** _____

Certification Date: _____/_____/_____

Operator Training and Certification Procedure

Trainer

- Explain and demonstrate each of the steps in the process. Use the applicable Work Instructions as references.

- When the trainee demonstrates proficiency in each task, check the trainer box. When each section is complete, you and the trainee will sign at the end of that section.

- When all steps of the Training & Certification Guide have been completed, notify your supervisor.

Trainee

- Take note of what the Trainer explains and observe the demonstration of each of the steps in the process.

- Spend time practicing the steps and procedures as you learn them.

- Demonstrate the operation process of each task to show that you can meet the performance standard and your trainer will check after each task.

- When you have completed all of the sections in this Training & Certification Guide, the Certifier will check to make sure you are performing each section well enough to meet the performance standard.

Certifier

- Verify the trainee can meet the performance standard for each task and check the Certifier box.

- If further training is necessary in any task, notify the supervisor and the trainer.

- NOTE: The Certifier may be the same person as the trainer. Other trainers, supervisors, or engineers may also certify trainee.

PreClean

Section 1: Introduction			
Task	**Criteria**	**Trained**	**Certified**
The trainee will:	*Accurately explain:*		
1. Accurately explain the function of and purpose of the Pre-clean operation.	1. Pre-clean is a procedure to clean copper layers chemically to prepare the surface for resist coating. Small amounts of surface copper are stripped to remove any stains and debris.	❑	❑
2. Know area product flow	2. Identify customer and vendor relationships	❑	❑

Section 2: Safety			
Task	**Criteria**	**Trained**	**Certified**
The trainee will:	*Identify, define, and demonstrate with 100% accuracy:*		
1. Identify moving parts & pinch points. Demonstrate safe operating techniques.	1. Identify pinch points & explain potential dangers. • Keep body parts away from rollers.	❑	❑
2. Demonstrate/explain proper chemical handling. Explain potential hazards in area.	2. Identify and demonstrate proper use of: • Chemicals: alcohol, sulfuric acid, 120R, 121M, copper sulfate. • Demonstrate safe handling; read MSDS, read warnings and labels. • Explain locations of MSDS	❑	❑
3. Wear proper PPE(Personal Protection Equipment)	3. Safety glasses, rubber gloves, rubber chemical gloves, and safety glasses. Safety glasses are always worn. • Rubber chemical gloves and safety glasses with side shields must be worn when handling chemicals.	❑	❑
4. Safely handle layers	4. Uses care when handling sharp edges of layers.	❑	❑

Section 3: Handling

Task	Criteria	Trained	Certified
Without references, the trainee will: 1. Demonstrate proper handling techniques.	1. All of the following: • Successfully complete Training & Certification of Handling Checklist. • Layers should be set in the loader with material stamp on the trailing edge • For flimsy material or material that curls, a backer board should be used on the feeder before setting up layers for auto-feed. • Always have the heavier copper side facing up.	❑	❑

Section 4: Production Tracking

Task	Criteria	Trained	Certified
The trainee will: 1. Reconcile product 2. Read and complete job traveler. 3. Successfully scrap product in ProCim. 4. Complete a job on the Traveler and in ProCim.	*Demonstrate and explain with 100% accuracy:* 1. Demonstrate and explain counting product, comparing to ProCim, Traveler and Physical count and how to correct any errors. 2. Accurately complete 5 consecutive travelers without assistance, including correctly completing Discrepancy Tracking Sheet. 3. Enter scrap 5 times correctly without questions, including multiple entries. Ensure correct process is charged. Demonstrate changing charged process as well as changing defect codes. 4. Correctly complete 3 consecutive jobs in ProCim & on the traveler.	❑ ❑ ❑ ❑	❑ ❑ ❑ ❑

Section 5: I Introduction to Machine

Task	Criteria	Trained	Certified
The trainee will:	*Demonstrate per section 9 of work instruction:*		

1. Properly use Preclean Control Panel.	1. Identify and explain all the following: • Alarm Acknowledge • Conveyor runout • Interlock Reset • Emergency Stop • Emergency Only • Keyboard	❑	❑
2. Identify and use application buttons.	2. All the following: • Shift • Numeric buttons • Arrow buttons • ENT(Enter) • Manual/Auto • Message Display • Next message • Previous Message • Display Data or message	❑	❑
3. Identify and explain all process buttons	3. All the following chambers of modules of the machine: • System • Alkaline Clean • Rinses 1-6 • Acid treatment • Panel Dry • Start • Stop	❑	❑
Section 6: Start Up /Shut Down			
Task	**Criteria**	**Trained**	**Certified**
The trainee will: *1.* Start up Pre-clean line.	*Demonstrate and explain with 100% accuracy:* 1. Explain and demonstrate start up procedure of the Pre-clean line without assistance. • Turn main power handle to the ON position. • Complete start up using Form- I/L Pre-Clean Start -up	❑	❑
2. Shut down Pre-clean line.	2. Explain and demonstrate shut down procedure of the Pre-clean line without assistance. • Press red “STOP” button on Control	❑	❑

	Panel • Turn main power handle to off position • Turn off pumps and conveyor when equipment is not in use, but leave main power and heaters on.	

Section 7: Set- up

Task	Criteria	Trained	Certified
The trainee will:	*Demonstrate and explain with 100% accuracy:*		
1. Check water and solution levels.	1. Demonstrate machine set up using process procedure as a guide.	❑	❑
2. Organize lots to run.	2. Uses resources to follow priority. (Due dates or Hot Sheet)	❑	❑
3. Set up lot to run.	3. All of the following: • Check traveler for special instructions of additional processing requirements	❑	❑

Section 8: Operation

Task	Criteria	Trained	Certified
The trainee will:	*Demonstrate and explain per work instruction with 100% accuracy:*		
1. Operate machine with correct settings.	1. Demonstrate and explain: • Verify speed and spacing settings on AMTech Feeder • Lower Feed tray and stack with layers. • Support base for them to sit on. • Adjust layer guides • Adjust suction cups • Press FEED button to start the feeder and CALIBRATION to set the double panel feed sensor. • (Feeder can also be started and stopped form inside the print room) • Verify conveyor speed • Inspect layers on exit from pre-clean line. Layers must be clean with no streaks or stains	❑	❑
2. Recognize good vs. bad product.	2. Demonstrate and point out non-conformities : • Clean • Dry	❑	❑

	• No streaks • No stains		
3. Put bad product on MRDT system.	3. All of the following: • Correctly completes MRDT process, using correct holding location. • Complete required paperwork, and notify engineer or supervisor or lead when necessary. • Scrap product on system and on traveler when necessary	❑	❑
4. Troubleshoot.	4. Explains correct procedure in the instance of malfunctions or machine jam	❑	❑
5. Rework.	5. Demonstrates proper use and completion or rework sheet.	❑	❑
6. Verify material core and copper weight.	6. All the following: • Verify material type and lot quantity with traveler • Verify stamped layer dimensions such as core thickness, panel size and copper weight.	❑	❑

Section 9: Operator Shift Maintenance

Task	Criteria	Trained	Certified
Using the process procedure and maintenance checklist, the trainee will:	*Demonstrate and explain per control plan with 100% accuracy:*		
1. Demonstrate daily cleaning of machine.	1. Explain and demonstrate per process procedure and the following forms: • I/L PreClean Start-up.XLS • I/L PreClean PM.XLS	❑	❑
2. Properly maintain equipment	2. Notify maintenance when equipment is not functioning and record all downtime in the Coating Production Lot (Form # Coatlog.doc)	❑	❑

Section 10: AMTech Feeder

Task	Criteria	Trained	Certified
The trainee will:	*Demonstrate and explain per process procedure with 100% accuracy:*		
1. Operate the AMTech Feeder	1. Demonstrate and explain cleaning and operation of the AMTech Feeder	❑	❑

Section 11: Quality Requirements		
Task	**Criteria**	**Trained Certified**
The trainee will: 1. Follow area and process quality requirements	*Demonstrate and explain per process procedure with 100% accuracy:* 1. All of the following: • Follow area 5S Guidelines • Notify supervisor if inspected layers are discrepant • Rework or scrap any stained or streaked layers • Use comment sections on system and traveler for comments appropriate to quality issues	❑ ❑

Trainee: _____ Date: _____/_____/_____

Trainer: _____ Date: _____/_____/_____

Certifier: _____ Date: _____/_____/_____

Coat for Layers

Section 1: Introduction		
Task	**Criteria**	**Trained Certified**
The trainee will: 1. Understand the process and function of coating. 2. Identify and explain the main sections of the machine. 3. Identify customer and vendors.	*Demonstrate with 100% accuracy:* 1. Application of photoresist to a copper surface to print/expose the image. 2. After pre-clean: a. Tacky rollers b. Pre-heaters c. Laminator d. Accumulator 3. customer: printing vendor: pre-clean	❑ ❑ ❑ ❑

Section 2: Handling & Cleanroom			
Task	**Criteria**	**Trained**	**Certified**
The trainee will:	*Explain and locate using key words and with 100% accuracy:*		
1. Properly gown for a Cleanroom.	1. Demonstrate to trainer: top to bottom gowning up; bottom to top when degowning	❑	❑
2. Understand Cleanroom Classifications	2. Explain cleanroom classifications	❑	❑
3. Demonstrate proper handling techniques.	3. Successfully complete training and certification of Handling Checklist.	❑	❑

Section 3: Safety			
Task	**Criteria**	**Trained**	**Certified**
The trainee will:	*Identify, define, and demonstrate with 100% accuracy:*		
1. Demonstrate proper safety behaviors.	1. All of the following: • Use proper lifting techniques. • Avoidance of moving parts • Avoidance of hot rollers • Avoidance of breathing resist fumes • Washing hands after handling resist • Do not remove resist trimmings while knives are rotating • Discard cover sheets when removed from resist (Done at DES)	❑	❑
2. Wear proper PPE.	2. All of the following: • Wear rubber gloves when cleaning with a solvent based cleaner • Always wear Safety Glasses	❑	❑
3. Locate & explain MSDS	3. Locate MSDS and explain content.	❑	❑
4. Identify main chemicals, warning and labels.	4. Explain purpose, use, and potential hazard.	❑	❑

5. Perform Emergency Shutdown.	5. Identify Emergency Stop Button	❑ ❑

Section 4: Production Tracking

Task	Criteria	Trained	Certified
The trainee will:	*Demonstrate and explain with 100% accuracy:*		
1. Reconcile product	1. Demonstrate and explain counting product, comparing to ProCim, Traveler and Physical count and how to correct any errors.	❑	❑
2. Read and complete job traveler.	2. Accurately complete 5 consecutive travelers without assistance, including correctly completing Discrepancy Tracking Sheet.	❑	❑
3. Successfully scrap product in ProCim.	3. Enter scrap 5 times correctly without questions, including multiple entries. Ensure correct process is charged. Demonstrate changing charged process as well as changing defect codes.	❑	❑
4. Complete a job on the Traveler and in ProCim.	4. Correctly complete 3 consecutive jobs in ProCim & on the traveler.	❑	❑

Section 5: Terms and Definitions

Task	Criteria	Trained	Certified
The trainee will:	*Demonstrate and explain with 100% accuracy:*		
1. Define relevant terms.	1. All of the following: • Mandrel • Photoresist • Polyolefin (poly) • Tack Roller	❑	❑

Section 6: Equipment and tooling

Task	Criteria	Trained	Certified
The trainee will: 1. Use applicable equipment and tooling correctly.	*Demonstrate and explain with 100% accuracy:* 1. All of the following: • Hakuto CSL • Preheater • Tack Roller • Photo resist sized to panel • Razor blades • Lint free cloth	❑	❑

Section 7: Set -up

Task	Criteria	Trained	Certified
The trainee will: *1.* Match and verify settings per control plan/ layer type profile.	*Demonstrate and explain per control plan with 100% accuracy:* 1. All of the following: • Temperatures-Lamination roll and tacking block • Speeds-Front conveyor, Lamination roll, and rear conveyor. • Film spacing, front and rear	❑	❑
2. Complete set-up preparations.	2. All of the following: • Turn on the “Thick Panel” Switch for panels thicker than .030 • Turn on the “VACUUM” option for panels wider than 24” (Vacuum optional on other products) • Adjust panel alignment with a dummy panel at start up and when resist is changed. • Verify exit temperature within specifications on the first panel coated.	❑	❑

Section 8: Start up and Operation

Task	Criteria	Trained	Certified
The trainee will: 1. Start up laminator.	*Demonstrate and explain with 100% accuracy:* 1. All of the following: • Turn on primary power switch • Turn Power Supply switch to manual. • Turn the MODE switch to manual • Set temperatures for upper/lower tacking (per control plan)	❑	❑

	control plan) • Adjust the conveyor width • Open the lower cabinet door and turn on switches “B centering F” and “B centering R”. • Adjust the conveyor width to the board width by rotating the front handle • Turn off “centering” switches after adjustment is complete • Hold laminating block pull out handle, and pull the unit out toward you. • Clean rollers • Thread up resist; center upper and lower resist rolls • Use Process Procedure to determine correct film width • Turn Vacuum switch “On” • Dress and trim resist • Close laminating block unit • Under MODE SWITCH press on the “AUTO” switch. • Under AUTO OPERATION press on the “On” switch.	
2. Start up Preheater	2. All of the following: • Depress green POWER, CONVEYOR, and HEATER switches • Adjust conveyor speed to match the Microklean conveyor speed • Adjust roll temperature on the preheater control panel	❑ ❑
3. Start up MicroKlean Tacky rollers.	3. All of the following: • Turn on using Power On/Off button. • Adjust the Speed Control Dial, adjust conveyor speed to match the pre-heater conveyor speed. • Verify the Function selector is in the forward feed direction • Inspect paper rollers for contamination • Change paper following instructions in process procedure if contamination is present.	❑ ❑

Section 9:	Shutdown		
Task	**Criteria**	**Trained**	**Certified**
The trainee will…. 1. Shutdown Laminator 2. Shutdown Pre-heater. 3. Shut down MicroKlean tacky rollers	*Demonstrate and explain with 100% accuracy:* 1. Under POWER SUPPLY, press the power off button 2. All the following: • Press red HEATER push button switch. • Conveyor must remain on for 20 minute cool down period to avoid roll damage. • After cool down, turn off CONVEYOR and POWER switches 3. Push “power Off” button on upper control panel	❑ ❑ ❑	❑ ❑ ❑

Section 10:	Cleaning and Maintenance		
Task	**Criteria**	**Trained**	**Certified**
The trainee will: 1. Complete PM Schedule. 2. Clean MikroClean tacky roller.	*Demonstrate and explain :* 1. Using from #720 iPM.Doc, complete Preventive maintenance schedule. 2. Clean the four polymer cleaning rollers: • Push “Power Off” button on upper control panel • Open access door • Depress latch on slide assembly and pull on the handle • Turn two outboard mounted quarter turn fasteners in a counter clockwise direction until they release. • Lift module containing the four rollers from slide assembly. • Remove the upper two polymer rolls by removing the four “E” clips. • Then lift out lower two polymer rolls • Clean rollers using only isopropyl alcohol. • After cleaning ,reinstall rollers and put module back into Microklean.	❑ ❑	❑ ❑

Section 11: Quality Requirements			
Task	**Criteria**	**Trained**	**Certified**
The trainee will: 1. Follow all Quality Requirements	*Demonstrate and explain with 100% accuracy:* 1. All of the following: • Follow area 5S guidelines • Follow daily and PM schedules • Re-work layers with wrinkled resist • Audit heat distribution across lamination rollers and record data on Form # Roll temp audit.xls. Do once per shift. • Clean tacky rollers when contaminated. • Follow MRDT guidelines	❑	❑

Trainee: _____ Date: _____/_____/_____

Trainer: _____ Date: _____/_____/_____

Certifier: _____ Date: _____/_____/_____

Appendix F: Old Training Checklist

CERTIFICATION CHECKLIST

The Innerlayer preclean procedure defines the method of operation for the cleaning of layers through this equipment. The procedure is to include the preventive maintenance checklists to identify the necessary process checks.

Employee is to be orientated, trained, and certified based on the guidelines below. Utilizing the trainer's knowledge, procedures, and a hands-on approach; the operator is asked to perform and explain the task. Certification is to take place upon trainee's ability to complete their task, and in some tasks to complete a written test.

Name_____ Emp #_____ Date_____
Shift_____

Trainer_____ Emp # _____

Trainee / Trainer:
Initial and date column **A**
Initial and date column **B**
Initial and date column **C**

OBJECT	C. A ORIENTATION (Date / Initial)	**B** Hands-On Date/Initial	**C** CERTIFIED (Date / Initial)
Read and sign MPP			
Review Control Plan			
Equipment start up			
Operate & understand Control Panel			
Load and operate Amtech feeder			
Visual inspection			
Make adds			
Equipment shutdown			
PM Schedule			
Nozzles check			
Change filters			
Bath make-up			

❒ Certification Date _____ ❒ Re-Certification Date _____

Appendix G: Old Certification Test

Name _____ Date _____

INNERLAYER PRECLEAN OPERATOR CERTIFICATION TEST

1) The surface of layers cleaned through the Innerlayer Preclean should look
   A. streaky B. stained C. clean with no evidence of discoloration

2) The first sump is made up with …

   A. a mild alkaline B. DI Water C. a mild acid

3) The temperature of the bath in the first sump should be …

   A. 90°F B. 100°F C. 110°F D. 125°F

4) The Acid Cleaner concentration should be …

   A. 5% B. 8% C. 10% D. 15%

5) The temperature of the Acid Cleaner should be …

   A. 90°F B. 100°F C. 110°F D. 125°F

6) All filters on the line must be changed …

   A. weekly B. monthly C. with every new Acid Clean bath build

7) Safety glasses with side shields are required …

   A. only when handling chemicals
   B. whenever you are in a manufacturing area
   C. safety glasses are not required at any time

Appendix H: Trainer's Notes- New System

ALIAS
Trainer's Notes
Pre-Clean/ Coat

Process Procedures Include:

MP05019 Resist Coat, Mach- 7201
MP05022 Surface Cleaning for Innerlayer Preclean

Section 1: Introduction		
Task/Performance Criteria	Training Method(s)	Materials
1. Understand the function of and purpose of the Pre-clean operation. *1. Pre-clean is a procedure to clean copper layers chemically to prepare the surface for resist coating. Small amounts of surface copper are stripped to remove any stains and debris.* 2. **Know area product flow** *2. Identify customer and vendor relationships*	✓ Explain to Trainee ✓ Have trainee explain ✓ Take trainee on tour of before and after processes. ✓ Make diagram of process flow through Inner Layer area Questions: Why is it necessary to prepare the surfaces? Answer: for better adhesion of resist coating	✓ Process Procedures ✓ Training and Certification guide ✓ Process Flow diagram
Section 2: Safety		
Task/Performance Criteria	Training Method(s)	Materials
1. Identify moving parts & pinch points. Demonstrate safe operating techniques. *1. Identify pinch points & explain potential dangers.* • *Keep body parts away from rollers.* **2. Demonstrate/explain proper chemical handling. Explain potential hazards in area**. *2. Identify and demonstrate proper use of:* • *Chemicals: alcohol, sulfuric acid, 120R, and 121M, copper sulfate.* • *Demonstrate safe handling; read MSDS, read warnings and labels.*	*Train at beginning of training period. Do not certify until completion of training, after observing safe operating procedures.* ✓ Identify moving parts & pinch points, and explain potential hazards. ✓ Trainee identifies. ✓ Show warnings and labels. ✓ Introduce trainee to chemicals; explain hazards, use, and handling. ✓ Locate MSDS, and explain how to	Warnings & labels Chemical Safety Class (if available) Materials MSDS

• *Explain locations of MSDS* **3. Wear proper PPE(Personal Protection Equipment)** *3. Safety glasses, rubber gloves, rubber chemical gloves, and safety glasses. Safety glasses are always worn.* • *Rubber chemical gloves and safety glasses with side shields must be worn when handling chemicals.* **4. Safely handle layers** ***4**. Uses care when handling sharp edges of layers**.***	explain how to read. ✓ Explain purpose, regulations, and use. ✓ Trainee attends Chemical Safety Class. ✓ Review class materials with trainee.	
Section 3: Handling		
Task/Performance Criteria	Training Method(s)	Materials
1. Demonstrate proper handling techniques. *1. All of the following:* • *Successfully complete Training & Certification of Handling Checklist.* • *Layers should be set in the loader with material stamp on the trailing edge* • *For flimsy material or material that curls, a backer board should be used on the feeder before setting up layers for auto-feed.* • *Always have the heavier copper side facing up.*	✓ Demonstrate & explain per handling checklist. ✓ Observe trainee demonstrate to you. ✓ Show IPC Handling video ✓ Walk around plant and observe handling practices- have trainee look for examples of good and bad handling **Questions**: Why so much emphasis on proper handling practices? **Answer:** Because handling damage is a major cause of defects	✓ Area Handling skills checklist ✓ Examples of scrap caused by poor handling ✓ Defect Code ✓ IPC Handling Video ✓

	and is totally within operator's ability to control (unlike some other defects) **Question:** Why should the heavier copper side be up? **Answer:** It will help keep the layer from rolling	
Section 4: Production Tracking-Knowledge		
Task/Performance Criteria	Training Method(s)	Materials
1. Reconcile product *1. Demonstrate and explain counting product, comparing to ProCim, Traveler and Physical count and how to correct any errors.* **2. Read and complete job traveler.** *2. Accurately complete 5 consecutive travelers without assistance, including correctly completing Discrepancy Tracking Sheet* **3. Successfully scrap product in ProCim.** *3. Enter scrap 5 times correctly without questions, including multiple entries. Ensure correct process is charged. Demonstrate changing charged process as well as changing defect codes.* **4. Complete a job on the Traveler and in ProCim.** *4.Correctly complete 3 consecutive jobs in ProCim & on the traveler.*	✓ Explain elements of Production Traveler ✓ Have trainee: • Locate tool number • Identify copper & core thickness • Locate part # • Locate material # • Identify tool # ✓ Attend ProCim Class or use PowerPoint presentation and class materials with trainee. ✓ Ensure trainee can enter multiple entries and view entries.	✓ Correctly completed samples of TIS (Traveler Information Sheet), Production traveler, MRDT forms ✓ ProCim class Materials-PowerPoint presentation, class handouts and scrapping training materials

Section 5: Introduction to Machine		
Task/Performance Criteria	Training Method(s)	Materials
The trainee will: **1. Properly use Preclean Control Panel.** *1. Identify and explain all the following:* • *Alarm Acknowledge* • *Conveyor runout* • *Interlock Reset* • *Emergency Stop* • *Emergency Only* • *Keyboard* 3. **Identify and use application buttons.** *4. All the following:* • *Shift* • *Numeric buttons* • *Arrow buttons* • *ENT(Enter)* • *Manual/Auto* • *Message Display* • *Next message* • *Previous Message* • *Display Data or message* **3. Identify and explain all process buttons** *5. All the following chambers of modules of the machine:* • *System* • *Alkaline Clean* • *Rinses 1-6* • *Acid treatment* • *Panel Dry* • *Start* • *Stop*	✓ Explain and demonstrate all functions per the process procedure ✓ Have Trainee read Process Procedure ✓ Give trainee practice time ✓ Have trainee demonstrate to you	✓ Control Plan ✓ Process Procedure ✓ Diagram of machine for Trainee to label

Section 6: Start up Shut Down		
Task/Performance Criteria	Training Method(s)	Materials
1. **Start up Pre-clean line.** *1. Explain and demonstrate start up procedure of the Pre-clean line without assistance.* • *Turn main power handle to the ON position.* • *Complete start up using Form-I/L Pre-Clean Start -up* 2. **Shut down Pre-clean line**. *2. Explain and demonstrate shut down procedure of the Pre-clean line without assistance.* • *Press red "STOP" button on Control Panel* • *Turn main power handle to off position* • *Turn off pumps and conveyor when equipment is not in use, but leave main power and heaters on.*	✓ Explain and demonstrate all functions per the process procedure ✓ Have Trainee read Process Procedure ✓ Give trainee practice time ✓ Have trainee demonstrate to you Questions: ✓ When might the line be shut down? ✓ What would you have to do if it had been down for a long time? ✓ Why do you leave main power and heaters on?	Process Procedure Applicable forms

Section 7: Set up		
Task/Performance Criteria	Training Method(s)	Materials
1. Check water and solution levels. *1. Demonstrate machine set up using process procedure as a guide.* **2. Organize lots to run.** *3. Use resources to follow priority. (Due dates or Hot Sheet)* 4. **Set up lot to run**. *3. All of the following:*	✓ Show where foil type is on traveler. ✓ Show material ✓ Ask them to explain difference ✓ Show where indicators are on back of machine ✓ Explain proper level ✓ Take sample to lab ✓ Weigh coupon(from lab)	✓ Production Traveler ✓ Copies of travelers with special instructions ✓ Process procedure

Check traveler for special instructions of additional processing requirements	✓ Run coupon Question: ✓ What sorts of special instructions might be on a traveler? ✓ Why is the copper weight important?	

Section 8: Operation		
Task/Performance Criteria	Training Method(s)	Materials
1. Operate machine with correct settings. *1. Demonstrate and explain:* • *Verify speed and spacing settings on AMTech Feeder* • *Lower Feed tray and stack with layers.* • *Support base for them to sit on.* • *Adjust layer guides* • *Adjust suction cups* • *Press FEED button to start the feeder and CALIBRATION to set the double panel feed sensor***.** • *(Feeder can also be started and stopped form inside the print room)* • *Verify conveyor speed* • *Inspect layers on exit from pre-clean line. Layers must be clean with no streaks or stains* 2. **Recognize good vs. bad product**. *2. Demonstrate and point out non-conformities :* • *Clean* • *Dry* • *No streaks* • *No stains* 3. **Put bad product on MRDT system**. *3. All of the following:* • *Correctly completes MRDT process, using correct holding*	✓ Explain & demonstrate. ✓ Trainee reads process procedure. ✓ Trainee explains & demonstrates. ✓ Explain and point out imperfections and defects: dents, stains. ✓ Explain MRDT process and form ✓ Show MRDT Hold station, location of forms ✓ Explain malfunctions. ✓ Demonstrate troubleshooting as it occurs. ✓ Explain why and where it comes from ✓ Show how to complete rework traveler ✓ Have trainee demonstrate filling out rework traveler	Process Procedure Control Plan MRDT Form and Process Procedure Rework Traveler

location. • *Complete required paperwork, and notify engineer or supervisor or lead when necessary.* • *Scrap product on system and on traveler when necessary* **4. Troubleshoot.** *4. Explains correct procedure in the instance of malfunctions or machine jam* **5. Rework.** *5. Demonstrates proper use and completion or rework sheet.* **6. Verify material core and copper weight.** *6.All the following:* • *Verify material type and lot quantity with traveler* • *Verify stamped layer dimensions such as core thickness, panel size and copper weight.*		

Section 9: Operator Shift Maintenance		
Task/Performance Criteria	Training Method(s)	Materials
1. Demonstrate daily cleaning of machine. *1. Explain and demonstrate per process procedure and the following forms:* • *I/L Preclean Start-up.XLS* • *I/L PreClean PM.XLS* **2. Properly maintain equipment** *2. Notify maintenance when equipment is not functioning and record all downtime in the Coating Production Log (Form # Coatlog.doc)*	✓ Explain & demonstrate. ✓ Trainee demonstrates.	Process Procedure Coating Production Log form

Section 10: AMTech Feeder		
Task/Performance Criteria	Training Method(s)	Materials
1. Operate the AMTech Feeder 1. *Demonstrate and explain cleaning and operation of the AMTech Feeder.*	✓ Explain & demonstrate. ✓ Trainee demonstrates.	
Section 11: Quality Requirements		
Task/Performance Criteria	Training Method(s)	Materials
1. **Follow area and process quality requirements** *1. All of the following:* • *Follow area 5S Guidelines* • *Notify supervisor if inspected layers are discrepant* • *Rework or scrap any stained or streaked layers* • *Use comment sections on system and traveler for comments appropriate to quality issues*	✓ Give examples of comments that might be made on TIS or ProCim system, or traveler ✓ Show 5S PowerPoint with Trainee and discuss- show how 5S is being implemented in area ✓ Show examples of incorrectly completed paperwork and have trainee find errors ✓ Explain the importance of adherence to all quality requirements	✓ Examples of stained and streaked layers ✓ ProCim system ✓ Rework paperwork ✓ Production Traveler and TIS ✓ 5S PowerPoint Presentation

Coat for Layers

Section 1: Introduction		
Task/Performance Criteria	Training Method(s)	Materials
1. Understand the process and function of coating. *1. Application of photoresist to a copper surface to print/expose the image.*	✓ Explain to trainee. ✓ Have trainee explain.	Process Procedure
2. Identify and explain the main sections of the machine. *2.After pre-clean:* *e. Tacky rollers* *f. Pre-heaters* *g. Laminator* *d. Accumulator*	✓ Point out and explain sections of machine. ✓ Trainee identifies. ✓ Explain function of each section. ✓ Trainee explains function.	Diagram of machine
3. Identify customer and vendors. *3 customer: printing* *vendor: pre-clean*	✓ Review area flowchart with trainee. ✓ Trainee completes block flowchart as "quiz".	Flowcharts

Section 2. Handling and Cleanroom		
Task/Performance Criteria	Training Method(s)	Materials
1. Properly gown for a Cleanroom. *1. Demonstrate to trainer: top to bottom gowning up; bottom to top when degowning*	✓ Demonstrate ✓ Trainee practice ✓ Demonstrate & explain per Handling Checklist. ✓ Trainee	Clean room Attire Area Handling skills Checklist

2**. Understand Cleanroom Classifications** *2. Explain cleanroom classifications* 3**. Demonstrate proper handling techniques.** *3. Successfully complete training and certification of Handling Checklist*	demonstrates.	Clean Room video Clean Room class and PowerPoint (if available)
Section 3: Safety		
Task/Performance Criteria	Training Method(s)	Materials
1. Demonstrate proper safety behaviors. *3. All of the following:* • *Use proper lifting techniques.* • *Avoidance of moving parts* • *Avoidance of hot rollers* • *Avoidance of breathing resist fumes* • *Washing hands after handling resist* • *Do not remove resist trimmings while knives are rotating* • *Discard cover sheets when removed from resist (Done at DES)* 2. **Wear proper PPE**. **2**.*All of the following:* • *Wear rubber gloves when cleaning with a solvent based cleaner* • *Always wear Safety Glasses* **3. Locate & explain MSDS** *3. Locate MSDS and explain content.* **4. Identify main chemicals, warning and labels.** *4. Explain purpose, use, and potential hazard.* **5. Perform Emergency Shutdown**. *5. Identify Emergency Stop Button*	*Train at beginning of training period. Do not certify until completion of training, after observing safe operating procedures.* ✓ Identify moving parts & pinch points, and explain potential hazards. ✓ Trainee identifies. ✓ Show warnings and labels. ✓ Introduce trainee to chemicals; explain hazards, use, and handling. ✓ Locate MSDS, and explain how to read. ✓ Show MSDS icon on Computer screen ✓ Explain flammability. ✓ Explain purpose, regulations, and use.	✓ MSDS Sheets ✓ Chemicals that are used ✓ PPE ✓ Labels for chemicals in area ✓ Process Procedure

Section 4: Production Tracking		
Task/Performance Criteria	Training Method(s)	Materials
1. Reconcile product *1. Demonstrate and explain counting product, comparing to ProCim, Traveler and Physical count and how to correct any errors.* **2. Read and complete job traveler.** *2. Accurately complete 5 consecutive travelers without assistance, including correctly completing Discrepancy Tracking Sheet* **3. Successfully scrap product in ProCim.** *3. Enter scrap 5 times correctly without questions, including multiple entries. Ensure correct process is charged. Demonstrate changing charged process as well as changing defect codes.* **4. Complete a job on the Traveler and in ProCim.** *4. Correctly complete 3 consecutive jobs in ProCim & on the traveler.*	✓ Explain elements of Production Traveler ✓ Have trainee: • Locate tool number • Identify copper & core thickness • Locate part # • Locate material # • Identify tool # ✓ Attend ProCim Class or use PowerPoint presentation and class materials with trainee. ✓ Ensure trainee can enter multiple entries and view entries.	✓ Correctly completed samples of TIS (Traveler Information Sheet), Production traveler, MRDT forms ✓ ProCim class Materials- PowerPoint presentation, class handouts and scrapping training materials

Section 5: Terms and Definitions		
Task/Performance Criteria	Training Method(s)	Materials
1. **Define relevant terms**. *1. All of the following:* • *Mandrel* • *Photoresist* • *Polyolefin (poly)* • *Tack Roller*	Use Process Procedure to show definitions of terms- ask about other terms in the area as well- If there are enough, give a written quiz or consider an area dictionary of terms for the trainee	Process procedure

Section 6: Equipment and tooling		
Task/Performance Criteria	Training Method(s)	Materials
1. Use applicable equipment and tooling correctly. *1. All of the following:* • *Hakuto CSL* • *Preheater* • *Tack Roller* • *Photo resist sized to panel* • *Razor blades* • *Lint free cloth*	✓ Demonstrate correct use of materials ✓ Have Trainee demonstrate ✓ Explain possible errors ✓ Explain the function of all the materials and equipment	✓ All materials used for process ✓ Process Procedure
Section 7: Set up		
Task/Performance Criteria	Training Method(s)	Materials
1. Match and verify settings per control plan/ layer type profile. *1. All of the following:* • *Temperatures-Lamination roll and tacking block* • *Speeds-Front conveyor, Lamination roll, and rear conveyor.* • *Film spacing, front and rear* 2. **Complete set-up preparations**. 2. *All of the following:* • *Turn on the "Thick Panel" Switch for panels thicker than .030* • *Turn on the "VACUUM" option for panels wider than 24" (Vacuum optional on other products)* • *Adjust panel alignment with a dummy panel at start up and when resist is changed.* • *Verify exit temperature within specifications on the first panel coated.*	✓ Show proper spacing ✓ Demonstrate how to set correct temperatures and speeds ✓ Have trainee demonstrate ✓ Give practice time Questions: ✓ Why do we use a dummy panel? ✓ Why is alignment important? ✓ How do you verify exit temperatures? ✓ What do you do if the exit temperature is too high or too low?	✓ Control Plan ✓ Production Traveler ✓ Different Layer Types ✓ Different Resist types ✓ Dummy Panels

Section 8: Start up and Operation		
Task/Performance Criteria	Training Method(s)	Materials
1. S tart up laminator. *1. All of the following:* • *Turn on primary power switch* • *Turn Power Supply switch to manual.* • *Turn the MODE switch to manual* • *Set temperatures for upper/lower tacking (per control plan)* • *Adjust the conveyor width* • *Open the lower cabinet door and turn on switches "B centering F" and "B centering R".* • *Adjust the conveyor width to the board width by rotating the front handle* • *Turn off "centering" switches after adjustment is complete* • *Hold laminating block pull out handle, and pull the unit out toward you.* • *Clean rollers* • *Thread up resist; center upper and lower resist rolls* • *Use Process Procedure to determine correct film width* • *Turn Vacuum switch "On"* • *Dress and trim resist* • *Close laminating block unit* • *Under MODE SWITCH press on the "AUTO" switch.* • *Under AUTO OPERATION press on the "On" switch.* **2. Start up Preheater** *2. All of the following:* • *Depress green POWER, CONVEYOR, and HEATER switches* • *Adjust conveyor speed to match the Microklean conveyor speed*	✓ Use Process Procedure and Training and Certification Guide as reference materials- make sure to "chunk " information so Trainee is not given too many tasks at one time to remember. ✓ For example- First learn start up procedures for Laminator- do not move on to preheater until they are fairly clear about the Laminator. ✓ Create a Job aid/Checklist that states all the steps in start up of each section of the machine. ✓ Let the trainee use the "Cheat Sheet" until they are comfortable without- coach them through runs without the "Cheat Sheets"	Process Procedure Control Plan

• *Adjust roll temperature on the preheater control panel* **3. Start up MicroKlean Tacky rollers**. *3. All of the following:* • *Turn on using Power On/Off button.* • *Adjust the Speed Control Dial; adjust conveyor speed to match the pre-heater conveyor speed.* • *Verify the Function selector is in the forward feed direction* • *Inspect paper rollers for contamination* • *Change paper following instructions in process procedure if contamination is present.*		
Section 9: Shutdown		
Task/Performance Criteria	Training Method(s)	Materials
1. Shutdown Laminator *1. Under POWER SUPPLY, press the power off button* **2. Shutdown Pre-heater.** *2. All the following:* • *Press red HEATER push button switch.* • *Conveyor must remain on for 20 minute cool down period to avoid roll damage.* • *After cool down, turn off CONVEYOR and POWER switches* **3. Shut down MicroKlean tacky rollers** *3. Push "power Off" button on upper control panel*	✓ Explain and demonstrate all functions per process procedure. ✓ Trainee reads process procedure. ✓ Trainee practices and demonstrates. Questions: ✓ When might the equipment be shut down? ✓ Why does conveyor need to stay on for a cool-down period? ✓ How long do you leave the conveyor on?	Process Procedure

Section 10: Cleaning and Maintenance		
Task/Performance Criteria	Training Method(s)	Materials
1. **Complete PM Schedule**. *1. Using from #720 iPM.Doc, complete Preventive maintenance schedule.* **2. Clean Mikro-Clean tacky roller.** *2. Clean the four polymer cleaning rollers:* • *Push "Power Off" button on upper control panel* • *Open access door* • *Depress latch on slide assembly and pull on the handle* • *Turn two outboard mounted quarter turn fasteners in a counter clockwise direction until they release.* • *Lift module containing the four rollers from slide assembly.* • *Remove the upper two polymer rolls by removing the four "E" clips.* • *Then lift out lower two polymer rolls* • *Clean rollers using only isopropyl alcohol.* • *After cleaning, reinstall rollers and put module back into Microklean.*	Demonstrate to trainee- show all forms, explain PM (Preventive Maintenance) Schedule. Explain when and how to call maintenance department Show how to clean tacky roller. Stress importance of clean tacky roller. Questions: ✓ When do you call maintenance? ✓ How often do you clean Tacky Roller? ✓ Where do you record maintenance completed?	✓ All applicable forms ✓ Process procedure ✓ Cleaning materials

Section 11: Quality Requirements		
Task/Performance Criteria	Training Method(s)	Materials
1. **Follow all Quality Requirements** *1. All of the following:* • *Follow area 5S guidelines* • *Follow daily and PM schedules* • *Re-work layers with wrinkled resist* • *Audit heat distribution across lamination rollers and record data on Form*	✓ Explain to trainee the importance of following quality guidelines ✓ Show examples of correctly completed paperwork: highlight the areas where they need to enter information. ✓ Show incorrect samples as well and have them find the errors.	✓ 5S PowerPoint presentation on share drive ✓ Process Procedure ✓ Applicable form for heat distribution

# Roll temp audit.xls. Do once per shift. • *Clean tacky rollers when contaminated.* • *Follow MRDT guidelines*	Questions: How do you determine if a layer needs to be reworked for wrinkles? How often do you audit heat distribution? What are the signs of 5S compliance in this area? How often do you clean tacky rollers?	distribution audit ✓ MRDT Process Procedure