CAREER EPISODE 1

Reduction in Steam Consumption

A) Introduction

[CE 1.1]

Project: Reduction in Steam Consumption

Duration: [Date] – [Date]

Location: [Location]

Organization: [Organization]

Position: Production Engineer

B) Background

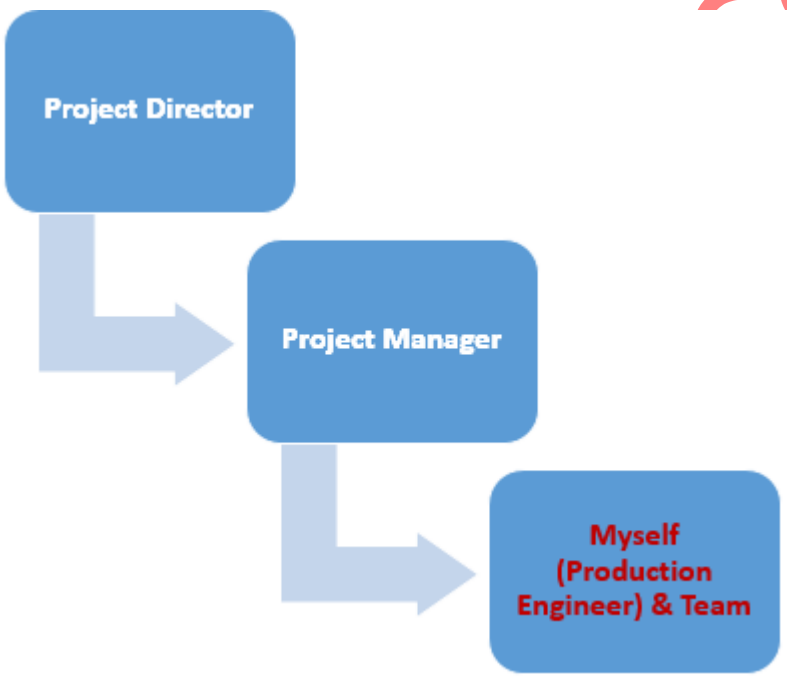
[CE 1.2]The pretreatment is basically an initial process in textile wet processing. It is mainly executed for removing oils, size, fats and waxes for enhancing absorbency. This makes the material sufficient white for making it ready for the process of dyeing. The process is typically carried out at 100 degrees in the fabric dyeing in process house. There was the pretreatment executed at 95 degrees which causes lower consumption of steam as well as reduces the soft-flow machines cycle-time.

[CE 1.3] The project aim was a reduction in pretreatment temperature from 100°C to 95°C in Fabric Dyeing. I worked on the reduction in PVA dissolution temperature from 120°C to 110°C in Fabric Dyeing. Furthermore, there was the reduction in temperature of hot wash following full bleach of Yarn in Package Dyeing machine from 100°C to 95°C. I also obtained an elimination of hot wash after Neutralization in full bleach of Yarn in Package Dyeing machine. There was even a reduction in the temperature of hot wash following Pretreatment of Yarn in Package Dyeing machine from 95°C to 75°C.

[CE 1.4] The work nature was based on the reduction in pretreatment temperature from 100°C to 95°C in Fabric Dyeing. Various work factors in the project were considered and analyzed with1

applying the appropriate production engineering skills.

[CE 1.5]



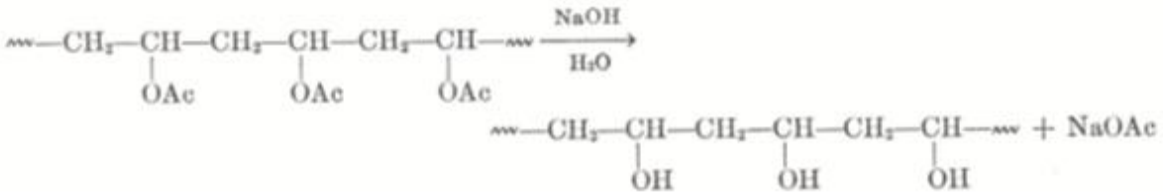
[CE 1.6] Responsibilities:

- I worked on carrying out the PVA dissolution at 110degrees in zero twist towel which was subjected to alter with the defined absorbency and whiteness index.
- I analyzed the PVA solubility in water which specifically dependent on the polymerization degree.
- I worked on setting the partial-hydrolyzed PVA solubility which was high at room temperature and fully-hydrolyzed PVA was mandatory in water at the same situation.
- I realized that the twist mainly referred towards the twists per inch of yarn values which were done using production engineering skills.

C) Personal Engineering Activity

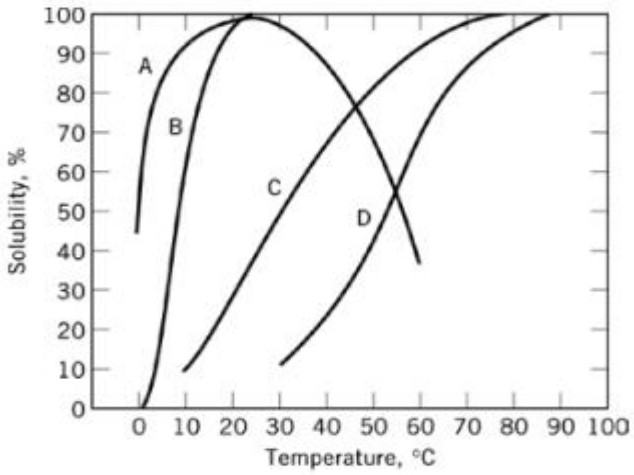
[CE 1.7]The whiteness indices and the absorbency of the fabric treated at 95^0C and fabric pre-treated in Soft-Flow machines at 100^oC were comparable. Thus, this process was

implemented on bulk scale and pretreatment was carried out by above process in FF-2. I carried out the PVA dissolution at 110°C in zero twist towel and observed change in whiteness index and absorbency. I set PVA as a hydrophilic polymer which was water soluble and was the largest volume synthetic resin produced in the world. It had decent physical properties, excellent chemical resistance and biodegradability of PVA had led towards the development of many commercial products based on the polymer. I used PVA as an emulsifier and as a stabilizer for colloid suspensions, as a sizing agent and coating in the textile and paper industries, and as an adhesive. Commercial PVA was typically made by the hydrolysis of poly (vinyl acetate) or PVAC in the reaction as shown:



[CE 1.8] I worked on the solubility, viscosity, and surface tension of PVA which mainly dependent on the temperature, concentration, % hydrolysis and molecular weight of the material. I selected the PVA which was soluble in highly polar and hydrophilic solvents like dimethyl sulfoxide (DMSO), water, Ethylene Glycol (EG), and N-Methyl Pyrrolidone (NMP). I realized that the water was the appropriate PVA solvent and the aqueous properties of PVA solutions were reviewed in the defined sections. I noted that the solubility of PVA in water mainly dependent on the degree of polymerization (DP), hydrolysis, and solution temperature. Any change in these three factors affected the degree and character of hydrogen bonding in the aqueous solutions, and hence the solubility of PVA and other solution properties.

[CE 1.9]Due to the existence of the hydrogen bonding, it was always difficult to achieve molecularly dispersed PVA solutions, especially for PVA of large molecular weight. In such cases, it was noted that the stirring and/or heating helped the dissolution and the effect of temperature on the solubility of PVA was shown below, for various values of DP. At low DP and low degree of hydrolysis, I obtained the complete solubility even at low temperatures (B). As the DP increased at high degree of hydrolysis, the temperature was required to be increased for improving the solubility (C and D), temperatures as high as 80 to 90°C may be required to obtain complete solubility. At very high DP and low degree of hydrolysis, the polymer started to gel at room temperature and the solubility decreases rapidly (A).



[CE 1.10]For PVA of a certain molecular weight, I prepared the extent of both inter and intra chain hydrogen bonding, and the solute-solvent hydrogen bonding were mainly determined from the degree of hydrolysis of PVA and the solution temperature. For PVA of low % hydrolysis, there was the bulky size and hydrophobic character obtained of the remaining acetate groups in the molecules. There were OH groups selected based on the prevention from getting close enough to form inter chain hydrogen bonds. I set the solubility of partially-hydrolyzed PVA which was thus high at room temperature while fully-hydrolyzed PVA was essentially insoluble in water at the same situation. I made sure that the twist mainly referred to the number of twists per inch of yarn. I noted that the lower the amount of twist in a yarn, the plush the towel was. It was also noted that the higher twist added strength and uniformity to the yarn which ultimately resulted in a durable and substantial feeling towel. There was also the research made on the low or zero twist fabric from longer staple cotton yarn.I noted that the zero twist yarn was made from PVA yarn and cotton yarn. I dissolved the towel made from zero twist yard which worked after the process of water and it made the cotton yarn untwist and became fluffy same as the cut pile towel. It also avoided the shortcoming of cut pile towel, such as easy dropping lint. This kind of towel was feeling much better, softer and better water imbibitions.

[CE 1.11] I worked on the whiteness index of the sample which was after pretreatment and it was found to be 65.28. I also obtained the absorbency which was found to be 68. The research was made on the sustainability on the whiteness indices and the absorbency of the Samples treated at 110^0C and fabric pre-treated in Soft-Flow machines at 120^oC were comparable. Thus this process was implemented on bulk scale and pretreatment was carried out by above process in FF-2. I worked on reducing the temperature of hot wash following full bleach of Yarn in Package Dyeing machine from 100°C to 95°C. I eliminated the hot wash after Neutralization in full bleach of Yarn in Package Dyeing machine. I obtained the trial results which were:

USTER ANALYSIS DATA	
RKM	14.81 (CSP=2221.5)
RKM CV	7.0
MAX RKM	18.34
MIN RKM	11.41
ELONGATION	4.06
ELONGATION CV	5.5
MAX ELONGATION	5.17
MIN ELONGATION	3.38

WHITENESS INDEX	
TOP	150.10
MIDDLE	150.02
BOTTOM	151.00

I recommended the hot wash prior to bleaching was eliminated and Spectra EB reduced to 0.35 GPL. The temperature of hot wash after bleaching was reduced from 100-95^{O}C. There was the hot wash set at 95C after neutralization was eliminated and rinsing was replaced by cold wash.

D) Summary

[CE 1.12] I obtained the results which indicated that the RKM was according to standard and whiteness index was satisfactory. I set the TMB cloth which was uniform without layers and pH after neutralization was 7.5 which was greater than standard. There was core pH value set which was more than standard. Significant improvements made in my production engineering knowledge with the timely execution of the assigned work duties in the project.

CAREER EPISODE 2

Reduction in Soft Water Consumption

A) Introduction

[CE 2.1]

Project: Reduction in Soft Water Consumption

Duration: [Date] – [Date]

Location: [Location]

Organization: [Organization]

Position: Production Engineer

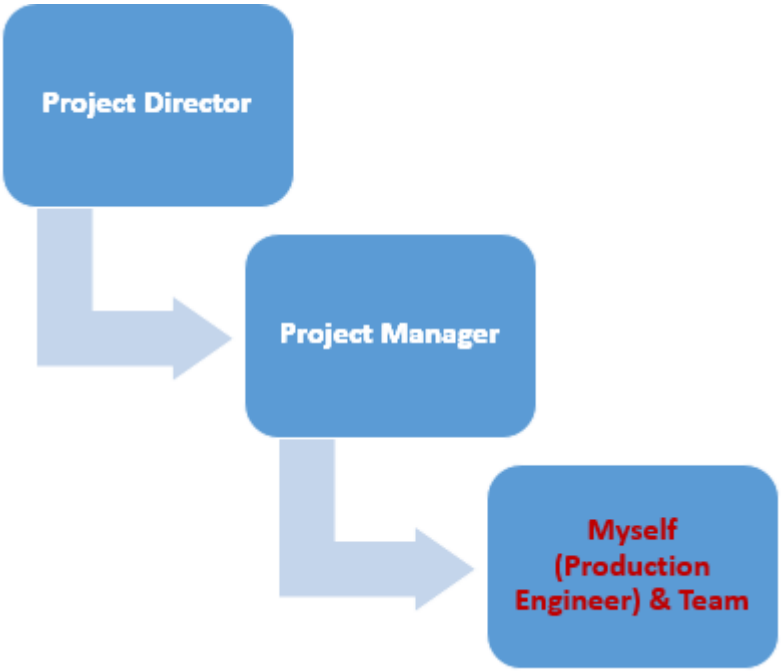
B) Background

[CE 2.2]The regulation process mainly works for the prevention of the rapid decomposition of bleach and with the minimization of the fiber degradation mainly termed as the stabilization. The bleach bath stabilizers normally function from free radicals' formation control. These are associated with the complex materials blends selection specifically serving functions from controlling the free radicals' formation. The regulation process was complex based on the selection of the material mainly serving various functions.

[CE 2.3]The work aim was based on the execution of the hot wash elimination after neutralization in yarn full beach in package dyeing machine. I worked on replacing the rinsing from the cold wash in full bleach of yarn in package dyeing machine. There was also the replacement executed for rinsing set to 10minutes from the cold wash in the pretreatment of yarn in package dyeing machine.

[CE 2.4] The nature was relied on the execution of the effective process for reducing the soft water consumption. The motive was the host wash elimination after neutralization along with the replacement of the rinsing from the cold wash in yarn full bleach in package dyeing machine. Various work activities in the project were analyzed and evaluated with the thorough implementation of the technical skills in the production engineering field.

[CE 2.5]



[CE 2.6] The assigned duties in the project were:

- I was responsible for carrying out the trials and testing which led towards obtaining the most effective process.
- I mainly carried out working on setting the hot wash temperature at defined 95 degrees which were obtained after the neutralization process elimination.
- I obtained the core pH value which was according to the defined standards when conducting various trails testing.
- I worked on getting the RKM values which worked with the defined standards and the whiteness index was obtained accordingly with the defined TBM clothing.

C) Personal Engineering Activity

[CE 2.7] I worked on the hot wash which was at 70 degrees with MSD and XC-J before the bleaching which was eliminated. There was a hot wash carried out at 95 degrees after the elimination of the neutralization. The spectra concentration EB was reduced from 0.81GPL to 0.35GPL. I obtained the trial results which are shown in the tables below:

USTER ANALYSIS DATA	
RKM	19.04
RKM CV	8.8
MAX RKM	23.24
MIN RKM	13.34
ELONGATION	4.79
ELONGATION CV	6.7
MAX ELONGATION	5.64
MIN ELONGATION	3.59

WHITENESS INDEX	
TOP	150.14
MIDDLE	153.22
BOTTOM	151.89

[CE 2.8]In the second phase, I worked on the hot wash which was at 70 degrees with MSD and XC-J before carrying out the elimination of the bleaching process. There was the hot wash temperature obtained after reducing the bleaching from 100 degrees. I set the hot wash temperature at 95 degrees after eliminating the neutralization and the concentrated spectra EB was reduced from 0.81 GPL to 0.35 GPL. I carried out the rinsing which was done after neutralization and it was replaced from a cold wash of 2 minutes. I obtained the trial results which are shown below:

USTER ANALYSIS DATA	
RKM	14.81 (CSP=2221.5)
RKM CV	7.0
MAX RKM	18.34
MIN RKM	11.41
ELONGATION	4.06
ELONGATION CV	5.5
MAX ELONGATION	5.17
MIN ELONGATION	3.38

WHITENESS INDEX	
TOP	150.10
MIDDLE	150.02
BOTTOM	151.00

[CE 2.9]During the third trial, the activities were executed with the hot wash which was prior to the elimination of bleaching. There were spectra EB obtained which was lower to 0.35 GPL. The hot wash temperature after bleaching was reduced from 100 degrees and hot wash was set at 95 degrees after elimination of the neutralization. There was also the rinsing executed with the cold wash replacement. I obtained the trial results which are shown below:

USTER ANALYSIS DATA	
RKM	19.04
RKM CV	8.8
MAX RKM	23.24
MIN RKM	13.34
ELONGATION	4.79
ELONGATION CV	6.7
MAX ELONGATION	5.64
MIN ELONGATION	3.59

WHITENESS INDEX	
TOP	151.41
MIDDLE	150.79
BOTTOM	151.11

I obtained the RKM values which was according to the set standard and the whiteness index was satisfactory with the TBM clothing mainly uniform without any layers. The core pH value was set to 7.31. I executed the process which caused saving of one bath and 3 minutes rinsing was done before softening which was mainly replaced with a cold wash. Thus, the process was executed in bulk scale and full bleach was carried out form FF-2 process implementation.

[CE 2.10]I did the replacement of the rinsing from the cold wash in the pretreatment of yarn in the package dyeing machine. I obtained the cycle time reduction from hot wash elimination which was after neutralization in full bleaching of yarn in package dyeing machine with the simultaneous doing of OBAs. There was a hot wash set at 70 degrees with MSD and XC-J before bleaching was eliminated and the hot wash was set to 95 degrees after elimination of the neutralization. The spectra EB concentration was reduced from 0.8 GPL to 0.35 GPL. I obtained the lesser RKM value than the defined standard and the whiteness index was satisfactory with the uniform TBM clothing without layers. The core pH value was higher than the set standard. In another testing, there was host wash at 70 degrees with MSD and XC-J before the elimination of the bleaching. The hot wash temperature after bleaching was reduced from 100 degrees. There was also the host wash set to 95 degrees after the elimination of the neutralization with the spectra EB concentration mainly reduced from 0.81 GPL to 0.35 GPL. The rinsing process was executed after neutralization which was replaced from cold wash for 2 minutes. There was the RKM value obtained which was according to the set standards and the whiteness index was also satisfactory. There was TBM clothing obtained which was uniform without layers and neutralization was set to 7.5 which was higher than the set standard. Also, I obtained the core pH value which was more than the standard.

[CE 2.11]During another trial testing, there was the hot wash before executing the elimination of the bleaching. There was a reduction obtained in the Spectra EB value which was closer to 0.35GPL and hot wash temperature after bleaching was reduced from 100 degrees. At 95 degrees,9

there was the hot wash after elimination of the neutralization and rinsing was replaced from the cold wash. I obtained the RKM value which was according to the set standard and the whiteness index was satisfactory with the TBM cloth which was uniform without layers. The core pH value was 7.31. I obtained the peroxide stabilizer reduction consumption in which spectra EB value was set from 0.9 g/l to 0.35 g/l in complete yarn bleaching in package dyeing machine. The excess peroxide presence in the yarn after neutralization mainly indicated the peroxide stabilization process. It mainly indicated the peroxide addition in the bleach bath. Also, the stabilizer Spectra EB quantity was reduced from 0.8 g/l to 0.35 g/l.

[CE 2.12]In the defined project process, there was appropriate execution made of the work activities in which various factors were analyzed and evaluated with the appropriate expertise applied in the production engineering field. I made work factors evaluation which assisted significantly in getting the timely results within the set project timeline.

D) Summary

[CE 2.13] I obtained the RKM which was of lesser than the defined standard. There was a whiteness index set that was satisfactory and the TMB cloth was uniform without any layers. I set the core pH which was more than the standard limit.From the second trial, I recorded the RKM value which was according to the set standard, and the whiteness index was satisfactory. There was TBM clothing which was noted to be uniform without layers. I set the pH which was after neutralization and it was set to 7.5 which was higher than the defined standard. The core pH value was more than the standard value. There were adequate enhancements made in my production engineering skills with the targeted work activities completion.

CAREER EPISODE 3

Standardization of Cycle Time to Improve RFT%

A) Introduction

[CE 3.1]

Title: Standardization of Cycle Time to Improve RFT%

Duration: [Date] – [Date]

Location: [Location]

Organization: [Organization]

Position: Production Engineer

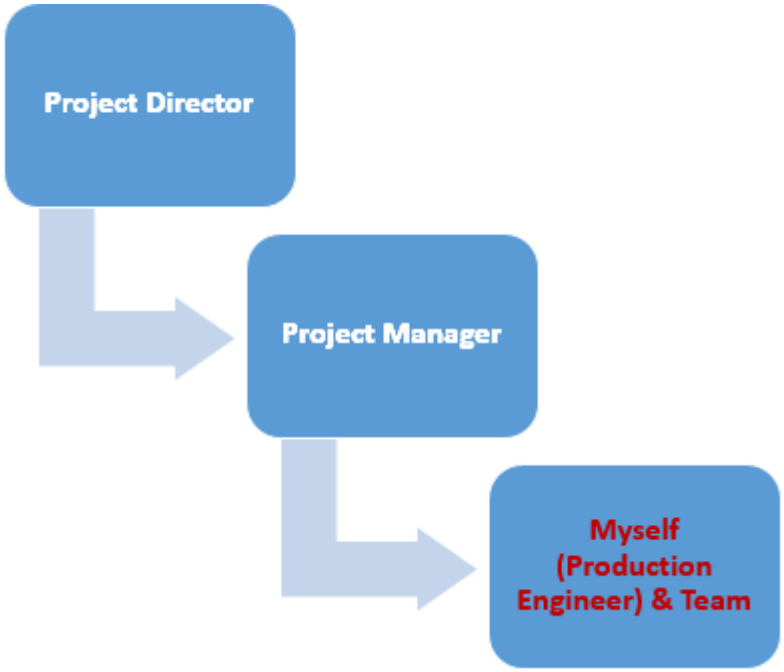
B) Background

[CE 3.2]The concept of RFT is mainly associated with the right first time to obtain the shape which was very much linked with the process of dyeing. There was an inverse relation associated with reprocessing and it includes enhancing the RFT which significantly reduces reprocessing with further enhancement in production. It was noted that the reprocessing mainly cost 1.5 times the production cost and on the other hand, it had various intangible advantages like quality, serviceability, and increasing A-Grade packing. In RFT, there is one percent improvement significantly resulted in the profitability. It was a mandatory requirement to enhance RFT for improving productivity and quality.

[CE 3.3]The main aim of the project was carrying out standardization of the package dyeing programs with the bulk variation controlling. I worked on the minimization of the lab to bulk variation from process control. I created awareness on the shop floor related to the cycle time variation which caused a delay in operation and overall process control worked for improving the overall RFT%.

[CE 3.4] The project nature was specifically split into various sections which were mandatory for obtaining the defined objectives with appropriate practices of production engineering skills.All the defined work objectives were achieved with the implementation of technical skills.

[CE 3.5]



[CE 3.6] The assigned work duties were:

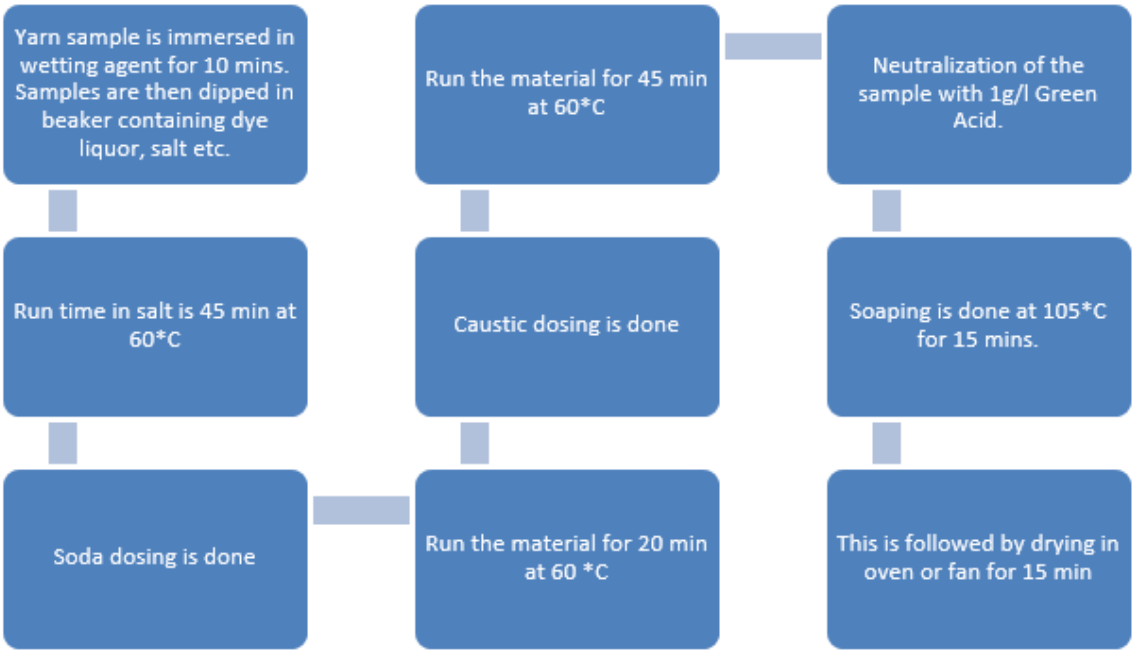
- I made focus on the three key areas which were based on the cycle time standardization along with improving RFT percentage.
- I set the base whiteness with the RFD ground absorbency.
- I carried out process parameters setting set the process parameters which affected significantly in dyeing quality and these were RFD parameters, temperature/pressure at defined stages.
- I worked on obtaining the chemicals and dyes weight with the functional considerations made on various factors for getting the desired work results.

C) Personal Engineering Activity

[CE 3.7] I started the work with the considerations made on the reprocessing which included inconsistency in the RFD ground along with obtaining the process parameters which further lack recipe confirmation from the lab. I obtained the wrong weighing of chemicals and dyes. There were even variations obtained in the dyes and chemical supply with setting the wrong temperature and liquor calibration. I also evaluated the wrong work practices with further inconsistencies in RFD ground which mainly worked for the ready for dyeing operation. I set the base whiteness with the RFD ground absorbency which did not vary from lot to lot and it resulted to cause shade variation. I analyzed the process parameters which worked with maintaining the processing of the material in the machine. There were variations in the parameters obtained which resulted in deviation in shade along with obtaining issues of un-levelness. I set the process parameters which affected significantly in dyeing quality and these were RFD parameters, temperature/pressure at defined stages, needed pH at numerous stages along with the needed liquor level. While implementing the project activities, there were mandatory factors analyzed and evaluated for successfully getting the defined work

results with making use of the production engineering skills in the project. I obtained the implemented process cycle as shown in the table and chart below:

Machine	Mathis Labomat Beaker Dyeing Machine
Weight Of Yarn	5 gm
MLR	1:7
Program	CIBA Lab 60 deg.



[CE 3.8] I obtained the recipe confirmation lacking from the lab which includes meeting shop floor requirements along with obtaining confirmation from process lab for new shades dyeing with lesser running and critical shades. I reprocessed the operation for correcting shades. I set the dyes appropriate weighing which worked during the processing of the dyes and chemicals were accurate. I even obtained variation in the dyes and chemical supply which worked along with the dyes brand quality with chemicals alteration. It resulted in the shade variation which happened with the defined recipes. These were finalized on the running supply and alteration obtained in the supply mainly resulted in causing shade variation.I evaluated the epi-center of the complete dyeing process which worked with the temperature ratio and the calibrations variations significantly resulted in causing shade variation. I followed the standard SOP which was associated with the RFT products and it played a significant role in getting the targeted work results. There were numerous factors considered for the cycle time variation mainly depending on the dyeing process which was nonstandardization of dyeing programs with delay in attending to chemical calls. I obtained a delay in sample decisions by obtaining further delay in the dyes weighing.

[CE 3.9]I executed the non-standardization of dyeing program with programs lacking for various shades in package dyeing machine and it confused operators regarding the number of

soaping and hot wash in various shades. I set the rinsing duration at numerous stages which were regarding whether the fixer was to be executed for a specific shade. I set the dyeing hold time for numerous shades, etc. I noted that the non-standardization mainly caused a delay with a lot of variations in the overall process execution. I obtained the major cause of delay mainly associated with the cycle time variation delay in attending the call from the operator. This was because of the manpower shortage and sample decisions were required to be made from shift supervisor. I obtained the appropriate weighing of chemicals and dyes with the functional considerations made on the dyes and chemicals in the store. This was specifically for avoiding proper management and planning.

[CE 3.10]I made sure to keep aware of all the operators regarding the operation process. It was the major factor that significantly contributed to the cycle time variation. There was the information obtained and sent to the supervisor regarding the present status of the lot with the drug-sheet which was set for the next lot mainly generated in advance with chemicals for the next lot. There were proper planning and coordination among the supervisor with the shift-end operation and executed the present lot in continuity without any delay. Thus, the awareness on the shop floor was mandatory for avoiding delays in the process.I made focus on the three key areas which were based on the cycle time standardization along with improving RFT percentage which was based on the depth-wise allocation of programs along with reducing the lab to bulk variation and obtaining awareness on the shop floor. The process cycle with defined checkpoints are underneath:

PROCESS	PARAMETERS	VALUE
RFD	pH	6.5
	Peroxide	Nil
	Hardness	<125 ppm
Soda Hold	pH	9.98
Caustic Hold	pH	11.01
Softener	Temp	45
	pH	6.5
Fixer	Temp	55
	pH	6.0

The sample analysis is shown in the table below:

SHADE	Shade was as not ok
DEPTH	Depth was lighter
TONE	Sample was less yellower
CYCLE TIME	8:30
TMB SOCKS	solid without layers

[CE 3.11]There were continuous weekly meetings held with the team members for discussing various issues and proposed the appropriate solutions using mechanical engineering knowledge. I consulted with the project head whenever there was any shortcoming faced in the project which ultimately resulted in getting the targeted outcomes.

D) Summary

[CE 3.12] With the experimental testing, I observed the outcomes on the yarn dyeing order of customer Shiva Traders and Ackerman Division. According to the results, there were 5 out of 6 shades came RFT and thus, Lab-Bulk RFT% was 83%. There was even the process controlling carried out which were checked based on the set RFD parameters, heating/cooling gradient, MLR at dyeing stage, pH a soda holds, softener, fixer, and caustic hold stages. I also successfully executed the water cleanliness at the fixer stage. With the executed activities in the project, I managed to obtain a significant boost in my mechanical engineering skills.

PROFESSIONAL ENGINEER
Summary Statement

These are the competency Units and Elements. These elements must be addressed in the Summary Statement (see Section C). If you are applying for assessment as a Professional Engineer, you will need to download this page, complete

it and lodge it with your application.

Competency Element	A brief summary of how you have applied the element	Paragraph number in the career episode(s) where the element is addressed
PE1 KNOWLEDGE AND SKILL BASE		
PE1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	The three Production Engineering projects were: • Reduction in Steam Consumption. • Reduction in Soft Water Consumption. • Standardization of Cycle Time to Improve RFT%.	CE 1.1, CE 2.1, CE 3.1
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics and computer and information sciences which underpin the engineering discipline	The project numerical analysis was made with the consistent practices of the production engineering skills.	CE 1.9, CE 2.8, CE 3.9
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	There were appropriate technical skills applied in the production engineering domain for getting the desired results.	CE 1.9, CE 2.8, CE 3.10
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	Numerous project factors in the work were evaluated for obtaining the defined work results.	CE 1.11, CE 2.10, CE 3.8
PE1.5 Knowledge of contextual factors impacting the engineering discipline	Evaluations on various work factors in the project were made for obtaining the set work results.	CE 1.7, CE 2.8, CE 3.8
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline	Thorough technical skills in the work were evaluated for obtaining the set work results.	CE 1.10, CE 2.9, CE 3.7
PE2 ENGINEERING APPLICATION ABILITY		
PE2.1 Application of established engineering methods to complex engineering problem solving	In the projects, there were evaluations made on various project factors and obtained the desired results.	CE 1.8, CE 2.10, CE 3.9
PE2.2 Fluent application of engineering techniques, tools and resources	Analysis was made on various work factors and achieved the desired work results within the defined work tenure.	CE 1.9, CE 2.7, CE 3.8
PE2.3 Application of systematic engineering synthesis and design processes	The research was carried out in a systematic manner for obtaining the results.	CE 1.10, CE 2.8, CE 3.7
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	There was an appropriate and systematic conduct carried out in the project for obtaining effective work results.	CE 1.9, CE 2.11, CE 3.10
PE3 PROFESSIONAL AND PERSONAL ATTRIBUTES		

PE3.1 Ethical conduct and professional accountability	An appropriate and adequate ethical conduct in the work was maintained for obtaining the defined results.	CE 1.12, CE 2.10, CE 3.11
PE3.2 Effective oral and written communication in professional and lay domains	There was appropriate oral and written communication skills followed in the work tenure for obtaining the results.	CE 1.11, CE 2.11, CE 3.10
PE3.3 Creative innovative and proactive demeanour	An appropriate demeanour in the project was executed with the effective implementation of the technical skills.	CE 1.10, CE 2.11, CE 3.9
PE3.4 Professional use and management of information	There were adequate information management principles applied in the work for obtaining the set work results.	CE 1.9, CE 2.7, CE 3.8
PE3.5 Orderly management of self, and professional conduct	Appropriate project conduct was maintained for getting effective work results.	CE 1.6, CE 2.8, CE 3.12
PE3.6 Effective team membership and team leadership	Adequate work improvements were made under the project supervisor's leadership which brought significant work results.	CE 1.11, CE 2.12, CE 3.10