

# **UNIVERSIDAD TÉCNICA DEL NORTE**



## **FACULTAD DE INGENIERÍA EN CIENCIAS APLICADAS**

### **CARRERA DE INGENIERÍA TEXTIL**

#### **ARTÍCULO CIENTÍFICO**

##### **TEMA:**

**“IMPROVING THE PROCESS OF GARMENT PRODUCTION ASSOCIATION  
COOPER-ACCION OF ALPACHACA”**

**AUTOR: FABIAN OSWALDO REMACHE LIMAICO**

**DIRECTOR: ING. EDWIN ROSERO**

**IBARRA – ECUADOR**

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## I. Overview

The present work aims to improve the process for preassembled in the workshop of COOPER-action Association, this partnership is a provider of school kits to children in the Government tax settlements. Participation in previous processes have not had the expected results in terms of economic gains for the members of the Association as well as also have been quality problems at the time of passing the controls on the delivery of uniforms.

Prior to this intervention of improvement, the members of the Association had a theoretical training that entails the entire clothing and in turn analysed all the problems that they had in their processes, this in order to identify existing problems and make account corrections to improve its competitiveness and ensure adequate utilities that allow to maintain the sustainability and sustainability of the workshop.

At the stage of training topics such as types of clothing, took stages of the process, quality control, production planning, production lines rolling. All this is aimed at addressing the new manufacturing practices that were implemented in the clothing workshop. It should be noted that earlier work in this

workshop performed it is empirically so it intends to implement and to inform the members of the Association working proven methods applied in clothing companies.

In the practical part. We begin by identifying the problems that are evident to their respective solution, *of these can enter:*

***High percentage of waste*** . For this item is to get a table suitable for laying and cutting of fabric, also proceeds to digitize patterns to make the stroke with the help of software optimizing raw.

***Problems in the measures of the garments***. Having digitized MOULDMAKING proceeds to assemble samples prior to the stroke, and final cut, this guarantees us that we will obtain the required measures. Another aspect to consider is the rest of the fabric mattress.

***Not-distribution of work and bad work environment***. To correct this phase proceeds to implement continuous modular production system that will enable us to equitable distribution of work and optimize available resources.

***Time by reprocessing and defective items***. By implementing the modular production system can be an auto quality

control and if there is a fault in this Assembly is detected immediately and will thus avoid reprocessing of garments as also the presence of faults.

***Failure in delivery dates.*** By implementing the modular production system, information is obtained as time standards, these allow us to know times for production and make decisions to meet delivery dates.

## **II. Presentation**

The 'Spinning development' programme, carried out since 2007, the free delivery of school uniforms, while promoting a model of economic inclusion, through links with the traditional manufacturing sector.

Alpachaca Cooper-action Association is one of the providers of these uniforms, improvement of the production process of the clothing workshop ensures that persons performing this activity to improve their standard of living, and the Association is not a business model to be followed by other associations which are doing the same work.

To improve the process of clothing is needed to take into account all stages, the resources that are needed for the manufacture of

garments as well as the administrative tools; all these points are discussed in the following chapters:

Chapter 1: This chapter describes the program spinning development which is part the Association, career and organization of the Association as also an analysis of the craft and entrepreneurial sector in the Ecuador.

Chapter 2: Process and machinery clothing, described all the steps needed to carry out the manufacture of garments, different types of machines that are required for such manufacture, occupational hazards and diseases and ways to prevent them.

Chapter 3: Productivity, explores the tools that are used to make a change and improve productivity as: strategic planning, process reengineering, continuous improvement, engineering methods and production planning which are a guide to the changes and take control of the process for decision-making based on real information.

Chapter 4: quality control, this with the purpose of knowing the methods of control and prevention of defects of quality in the products.

Chapter 5: a description of the process is done before implementing the improvement

and methods or areas are identified to intervene.

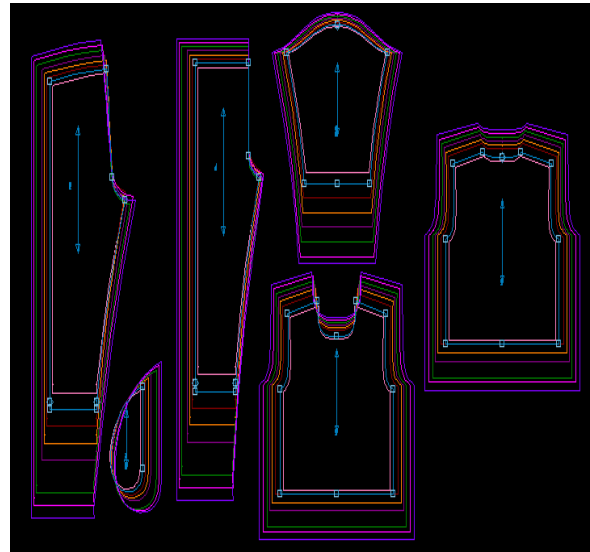
Chapter 6: executes the required changes to achieve improvement and implemented formats and technologies needed for this purpose. These being:

- Use of technical data sheets.

COOPER-ACCIÓN													
FICHA TÉCNICA													
DATOS GENERALES													
ARTÍCULO	PANTALÓN GABARDINA												
CÓDIGO	5												
TARGET	NIÑOS EN EDAD ESCOLAR DE 5 A 14 AÑOS												
MATERIAL	SATÍN POU ALGODÓN												
PROVEEDOR	SINTOFIL												
FECHA	05/10/2014												
CLIENTE	MIES												
ETIQUETA INSTRUCCIÓN DE LAVADO	POU ALGODÓN												
DESPERDICIO	14%												
TALLA	medida del cierre (cm)												
4	12												
6	12												
8	12												
10	12												
12	15												
14	15												
16	15												
18	15												
													
	<table border="1"> <thead> <tr> <th>MÁQUINA</th> <th>PUNTADAS/PULGADA</th> <th># AGUJA</th> </tr> </thead> <tbody> <tr> <td>OVERLOCK</td> <td>12</td> <td>90</td> </tr> <tr> <td>RECTA</td> <td>10</td> <td>90</td> </tr> <tr> <td>RECUBRIDORA</td> <td>10</td> <td>90</td> </tr> </tbody> </table>	MÁQUINA	PUNTADAS/PULGADA	# AGUJA	OVERLOCK	12	90	RECTA	10	90	RECUBRIDORA	10	90
MÁQUINA	PUNTADAS/PULGADA	# AGUJA											
OVERLOCK	12	90											
RECTA	10	90											
RECUBRIDORA	10	90											
CUADRO DE MEDIDAS Y PESO MATERIA PRIMA													
DESCRIPCIÓN	TALLA 4	TALLA 6	TALLA 8	TALLA 10	TALLA 12	TALLA 14	TALLA 16	TALLA 18					
CINTURA (cm)	26	28	30	32	34	36	38	40					
CADERA (cm)	36	38	40	42	44	46	48	50					
LARGO TOTAL (cm)	65	70	75	80	90	95	100	105					
ENTREPIERNA (cm)	49	53	57	61	70	74	78	84					
BASTA (cm)	16	17	18	19	20	21	21	22					
PESO PRENDA TERMINADA (gr)	171	196	222	238	268	295	327	354					
DESPERDICIO (gr)	23,94	27,44	31,08	33,32	37,52	41,3	45,78	49,56					
MATERIA PRIMA (gr)	194,94	223,44	253,08	271,32	305,52	336,3	372,78	403,56					

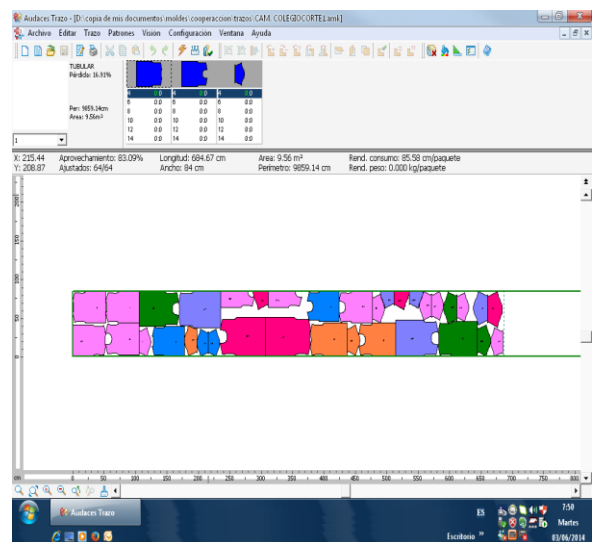
Fuente: Cooper-acción

- Use of design software and scaling.



Fuente: Cooper-acción

- Use of software tracing.



Fuente: Cooper-acción

- Calculation of raw formats.

<b>COOPER-ACCIÓN</b>				
<b>CÁLCULO DE MATERIA PRIMA</b>				
FECHA:	02/05/2014	RESPONSABLE:	FABIAN REMACHE	
NÚMERO DE ORDEN DE PRODUCCIÓN:		PRENDA:	CAMISETA CUELLO REDONDO	
TIPO DE TELA	JERSEY POLI ALGODÓN 65/35			
PROVEEDOR	RIZZO	RIZZO	RIZZO	RIZZO
DESCRIPCIÓN	CORTE 1	CORTE 2	CORTE 3	CORTE 4
ANCHO DE LA TELA (M)	1,68	1,68	1,68	1,68
RENDIMIENTO (M)	3,31	3,31	3,31	3,31
PRECIO/ KG (USD)	7,65	7,65	7,65	7,65
% de encogimiento	1,03	1,03	1,03	1,03
METROS CUADRADOS POR KG	5,56	5,56	5,56	5,56
GRAMAJE (gramos por metro cuadrado)	179,83	179,83	179,83	179,83
USD POR METRO CUADRADO	1,38	1,38	1,38	1,38
NÚMERO DE TALLAS A PRODUCIR	16	6	12	2
CAPAS DE TENDIDO	40	23	9	4
TOTAL DE PRENDAS A PRODUCIR	640	138	108	8
LONGITUD DEL COLCHÓN (METROS)	6,85	2,87	5,49	1,29
METROS DE TELA NECESARIOS	274	66,01	49,41	5,16
KG DE TELA REQUERIDA	85,26	20,54	15,38	1,61
USD PARA MATERIA PRIMA	652,26	157,14	117,62	12,28
TOTAL DE PRENDAS	894,00			
TOTAL DE KILOS DE TELA	122,78 kg			
RIB 9 %	11,05 kg			
TOTAL USD MATERIA PRIMA	1019,51 USD			

Fuente: Cooper-acción

- Cutting method.



Fuente: Cooper-acción

- Routing table.



Fuente: Cooper-acción

- Waste control.



Fuente: Cooper-acción



**COOPER-ACCIÓN**

CONTROL DE DESPERDICIOS TELA SARGA (PANTALÓN Y FALDA)		% DE DESPERDICIO DEL LOTE		13,66		
FEBRA	ORDEN DE PRODUCCION	FECHA	18/05/2014			
	PANTALÓN	74	75	76	77	78
	PANTALÓN	74	75	76	77	78
	PANTALÓN	74	75	76	77	78
	PANTALÓN	74	75	76	77	78
	FALDA SPORT	74	75	76	77	78
	FALDA SPORT	74	75	76	77	78
	FALDA SPORT	74	75	76	77	78
	FALDA SPORT	74	75	76	77	78
TOTAL		74	75	76	77	78

Fuente: Cooper-acción.

- Cost of labor.

COOPER-ACCIÓN			COOPER-ACCIÓN		
COSTO MANO DE OBRA (USD)			COSTO MANO DE OBRA ARTESANAL (USD)		
DESCRIPCIÓN	MENSUAL	ANUAL	DESCRIPCIÓN	MENSUAL	ANUAL
salario básico unificado	366,00	4392,00	salario básico unificado	366,00	4392,00
aporte patronal iess 11,15 %	40,81	489,71	aporte patronal iess 11,15 %	40,81	489,71
enfermedad 13 %	47,58	570,96	enfermedad 13 %	47,58	570,96
decimo tercer	30,50	366,00	decimo tercer	0,00	0,00
decimo cuarto	28,33	340,00	decimo cuarto	0,00	0,00
fondos de reserva	30,49	365,85	fondos de reserva	0,00	0,00
TOTAL	543,71	6524,52	TOTAL	454,39	5452,67
costo diario	27,1855067		costo diario	22,71945	
costo hora	3,39818833		costo hora	2,83993125	
costo minuto	0,05663647		costo minuto	0,047332188	
DATOS A TOMAR EN CUENTA					
días al año	365				
fin de semana	100				
feriados	10				
vacaciones	15				
DIAS LABORABLES	240				

Fuente: Cooper-acción

- Takes time and production lines rolling.

**COOPER-ACCIÓN**

**HOJA DE TOMA DE TIEMPOS Y BALANCEO**

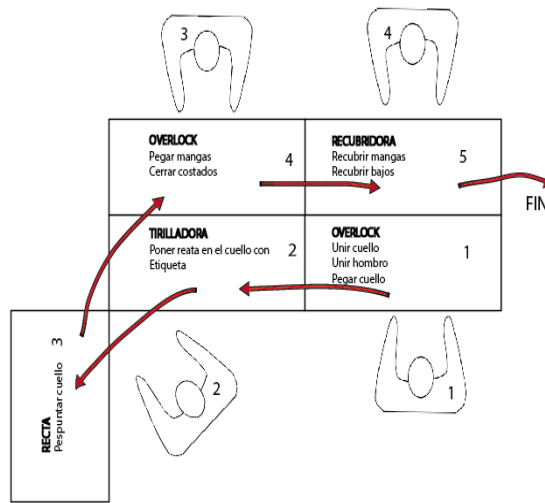
TARGET: NIÑAS Y NIÑOS DE EDAD ESCOLAR (5-14 AÑOS)

Departamento: Producción	TOMA DE TIEMPOS (s)	Prenda CAMISETA CUELLO REDONDO	
Módelo: COOPER-ACCIÓN		Beneficiario: 100%	Mete: 70/0%
N° personas: 4		prenda día: 30	
Jornada (min): 480		prenda hora: 30	26
Tiempo estándar (min): 64			

N.	OPERACION	Máq.	1	2	3	4	5	Prendas por hora	P.H.	P.D.	R.P.	T.R. (min)	D.F.E.	
1	FOM BRABROS	OVER	36	35	35	28	22	30	0,50	1,10	960	0,31	19	41
2	PEGAR CUELLO REDO	OVER	75	65	75	65	75	75	1,25	48	384	0,78	47	13
3	PEGAR TIRILLA	TIRLL	45	58	57	45	48	50	0,83	72	576	0,53	31	29
4	PEGAR MANGAS	RECTA	30	32	38	38	35	35	0,58	103	823	0,26	22	38
5	CERRAR COSTADOS	OVER	60	55	50	55	54	55	0,92	65	524	0,57	34	26
6	DETEXER MANGAS	OVER	42	58	48	47	46	47	0,78	77	613	0,49	29	31
7	DETEXER BROS	R.CB	30	35	28	32	30	31	0,52	116	924	0,32	19	41
											3,68	230/25		

P.H. = Prendas por hora  
P.D. = Prendas por día  
R.P. = Requerimiento de personal  
T.R. = Tiempo requerido

DISTRIBUCIÓN DE MÁQUINAS DEL MÓDULO PARA LA CONFECCIÓN DE LA CAMISETA BÁSICA CUELLO REDONDO.



Fuente: Cooper-acción

- Efficiency achieved.

TIEMPO ASIGNADO PARA LA CONFECCIÓN			
DESCRIPCIÓN	CANTIDAD	SAM (MIN)	HORAS
CAMISETAS	889	6,45	95,57
TERNOS CALENTADOR	889	18,59	275,44
CAMISETAS POLO	513	11,45	97,90
PANTALÓN GABARDINA	292	28,62	139,28
FALDA SHORT	226	18,17	68,44
CORTE DE PIEZAS	2809	1,7	79,59
CORTE DE HILOS Y DOBLADO	2809	5,16	241,57
EMPACADO	2809	0,83	38,86
<b>TOTAL DE HORAS REQUERIDAS</b>			<b>1036,65</b>
TIEMPO UTILIZADO PARA LA CONFECCIÓN			
NÚMERO DE OPERARIAS	DÍAS LABORADOS	TOTAL DE HORAS CONTRATADAS	
9	19	<b>1368</b>	
% DE EFICIENCIA DEL TALLER DE COOPER-ACCIÓN		<b>75,78</b>	

Fuente: Cooper-acción

### III. Conclusions and recommendations.

- The percentages of waste are within the standards for this type of process, contributes to the economic results expected at the end of the year. (See table 29-32).
- Without a doubt one of the most notorious results of the application of this set of tools and processes organization, it is the Elimination of rework and almost free of defects in the garments. Because the planning, order and control is maintained throughout the process of manufacture of these school uniforms.
- The efficiency of 75% obtained in this process, is acceptable to be the first time that it is done is of marera technical and with the proper use of resources which has the Association. (See table 41).
- The achieved profitability of 50% on the investment is more than enough to ensure the sustainability and sustainability of the workshop of the Association and to encourage other associations and people entering to form part of this sector of the clothing to implement these methods of work. (See chart 46).
- Socialization and pre-employment training to members of the Association had were of vital importance to achieve these results, since they had a clear idea of the changes to be executed. As your time during this stage determined the shortcomings and problems that had in previous processes. At this stage they made of the importance of making the change and pledged to put all of his party to have a good finish. (See attached pictures).
- The use of programs design and stroke that were used to develop the moulds and respective strokes were of great help for ease and accuracy that provide such tools for this work.
- Working with a modular production system is used all the resources in a proper manner and distributed work in an

equitable manner, which helps to maintain a good working environment. As well as help develop the skills of its members in an accelerated manner.

- The availability of tools and machinery maintenance are of vital importance to maintain working efficiency and quality of the products manufactured.
- By adopting this modular work system, lack of planning in terms of the availability of materials in the amount and at the right time can cause a significant decrease in efficiency, so you should take precautions to avoid it.

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## V. Web pages.

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- ✓ <http://www.sisman.utm.edu.ec/libros>
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