

## ASPECTS REGARDING THE FABRICS SEWING QUALITY

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### INTRODUCTION

The clothing industry assures the greatest level of the raw material manufacturing, bringing together all the efforts of the other textile domains.

The sewing operations holding a great percent (70 – 80%) in total time of the clothing manufacturing processes. This fact is determinates on a hand by the individual processing of the pieces, assembles or products and on the other hand by the manual – mechanic character of the operations, with a lot of manipulations. This point of view is supported by other specialists witch affirm that almost 2/3 parts from the working force used in clothing industry is geared in sewing operations.

### 1. THE FABRICS SEWING QUALITY APPRECIATION

For the universal sewing machine using, the direct participation of the worker at sewing operation, by moving the pieces and establishing their movement speeds. That induces a dependence relation between the work quality and productivity and the worker qualify degree, attention and tiredness.

Between the machine and operator are establishing links those content is periodical modified, so the worker – machine relationship is a complex one, the informational flux going in the both senses. The equipment functioning and the operation realizing are percept by seeing and hearing. The hands and fouts are transmitting the commands to the equipment.

In sewing time, some specifics actions like the pieces manipulation, action of the upper shaft, sew speed establish, extremities reinforcement etc., impose the hands and fouts movement synchronism, the sight appreciating the correctness of the partial realizing of the operation in the machine working zone. The human brain, for an error appearance, takes correction decisions processes the information.

The sewing operations are repetitive so that, in time, the operator acquires automate motions

with high influence over the working productivity and quality.

The quality level of the sewing operation could be express by the following relation:

$$K = f(k_i) \quad (1)$$

were:

- $k_1$  – represents the raw material quality;
- $k_2$  – the working force quality;
- $k_3$  – the machines and equipment quality;
- $k_4$  – the technical documentation quality.

Supposing that the technical documentation and fabric quality are realized, the assurance of the sewing operations needs:

- to realize correctly the operation, respecting the sew placing and the sewing contour, with a correct layers fixing, without stretch or folds;
- to realize correctly the seam, with uniforms, predefined stitches and equilibrated strains in the sewing threads;
- to assure the right resistance of the assembly at strength, flexion or rubbing solicitations.

The human influence is in inverse ratio to the equipment technical level, so that with the growing of the machine performances by mechanization, automation and robot using, the subjective intervention of the operator in sewing operation quality assurance decreases.

### 2. APPRECIATION INDICATORS FOR THE SEAMS QUALITY

The sewing operations quality can be appreciate by a group of indicators, such as table 1. The order of the indicators group importance can be different between one sewing operation to another or from an article to another.

For instance, in the case of ornamental seams the esthetics and deformation indicators are the most important, while for the assembly seams the most important are the mechanical indicators. For the protective clothing the exploitation indicators are determinants but for the fashion clothing these will be subordinated to the other groups, with priority being the esthetics indicators.

**Table 1.** Indicators for the seams quality appreciation

GROUP	SPECIFIC INDICATORS
Esthetic indicators	Sewing integrity
	Stitch uniformity
	Stitch compressing
	Seam uniformity depending on the thread tension equilibration
Deformation indicators	The perfect following of the sewing line
	Folding of the fabric on the sewing line
	Layers length difference on the sewing line
Mechanics indicators	Shorten / lengthen of the sewing line
	Strength on longitudinal / transversal direction
	Breaking length on longitudinal direction
	Flexion rigidity
	Fabric perforation
	Reliability
Using indicators	Remaining deformation after cyclic stretching stress
	Rubbing resistance
	Atmospheric agents resistance
	Washing stability
	Chemical clearing stability
Economic indicators	Seam sliding
	Fabric consumption
	Sewing thread consumption

*The esthetic indicators* influence the exterior aspect of the seam and they are, principally, depends on the respecting of the operations technical parameters. *The seam integrity, the stitch uniformity and thread tension equilibration* depend in the same measure on the technical state of the sewing machine, but the worker have the decisive influence on *the stitch compression and the following of the sewing line*.

About the *following of the sewing line*, it is necessary to have in view that the cutting tolerances, cumulated with those at the sewing process can easy exceed the admissible tolerance of the article dimensions (0.5 – 1 cm). For instance, if on the chest line an article has five pieces (two fronts, two gussets and a back). For a maximum admissible tolerance of 1 cm to the finished article the tolerances for each longitudinal seam mustn't exceed 2 mm, otherwise it is possible to exceed the tolerance interval between two consecutive sizes and the shape of the product can be modified.

*The deformation indicators* influence specially the article aspect but also that dimensional correspondence. This indicators are important in the synthetics fabrics sewing because those great deformation capacity. The deformation specific indicators, that have been assimilate with sewing defects, can be influenced by:

- the sewed fabric, by surface state, density, finishing;
- the sewing thread, by thread density, nature, torsion and contraction;
- the equipment and the sewing parameters, by the feed plate system, the pressing foot pressure, the threads tensions, the stitch length.

*The mechanic indicators* determinate the clothing articles shape stability at mechanic forces action (stretching, folding and puckering). Generally, the sewing assemblies must have a good elasticity. These indicators amounts are establish using specific apparatus and are differentiates in order to stitch type, seam type, sewing parameters, sewing thread and fabric characteristics etc.

*The using indicators* put in evidence the way that the seam and the clothing article implicitly behave in wearing and cleaning time, when are action on mechanics (stretch, flexing, rubbing forces) and physical – chemical factors (light, humidity, temperature, perspiration, solvents etc).

*The economic indicators* permit the evaluation of the materials consumption for sewing. The fabric consumption is evidence in seam allowance and the thread consumption depends on the stitch type, stitch length and seam type.

For the appreciation of the stitches and seams quality indicators it is use technical and euristics experimental methods. The organoleptical methods, based on the quality appreciation using the sense organs, can be used for the esthetic indicators. The other indicators groups involve the measuring and calculating methods.

### 3. INFLUENCE FACTORS FOR THE SEAMS QUALITY

The sewing quality indicators have influence or determinate by some factors comprised in table 2.

Out of five groups, the engineer can operate with four of them, but knowing very well the fabric characteristics. In this sense, beginning with the clothing article design, the stitches and seams structures must be choose in conformity with the mechanics and using indicators, different for knitting and weaving. The elasticity of the knitting fabrics involves using chainstitches and the seams will be too adapted to the fabric characteristics.

The sewing thread characteristics must be in correlation with those of fabric regarding the fibrous composition and thickness, but it must to know some mechanics, using and deformation indicators.

**Table 2.** Factors with influence on the seam quality

GROUP	SPECIFIC FACTORS
Stitch and seam structure	Stitch type (lockstitch or chainstitch)
	Number of threads
	Stitch displacement (visible, internal, blind)
	Threads displacement in the stitch (longitudinal, transversal, on the fabric surface, on the fabric edge etc.)
	Number of parallel seams (1 – n)
	Number of fabric layers and assembly configuration
Fabric characteristics	Fibrous composition
	Structure
	Density
	Thickness
	Surface state
	Elasticity
Thread characteristics	Needle puckering resistance
	Fibrous composition
	Structure
	Thread density
	Torsion
	Finishing
	Stretch, rubbing, flexion resistance
	Thermal stability
Sewing process	Sewing speed
	Threads tension
	Needle diameter
	Needle pick shape and usurer
	Needle heating
	Presser foot pressure
	Stitch density
	Devices attachment
Stitch parameters	Stitch length
	Stitch width or seam allowance
	Stitch density
	Number of stitches (buttons, button-holes etc.)

If the possibilities to choose the sewing thread are relatively limited, the engineer is free to

decide the technological process and stitches parameters. This is the domain where the

information about fabric, finished article, thread, equipment, technology, working force must be correlated.

Because each quality indicator is determinate by some different factors, the optimization is a complex multifactorial problem.

For instance, the seam stretch resistance on longitudinal direction depends on stitch structure, fabric and sewing thread characteristics, sewing process and seam parameters, so on all groups of factors.

In addition to the anterior aspects, the quality assurance in sewing domain aims at some managerial, techniques and technological measures.

The *technological management* aims to:

- the operator selection in concordance with the work complexity, quantity and quality;
- the reducing to a minimal value of the external perturbations, to assure the right work medium (light, temperature, psychological state etc.);
- the ergonomically configuration of the work places to minimize the person movement and effort;
- the operator instruction to do besides operations to avoid the monotony.

The technical point of view refers to:

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- the machines supplying with devices to reduce the physical work and to unload the operator mind;
- the sewing speed adaptation to the operation complexity and operator ability.

The technology aims to:

- the sewing lines adaptation (shape, seam direction angle, curvature radius, length etc.);
- the correct technological parameters establishing.

In conclusion, it must be remark the complexity of the quality assurance problem in sewing domain. The industrial practice proves that it is more advantage to prevent the deflection appearance than to correct them.

### ***Bibliography***

**1.Papaghiuc, V.** *Contributii la perfectionarea tehnologiilor de asamblare prin coasere a materialelor textile, PhD thesis, Iasi, 1997.*

**2. Papaghiuc,V., Ionescu,I.** *Performante in domeniul coaserii materialelor textile, Ed. Gh.Asach, Iasi, 1999*

**3.Sanghina, V.F.** *Ocenca cacestva soedinenii detalei odejdy, Moskva, 1981.*