AUTEX Research Journal, Vol. 9, No3, September 2009 © AUTEX

FANCY YARNS - AN APPRAISAL

Katarzyna Ewa Grabowska, Izabela Luiza Ciesielska, Simona Vasile*

The Technical University of Lodz, The Institute of Architecture of Textiles
Zeromskiego street 116, 90-543 Lodz, Poland

*The University of Ghent
Technologiepark 907, 9052 Zwijnaarde-Ghent, Belgium

Abstract:

The great interest in fancy yarns area was noticed at the textile market all over the world as well as in science area. That interest may be the consequence of liberalization in trade with countries like China. Due to liberalization in fancy yarns sector trade between Europe and Asia, the main Asian producers of fancy yarns compete with each other to offer more and more sophisticated products. The production of fancy yarns has been differentiated and enriched in such scale that makes almost impossible to catalog and standardized all the produced types. However, certain activities has been taken up at The Technical University of Lodz with cooperation of the University of Gent to investigate the area from scientific point of view, mainly by tests based on fancy cotton yarns e.g. spiral, loop and bunch as well as fancy elastic yarns e.g. spiral, bunch and flame yarns. The aspects of fancy yarns implementation into fabrics will be considered as well as positioning those scientific activities at the European level with connection to the global policy. Therefore, the aim of this paper is bringing closer the matters concerning fancy cotton yarns and fancy elastic yarns from scientific point of view on a base of chosen examples carrying out a comparison of physical properties of those fancy yarns, the introduction of those yarns as wefts into fabrics. The aesthetic aspects and behaviour at wear of final products will be considered.

*The first experiment concerns the production, on the ring twisting frame, of three types of fancy cotton yarns, spiral, loop and bunch which were differentiated in respect of twist, linear density, the angel of lap of pegs by yarn on the slat of ring-twisting frame (the input only for spiral yarns) and the frequency of rocker's action in ring-twisting frame (the input only for bunch yarns). All obtained yarns were analysed in respect of real value of twist (t/m), linear density (tex), breaking force (cN/tex), elongation during breaking (%), air index (m/sec), bending rigidity (cN*cm) and width of hysteresis from bending rigidity test (cN*cm/cm). The fancy cotton fabrics were analysed in respect of mass surface (g/m2), friction-mass loss (g), piling, flexural rigidity (mg*cm), tearing (N), creasing, breaking force (cN/cm) and elongation while breaking.*

*The second experiment concerns the production, on the hollow spindle, of three types of fancy elastic yarns, loop, bunch and flame yarns which were differentiated in respect of twist (t/m), linear density (tex), the value of stretch given to the elastic component (%) and preparation of the bobbin - precise and normal. All obtained yarns were analysed in respect of real value of twist (t/m), linear density (tex), breaking force (cN/tex), elongation during breaking (%), air index (m/sec). The fancy elastic fabrics were analysed in respect of mass surface, flexural rigidity (mg*cm), creasing, breaking force (cN/cm) and elongation while breaking (%) and dimensional stability. All the statistical analyses were carried out with usage of multiple regression module.*

Key words:

Fancy yarns, production of fancy yarns, spiral yarn, flame yarn, bunch yarn, fancy yarns properties, fancy fabric properties, fancy elastic yarns, trade policy

Introduction

After making a discovery of the most inventions, the humanity was immediately trying to find for it the new application. Those inventions were improved in time in such way which lets for fulfilling the humankind requirements in the changeable reality. The ideal examples of this process are textiles. They may be the symbol of the high social status, the membership to different groups, may be the object of admiration and envy. They accompany human from the birth to the death.

Considering only one piece of the variety of textiles - yarns one may observe multiaspectal constant yarns modelling to satisfy the final user.

The legislation and market analysis

Those yarns are not only the items to admire but also have a great market value. Carrying out market analysis shows fancy yarns market potential.

The textile and clothing industries are important to a large number of developing countries. However, the world trade in textiles and clothing has been subject to an ever-increasing array of bilateral quota arrangements over the past three decades. The range of products covered by quotas expanded from cotton textiles under the Short-Term and Long-Term Arrangements of the 1960s and early 1970s to an ever-widening list of textile products fashioned from natural and man-made fibres under five extensions of the Multi-Fibre Arrangement (MFA) over the period 1974-1994 [1].

At the end of 1994, when MFA was terminated, it had a membership of 39 countries. Eight of these were developed countries, informally designated as 'importers'; the remaining 31 developing country members were considered 'exporters'. MFA permitted exporting and importing countries to enter into bilateral arrangements requiring exporting countries to restrain their exports of certain categories of textiles and clothing. In entering such bilateral agreements, countries were expected to adhere strictly to MFA rules: for setting restraint levels, for including such provisions as annual growth rates, carry-over of unutilised quotas from the previous year and carry-forward of part of the current year's quota for use in the following year. The basic aim of the Agreement on Textiles and Clothing (ATC) was to secure the removal of restrictions currently applied by some developed countries to imports of textiles and clothing. To its end the Agreement sets out procedures for integrating the trade in textiles and clothing fully into the GATT system by requiring countries to remove the restrictions in four stages over a period of 10 years ending on 1 January 2005. When the WTO Agreement on Textiles and Clothing [2], negotiated in the Uruguay Round, became operational on 1 January 1995, several importing Members [the United States, Canada, the EU (15 countries before May 2004) and Norway] had a total of 81 restraint agreements with WTO Members, comprising over a thousand individual quotas. In addition, there were 29 non-MFA agreements or unilateral measures imposing restrictions on imports of textiles. Since January 2005 EU countries liberalized the textile trade policy. The great boom for textiles in direction Asia › World has started. As a consequence of this liberalization yarn producers compete with each other in creation new products.

One of the issues concerns nomenclature and norms for those new types of fancy yarns. Number of new types and variations of yarns grows rapidly. Most of those new types were not analysed fully, there are no descriptions in standards concerning those new types.

Regardless the explosion of the new fancy yarns products without the proper standardisation procedure or at least classification, the process of evolution of yarns, in general, lasts, both in the context of the components and final products as well as trade. The market analyses show growth in global production. It kept its upward momentum in the fourth quarter of 2006 reaching the second highest value in three years despite the fact that North and South America experienced a significant reduction. Worldwide inventories of both yarn and fabrics jumped with both reaching the highest levels of the past three years. Global fabric stocks increased only as a result of higher Asian stocks (Pakistan) whereas Europe, North and South America recorded lower inventories.

Yarn stocks increased both in Asia and Europe but fell in South America. Yarn order rose in Europe but decreased significantly in South America while fabric orders were lower both in Europe and South America. The fourth quarter of 2006 saw a reduction in global yarn output of 1.4% which was mainly the result of lower production in North America (-12.3%) and South America (-7.9%) with Asia and Europe re-cording increases of 0.3% and 4.0%, respectively. On a yearly basis global yarn output was 3.4% higher.

World fabric production rose by 3.6% in the fourth quarter in comparison with the previous one. Asia and Europe experienced higher outputs (+10.8% and +6.7%, respectively) while North and South America were faced with curtailments of -15.9% and -16.6%, respectively. On an annual basis Asia's production jumped by 32.0%, whereas North America (-40.8%), South America (-8.2%) and Europe (-4.6%) reported lower output levels. The level of yarn stocks increased by 5.9% in the last quarter of 2006 with higher stock levels reported both from Asia (+8.8%) and Europe (+1.4%), while South America's fell by -2.6%. Compared to previous year's quarter yarn inventories were up only in Asia (+9.3%) with Europe's, South and North America's falling by -5.9%, -0.8% and -1.2%,respectively. Compared to the fourth quarter of 2005 the increase in global inventories of fabrics was even more stunning (+53.2%) with Asia experiencing a jump of +183.5% due to the tripling of inventories in Pakistan (+324%). Yarn orders in Europe went up by 3.0% in the last quarter of 2006, while Brazil's declined by -12.9%. In comparison to last year's fourth quarter yarn orders were also higher in Europe (+1.3%). Fabrics order in Europe and Brazil decreased by -3.1% and -14.9%, respectively, in the last quarter of 2006. On a year-to-year basis orders it dropped by -5.2% in Europe and -23.4% in Brazil. The weaving yarn imports sagged in the first quarter of 2007, machine-knitting yarn imports in the same period almost doubled [3].

According to trade reports knitted outerwear will be popular for both the men's and women's market for Autumn/Winter 2007/08 retail, following consumer preference trends towards compact and lightweight winter clothing. This trend has been a likely contributor, along with the current popularity of worsted knitwear and jersey fabrics, to the relative buoyancy of knitting yarn activities [4].

Examples of fancy yarns:

Fot. 1. The set of fancy yarns assortments collected on the base of Ningbo MH Industry Co. Ltd products. [www.globalsources.com]. Set of examples of the fancy yarns - in order from the top left: slub yarn, wave yarn, slub yarn. Middle raw: tape yarn, tape yarn, slub yarn. Last raw: fancy with periodical effects, slub yarn with gold thread, spiral yarn.

The great interest is also seen at the science stage. It seems that this growing demand for different types of fancy yarns must by followed by scientific analysis of those products. That is why the European Commission supports financially projects that involve yarns.

The 5th and the 6th Framework Programmes supported financially 88 different projects involving yarns (a search made on a base of key-words) as a one of the main object to work on [5]. The important international activities are also bilateral agreements. The projects' results presented below were founded in the frame of such cooperation.

The parametrical analysis of fancy yarns and their implementation into fabrics

The aims of the first bilateral agreement between The Technical University of Lodz and Ghent University were:

- supplying to the fancy yarns producer a receipt for yarns production. That would save time and money connected with carrying out "trials and errors" method usually used in the spinning mills before introducing a new product to the market,

- production and analysis of produced fancy cotton yarns,

The Fot. 2, 3, 4 were taken with usage a microscope and "Lucia"- System for Image Processing and Analysis at the Textile Department in Ghent, Belgium.

For the needs of the research, the 15 spiral cotton fancy yarns, 15 loop cotton fancy yarns and 25 bunch cotton fancy yarns were produce on the ring twisting frame. The input parameters for cotton fancy yarns: spiral, loop and bunch are presented in Table 1 and the output parameters for cotton fancy yarns: spiral, loop and bunch are presented in Table 2.

- weaving fancy cotton fabrics on the base of chosen fancy cotton yarns as wefts (Fot. 5, 6, 7),

- analysis of the chosen parameters of those fabrics (Table 3).

Except of well - known dependences between yarns and fabrics e.g. increasing the weft density, in essential way increases fabric's mass surface [6, 7, 8], authors found some original connections between yarns and fabrics. For example, in case of fabrics with loop cotton yarns - wefts one noticed an impact of the yarns' bending rigidity and weft density on the mass surface of the fabrics. The bending rigidity of the fancy cotton loop yarns is a function of the linear density of the yarn and the number of twists. In case of bunch yarns, the higher value of the air - index of the yarn, the higher value of mass surface. It might be connected with the increase of yarns' linear density. Another reason for increasing the yarns' air-index is catching the air in the spaces between component yarns (component yarn is 100% cotton yarn 20 tex) in the fancy cotton yarn. It is more difficult for the yarn to go through the nozzle of the air-index tester, therefore its air-index may be lower [9].

Fot. 2. A fancy cotton loop yarn.

Fot. 3. A fancy cotton spiral yarn.

Fot. 4. A fancy cotton bunch yarn.

Fot. 5. A fancy fabric made cotton loop yarns.

Fot. 6. A fancy fabric made of fancy cotton spiral yarns.

Fot. 7. A fancy fabric made of fancy cotton bunch yarns.

Fot. 8. Set of fancy cotton fabrics.

Table 1. The input parameters for cotton fancy yarns: spiral, loop and bunch.

INPUT PARAMETERS	VALUE	COMMENTS
Linear density of each component yarn (tex)	20	The same for core, effect yarns and binding yarn
Number of twist (twist/meter)	285-521	5 levels of twist:200, 285, 400, 519, 600
Linear density of cotton fancy yarns' effect (tex)	20-100	5 levels of linear density: 20, 40, 60, 80, 100
Number of the components in the core	2	
SPIRAL YARNS		
Angle core/effect yarns (degrees)	90-120	4 levels: 0°, 30°, 90°, 120°
LOOP YARNS		
Overfeed (%)	50-200	5 levels: 50, 82, 127, 172, 200
BUNCH YARNS		
Frequency of the rocker (action/time unit)	20-120	5 levels: 20, 40, 70, 100, 120
Overfeed (%)	50-200	5 levels: 50, 82, 127, 172, 200

Table 2. The output parameters for cotton fancy yarns: spiral, loop and bunch.

YARN TYPE	LINEAR DENSITY (tex)	ELONGATION (%)	BREAKING FORCE (N)	BENDING RIGIDITY ($cN*cm^2$)	AIR INDEX (m/s)
Spiral	80.00 – 158.00	5.44 – 9.29	10.45 – 21.66	0.22 – 0.69	34.14 – 46.11
Loop	132.87 – 280.09	4.37 – 12.32	5.96 – 9.36	0.25 – 0.75	32.07 – 44.28
Bunch	103. 31 – 427. 23	3.36 – 14.87	5.61 – 14. 17	0.32 – 3.35	23.11 – 37.70

Table 3. The input parameters for cotton fancy fabrics: spiral, loop and bunch.

FABRIC TYPE	FANCY WEFT LINEAR DENSITY (tex)	WEAVE TYPE	COMBINATION OF WEFTS	FABRIC DENSITY IN WEFT DIRECTION (number/cm)
SPIRAL WEFT				
1	79.82	Plain	Plain cotton 20tex, fancy spiral	12
2	117.68	Plain	Plain cotton 20tex, fancy spiral	8
3	79.82	Twill 1/3 Z	Plain cotton 20tex, fancy spiral	8
4	117.68	Twill 1/3 Z	Plain cotton 20tex, fancy spiral	12
5	79.82	Plain	2× Plain cotton 20tex, 2× fancy spiral	12
6	117.68	Plain	2× Plain cotton 20tex, 2× fancy spiral	8
7	79.82	Twill 1/3 Z	2× Plain cotton 20tex, 2× fancy spiral	8
8	117.68	Twill 1/3 Z	2× Plain cotton 20tex, 2× fancy spiral	12
LOOP WEFT				
1	186.42	Plain	Plain cotton 20tex, fancy loop	12
2	140.76	Plain	Plain cotton 20tex, fancy loop	8
3	186.42	Twill 1/3 Z	Plain cotton 20tex, fancy loop	8
4	140.76	Twill 1/3 Z	Plain cotton 20tex, fancy loop	12
5	186.42	Plain	2× Plain cotton 20tex, 2× fancy loop	12
6	140.76	Plain	2× Plain cotton 20tex, 2× fancy loop	8
7	186.42	Twill 1/3 Z	2× Plain cotton 20tex, 2× fancy loop	8
8	140.76	Twill 1/3 Z	2× Plain cotton 20tex, 2× fancy loop	12
BUNCH WEFT				
1	128.78	Plain	Plain cotton 20tex, fancy bunch	12
2	159.68	Plain	Plain cotton 20tex, fancy bunch	8
3	128.78	Twill 1/3 Z	Plain cotton 20tex, fancy bunch	8
4	159.68	Twill 1/3 Z	Plain cotton 20tex, fancy bunch	12
5	128.78	Plain	2× Plain cotton 20tex, 2× fancy bunch	12
6	159.68	Plain	2× Plain cotton 20tex, 2× fancy bunch	8
7	128.78	Twill 1/3 Z	2× Plain cotton 20tex, 2× fancy bunch	8
8	159.68	Twill 1/3 Z	2× Plain cotton 20tex, 2× fancy bunch	12

Next discovery concerns the coefficient of variation of breaking force of fabrics measured in warp direction and the density of wefts insertions. The higher the density of weft insertions, the higher the breaking force coefficient of variation of fabric measured in the warp direction. Due to great irregularity of bunch yarns, the increasing the density causes higher variations while breaking test. The more contact points of the yarns in both directions when density is maximal (the maximal weft density here is 12 wefts/cm; the minimal weft density here is 8 yarns/cm), the higher breaking force coefficient of variation in the fabric in warp directions. It may be caused by the fact the highest irregularity of bunch yarns among all three analysed yarn types.

There is also a relation between the elongation of fabric measured in the warp direction and the density of wefts insertions as well as the type of weave: the higher the density of weft insertions of the fabric with plain type of weave, the higher the elongation of the fabric. It is true for all 3 types of fancy cotton yarns.

There is a statistical dependence between elongation measured at the breaking moment and the twist given in the final process. The dependence in non-linear, the higher square value of this twist, the elongation value is also higher. Such model was found only for loop cotton yarn.

There is an influence of the frequency of rocker's action on the standard deviation from the average distance between bunches. The higher frequency of rocker's actions, the lower standard deviation from average distance between the bunches on the yarn. Although the settings on the ring twisting frame were regular without random intentional perturbations there were limited differences in distances between bunches. It may be the effect of worn of certain elements in the ring twisting frame like a gear-wheel responsible for rocker's action.

There is a statistical dependence evidential that linear density of the yarn impacts on the width of hysteresis from bending rigidity test. Statistic shows that increased linear density makes a loop of hysteresis widen. It is true for all 3 types of analysed fancy cotton yarns.

There is no relation between the angel of lap of pegs by yarn on the slat of ring-twisting frame and the structure of spiral cotton fancy yarn. Although during the production process the observer may have the impression of existing certain tensions resulting from changing the angel, in a fact in a final yarn those tension, compensate and finally, they do not have the impact on the structure of fancy spiral cotton yarn. The aesthetical aspects and behaviour at wear analyse are based on the piling and friction tests.

Fot. 9. The example of bunch fancy cotton fabric. The unique stripes effect.

Fot. 10. The zoom on an examplary bunch fancy cotton fabric.

The type of weave influences, in essential way, on the phenomena of piling of fabric with loop yarns as a weft: the fabric with the plain type of weave has the highest tendency for piling. One may explain this phenomenon by higher number of coverings by warp in the plain weave.

The mass loos [g] measured after the friction test depends on the weft density parameter. For the maximal value of 12 wefts / cm the mass loos is lower than in case of minimal value of 8 wefts / cm. It might be explained by the existence of larger spaces between the weft yarns in case of minimal value of density parameter. The lower density structures are subject to yarns' movements and in the same time, due to lack of stabilisation, are subject to a higher friction than well - fixed the weft fancy yarns - in case of maximal density.

The relative regularity of spiral and loop cotton yarns in comparison to bunch yarns was clearly seen on the base of those researches [9 -14].

The observations made during the researches point on bunch fancy fabrics as the most unique in their character. Due to bunch cotton yarns production regular settings, the regular distances between the bunches on the length of the fancy yarns were achieved. The insertion of those yarns as wefts gave the stripes effects in the fabrics (Fot. 9, 10). That kind of effect - treated so far as defect is usually avoided by the pro-

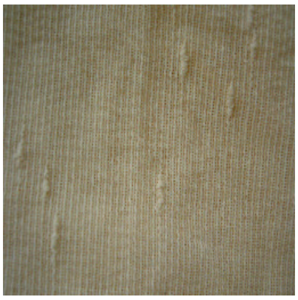
Fot. 11. A fancy elastic loop yarn.

Fot. 12. A fancy elastic flame yarn.

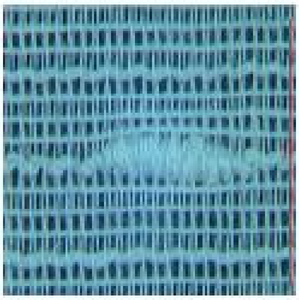
Fot. 13. A fancy elastic bunch yarn.

Fot. 14. A set of fancy elastic fabrics.

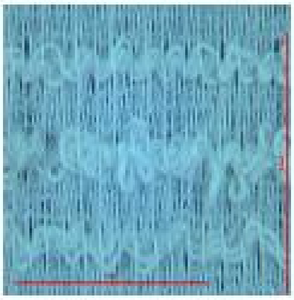
Fot. 15. A set of fancy elastic fabrics.



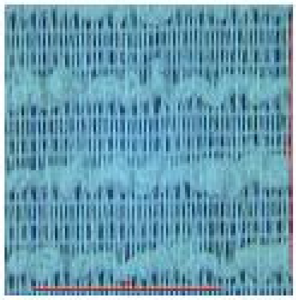
Fot. 16. A fancy elastic bunch fabrics.



Fot. 17. A fancy elastic bunch fabric.



Fot. 18. A fancy elastic flame fabric.



Fot. 19. A fancy elastic loop fabric.

ducers as it makes fabrics unique, difficult in sewing garments by loss of fabrics while appropriate cutting. Therefore, in authors point of view, fabrics may fulfil the expectations of hâut - couture designers and their clients, not only for garments but also for accessories in vogue.

To continue those deliberations on fancy yarns authors decided to make another approach focusing on fancy elastic yarns and fancy elastic fabrics.

The aims of the second bilateral agreement between The Technical University of Lodz and Ghent University were:

- production and analysis of produced fancy elastic yarns with application elastic filaments to improve elasticity of traditional fancy yarns. As stretch fibres always compose the core of fancy yarn, it is exposed to higher stress and is more likely to break. Therefore, the detailed analysis of yarns' mechanical properties is needed;

The Fot. 11, 12, 13 were taken with usage a microscope and "Lucia"- System for Image Processing and Analysis at the Textile Department in Ghent, Belgium.

For the needs of the research, the 9 flame elastic fancy yarns, 9 loop elastic fancy yarns and 9 bunch elastic fancy yarns were produce on the hollow spindle. The linear density of flame yarns is in the range: 98,56 - 108,36 [tex]; the twist values are: 275[t/m], 375[t/m], 475 [t/m]. The linear density of loop yarns is in the range: 145,50 - 164,60 [tex]; the twist values are: 500[t/m], 650[t/m], 800[t/m]. The linear density of bunch yarns is in the range: 89,12 - 100,90 [tex]; the twist values are: 275[t/m], 375[t/m], 475 [t/m].

- weaving of unique fancy elastic fabrics with fancy elastic yarns as wefts;

The Fot. 17,18,19 were taken with usage a microscope and "Lucia"- System for Image Processing and Analysis at the Textile Department in Ghent, Belgium.

- estimation of the aesthetical properties of the fabrics before and after stages of stabilisation processes.

Apart from well - known factors influencing the properties of fancy elastic yarns, like the impact of linear density of component yarns on the linear density of the fancy elastic yarns [6, 7, 8], authors made some findings concerning the twist and stretch given to the fancy elastic yarns during the production process. It seems to have the influence also on the architecture and dimension of the effects along the fancy elastic yarns. The twist given to the fancy elastic yarns in interaction with linear density of final fancy elastic yarns as well as with linear density of components of fancy elastic yarns (polyamide and elastic 8,5 - 16,3 [tex]) have the most significant impact on all the structural, dimensional and strength parameters of the fancy elastic yarns. The stretch plays an important role only when analysing the elongation parameters. The higher value of the stretch (for flame, loop and bunch elastic yarns, stretch values are 275[%], 280[%], 315[%]), the higher value of the fancy elastic yarns elongation. It is true for all 3 types of fancy elastic yarns. This dependence is non-linear. The higher square value of the stretch given to the elastic component during the twisting process, the higher the value of the elongation.

Other findings concern observations made while analysing fancy elastic fabrics parameter.

Results point out there is a great impact of the type of the bobbin - precise or normal prepared according to Al Dib and Snycerski [15] on the improvement of the weaving process and mechanical properties of the produced fabrics. The second important parameter influencing the mechanical properties of the fancy elastic fabric is the number and kind of plain - non fancy elastic yarns - wefts implemented to the fabric between the fancy elastic yarns during weaving process. Those yarns were made of cotton 15 [tex] and elastic with textured polyamide 5,2 [tex].

The authors find a connection between mass surface of all 3 types of fancy elastic fabrics and the type of bobbin with fancy elastic yarns as wefts prepared for the weaving process. The stepwise high precision winding method includes winding the yarn on the bobbin with a reciprocating yarn changing guide in a series of steps so that an outer circumferential speed of the yarn-bobbin package is constant; reducing the yarn guide reciprocation frequency in each step from a starting frequency value to a final frequency value while keeping a winding number constant during each step so that the final frequency value is proportional to a bobbin rotation frequency in each step, and then increasing the yarn guide reciprocation frequency discontinuously to another starting frequency value and beginning a following step with the yarn guide reciprocation frequency equal to the other starting frequency value.

Other factors influencing essentially the mass surface of the fancy elastic fabrics are the type of the weave (plain and twill), the number and the type of plain - not fancy elastic yarns - wefts. Factors like: the type of weave, the type and the number of plain- not fancy elastic yarn also used as weft as well as mechanical parameters of fancy elastic yarns influence the mechanical properties and the aesthetical features of fancy elastic fabrics.

The mass surface was higher for the plain weave with the density 12 [yarns/cm], which was the constant value for all fabrics and with maximal value of plain-not fancy elastic yarns (the type and the number of plain yarns: 1 cotton yarn - 15 [tex], 3 cotton yarns 3(15 [tex], 1 elastic with textured polyamide - 5,2 [tex], 3 elastic with textured polyamide - 3(5,2 [tex]) inserted between fancy elastic yarns during weaving process.
The visual judgement of the fancy elastic fabrics was carried out first - after carrying out the creasing test and next - before and after each stage of thermal and stabilisation treatment.

The creasing test was carried our according to the standard NBN G55.020: 1988. The experts compared the crushed samples with the standards and gave them the appropriated marks in the scale from 1-5, where 1 means a strong crease and 5 means lack of the crease. The highest ability for creasing have fabrics made of flame fancy elastic yarns and the lowest ability for creasing have fabrics made of bunch fancy elastic yarns.

The next area where experts made a visual judgement are before and after fabrics' treatment. The 1st stage of treatment consists in thermal (temperature=90oC; time=40s) treatment of the fabrics. The fabrics were put to the climate chamber and were subject to the thermal effect (the temperature of the air in the chamber was 90%±1%). The aim of that action was checking the dimensional stability of the fabrics after only thermal treatment (only dry air). This treatment did not change statistically significantly the dimensions of the fancy elastic fabrics. The 2nd stage concerns both thermal and water treatment of the fabric. The fabrics were put to the washing machine to subject them the water and temperature treatment. The wash process was carried out according to the norm ISO 6330:2000 with usage detergent 38.5g, softener 10g, and bleaching agent 1.5g in 40°C temperature of washing. The 2nd stage may be treated as a stabilization process.

The 3rd stage concerns also washing process but in 60°C of temperature.

After each treatment a visual judgment was done. The greater aesthetics properties change took place after the 2nd stage treatment. The significant decrease of fabrics dimensions, about 40 % was noticed.

Before and after all stages of fabrics treatment the samples were in the standard atmosphere for conditioning purpose, according to the norm ISO 139:1973.

The highest dimensional change for fancy loop and bunch fabrics was observed in case of fabrics' samples with twill weave made of cotton plain type of non - fancy yarns after the 2nd stage of fabrics treatment.

The highest dimensional change was noticed in case of flame fancy fabrics made of cotton plain type of non - fancy yarns after the 2nd stage of treatment. It is impossible to conclude unequivocally which of the weave gives the highest dimensional change after the 2nd stage of treatment.

After the 2nd stage of treatment one noticed an extreme shrinkage of analysed fabrics. Except of changing the dimension of the sample after the 2nd stage of treatment, the samples have change diametrically the facture. The strong relief being the effect of bulge appears on the surface of the fancy elastic fabrics. The effect component of the fancy elastic yarn accumulates on the elastic core of the yarn after the 2nd stage of treatment.

Conclusions

1. The EU countries may compete with Asian countries also in the filed of garments industry by preparing luxurious hâute - couture collections. Therefore there is a great need of supporting luxurious garments collection in the form of new textiles solutions.
2. The authors managed to create a formulary on the base of researches carried out in the frame of both bilateral agreements. The formulary includes prescriptions for productions fancy cotton spiral, loop and bunch yarns as well as fancy elastic yarns flame, loop and bunch. Those prescriptions were created on the base of physical test on those yarns and statistical analysis of physical test data. Such formulary provides to the fancy yarns producers receipts, e.g. how to achieve a fancy elastic loop yarns with the highest size of the loops on its length that can be easily weaved and knitted.
3. The carried out analysis let for claim that the most significant impact on the structure of the fancy cotton and elastic yarns have a twist given to the yarns in the final process of twisting.
4. The stretch given to the fancy elastic yarns in the process of twisting has an impact only on elongation of the fancy elastic yarns. It has a second rate meaning in comparison to the twist in influencing yarns' parameters.
4. The preparation of precise bobbin with wefts makes the conditions of weaving process better and the quality of fabrics higher.
5. An effect of stripes - understood as a defect was noticed on the surface of fabrics produced with weft cotton bunch yarns. It was caused by producing the bunch fancy yarns with regular periodical effect. This systematic repetition of effects (bunches) on the length of the yarn causes stripes effect on the fabric. Generally, yarns producers implement randomised distribution of effects on the yarns as a setting of twisting machines, to reduce or remove repeatability of distances between effects on the yarns (e.g. bunches). The fabrics produced for the presented researches' needs because of its unique could be used for hâute - couture.
6. The behaviour of fabrics at wear is as important as aesthetic properties for the consumer therefore behaviour at creasing, friction and pilling were considered to evaluate it. It was found that the creasing of the fabric and the phenomena of pilling strongly depend on the type of weave. Plain weave fabrics with loop yarns as wefts have a lower tendency to form pilling but the plain weave fabrics with spiral and bunch yarns as wefts present a more accentuated crushing. It was not found for all types of yarns, which means that other not investigated yet parameters influence in a more significant way these two properties.

References:

1. *MultiFibre Arrangement, WTO, 1974*
2. *Agreement on Textiles and Clothing (ATC), WTO, 1995*
3. *www.fiber2fashion.com*
4. *www.yarnsandfibers.com*
5. *www.cordis.europa.eu/search/*
6. *Gong, R.H., R.M. Wright, "Fancy Yarns. Their manufacture and application" The Textile Institute, 2002.*
7. *Grabowska,K.E., "Characteristic of bunch fancy yarns"-Fibres and Textiles in Eastern Europe, vol. 7,nr 4, p 34-38, 1999.*
8. *Grabowska,K.E., "Characteristic of fancy loop yarns"- Fibres and Textiles in Eastern Europe, vol. 8, nr 1, 2000.*
9. *Van Langenhove, L., Grabowska, K.E., Masajtis, J., Vasile, S., Ciesielska, I. L., Barburski M., The Analysis of the structure and its influence on properties of spiral, loop, bunch" - 5 th World Textile Conference AUTEX 2005, 27-29 June 2005, Portoro•, Slovenia.*
10. *"The influence of component yarns characteristics and ring twisting frame settings on the structure and properties of spiral, loop and bunch yarns" - Fibres and Textiles in Eastern Europe 2/2006 - Katarzyna Ewa Grabowska, Simona Vasile, Lieva Van Langenhove, Izabela Luiza Ciesielska, Marcin Barburski.*
11. *Grabowska K.E., Vasile.S, Van Langenhove L., Ciesielska I.L., Barburski M., The Influence of component yarns' characteristics and ring twisting frame settings on the structure and properties of spiral, loop and bunch yarns, fibres and textiles in eastern Europe, vol. 14, nr 3, 2006.*
12. *Grabowska K.E., Influence of the structural parameters on the strength of fancy yarns. The mathematical approach, seminar "The magical world of fancy yarns", University of*

Ghent, Department of Textiles, Belgium, 19 January 2006.

13. *Grabowska K.E., Van Langenhove L., Vasile S., Barburski M., Ciesielska I., "Bending property of the yarns and woven fabrics", Proceedings of The 6th World Textile Conference AUTEX 2006, June 2006, Raileigh, USA.*
14. *Grabowska K.E.,. Van Langenhove L , Vasille S., . Ciesielska I. L, Barburski M. " The magical world of fancy yarns. The Statistical analysis of fancy yarns properties"- 6th World Textile Conference AUTEX 2005 w Relaigh, USA, 11-14 of June 2006.*
15. *Al Dib, S., Snycerski, M. "A new winding package structure for stepped precision winding method" VIII Scientific Conference. Faculty of Textile Engineering and Marketing, 2005.*

Acknowledgments

The programme and the scope of this research works were accepted and funded by Science and International Administration of the Ministry of Flanders and the Department of International Cooperation of The Polish Ministry of Scientific Research and Information Technology.

∇∆