NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY [IJIERT]
ISSN: 2394-3696
VOLUME 7, ISSUE 5, May.-2020

DESIGN OF MULTI-ASSORTMENT FLEXIBLE FLOWS AT SEWING PRODUCTION TIME REQUIREMENT

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ABSTRACT
The article discusses the urgent task of quickly re-equipping enterprise sewing threads from one type of assortment to another, in a shorter period, depending on the requirements of a market economy. In this paper, we propose one of the directions of designing a multi-assorted thread for the production of various types of garments for girls of primary school age.

KEY WORDS: multi-assorted flexible flow, assortment of clothes, flow rate, product complexity, flow rate, production facilities.

INTRODUCTION

The problem of designing multi-assorted flexible flows is one of the urgent problems of our time. Currently, most of the design process of technological processes at sewing enterprises is carried out on the basis of a single-assorted type of single-model or multi-model products. As a result, the difficult task of re-equipping flows to a completely different model of clothing demanded by the consumer arises.

Currently, the market economy, in the time of lightning changes in modern fashion, the transition from one type of product range to another in a short period is very difficult. In this regard, the development of a design technology for rational flexible multi-sorted flows for products of an unstable assortment is relevant [1].

The scientific significance of this work is the dependence of the competitiveness of companies on understanding customer preferences at the present time, which requires a clear concept of positioning, and consistency in communication with the target audience [2].

Materials and methods. In a market economy, it is necessary to quickly respond to changes in demand: quickly switch from one type of assortment to another, change the volume of output. These requirements contributed to the creation of flows with a flexible organizational and technological structure, in which highly skilled workers are involved, involving the combination of various functions and operations of the labor process by one executor. This strategy contributed to the emergence and development of the conveyor production method, which existed for more than half a century, but became incompatible with modern technologies and market requirements [3].

Below is the design of a multi-assorted flexible flow for the production of products for girls of primary school age. Moreover, taking into account the requirements of consumers for certain types of clothing, depending on the seasonality of the season, the following product models are offered: for a summer dress and for a winter graduation, a suit consisting of a vest and skirt.

Preliminary calculation of the multi-assortment flow for the production of 443 units / shift dresses for girls of primary school age from cotton

Given the medium-power enterprise, the organization of the sewing thread with the number of workers - $N_{раб}$ = 20 people is proposed in the work. Based on the complexity of the product ($Т_{изд}$) we find the average duration of time for the implementation of one organizational organization, i.e. - flow rate (τ):

$$\tau = \frac{Т_{изд}}{N_{раб}} = \frac{1296}{20} = 65 \text{ сек.}$$

Next we find the flow rate (Мпот):

$$М_{пот} = \frac{R_{см}}{\tau} = \frac{28800}{65} = 443 \text{ ед/см;}$$

where: $R_{см}$ – is the duration of the shift.

Table 1. Organizational and technological scheme of multi-assortment flow for the production of dresses for girls of primary school age from cotton

Organizational Operation No.	No. of indivisible operation	Name of technologically indivisible operation	Specialty	Discharge	Time spent, sec	Number of workers		The cost of processing, sum	Production rate	Applied equipment, accessories, tools
						estimated	actual			
1	2	3	4	5	6	7	8	9	10	11
		Launching								
	1	Getting cut	P	2	15	0,23		14,6	1920	Cart, table, magazine pen
	2	Checking cut quality and register in the magazine	P	2	25	0,38		24,34	1152	
	3	Handing out cuts for jobs	P	2	25	0,38		24,34	1152	
1		Total:	P	2	65	1	1	63,28	443	
	4	Sticking on patch pockets	У	3	20	0,31		21,24	1440	SM STB-200 type, Vista
	6	Ironing ready patch pockets	У	3	20	0,31		21,24	1440	
	7	Sticking applique on yoke	У	3	12	0,18		12,74	2400	
	9	Ironing a seam of connection of the coquette with a forward panel of a product	У	3	12	0,18		12,74	2400	
2		Total:	У	3	64	0,98	1	67,99	450	
	5	Turning over cuts of patch pockets	M	3	65	1		69,1	443	DDL-9000CFMS type, «Juki» Japan
3		Total:	M	3	65	1	1	69,1	443	
	8	Starting the lower cut of the yoke and the upper cut of the hem of the front half with simultaneous overcasting	CM	4	48	0,74		56,515	600	MO-6714S-BE6-44H/G39/Q141 type, «Juki» Japan
	10	Marking on the shelf the location of patch pockets	P	2	15	0,23		14,61	1920	
4		Total:	CM	3	67	1,03	1	71,12	429	
	11	Stitching patch pockets on the front panel of the product	M	3	62	0,95		65,93	464	DDL-9000 CFMS type, «Juki» Japan
5		Total:	M	3	62	0,95	1	65,93	464	
	12	Bending and sewing a section of a hem of a back fastener	M	4	126	1,94		148,72	228	DDL-9000 CFMS type, «Juki» Japan
6		Total:	M	4	126	1,94	2	148,72	228	
	13	Bending and ironing the inner section of the hem of the back fastener	У	3	46	0,71		48,873	626	SM STB-200 type, Vista
	14	Marking the location of the six loops on the clasp	P	2	16	0,25		15,58	1800	Lecalo, chalk
7		Total:	У	3	62	0,95	1	64,45	456	
	15	Sewing six loops on the clasp	П/а	4	66	1,01		77,77	436	LBH-1790 S type, «Juki» Japan
8		Total:	П/а	4	66	1,01	1	77,77	436	
	16	Turning around the lower sections of the wing-type sleeves	M	3	66	1,01		70,17	436	DDL-9000 CFMS класс, «Juki» Japan

9		Total:	M	3	66	1,01	1	70,17	436	
	17	Checking the quality of the processed parts of the product	P	2	27	0,41		26,31	1066	SM STB-200 type, Vista
	19	Ironing the shoulder seams of the joint	У	3	14	0,21		14,87	2057	
	21	Ironing side seams	У	3	27	0,41		28,7	1066	
10		Total:	У	3	68	1,05	1	69,88	423	
	18	Sewing shoulder sections while sewing	СМ	3	25	0,38		26,56	1152	MO-6714S-BE6-44H/G39/ Q141 type, «Juki» Japan
	20	Sewing side cuts while sewing	СМ	4	100	1,54		117,74	288	
11		Total:	СМ	4	125	1,92	2	144,29	230	
	22	Filling neck sections with a plain border	M	4	25	0,38		29,43	1152	DDL-9000 CFMS type, «Juki» Japan
	24	Filling the seam of the sleeve connection with a plain border	M	4	40	0,62		47,09	720	
	26	Rounding the hem of the product with a plain border	M	4	70	1,07		82,5	411	
12		Total:	M	4	135	2,07	2	159,03	213	
	23	Stitching sleeves in an open armhole	M	4	64	0,98		75,35	450	DDL-9000 CFMS type, «Juki» Japan
13		Total:	M	4	64	0,98	1	75,35	450	
	25	Trimming and lowering the bottom of the dress	P	3	20	0,31		21,25	1440	Scissors, lecalo, chalk SM STB-200 type, Vista
	27	Final: wet-heat treatment of the product	У	3	42	0,65		44,66	685	
	28	Marking the location of the six buttons on the back of the product	P	2	10	0,15		9,74	2880	
14		Total:	У	3	72	1,11	1	75,65	400	
	29	Sewing six buttons on the back	П/а	4	65	1		76,54	443	MB-1373-00S type, «Juki» Japan
15		Total:	П/а	4	65	1	1	76,54	443	
	30	Cleaning up product debris	P	2	66	1,01		64,32	436	Brush, scissors
16		Total:	P	2	66	1,01	1	64,32	436	
	31	Marking dress	P	2	14	0,21		13,63	2057	Label
	32	Packing the product	P	2	28	0,43		27,28	1028	Plastic bag
	33	Filling out the routing sheet and send the product to the finished goods warehouse	P	2	20	0,31		19,47	1440	Route sheet, pen, trolley
17		Total:	P	2	62	0,95	1	60,39	464	
		In total:				19,96	20	1423,9		

Preliminary calculation of multi-assortment production flow:

242 units / change of costume (vest and skirt), for girls of primary school age from half-woolen fabric.

Given the medium-power enterprise, the organization of the sewing thread with the number of workers - $N_{раб}$ = 20 people is proposed in the work. Based on the complexity of the product ($Т_{изд}$) we find the average duration of time for the implementation of one organizational organization, i.e. - flow rate (τ):

$$\tau = \frac{Т_{изд}}{N_{раб}} = \frac{2373}{20} = 119 \text{ сек.}$$

Next we find the flow rate: (Мпот):

$$М_{пот} = \frac{R_{см}}{\tau} = \frac{28800}{119} = 242 \text{ ed/см;}$$

where: $R_{см}$ –is the shift duration.

As a result of the work on designing a multi-assortment stream for the production of products for girls of primary school age, an aggregate-group stream with a free rhythm of work was planned. Moreover, regardless of the fact that the assortment is different, the number of workers does not change. In this case, the actual number of workers is 20. Naturally, the complexity of manufacturing products is different, thereby different power and flow rate. When planning workplaces, the maximum number of basic equipment used and the equipment for stock were taken into account.

Based on the analysis of literary sources, it was revealed that the success of companies in the clothing market largely depends on understanding the preferences of customers - their lifestyle, attitudes, tastes, including fashion perception, attitude to price and quality, emotional factors that motivate the choice of goods [4].

In the article by Radjabova G.Dj. "The historical heritage of the national culture of ancient Bukhara", published in the scientific and technical journal BukhETI, "Development of Science and Technology" No. 2/2019. - page 158, makes a note about the gold-embroidery art of the city of Bukhara, which testify to the high development of the culture of the population from time immemorial. The development of consumer requirements regarding modern garments depends on the direction of fashion at this stage [5].

In the article Tursunova Z.N. "Studying and identifying the design features of a men's jacket with a view to improving it", published in the scientific and technical journal BukhETI, "Development of Science and Technology" No. 3/2018. - p. 156, provides information about the types and forms of the main details of clothing that make up its design, about the number and the types of seams and decorative elements used. The design, cuts and directions of the warp threads of all the upper, lining and gasket parts of the jacket are studied in detail. Unification and standardization of clothing parts contributes to a fuller use of sewing machines of special and semi-automatic action.

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CONCLUSION

As a result of market analysis, it was found that the main trends in the assortment policy of modern manufacturers are in the design and manufacture of multi-assorted industrial clothing.

It has been established that for the production of multi-assorted clothes, flexible flows are needed, adapted to produce heterogeneous series of various assortment types of products with frequent changeability. The main directions of the design of flexible flows were studied and it was found that the production structure focused on the means of production, that is, on the technological principle, ensures the efficient use of equipment. The main signs of flexible flows are revealed, which are the size of a series of one model, the quantitative structure of workers' employment, the number of manufactured types of products, the type of technological process, the principle of organizing a workplace, the method of transportation of semi-finished products.

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