ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

Innovations in Construction Technology: Production and Application in Uzbekistan of Slings Made of Textile Tapes and Combined Ropes

AbdullayevIbragimNumanovich, AhmedovJamoliddinDjalalovich, RahmanovBahodirKushakovich

PhD, department of "Construction of buildings and constructions", Fergana Polytechnic Institute, Fergana city, Uzbekistan

PhD, department of "Architecture", Fergana Polytechnic Institute, Fergana city, Uzbekistan

PhD applicant,department of "Architecture", Fergana Polytechnic Institute, Fergana city, Uzbekistan

ABSTRACT: Reviewed problems, primal problems and prospects of a research and expansions of production of load gripping devices from woven synthetic tapes and ropes are considered. Offers on effective use them in the hoisting-and-transport inventory operated in various branches of economic activity of the Republic of Uzbekistan are given.

KEYWORDS: hoisting-and-transport inventory, load gripping objects, slings, woven synthetic tapes and ropes, researches, normative and technical documents.

I. INTRODUCTION

The main tasks of transition to an innovative path of development are clearly set by the leadership of our country everywhere and on a daily basis [1]. Much is being done at the state and regional levels. The cost of the country's budget for science is increasing. Public corporations, large private companies adopt their innovative development programs. Modern knowledge-intensive technologies are beginning to be used in different regions of the country. The legalizationbase for innovative growth in Uzbekistan has been established. The Decree of the President of the Republic of Uzbekistan №-UP-5577 of 14.11.2018yy "On Additional Measures to Improve State Regulation in the Field of Construction" gives a new impetus in attracting modern technologies, in developing a healthy competitive environment, in attracting domestic and foreign investments, reforming the regulatory framework in the construction sphere.

II. RELATED WORK

With continuous acceleration of scientific and technological progress, innovative technologies and application of modern complex high-performance equipment and materials, it is necessary to increase accuracy of installation of construction structures, technological equipment, loading and unloading works and high qualification of installers, introduction of effective methods of installation works with the use of improved lifting facilities, which contribute to significant reduction of time and cost of works. In this direction - preparation of new units of installers and constant improvement of their qualification and skill are also the most important task [2]. Currently, there are many different technologies for the use of both rigging equipment and handling devices (SCPs). For example - according to functional purpose - slinging of cargo with a branch of sling by "impact," where sling performs functions of both connecting element and grip. The principle of interaction between the grip and the load is a holding principle. Thus, one sling falls under the entire classification at the same time and is a self-sufficient element.

It is known that metal slings, when subjected to heavy loads, are unable to take their original form, and in some types of residual deformation they must be removed from circulation at all. Figure 1. Typical defects formed on steel cables irrespective of their standard service life are presented, such as basket-like deformation, core extrusion, rope bending, rope twisting [3].

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 10 , October 2019

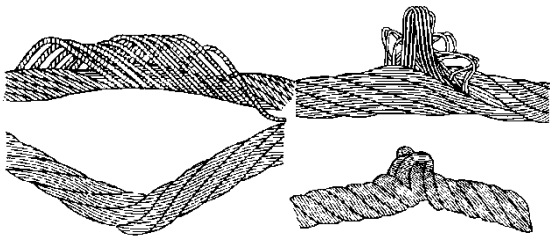

Figure 1. Defects in the form of basket-shaped deformation, core extrusion, rope bending, rope twisting.

Table 1. shows our analysis of the use, planned scrapping and premature rejection of steel cables of different diameters for 2018 on a mechanized column in Fergana.

Table 1.

Ø steels cables	Use in a year			Planned write-off in a year		Premature rejection in a year	
	price 1 m.	Pc.s	Price	p.m.	sum.	p.m.	sum
16,5	18400	200	3680000	100	1840000	50	920000
21,0	28350	200	5670000	100	2835000	50	1417500
24,0	35900	200	7180000	100	3590000	50	1795000
28,0	49750	200	9950000	100	4975000	50	2487500
32,0	61800	200	12360000	100	6180000	50	3090000
	Total:		38840000		19420000		9710000

The table shows that if the planned write-offs are 50% of the cables used, the premature cancellations were 25% of the used cables for the year. The total amount of written-off and rejected cables is about 30 million sum. Taking into account that about 100 such mechanized units work in the republic, and hundreds more industrial enterprises and warehouses with bridge, portal and goat cranes, the given figure increases into tens of billions of sum. In fact, this factor, along with many prevailing factors, leads many countries to improve SCPs through the use of synthetic textile tapes and ropes (STLC).

III. TEXT INPAINTING

During the metrology at structural faculty of the Fergana Polytechnic Institute researches, as on studying of elastic characteristics textile a sling, so, and on production and test of their principal specifications are conducted.

The sling is the main research technique studying of such deformation characteristics as an elasticity, creep and a relaxation of woven synthetic tapes from which load gripping slings actually gather.

Because of their flexibility, synthetic textile slings are less susceptible to deformation. Textile slings quickly take on their original shape. This circumstance directly affects the service life; In textile slings it is much higher at a careful ratio than in steel rope. The polymer material from which they are made is almost unfamiliar with the property of "fatigue" [4].

Thanks to the development of production of high-strength synthetic fibres, the use of textile slings has become available for various construction facilities, factories and enterprises of the construction industry. Textile slings are now becoming increasingly popular cargo handling devices. The ease, flexibility and high load capacity of this type of sling allows to solve many problems in the sphere of lifting and movement of cargo, which until recently were considered impossible.

In some cases, they are the only possible means for binding and slinging the cargo. This applies more to goods in need of careful handling.

Cables and hemp ropes have previously been used as temporary decouples and pull-backs, which are now also predominantly replaced by synthetic belts and ropes. Obtaining such tapes in turn depends on success in physics, chemistry and chemical technology, metal science and other material sciences [5].

Various studies [6] consider the physical properties of synthetic tapes and ropes for different purposes. Studies of tensile and bending strength are carried out depending on the diameters of the goods in contact, the abrasion process at the point of contact between the synthetic sling and the steel part [7]. The smooth steel surface becomes abrasive for synthetic fibers of tapes and ropes. There are various studies in this regard: - To replace carbon steel rollers with synthetic rollers;

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 10 , October 2019

- Applying an empirical model to predict the life of the LRTC in cyclic bending;
- By determination of tensile strength and extension of the STLC at different temperatures;
- Measuring tensile strength and expansion of the STLC at various temperatures (-40 to 60 ° C) in order to determine the temperature range of their application;
- Increasing the tensile strength of the STLC with the addition of various fibres (coconut, hemp, kenaf and susal);
- On use of STLK in stationary loading and unloading operations on bridge, portal and goat cranes;
- On use of STLK in such devices as mine hoists, road, air, railway, water transportation, personal protection equipment during operation at altitude, on use of STLK during debris disassembly in extreme situations [8].

IV. EXPERIMENTAL RESULTS

Thanks to the introduction of low-cost textile slings made of polyester or polypropylene fabric tapes on the market, the industry has developed the production of modern multi-turn sling and tie-up cargo belts. These materials are resistant to effects of moisture, heat, light, have high frost resistance, are not exposed to chemicals, oils and organic solvents. The main advantage of textile tapes and ropes is a small mass, do not entangle and are not confused with each other, wear-resistant, easily cleaned when contaminated, able to withstand loads of up to 100 tons, which makes them indispensable for slinging or fixing heavy loads, without damaging the surface.

So let 's highlight the main advantages of woven tapes and ropes [4]:

- Safety of load: loads (especially with soft edges or carefully prepared surfaces) are less damaged during lifting. It is this property that is the best characteristic of STLC, as they carefully bend the product and do not ruin it;
- Light weight: STLK is much lighter than metal. This property is particularly noticeable when working with heavy-duty slings. It is easier to move the sling itself, easier to put under the load, easier to stick to the crane hook. In addition, textile slings save not only human resources but also time spent handling;
- Safety: on STLC there are no burrs, sharp edges and protruding damaged wires causing injuries. As a result, savings in temporary incapacity to work and reduced downtime in the workplace;
- High wear resistance and resistance to deformation: STLK, compared to metal, have higher wear resistance to multiple folds and extensions in one place;
- TLCS are less susceptible to deformation changes, abrasive materials, many chemicals (acids, alkalis, oxidants, seawater);
- Compactness: STLC is easy and convenient to roll and store. Metal slings cannot be rolled neatly as they have spring properties, they are very difficult to move from place to place. All these disadvantages are deprived of textile slings. They can be rolled up as you like, without being flattened or intertwined with each other;
- It should be noted separately that at present textile synthetic materials of technical purpose are covered with light-returning (CB) coatings with CB filaments. STLC with such coatings are resistant to the influence of external aggressive environment, are not afraid of the sun, are protected from the influence of water, oil, oils, solvents, chemically active substances. In addition, in order to provide increased safety for the use of STLCs, they are subjected to special effects of light reflection by weaving special CB threads into them, or by suturing CB tapes [5].

Along with the advantages listed, the STLC has disadvantages:

- They fear open fire;
- Can obtain through-fires from liquid metal droplets formed during welding;
- High concentrations of alkalis and acids are dangerous to them, which cause damage if they are exposed to long-term effects;
- Artificial STLC fibers lose their qualities under the influence of ultraviolet radiation;
- STLK is not resistant to cuts.

Despite the above-mentioned disadvantages, the main advantage of safety should be the fact that when the STLC is broken due to the location of the main bearing fibres, it breaks down in the direction of force application, while the behavior of the steel rope sling in the same situation is "unpredictable" and can lead to an accident [9].

A review and examination of the regulatory framework for the use of STL-based GPI shows a significant gap in this direction. Thus, more than 40 years ago GOST 10293-77 "Capron ropes" was established on which the production of non-metallic slings was based. A special role in the system of state supervision was played by the State Gortekhnadzor (Гортехнадзор), which carried out control and normative activities.

2016, the Interstate Council for Standardization, Metrology and Certification (Russia) adopted the standard GOST 34016-2016. "Lifting cranes.Cargo gripping devices. Safety Requirements" 8 CIS countries voted in favour of this standard (Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan).

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

Over the past decade, the market of our country has actively received SCPs based on STLC and components for their production from abroad, made according to the standards of Russia, the USA and Europe. Unfortunately, the standards developed in previous times are outdated, do not reflect the world trends of the industry, do not take into account the rapidly changing technological base of production, as well as new materials entering the construction market.

In Russia slings on the basis of STLK make according to requirements of RD 24-SZK-01-01 "Slings cargo general purpose on a textile basis" of tapes of the production or import. Textile slings Sevkanat (Севканат), GUMP "parachute building (парашютостроение) scientific research institutes", InkaOu (Finland), Certex (USA), Span Set, Industrial Products, Gehont und Hebetechnik, Carl Stahl GmbH, Geron (all - Germany) are popular, LANEX CZ, Spol. S.r.o. (Czech Republic), Lemens (Holland) etc. However, to reduce their cost, many companies sew slings with a loading capacity from 0.5 ÷ of 20 ton in own shops. From SVM material of foreign production. Among such companies is Moscow LLC "Polypro" and Oryol production division holding ZAO "Promstal." They produce all types of these products with a load capacity of up to 15 tons. And up to 20 m long from polyester and polyamide. Among the products of this company are tape and rope slings, which are used in a wide range of industries and transport [3]. In our Republic there is a production of polypro.

V. CONCLUSION

At present, in each territorial region of the Republic, private companies and firms use hundreds of modern lifting mechanisms, and throughout the Republic there are thousands of them, these are: tower, portal, goat and bridge cranes; - caterpillar and pneumatic-wheeled cranes; - car cranes; - portable, mobile, attachment cranes hoists, mini loaders, self-propelled chassis, tractors with arrow equipment, etc. This is confirmed by the results of the static collection, processing and analysis of the number of lifting and transportation equipment (PTO) in the Fergana region over the last 10 years, which are presented at the figure-2.

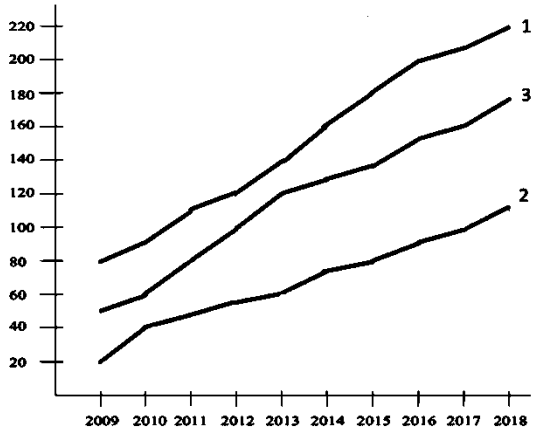

Figure-2. Increase in the number of PTO park in Fergana region for 2009-2018,
Where 1- auto cranes; 2- other PTO; 3- tower building bridge, goat cranes.

Their number is constantly growing, and many mechanisms of foreign firms and companies carrying out construction and installation works in Uzbekistan (NPP, Tashkent CITI, etc.) are still added to them. Although, they provide themselves with lifting equipment and bear the responsibility for safety. It is known that the specific weight of lifting operations in installation processes is 35-40% of the total volume of these processes.

The demand for PCP is also increasing due to the increase in the volume of loading and unloading works in warehouse conditions, on auto-aircraft and railway transport, other industries and economic spheres.

This fleet of lifting mechanisms constantly requires a reliable and high-quality set of accessories. Even with a successful combination of steel tooling and synthetic tooling, the amount of consumption of this kit is significant. Taking into account that on average 8-10 million sum (uzb. sum) per year is required per lifting mechanism, and depreciation contributions to the mechanism are made within 10-15 years, the country spends tens of billions of sum on lifting equipment alone. And this highly specialized field of knowledge requires research. The traditional ring sling with a lifting capacity of 12.5 t and a working length of 5 m shall be made of steel rope with a diameter of 39 mm. Has a weight of 75 kg, then its textile analogue weighs about 15 kg. It is estimated that when slings are used even with

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

minimum intensity and if one 4^x branch sling with cable diameter of 39 mm weighing 75 kg is rejected during one calendar year, about 1000 tons are spent on all lifting facilities,steel cables.

In the following table 2,we presented comparisons of steel and synthetic slings for only five types of slings.

Table2.

№	Sling type	Sling length, m.	Steel sling		Synthetic sling	
			Sling weight, kg	Ø cable, mm.	Sling weight, kg	Sling width, mm.
1.	Loopback	2	12	16	0,5	60
2.	Ring	2	12	16	1,0	60
3.	Onebranch	3	39	22	1,2	60
4.	Twobranch	3	51	22	1,3	60
5	Fourbranch	3	75	22	1,5	60

These circumstances influence the positioning of SCP on the basis of STLC as an independent type of product, having its classification by purpose, design, industry application, load capacity, etc. In addition, SCPs are dangerous products and therefore should have minimum requirements in the form of regulatory and technical documents. This in turn will comply with the state policy of ensuring the safety of products [10].

Taking into account the situation when the domestic market is filled with Russian-made GPPs, the production of which is based on the requirements of NTD adopted on the basis of European Norms (EN), there is a gap in the use of these products, i.e. there is no typical range and nomenclature base. There are also no requirements for the type and type, necessity and availability of permits for imported products (grips, textile tape and ropes, ends, etc.).

Finally, in order to achieve the modern technical level of application of SCP on the basis of STLC it is necessary to carry out work on formation of own (domestic) system of SCP standards. This will serve as a basis for stimulating construction production to technological re-equipment. At the same time, the effect of these standards should clearly exceed the cost of their use. Otherwise, the positive effect will not be achieved. Since it is possible to de jure resolve the issues of the application of the STLC, while de facto they have long been applied in the market of Uzbekistan.

In this state of the matter, it becomes necessary to make proposals to improve the existing and develop new standards for the use of synthetic slings, as well as to introduce common terms and definitions, both in Russian and Uzbekistan.This is evidenced by the joint works published in the Russian publications [11,12]

Research in this direction allows production from local raw materials of STLC and their wide application open the prospects of reduction of labor costs in the production of loading and unloading operations, improvement of culture and environmental friendliness of production, and eventually achievement of import substitution.

REFERENCES

[1] Decree of the President of the Republic of Uzbekistan No. UP-5544 21.09.2018 "On Approval of the Strategy for Innovative Development of the Republic of Uzbekistan for 2019-2021."
[2] Gordin Z.G. Increase efficiency of installation cranes. TSNIIOMTP. Moscow, Stroyizdat, 1986
[3] Suleymanov M.K., Sabiryanov..,. Sling and rigging works in construction and industry, M. Publishing Center "Academy," 2007.
[4] Stepanova E.Y., Melnikov V.I. Innovative and knowledge-intensive technologies in the multifunctional holding for the production of textile slings and combined ropes (on the example of CJSC Promstal, Eagle). Innovations and personnel in mechanical engineering. № 3, 2013.
[5] Zelenkova T. N., Kozlova O.V. Retroreflective textile materials based on domestic TVV. National Association of Scientists (NAU) No. 10 (26), 2016.
[6] www.remera.ru
[7] Ivashkov N.I., Prusov A.Y. Analysis of structure and content of standards for slings and components. Handling, 2013, No. 5, 6 (75), p. 21-24.
[8] Suleimanova L.A., Rahmanov B.K., Kocherchenko V.V., Solodov N.V. "Promising directions of development of technology of rigging works using slings on textile basis." Journal of BGTU named after V.G. Shukhova, № 7. 2018 BGTU, Russia, FerPI, Uzbekistan.
[9] Iodchin A.S. Seleznev N.S. "Modern sling systems." Journal of Safety of Work in Industry, № NPC "Kamro," Gosgortekhnadzor of Russia. № 9, 2003.
[10] Prusov A.Y. "Standardization of cargo gripping devices," current state. Yaroslav GTU. International Journal. No. 1 (67) Part 1.
[11] https://naukaru.ru/en/nauka/article/22376/view PERSPECTIVE DIRECTIONS OF TECHNOLOGY DEVELOPMENT OF LIFTING WITH USE OF TEXTILE SLINGS.
[12] https://elibrary.ru/item.asp?id=38228183 PROBLEMS OF PRODUCTION AND APPLICATION OF load gripping devices FROM SYNTHETIC TAPES AND ROPES IN UZBEKISTAN

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

AUTHOR'S BIOGRAPHY

1. AbdullayevIbrohimNumanovich

Candidate of Technical Sciences, Associate Professor of the Department "Construction of Buildings and Structures" of the Fergana Polytechnic Institute (FerPI).

In 1971 he graduated from Tashkent Polytechnic Institute with a degree in Industrial and Civil Engineering. In 1972 he joined the department assistant at FerPI. From 1973 to 1976 he was a graduate student of the Department "Construction Production Technology" of the Kiev Engineering and Construction Institute (KISI). In 1978 he defended his thesis for the study degree "k.t.N." In 1984 he received the academic title of associate professor in the department "Technology of construction production." From 1979 to 1985 he was Head of the Department of Science of FerPI. From 1985 to 1989 he headed the department. In 1989-92 he worked in the association Ferganastra as head of the production and technical department. From 1993 until 2018 He was the founder and head of a private construction firm. Since October 2018.Returned Assistant Professor of the Department "Construction of Buildings and Structures" FerPI. The results of his scientific works on "Increasing labor productivity by improving the quality of construction and technological processes" were introduced in the construction of petrochemical facilities in Fergana. He has a number of scientific works in the form of 1 monograph and 10 publications.

Currently he leads the management of young specialists in the preparation of theses for the degree of PhD., lectures bachelor and master in the disciplines "Technology of construction production" and "Construction of buildings and structures."

2. AhmedovJamoldinDjalolovich

From 6 September 2018:Head of the Department of Architecture of the Construction Faculty, Fergana Polytechnic Institute, Date of birth: 09.07.1973, Place of birth:Fergana region, Tashlak district, Nationality: uzbek. Education: Higher,Graduated (when and what):1998 Fergana Polytechnic Institute, Specialty in Education: Industrial-Civil Construction
Academic degree:Candidate of Technical Sciences PhD,
EMPLOYMENT ACTIVITIES:
1993 - 1998 - Student of the Construction Faculty of the Fergana Polytechnic Institute
1998 - 2001 - Engineer of the Scientific Department of the Fergana Polytechnic Institute
2001 - 2006 - Assistant of the Department of Construction of Buildings and Structures of the Fergana Polytechnic Institute
2006 - 2012 - Associate Professor of Construction of Buildings and Structures, Geodesy, Cartography and Cadastral Department of Fergana Polytechnic Institute
2012 - 2014 - Head of the Department of Architecture of the Fergana Polytechnic Institute
2014 -2017 - Dekan of Construction Faculty of Fergana Polytechnic Institute
2018- Head of the Department of Architecture of Fergana Polytechnic Institute

3. RahmanovBahodirKushakovich

From 04.09.2019:Senior Lecturer, Architecture Department, Fergana Polytechnic Institute. Year of birth: 17.10.1961Place of birth:Kuvasai city, Fergana region, Nationality:uzbek

Education: Higher in 1984 Fergan Polytechnic Institute, In 1993 Central Research InstituteOrganization, mechanization and technical assistance to construction(CIIOMTP). Specialty: industrial and civil engineering. Academic Title: PhD applicant.

EMPLOYMENT ACTIVITIES:
1979-1984 - Student of Fergana Polytechnic Institute
1984-1986 - service in the armed forces
1986-1987 - engineer of the Fergana branch of "Uzmezhkolkhozproekt"
1987-1988 - Senior Laboratory Technician of the Department "Economics and Organization of Production" of FerganaPolytechnic Institute
1988-1990 - trainee-researcher of Moscow Engineering and Construction Institute (MISI)
Named after V.V. Kuibysheva
1990-1993 - postgraduate student of full-time training of TsNIIOMTP of the State Union of the USSR (Moscow)
1993-1998 - Director of the Trade House of Tashkent Trade and Production Joint Stock Company
Ok oltin EU Society

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 10 , October 2019

1998-2000 - Deputy Chairman of the Board of AOOT "Fergana Textile Plant"
2000-2004 - Vice President of Uzbek-Korean SP Kabul-Fergana Co. LTD.
2004-2007 - Director of the private enterprise Maxi Service Center
2007-2011 - Director of Kuvasai Electric Networks Enterprise
2011-2012 - Engineer of the company "Fergana Electric Networks"
2012-2013 - Director of Kuvasai Electric Networks Enterprise
2013-2015 - Assistant, Senior Teacher of the Department "Service by Sectors of Housing -Public and domestic services "of Fergana Polytechnicinstitute

2015-2019 - Deputy Dean, Head of the Department of "BIKGCC," GCC "of the Construction Faculty of the Fergana Polytechnic Institute
2019 - BC - Senior Lecturer of the Department "Architecture" Fergans

1. 	2. 	3.