THE REPUBLIC KAZAKHSTAN MINISTRY OF EDUCATION AND SCIENCE

The East Kazakhstan State Technical University of D.Serikbaev

As the manuscript

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RESEARCH OF ESSENTIALLY NEW DESIGN OF LEADING ROLLERS FOR ROAD SKATING RINKS

6N0713 “ Transport, the transport technics and technologies ”

The author's abstract under the dissertation on competition of the academic degree
The master of sciences

The supervisor of studies:
The professor of chair «ТМ и О»
Дудкин М.В

Ust-Kamenogorsk, 2010

Industry and agriculture development is closely connected with expansion of a network of highways, increase in amount of works under the maintenance, repair and reconstruction of operating highways. Performance of these actions on the basis of the highly effective road-building technics and the equipment provides essential economy material, power and a manpower of productions in building and a road economy. It will demand application of new effective road technics which self-propelled smoothly-valtsovye skating rinks concern.

Now road building develops in a direction of increase in durability and durability of roads that causes application for the device of road clothes of expensive materials and complicates technology. However the enclosed means and the spent efforts appear vain if the earthen cloth is insufficiently steady. Consolidation also represents the important component of technology of building of buildings and constructions. How projected works on consolidation also are realised, reliability, quality and durability of the finished object depend.

Therefore to the device of the strong and steady earthen cloth which are the base of a construction, the great attention is given especially. For reception of the most dense packing of particles of a material, coupling increase between them, road-building materials condense. Consolidation soils and other road-building materials – the cheapest and at the same time effective method of increase of durability and stability of an earthen cloth. The process of consolidation which is carried out by static or dynamic influence, essentially influences operational durability of separate building elements and a construction as a whole. Consolidation asphalts mixes conducts to reduction of air inclusions, and also to coupling increase between the particles making a mix. At consolidation of bulk materials and soils natural залегания, and also rubble pores are narrowed, and at consolidation of a damp material the water maintenance also is reduced.т Soils by the nature are rather various and consequently their physicomechanical properties are various. In the course of building them condense in different conditions – on the big areas, in embankments, on slopes, in trenches, foundation ditches, etc. All it causes various requirements to cars for consolidation грунтов. Often these requirements are inconsistent and consequently consolidation грунтов in road building cannot be executed any one or even two types of cars

existing now. The high density of a material is reached by a correct choice of methods of consolidation, parametres of applied cars and consolidation modes.

Pressure upon surfaces of contact of working bodies of cars with the condensed environment should not be above strength of environment. They should raise gradually from pass to pass or from blow to blow. At high pressures on a surface of contact of working bodies with a material there is a plastic current (expression) of a material from under working bodies. At to rolling it involves wave formation. At insufficient pressure the demanded density of a layer that will negatively affect the durability bearing abilities and durability of a road covering will not be reached.

A variety of types of condensing cars, and also their rather low productivity complicate technological process on erection of a road cloth, demand attraction of considerable manpower resources that, finally, raises cost of a unit of production by manufacture of works. It rises the price road building and frequently does not allow to use all types of road skating rinks with full efficiency.

Work urgency. One of the actual problems facing to the country, development of a network of highways with a firm covering is. Performance of the increasing amount of works on building of highways and their modernisation demands application not only qualitatively new technologies of building, but also new high-efficiency cars and complexes. Rates of development of motor transport and a turnover of goods demand an intensification of process of building of highways, increase in term of their service. The important element of technological process of building of highways is consolidation asphalts mixes.

As it is known, the technology of consolidation of a road covering skating rinks provides use, as a rule, several standard sizes of skating rinks. It is caused by specificity of consolidation of road coverings and a choice of necessary "dosage" of condensing influence. So, in the beginning of process of consolidation for prevention of shift of a material it is necessary to condense a covering with small loadings. In process of increase in degree of consolidation of a covering apply

heavier skating rinks which create an elevated pressure вальца on a basic surface, i.e. for manufacture of sealing works sometimes it is required to use three and more various skating rinks. Application of rollers of a traditional design does not allow to design the universal skating rink providing optimum parametres of consolidation of road-building materials even for some passes on one trace. Therefore working out of a design of a skating rink with by a wheel variable curvature is actual. One such skating rink is capable to replace some skating rinks with usual rollers that, is doubtless, actual at present dearness of technics. Preliminary researches have shown that similar decisions in foreign and domestic practice are not present.

In territory of Republic Kazakhstan of industrial production of road skating rinks or condensing rollers to them – is not present, therefore the given work is actual and competitive in the technological market of Republic Kazakhstan. The basic suppliers of road skating rinks to Kazakhstan – Russia, Germany and China. In Russia in research of consolidation of road-building materials by road skating rinks with changing contact pressure, basically, were engaged in МАДИ (ТНАТ), Moscow, SibAdI, Omsk, ТГТУ, Tver. Now working out of the new, effective equipment for consolidation of road-building materials in these HIGH SCHOOLS, except for SibAdI, is not conducted.

The work purpose. Working out of the road skating rink raising efficiency of consolidation of road-building materials for the account of change of contact pressure condensing wheel of a skating rink in a zone of contact to the condensed surface, decrease in expenses for manufacture at the expense of reduction of the nomenclature of the skating rinks applied in road building, improvement of quality of a road covering.

Object of research. For research the condensing equipment a road skating rink is accepted.

Positions protected in work:

Results of modelling of kinematic and power parametres of the condensing equipment a road skating rink;

Results of experimental researches by definition of influence of operating modes of a road skating rink with changeable geometry вальца on efficiency of process of consolidation soils mixes and on work-load the condensing equipment;

Practical value of work. The expediency of equipment of a road skating rink вальцем with changeable geometry is proved and its efficiency is estimated.

Recommendations about perfection of condensing workers of bodies of road skating rinks and a design procedure and optimisation of parametres of the condensing equipment with changeable geometry are developed.

Publications. By results of executed researches 2 printing works are published.

Work has experimental and theoretical character. The laboratory experiment, which analysis of results is presented in the third section.

THE BASIC MAINTENANCE OF WORK

In introduction the problem urgency is shown, problems, a subject, object of research are defined the purpose. Hypotheses and the positions which are taken out on protection are formulated, scientific novelty, the practical importance of work reveals.

In the first section results of the review of the scientific and technical information which analysis has allowed to draw a conclusion on expediency of application of a road self-propelled skating rink with changeable geometry wheel, providing change of contact pressure condensing wheel a skating rink in a zone of contact to a condensed surface are presented.

In the second section the choice and a substantiation of the technological scheme wheel with changeable geometry of curvature rim is made. The offered skating rink allows to change contact pressure wheel for a material, and at

installation – dynamically to influence a condensed material, thereby, creating peak efficiency of consolidation, reducing structural resistance of a material to deformation and optimum dosing out size of contact pressure that will allow to condense road materials, reaching factor of consolidation of Ku=1 and more, at smaller number of passes on one trace. As a whole use of such skating rinks is capable to affect essentially rates of building of road constructions and expansion of a network of highways in our country and abroad. Application of a skating rink with changeable geometry of condensing rollers will allow to intensify process of consolidation of road-building materials and to improve working conditions of the machinist.

In the third section laboratory research is presented. The purpose of experimental researches is check and specification of the basic theoretical positions, a choice of rational parametres and operating modes of various working bodies of the road skating rinks adapting for the condensed environment. At carrying out of experimental researches some problems were consistently considered:

1) Experimental definition of dependence of factor of consolidation of a material from curvature radius wheel in a zone of their contact. These experimental researches were spent serially on model вальца with changeable curvature обечайки in a zone of contact to the condensed environment and the experimental stand for research of road skating rinks;

2) Experimental definition of influence of design data of skating rinks with the working bodies adapting for the condensed environment, on consolidation soils, asphalts mixes and other road-building materials. In the given section of dissertational work techniques of experimental researches of efficiency of influence of various design data of working bodies of a skating rink on the condensed environment are presented.

In the fourth section theoretical research of working process of a road skating rink with the working bodies adapting for the condensed environment is

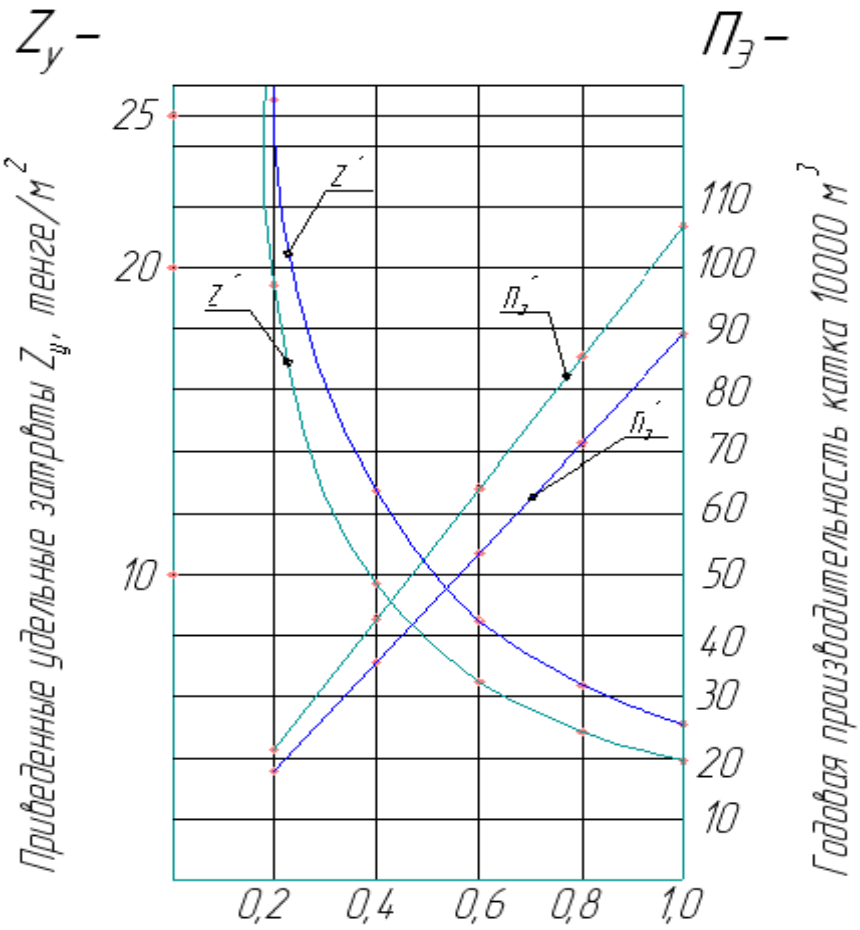
stated. The analysis of the intense and deformed condition of rings in three cases loads shows that for constructive realisation two cases are suitable. The first case corresponds to a ring stretched by two forces. This case of deformation can be realised both in a variant with wheel, and in a variant with compulsory deformation by two rollers with two supporting rollers in a perpendicular direction.

The second variant corresponds to a ring with local deformation allowing to change, at rather small efforts, in wide ranges curvature radius wheel in a zone укатки

In the fifth section calculation of economic efficiency of a skating rink with changeable geometry of the leader wheel which has shown that at installation вальца with changeable geometry on a road skating rink of a class 8,5 т probably reception of annual economic benefit to 1342495 tenges on one car of type ДУ-47Б at preservation of efficiency of consolidation of materials, increases in a thickness of a condensed layer of a material, and also reduction of quantity of passes of a skating rink before achievement of the set factor of consolidation of a material is made.

The analysis of graphic dependences (drawing 1) shows that with increase

Thickness of a condensed layer of road-building materials operational annual production rate of a skating rink linearly increases, and the resulted specific expenses, accordingly, decrease.



Drawing 1 - the Schedule of dependence of productivity of Pe and resulted specific expenses Zy from a thickness of a condensed layer h0

Experimental researches executed on the natural sample of a road skating rink, and also the technical and economic analysis have proved possibility of increase of efficiency of road skating rinks at the expense of application wheel with changeable geometry. Research of condensing ability wheel with changeable geometry has allowed to establish that it is capable to condense qualitatively asphalt a mix.

The mathematical model of working process skating rinks of the static action, establishing interrelation of kinematic parametres, a twisting moment on a shaft of a drive, efforts on levers of the mechanism of deformation rim with design data, operating modes and physicomechanical properties asphalts mixes is developed. It is established that the mathematical model is adequate to real processes of interaction of working body with asphalts a mix at consolidation by results of the analysis settlement and experimental data of research of the

condensing equipment of a road skating rink, the divergence of results does not exceed 12 %.

Operating modes of a road skating rink consolidations providing the maximum degree asphalts mixes are defined.

Experimental researches have allowed to establish for -

load working body from operating modes.

Dependences for an estimation of efficiency of road skating rinks on productivity and specific indicators which can be used for more exact estimation of efficiency and a technological level of road skating rinks are specified.

Results of researches and their analysis have allowed to define a direction of the further works on increase of efficiency of road skating rinks:

Definition of influence of modes of consolidation, amplitudes of fluctuation in horizontal and vertical planes of working bodies, methods of physical modelling and in the conditions of bench tests that will allow to investigate more quantity of influencing factors on productivity of a road skating rink; working out and creation of microprocessor system for maintenance of the automatic control of density, adjustment and management of modes of consolidation of working body of a road skating rink depending on change of physicomechanical properties asphalts the mixes, allowing to raise quality of works and to save power and material resources.

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