

Ivan Avgustovich TIME - precursor of scientific approach to wood machining

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Abstract: *Ivan Avgustovich. TIME - precursor of scientific approach to wood machining.* The theory of wood cutting. In 1870 University I.A. Time published a book on wood cutting. The book has been quoted by many authors dealing with machining but it seems that their knowledge of Time's was limited to citing ascertainties which are repeated in literature. The authors decided to search out the book to look at Time's line of reasoning and elaborate his research method. The book is kept in Warsaw University Library collection.

Keywords: Ivan Avgustovich Time, wood machining, book, Warsaw University Library

INTRODUCTION

The theory of wood machining is a knowledge which describes physical side of machining process, describes laws of new surfaces shaping, explains facts and gives qualitative and qualitative description and also evolves methodology computations.

MAIN STAGES IN DEVELOPMENT OF MACHINING THEORY

First searching directions: it is the school of I.A.Time, in which his students used in research mechanical and mathematical analysis of machining process. Works of M.A. Dieszevoj (M.A. Дешевој), Z.A. Voskriesiensi (C.A. Воскресенски) when researching the resistance of materials during machining use analysis of forces action and chip behavior during wood cutting with elementary knife.

Currently problems connected with wood machining are published in numerous publications: *Amalicki (2005)*, *Amalicki and Ljubczenko (1977)*, *Amalicki and Saniev (1992)*, in textbooks: *Ljubczenko (2004)*, *Glebov (2001)*, *Bierszadzki and Cvietkova (1975)*, *Ivanovski (1975)*, *Lisican (1996)*, *Zakrzewski and Staniszewska (1997)*.

Finding out that Ivan A. Time influence on development of this scientific discipline was so immense the authors tried to find out the above-mentioned scientific work as later works were easily obtainable *Great Soviet Encyclopedia (2001)*.

The searches started from University libraries in Central Europe. Unfortunately even in the libraries where other his publications were obtainable this very publication wasn't. The search was also conducted in Russia but without any success. Meanwhile it turned out that the book can be found in the collection of Warsaw University Library. After scan of it was obtained the authors analyzed its content trying to compare it with contemporary findings.

In his work Ivan Avgustovich Time describes cutting process. As a result of chips' classification, explains the phenomenon of contraction (change of dimensions being a result of plastic deformation), stating that the thicknesses and widths of cut layer affect cutting in different ways *Time (1870)*.

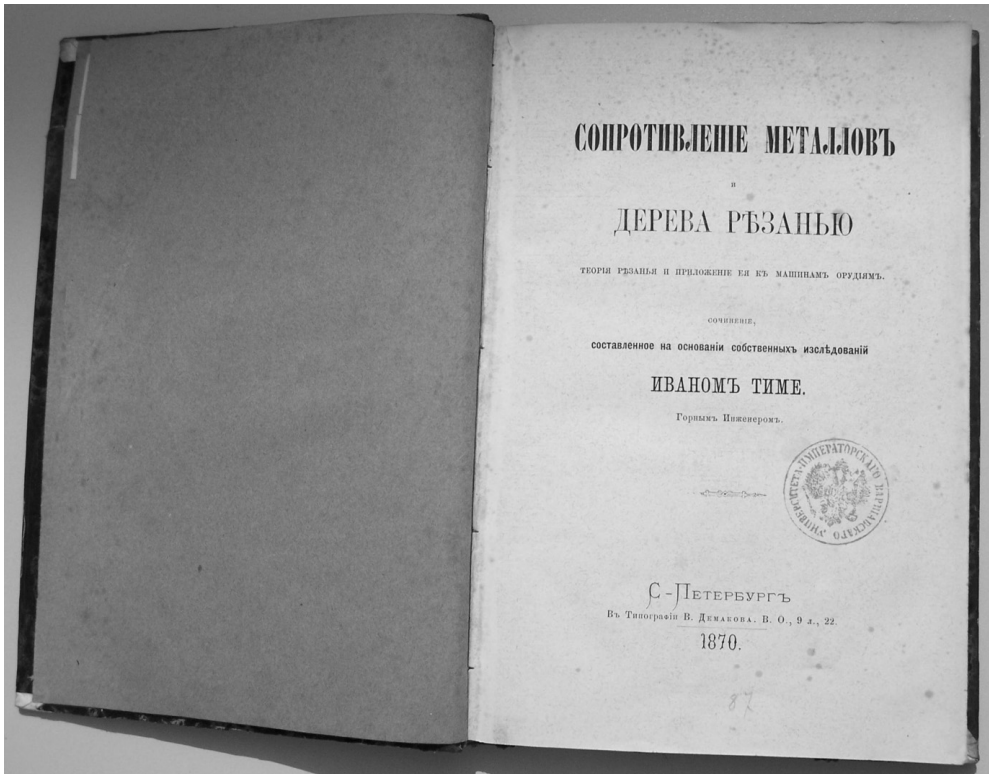


Fig. 1 The title page of Ivan A. Time's book

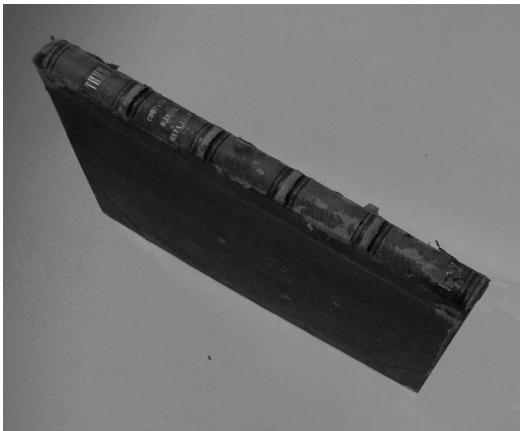


Fig. 2 The view of the book



Fig. 3 Warsaw University stamp from the XIX century

On the basis of experiments Time determined dependences between cutting force and dimensions of chips and cutting layer. He also showed intermittence in chips' separation.

He considered fibrous structure of wood and suggested considering longitudinal, transverse and tangential cutting. To calculate cutting force he proposed to use $F_x = K \cdot b \cdot a$ formula,

where: K - appropriate cutting work [J / cm^3];
 b , a - width and thickness of chip [mm].



Fig.4. Ivan Avgustovich Time creator of modern wood machining theory

In the beginning of his work Ivan A. Time affirmed that for a given machined material value K - appropriate cutting work, is constant and pressure force is different, proportional to width and thickness. Later he stated that cutting smaller chips requires more force than bigger ones. Specific cutting work should diminish together with growing dimensions of chips. Width and thickness of machined layer influences cutting force.

So Ivan A. Time was the first scientist to come to the right conclusion that width and thickness of machined layer have different influence on cutting force. He studied the cutting process at low speed which is shown in the picture enclosed. The drive of cutting device was constructed on the basis of gravitation - hanging weights, and cutting force was realized on lever. In the end of his work he ascertains that knowledge of machining theory is essential in practical work of engineer technologist dealing with production of wood products.

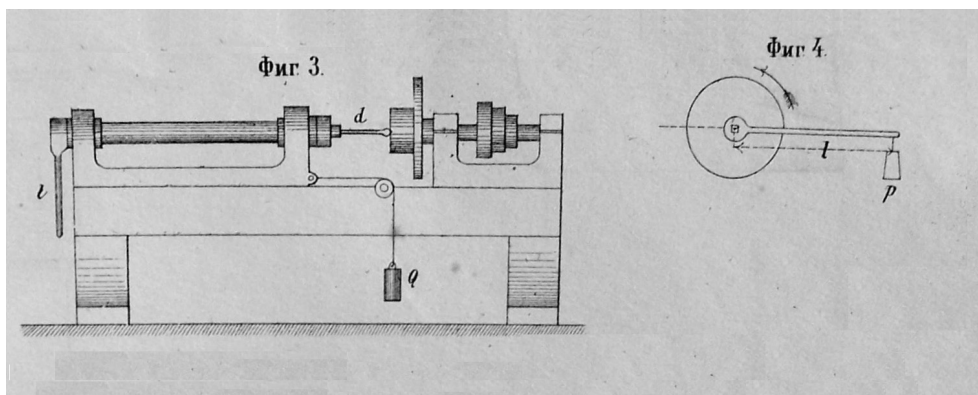


Fig.5. Time stand

Such knowledge enables choosing right cutting regimes on woodworking machines, control quality productiveness of work, limit losses during production process etc.

REFERENCES:

1. AMALICKI V.V. 2005: Stanki i instrumenty lesopilnogo i dierevoobrabajuszczego proizvodstva. Izd. Lesnaja Promyszennost. Moskva.
2. AMALICKI V.V. and V.I. LJUBCZENKO 1977: Stanki i Instrumenty derevoobratyvajuščich predprijati. Izd. Lesnaja Promyšlennost. Moskva.
3. AMALICKI V.V., SANIEV V.I. 1992: Oborudovaniye i instrument derevoobratyvajuščich predprijati. Izd. Ekologia Moskva.
4. BIERSHADZKIJ A.L. 1958: Rezanje dreviesiny. Goslebumizdat, Moskva.
5. BIERSHADZKIJ A.L., CVIETKOVA N.I. 1975: Rezanje dreviesiny. Goslebumizdat, Moskva.
6. CVIETKOVA N.I. 1975: Derevoobrabajuszczie stanki i instrumenty, Izd. Vyszejszaja Szkola. Minsk.
7. DIEŠEVOJ M.A. 1936: Mechaniczeskaja Technologja Dreviesiny. Izdat. ONTI Leningrad.
8. GLEBOV I.T. 2001: Rezanje dreviesiny. Učebnoje posobje. Jekaterinburg.
9. IVANOVSKI E.G. 1975: Rezanje dreviesiny. Izd. Lesnaja Promyszennost. Moskva.
10. LJUBCZENKO V.I. 1996: Rezanje dreviesiny i dreviesnych materialov.
11. LISIĆAN J et. al. 1996: Teoria a tehnika spracovanja dreva. Mat-Centrum, Zvolen 1996.
12. TIME I.A. 1870: Soprotivlljenje metałlov i diereva rezanju. Peterburg.
13. VOSKRIESIENSKI S.A. 1955: Rezanije dreviesiny. Goslebumizdat, Leningrad.
14. ZAKRZEWSKI W., STANISZEWSKA A. 1997: Obróbka cięciem. Wydawnictwo Akademii Rolniczej, Poznań 1997.
15. The Great Soviet Encyclopedia, 3rd Edition (1970-1979). © 2010

Streszczenie: *Ivan Time prekursor naukowego podejścia do obróbki drewna.* W 1870 roku Ivan A. Time wydaje w Petersburgu książkę poświęconą skrawaniu drewna. Na książkę tę powołuje się szereg autorów zajmujących się obróbką skrawaniem, lecz wydawało się, że ich znajomość pracy Timego ograniczała się do cytowania stwierdzeń, które powtarzają się w literaturze. Postanowiono zatem odszukać pracę Timego, aby można prześledzić tok jego rozumowania, oraz uszczegółwić metodę badawczą którą się posługiwał. Poszukiwaną książkę znaleziono w zbiorach Biblioteki Uniwersytetu Warszawskiego.

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