POLISH ACADEMY OF SCIENCES
INSTITUTE OF PHILOSOPHY AND SOCIOLOGY

DESIGN RESEARCH IN PROGRESS

WARSAW 1987

DESIGN METHODOLOGY UNIT

DEPARTMENT OF PRAXIOLOGY
AND THE SCIENCE OF SCIENCE

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INTRODUCTION

The growing interest in the theory and methodology of practical sciences and design called our attention to the need for compiling a directory of studies carried out in this field.

Besides facilitating communication among researchers, the aim of the directory is to create a data base for making a synthesis of accomplishments and pointing out the observable trends in the development of research.

The information presented in the Design Research in Progress comes from responses to a questionnaire sent to design researchers we known personally, authors of well-known scientific publications, and participants in many international conferences.

Unfortunately, we were unable to reach many persons with considerable success in this field and also failed to receive responses to some of our questionnaires. We also omitted information received in response to the questionnaire concerning the design of specific machines or equipment. Rather, we included information concerning research on design and on practical sciences which has methodological values.

The present edition of the Design Research in Progress lists, however, 153 investigations, 122 research teams from 17 countries.

The format of the entries follow the format of the original questionnaire:

Name of principal investigator — Adress of principal investigator
Other investigators

The title of project

Date initiated - Date completed (or estimated date of completion)

Description of project

Publications

All projects are numbered on the left margin. The name of principal investigator is used for purposes of alphabetizing and it is underlined, as well as names of other co-principal investigators.

If a principal investigator has more than one project listed under his name, they are designated by Roman numerals, and listed in order of project commencement date.

We do not regard this edition of Design Research in Progress as closed. In the future we intend to reach new people and research centres and to supplement - as the data comes in - the information presented here.

Therefore, we kindly request everybody involved in design research and research in practical sciences to answer the questions contained in the questionnaire (see page 85) and to send it at our address.

1 Altshuller G.S. (I)
Theory of solving
inventive tasks
1946-1985

Social Laboratory of the Theory
of Invention
Nyeftyepyeryerabotchikov 108
370 119 Baku-119,
USSR

Studies aiming to create a new method for designing systems and solving inventive tasks, based on simultaneous investigations of laws governing the development of technical systems discovered through analysis of a large collection of patent information. The design process in this approach is regarded as revealing, analyzing, and overcoming technical antinomy. The findings are used to develop techniques for teaching a new design method. Present works concentrate on further studies of the laws of new systems, creating a system of models to solve typical design tasks, stimulating investiveness and forecasting, and also elaborating a program for the algorithmical solution of untypical tasks.

2. Altshuller G.S. (II)
Borodastov V.G., Vertkin I.M.
Gerasimov V.M., Zlotin B.L.
Litvin S.S., Mitrofanov V.V.
Petrov V.M., Selutsky A.B.
Salamatov Y.P., Shteinberg V.E.
Semionov S.N., Ivanov G.I.

Theory of the development of technical systems
1985-1987

The essence of the theory of solving inventive tasks is formulation of laws governing the development of systems to use them in the design process of new systems. There laws (e. g. law of completeness of parts, law of passage of parts from the macro- to the microlevel, law of energetic conductivity of the system, consistency of factors) were discovered through an analysis of several hundred inventions. Besides this, the theory analyzes and systematizes relations between matter and energy, making it possible to create a system of models for solving typical inventive tasks. Deeply hidden technical con-

tradictions appearing in the process of solving these tasks can be surmounted by the algorithm developed, which is a collection of "tricks", and by operators that eliminate the inertia of thinking. Many valuable inventions were created by putting this theory into practice. The team is now working on a method for teaching the theory to engineers,students and pupils.

3. Antoniuk G.A.

Department of Philosophy
Byelorussian Academy of Sciences
Brovki 15a, Minsk
USSR

Methodology of social design
- 1986

Theoretical studies of the anthroposphere,understood as people's continually expanding sphere of live activity, as a global system embracing social activity and the world of nature. The commonly recognized necessity consciously shaping the anthroposphere as a homogeneous and highly organized whole leads to a postulate which would reconcile satisfaction of human needs with the simultaneous consideration of the laws and conditions of the coexistence of nature and societies. The basic condition for meeting this postulate is not only an adequate level of knowledge and technology,but also a form of government transforming society on the principle of equality and justice. The aim of global social design is to determine the optimal states of the anthroposhere in concrete historical conditions, satisfying changing demands made on this system.

4. Beitz W., (I)
Pourshirazi M., Susato A.

Technische Universität Berlin,
Institut für Maschinenkonstruktion, Konstruktionstechnik
17 Juni 135, 1000 Berlin
West Berlin

Models for computer-aided design
- 1986/87

In contrast to the traditional approach, a new procedure is consisting in determining step-by-step the optimal characteristics of the product with respect to its later realisation.

5. Beitz W., (II)
Pourschirazi M., Susato A.

Methodology for recycling design
1985

Principles for designing products allowing for their regeneration to facilitate their re-use.

6. Beitz W., (III)
Pourshirazi M., Susato A.

Assembly design
1985

Studies on design principles to facilitate assembly of units and individual products.

7. Bessant J., Appleby C.

Brighton Polytechnic, Department of Business Management
Moulscoomb, Brighton BN2 4 AT
Great Britain

Comparative analysis of relations between government and industry in Great Britain and the federal Republic of Germany
- 1985

This work presents the findings of a comparative analysis of the policy of Great Britain and the FRG in the foundry industry concerning ways of overcoming crises by the leading sectors of the fields analyzed. The findings, based on interview techniques and comparative analysis of the policy of both countries, show clear differences. The lack of consistence and fragmentariness in practical applications in Great Britain are contrasted with the cohesiveness of industrial policy in the FRG and integration of the sector analyzed.

Publication
Bessant J., Competition, technical change and the UK foundry industry. Steel Casting Research Journal, Autumn 1984.

8. Biggioggero G.F., Rovida E., Paolini G.

Politechnica de Milano
Sez. Disegno di Macchina
Piazza Leonardo da Vinci 32
20133 Milano
Italy

Methodical design of machine elements
1981-

A critical analysis is made of construction experiences and a statistical description made of data of a selected sample of machines, resulting in: a method for choosing a design solution for a specific function; a method for determining the dimensions of specific elements of machines; logical patterns of the design process. The main purpose of the studies is to develop through the use of computer technique: 1) a catalogue of mechanical functions arranged according to their complexity; 2) for every function - a list of design solutions and criteria for choice based on design requirements; 3) for every design solution criteria defining dimensions with the aid of tables and diagrams.

9. Bonkowicz-Sittauer S.

Institute of Computers
Krzywickiego 34,
02-078 Warsaw
Poland

Formalization of description and the computer-aided design process

1. An attempt to formalize description of the design process
   1983-1984
2. Methods for synthesizing programming for the computer-aided design process
   1983-1984
3. Algorithmization of design problems
   1984
4. Creation of utilizable programming - systems approach
   1984
5. Formal methodology for creating (a synthesis) various types of CAD programs
   1983-1985

A methodology for creating particular types of CAD programs was formulated by: studying both certain aspects of the design process itself (subject 1 and partially 2) as well as an appropriate classification of the possible types of CAD programs (subject 3 and partially 2) and also through an analysis of the method itself for creating (a synthesis) of computer-aided design programs (subjects 3 and 4). Subject 5, which sums up earlier stages of research, described various types of CAD programs depending on their internal structure. The basic feature distinguishing such programs was seen in the program means and also the basic type of design task the program is supposed to serve.

10. Borisov V.I., Lukashyn A.P.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Science-fiction and progress

A textbook has been written entitled "Science-Fiction and Reality", which discusses the main features of science--fiction literature, threated as a set of intellectual experiments whose study allows us to form a judgement on trends in the development of science and technology. The work also reviews the main problems areas that are treated in science--fiction literature: space, time, man and the environment, society. The experimental solution of problems in science--fiction, the errors and accomplishments of science-fiction writers are critically analyzed.

11. Bossak M. (I)

Center for Computer-Aided Engineering
Kolejowa 57,
01-210 Warsaw
Poland

Structure of the design process and goals of computer-aided design works
1984

This work describes the main stages of the computer-aided design process, with special emphasis on the role of design criteria. The factors on which computer-aided design success depends and the benefits it should bring are listed.

12. Bossak M. (II)

Mathematical modeling in computer-aided design
1984

This work discusses the features of physical and mathematical modeling which are essential for engineering applications and their role in the computer-aided design process.

13. Brandowski A.

Institute of Basic Technical Sciences, Higher Maritime School
Czerwonych Kosynierów 83,
81-962 Gdynia
Poland

A Study of the effectiveness of technical systems in ships
- 1985

The basic conclusion of this work is that effectiveness is common feature of the system and realization of its operating process. The physical factors influencing effectiveness of the system are shown and a cybernetic model of the system's effectiveness presented. A general formalization of an effectiveness model is made by introducing vector and synthetic measures of effectiveness. Simulative and analytical models as well as the Markov model for evaluating a system's effectiveness are shown.

14. Brenner M.A.
Deviatkin S.P.,
Deviatkin N.A.

Social Laboratory of the Theory of Invention
(see Alstshuller G.S.)

Typical ways of overcoming technical antinomies
1986

Studies on the mechanisms for overcoming technical antinomies are being carried out as part of the theory for solving inventive tasks. A few dozen typical ways of overcoming technical difficulties are presented which in the process of solving inventive tasks comprise a multi-storeyed, hierarchical system. On the lowest level are elementary ways, on a higher level - a few ways (trick and counter-trick), and on the highest levels a combination of ways and physical effects. The higher up a given way of overcoming contradictions, the more complicated the task which it can solve. Further studies are planned in the search for new effective ways of overcoming technical antinomies.

15. Buchman I.B., Altshuller G.S.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Working out a method for conducting scientific-research and experimental-design works by the use of the theory for the development of technical systems and functional-price analysis

The work analyzes development processes of technics, with special emphasis on social needs, economies of materials and labor. Considering the fact that the development and improvement of technical systems should be realized with the least use of materials and labor during the entire life cycle of a system, an improved method for conducting scientific-research and experimental-design works was formulated.

16. Bunge M., Tobar J.F.

Foundations Philosophy of Science Unit
3479 Peel St.
Montreal, Canada

1. Ontology of artefacts
   1984
2. Epistemological problems in technology
   (work in progress)
3. Ethical problems of technology
   (work in progress)

This work is devoted to the central problem of the philosophy of technology, i.e. the ontological properties of artefacts. The concepts of real and formal artefacts have already been explained; hence this work explains the ontological status of formal artefacts in a fictitious way by means of conceptual materialism. Since artefacts are one of

the design goals in engineering, this work analyses some features typical of design: the way from an idea to production is examined from the viewpoint of the technological process; the problem of optimization; the evaluated and systems context for creating a design (considering the basic and applied sciences, technological knowledge, sociology and economics, production and art). This work also analyzes some philosophical problems appearing in the design of artefacts.

17. Chajtman S. (I)

Institute for Organization of the Machine Industry, Orgmasz
Żelazna 87, 00-958 Warsaw
Poland

Methodological foundations for identification and design of information systems
1977

1) Decomposition of the economic-productive system and isolation of the information system; 2) Modelling links between productive and information processes in the economic-productive system; 3) The concept of designing and identifying an information system. A methodology is presented for designing economic-productive systems and, more broadly, so-called ergotransformational systems, starting from the assumptions and regularities of the multisectoral decomposition of the system and the trisequential structure of productive and information processes. These assumptions lead to certain laws for modeling connections between individual groups of processes and make it possible, i.e. to determine the conditions for designing information systems.

18. Chatman S., (II)
Żysik M.,
Siedlarski J.,
Strojnowski Z.,
Siedlecki M.

A method for the decomposition of systems for the technical

preparation of production
in the machine-building industry
1982

Using the idea presented in the above work, components of subsystems for the technical preparation of production in the enterprise were systematized. The scope of these subsystems and relations with neighboring plants were more precisely defined. A systematic table was worked out compiling technical preparation processes and processes guiding the technical preparation of production. This table serves i.a. as the methodological basis for designing informatization of the processes and systems of this production.

19. Chajtman S. (III)

Information systems and processes
- 1986

This work develops theses presented in works 1 and 2, expanding the notion of the operational structure of processes and also the systematic arrangement of informational--controlling processes in the enterprise.

20. Khomenko N.N.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Selection of the minimal task
- 1985

The aim of the work is to explain the selection of the minimal task, i.e. a task whose solution, with minimal changes in a given technical systems, makes it possible to eliminate its deficiencies.

21. Churches A.E.,
Frost R.B.

School of Mechanical and Industrial Engineering
The University of New South Wales
Post Office Box 1

Kensington N.S.W.
Australia 2033

An evaluation of the role of computers in mechanical engineering design courses
1985

This work analyzes fields of design engineering in which computer-aided teaching promises to attain certain goals of teaching design, namely, increasing its comprehension, broader knowledge and engineering thought. To attain these goals, however, caution in the introduction of computer-aided teaching is recommended.

22. Cross N.
Glynn S., Cross A.

Design Discipline
Open University
Milton Keynes
Great Britain

Design epistemology
1980-1985

These studies have the aim of explaining the epistemological foundations of design knowledge and to justify the claims of "design-creative" ways of acquiring knowledge. The studies identify the epistemological foundations of cognitive acts and design practice, identify the epistemological concepts relating to design "secrets". The authors hope to make a synthesis of various concepts and principles that will lead to the first satisfactory epistemological formulation of the main aspects of "design-creative" ways of acquiring knowledge.

23 Sawidowicz W.

Institute of Culture,
Ministry of Culture and Art
Senatorska 13/15,
00-075 Warsaw
Poland

27. Deviatkin S.P., Deviatkin N.A.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Application of ways for eliminating technical antinomies as well as physical effects and phenomena in the solution of inventive tasks
1984-1986

The work creates a bank of information indispensable for discovering regularities appearing in the elimination of technical contradictions during the solution of inventive tasks.

28. Deviatkin N.A., Deviatkin S.P.

Influence of science-fiction literature on creativity of engineers
1984-1987

Studies on the influence of contemporary science-fiction literature on the development of creative imagination are conducted during teaching of the theory for the solution of inventive tasks to students of the people's university for scientific-technological creativity (Ishimbay, Baskirian ASSR). It is planned to use the findings in the teaching of design engineering.

29. Farber B.S.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Solution of inventive tasks at the macrolevel
- 1987

The work (using Altshuller's general theory of the development of technical systems) concerns choosing macrolevel

mechanisms for inventive solutions from the existing set of technical solutions. A table of "micro-macrolevel" analogues has been developed containing a set of corresponding physical effects and mechanical constructions based on them which can serve as the basis for new solutions. For example, the geological effect (change in the viscosity of liquid under the influence of an electrostatic or magnetic field) is replaced by interaction among microwaves to assure clearance between the resistor and the surface of a printed-circuit board.

30. Fiey V.R.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

The law concerning passage of working elements of technical systems to the microlevel
- 1985

The work concentrates on one of the laws of Altshuller's general theory of the development of technical systems, namely, on the law concerning the passage of elements of technical systems to the microlevel (the level of powder, molecules, atoms, electrons). In most cases this passage is equivalent to the search for a physical effect indispensable for solving an inventive task and hence - finding concrete mechanisms, principles, ways of realization. The work defines the number of levels, discovers rules for synthesis of structures at a particular level and rules governing these structures. A diagram for acquiring knowledge of these levels is presented and criteria introduced for assessing the perfection of a technical system according to the number of levels set in operation. An algorithm has been worked out for the passage of a technical system to the microlevel.

31. Frost R.B.

School of Mechanical and Industrial Engineering, The University of New South Wales Kensington, N.S.W. Austrialia

A systematic strategy for functionally representable design tasks
1983

Procedures are described which can be useful in formulation of design tasks when they can be represented by a given number of dependencies containing a particular number of variables. The use of these procedures, arbitrarily adapted to the requirements of the designer, can considerably reduce the design time thanks to avoidance of improper methods. The procedures depend on the structure of the system defined by relations between elements and on the choice made by the designer. The final product of these procedures is a network of actions or several alternative networks of actions making possible the effective completition of a specific design task, if possible without repetitions. If this is unavoidable, however - operative optimization is used.

32. Gasanov A.I.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Regularities of the development of administrative-managerial and employee systems
1984-1987

The aim of these studies is to discover typical ways of overcoming conflicts between administrative-managerial and employee systems and also to classify them to create an information bank for managers. The theoretical and methodological base for the studies is Marxist-Leninist dialectics, Altshuller's theory of the development of technical systems,

the theory of large systems, social and general psychology, and information theory.

33. Gasparski W., Amanowicz M, Frieske K., Langowska U., Miller D., Slowikowski J., Strzalecki A., Marczynski R., Tempczyk H., Tyszka T., Wrona S.

Design Methodology Unit
Department of Praxiology and Science of Science, Institute of Philosophy and Sociology, Polish Academy of Sciences
Nowy Swiat 72,
00-330 Warsaw
Poland

Science of design. Elements of knowledge on design
- 1986

The first attempt of this kind to make a synthesis of knowledge on design based on studies of design carried out in various scientific disciplines: above all methodology, psychology, decision theory, information science, sociology, philosophy, economics, ergonomics, and organization of design. The work is intended for persons interested in design as a social phenomenon, above all for teaching design and for students in departments of practical (applied) sciences. Scientific-Technical Publishers plans to issue this work in book form.

34. Ginalski J.

Academy of Fine Arts
Department of Industrial Forms
Smolensk 9
Cracow
Poland

Design process of an industrial form for a product with a high degree of complexity motor-car case
1984

The work is documented with materials from designs of motor-cars made in the years 1977-1981 by a team of designers of the Department of Industrial Forms AFA in Cracow for

the Motor-Car Factory in Bielsko-Biala. The specific features distinguishing the design process of an industrial form from the complete design process are presented and described and conclusions listed concerning authorship in multiperson teams.

35. Gortshakov I.P., Altshuller G.S., Sorokin A.A.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Improvement of the forms of work of students in training and research
1980-1990

The work presents findings of studies carried out in one of the departments of the technical institute for aviation, in which the theory of solving the inventive tasks is part of a new subject introduced: training-research works of students. During the practical activities, students are given tasks which are divided into schooling tasks, which are solved through theoretical knowledge, and practical tasks, which are solved through scientific-research work carried out by individual departments or commissioned from the outside. Experience has shown that this method stimulates creative thinking during studies.

36. Grätz J.F.

Ruhr-Universität Bochum
Lehrstuhl für Konstruktionstechnik I
Universitätsstr. 150
POB 102148, 4630 Bochum 1
FRG

Model algorithms for establishing three-dimensional geometry in an optional limitation of surfaces in computer-aided design
1983

The work presents a plan (created within existing programs for computer-aided three-dimensional construction of analytically simple surfaces of the first and second order) for integrating surfaces of a higher order in one complete model. Much attention is focused on preserving existing systems philosophy defining the precise definition of a surface as a synthesis of geometry and topology. For surfaces of a higher order intraprogrammatic assumptions of geometry and topology reveal only those parts of a developed surface which are found inside its limiting contours.

37. Gregory S.A.

22 Crescent Road
Stafford St17 9AL
Great Britain

Observation of the phenomena of design and designing; Epistemology and axiology of design; Influences on the designer's roles; Design and expert systems; Object characteristics and the purchaser; Design as a corporate strategy activity; Measurement of design effectiveness; Management and design; Design technology and its transfer
1963 -

Design and the design process are studied as an object of scientific observations and the practical application of design knowledge and processes. The data come from field surveys, laboratory observations, protocols, reports, and documented statements on professional work. These data may concern special aspects of design or can come from fields professionally associated with design, e.g. management science, or through behavioral connections - from phychology. The set of these data makes it possible to test statements concerning a design and the process of its creation, to identify those aspects which require further study and also makes possible creation of the basis for a system of experts. Applications in running enterprises, management and connec-

tions of design at the strategic level with running enterprises and market policies.

38. Hiler C., Golembiewski J., Kalwak J.A., Myszkowski R., Podlejski K.

Institute for Electric Metrology
Wroclaw Technical University
B. Prusa 53/55, 50-371 Wroclaw
Poland

A method for visualization of measurement results
1985-1989

The work presents findings of studies on perception of visual information given in the form of so-called animated hypertests. Animated hypertests have a graphic form reflecting a person's ideas on an object studied or arbitrary form of a geometrical figure to whose shape and dimensions the parameters measured are ascribed. For example, subjects were shown a figure in the shape of an amoeba with many arms, and it was found that symmetry of a 12-armed amoeba is perceived after an exposure time of 1.6 s. and parameters that change - after an exposure time of c. 6 s. Further studies concern perception of texture and gradient of the surface quality of hypertests of various types.

39. Jackiewicz W.

Committee for Urban Planning and Architecture
Polish Acedemy of Sciences
Katowice
Poland

Architecture not only of the theatre
1984

This monograph contains theoretical investigations on theatre architecture, reflections on results attained in designs and their realizations, discussions of specific technological solutions and shaping the environment with a view to participation in manifestations or gatherings.

40. Jakunin V.V.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Reduction of functionally identical devices in the tasks of radiotechnology and radioelectronics
1985

Using concrete examples from radiotechnology and radioelectronics, this work demonstrates the regularity of development and necessity for reducing functionally identical devices. Solutions concerning reductions of devices of this kind and examples from radiotechnology and radioelectronics are presented.

41. Jaskula Z.

Department of Foundations of Power Engineering Machines Construction
Institute of Power Engeneering Machines and Equipment
Silesian Technical University
Konarskiego 22,
44-110 Gliwice
Poland

Introduction of the science of construction
1985

This work concerns the logical-formal foundations of operational significance for machine design and construction. It refers to general knowledge of systems and to design-construction knowledge. The introduction presents findings of methodological studies of the foundation of the science of construction and in further chapters: the conception of the logical-formal bases of this science concerning three problems - ontological, holistic, and teleological approaches to the subject of design and construction. Generalizations on the highest level of abstraction are present-

46. Jungermann H., (II)

Fleischer F.

Construction and evaluation of scenarios
1984-1986

The work is devoted to constructing and testing a method for evaluating the quality of scenarios understood as a hypothetical description of what will happen in the future. It is anticipated that a bidirectional procedure for constructing a scenario (progressive and regressive) will be elaborated based on conclusive models of technological processes, making it possible to estimate the influence of new technologies in information and communications during the next 20 years.

47. Kalugin I.B., Biba V.N.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

The principle of extreme properties
1985

The work makes it possible to forecast the general properties of physical and other phenomena on the basic of existing properties. It is planned to use this work to discover the general properties of technical systems on the basis of existing properties.

48. Korner E.

Institute of Library Science and Scientific Information
Warsaw University
Nowy Swiat 59,
00-046 Warsaw
Poland

Design stages and information needs of designers
1983

The work covers the following problems: scientific-technical and economic information in the professional work of the designer; stages of investment design; information needs of designers in light of the literature of the subject; studies of information needs of designers in individual stages of design in the main study-design center of housing construction Inwestprojekt in Warsaw.

49. Keys P., Jackson M.C.

Department of Management Systems and Science, University of Hull
Cottingham Road, Hull HUG 7RX
Great Britain

Role of the systems approaches in problem-solving
continuous

Analysis of the contribution of systems approaches of various kinds to the solution of problem, especially by managing directors of organizations. The authors argue that theoretical knowledge in this field is necessary for executives for a better understanding of problems appearing in practice. Problem contexts were analyzed and classified according to two factors: degree of complexity of a given system and the degree of agreement of decision makers on the goals of the system. Problems in various problem contexts are best approached by various systems-oriented methodologies.

50. Kitajima K., Yoshikawa H.

Department of Precision Machinery,
Faculty of Engineering,
The University of Tokyo
Hongo 7-3-1, Bunkyo-ku, Tokyo 113
Japan

Hierarchical machine design system HIMADES-1 based on the structure modes for machine
1984

53. Kondrakov I.M.

Institute GD CO AN USSR
Krasnyi prospekt 54, Novosibirsk,
USSR

Regularities of the development of scientific systems
- 1987

The work presents studies on the discovery of objective regularities of the development of scientific systems; their aim is to create an algorithm for the solution of a particular class of discovery tasks.

Publication
Algorytmizacja rozwiązań zadań odkrywczych (Algorithmization of the solution of discovery tasks). Projektowanie i Systemy (Design and Systems), Vol. V, 1983, Ossolineum, Wroclaw.

54. Kostov K.H.

Center for Science of Science BAS
Sofia, Sierdika 4
Bulgaria

Design model for research automation system
1980

The work presents a system for the automation of studies made up of the following stages: construction of the model, development of the design model and the design itself. The model reveals the structure, links and relations between system components. Subsystems are distinguished: forming, source, transforming, integrating-differentiating, informational, controlling, and diagnostic-correcting. Using these subsystems for decomposition, a creating model is obtained. The first creating model is regarded as an initial model (M_0). After theoretical analysis and experimentation, correction and description of the model takes place, leading to the elaboration of a new model (M_1). If M_1 does not fit the conditions, a second model M_2 is elaborated and so on till the design model is reached. Experiments on models M_0

M_1, M_2, ..., K_m are done through the use of simulation programs.

55. Kotarbinski A.

Research Team for Architecture and Urban Planning
Department of Technical Sciences
Committee for Architecture and Urban Planning
Polish Academy of Sciences
PKiN, 00-901 Warsaw
Poland

Assessment of the state of architecture and urban planning in Poland
1980

This work evaluates architecture and urban planning in Poland on the turn of the 1970s as field of practical endeavors. The generally unappreciated importance of these fields in the national economy is described, especially in its subsystems: administration, spatial economy, and science. A synthetic outline is presented of architectural and urban planning projects after 1970, showing reasons for worsening of the environment and landscape in Poland. The generally unsatisfactory or poor state of spatial economy in various branches is highlighted (housing, industry, agricultural and rural development, construction, services, transport and communications), showing limitations imposed on urban planning and architecture by fields with higher priority in the department system, other reasons for the poor condition and suggested directions of improvement.

56 Kowalski J.

Universidad de Guanayuato,
Facultad de Ingenieria en Salamanca
Apdo. Postal 215 Suc. "A",
36700 Salamanca, Gto,
Mexico

An operational strategy for mathematical modeling in optimal construction design of machines
1984

A modeling strategy is presented based on the systems approach, making possible quality control of objects designed and in general useful for parametric and substructural optimization. A method is also described for choosing structure in optimal design. The framework of the conception is a hierarchical two-levelled modeling system, controlled according to the classification principle of the model of objects.

Publication
Modelowanie obiektów konstrukcyjnych w projektowaniu optymalnym (Modeling construction objects in optimal design), Warsaw, WNT 1983.

57. Kreynina S. — Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Project of a secondary school textbook "Theoretical foundations for the solution of inventive tasks" - 1985

The aim is to elaborate the draft of the textbook for pupils in the upper grades, containing the following problems: law of the development of technical systems, algorithm for solving inventive tasks, development of creative imagination, application of physical phenomena and effects to the solution of inventive tasks.

58 Krupa T., (I)
Kalwas L., Kasprzyk S.,
Krawczynski M.,
Laczynska D.,
Matulka E., Ostrowska T.,
Poponczyk T.,
Zajaczkowski P.,
Zebrowski W.

Institute of Management
Warsaw Technical University
Narbutta 85, 02-524 Warsaw
Poland

Idea of a data processing system for modernization needs of an enterprise in the machine industry
1981

The work attempts to formulate an idea for a data processing system useful for the on-going modernization of the enterprise. The studies have elaborated functions and structures of a system together with a plan of actions necessary for its design, realization and practical application. The work contains: 1) a model of a producing enterprise open to changes (adaptational model) and considering economic results as a measure of the goal of the enterprise's operations; 2) structural aspects of the construction and functioning of an enterprise; 3) theoretical aspects of the task data base together with an apparatus for formalization of the task model of an enterprise; 4) a diagnostic apparatus to assist introducing variants and assessing programs of modernization. The work lays the basis for creating an automated method for designing modernization based on an original idea of the task model of an enterprise and adequate system of data processing.

Publication
O badaniach systemowych. Próba analizy empirycznej poglądów polskich badaczy systemowych (On Systems Research.An Attempt of Empirical Analysis of Polish Systems Research Workers? Views), Projektowanie i Systemy (Design and Systems), Ossolineum, Wrocław, 1984, VI, p. 149-160.

74. Lewicka-Strzalecka A. (II)

The systems approach as a methodological attitude. Empirical analysis of the views of representatives of the practical sciences
1984

This work presents the theoretical foundations, method and results of investigations whose aim was the empirical identification of the systems approach in the process of solving well - and ill - structured practical problems. It was assumed that the systems approach is a special kind of methodological attitude which can be identified by means of a specially constructed tool for this purpose, made up of 18 bipolar constructs that are dichotomous methodological rules. These constructs were isolated in the course of descriptive analysis of works in systems studies and methodology of science. Two groups of persons were studied:group 1 consisted of persons declaring the systems approach,group 2 - not identifying with it. It was assumed that identification of the systems approach consists in showing the differences between these two groups. Through statistical analyses the factorial structures of methodological attitudes were obtained in four separate situations, while tests of statistical differences of factorial results made it possible to describe the determinant of the systems approach. Moreover, the groups were compared with respect to all constructs jointly. It was determined that a synthetic measu

of the systems approach is a discriminating function obtained as a result of a multidimensional discriminative analysis.

Publication
The systems approach as a methodological attitude. An empirical analysis. /in/ R. Trappl. (ed). Cybernetics and Systems Research. '84. North-Holland 1984, pp. 53-60.

75. Lewicka-Strzalecka A. (III)

Scientometric Analysis of systems science
1985

A scientometric analysis was made of systems science on the example of 132 papers contained in materials of the "Seventh European Meeting on Cybernetics and Systems Research". Science was treated as an information system in which information carriers are scientific publications. It was assumed that the collection of 1660 bibliographic references cited by the publications is an information stream steering this system and is the source of new and important information on systems science.

Publication
Is "Cybernetics and Systems Research" a system? A scientometric analysis. /in/ R. Trappl /ed./. Cybernetics and Systems Research. '86. Reidel. Dordrecht, p. 1-8.

76. Likhachev A.Y. (I) — **Social Laboratory of the Theory of Invention** **(see Altshuller G.S.)**

Studies on the specifics of solving creative tasks in biology and medicine
1980

This work discusses similarities and differences between the solution of creative tasks in biology and medi-

cine and in technology. Their most specific features are holisticness, historical inheritance, the relatively meager research and systematization in this field, and the changeability of biomedical objects connected with this difficulty. Hence the comprehensive study of biomedical creativity requires that the existing heuristic methods be refined and developed. The work explains certain peculiarities of solving biomedical tasks and constructing models that will be useful in practice and help to obtain results.

77. Likhachev A.Y. (II)

Specifies of constructing a data bank on medical-biological effects with emphasis on the principle of holisticness
1984

This work formulates the principles for constructing a general information data bank (containing the foundations of knowledge, structure, functions, measurements, etiologies of illnesses, therapies, concepts and theories) on the solution of creative tasks in the medical-biological field. Long years of experience in constructing data banks in technology were used as a guide. To carry out multiaspect inquiries this work suggests the introduction to a data bank automatic recoding of data from its general informational and searching part to its heuristic part. This can be presented in the form of a matrix; difficulties are presented by a description of geometrical and topological properties, unclearly defined relations and not logical and numerical properties. For the solution of tasks the formalism developed in physics by J.N. Kulakova is suggested.

Publication
Use of mathematical methods in developing medical and biological data and the use of ETO in medical technology.
Moscow, p. 16-18.

78. Lis S., (I)
Wagner K.

Institute for Organization and Management,
Warsaw Technical University
ul. Narbutta 85, 02-524 Warsaw
Poland

Elaboration of an organizational analysis of the design cycle and completion of modernization
1982

The work discusses the main flaws of the existing way of designing and modernizing machine construction enterprises and suggests a new way, whose main features are continuity of the modernization process and division of the design process. The general model of technological-organizational design of modernization presents the concept of long-range design, suiting programming an enterprise's development and the design of modernization projects. For each of these cases a structure was worked out of the design process divided into design modules for which functions and inputs (data) and outputs (design results) were defined. Requirements are also presented on a base of indices and standards and also conclusions resulting from computer-aided design.

79. Lis S., (II)
Buluk J., Nosowski W.,
Siudak M.

Rhythmicity of the productive process-disturbances and their compensation
1982

This work is devoted to the theoretical and practical problems of identifying and compensating for disturbances in productive processes. It contains synthetic generalizations of extensive empirical material and long years of theoretical studies in organization in conditions were disturbances are present. The authors made a detailed analysis of dis-

turbances and developed a number of models to compensate for them, enabling them to be effectively overcome.The work contains suggestions of a method for describing a productive system for the needs of simulative investigations in conditions where disturbances are present.

80. Langowska U.

Design Methodology Unit,
Department of Praxiology
and Science of Science,
Institute of Philosophy
and Sociology
Polish Academy of Sciences
Nowy Swiat 72,
00-330 Warsaw
Poland

Systems analysis of the science of organization and management in Poland in the years 1963-1976
1979

This work presents a method for a scientometric analysis of a scientific discipline regarded as a system, more precisely as an information system. This is the first attempt to use this method in the analysis of a practical discipline, namely, the science of organization and management in the years 1963-1979. Two problems are emphasized: description and analysis of the structure of the front of scientific investigations and study of the structure and character of information channels (periodicals) through which information flows in the science in question. To deepen the qualitative analysis of the science of organization and management qualitative studies of this discipline were carried out which were supplemented with a poll of experts' opinions.

Publication
Systemowa analiza nauki o organizacji i zarządzaniu w Polsce w latach 1963-1979 (Systems analysis of the science of organization and management in Poland in the years 1963-1979). Wyższa Szkoła Pedagogiczna, 1984 Opole.

81. Maver T.W.,
Susseck H.C., Bridges A.H., Clarke J.B., Stearn D., Macrandall D., Forrest I., McLean D.

ABACUS,
Department of Architecture
and Building Science,
University of Strathclyde
George Street, Glasgow,
Great Britain

Computer-aided design in architecture
1979

Studies and development works are being carried out on computer-aided design in architecture. The main subject of these studies is the decision making process in architecture.

82. Mikhailov V.A.,
Sergieyev S.T.,
Tolstova M.V.,Ignatyeva V.P.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Study of chemical effects and ways of using them in the qualitative development of technical and chemical systems
1981-1990

This work concerns the use of chemical effects (consisting in metabolism alone or in the use of accompanying phenomena such as: emission or absorption of energy, formation of gasses, change of volume) in the qualitative development of technical systems, consisting in the shift of their tools from the macrolevel to the microlevel. Collections of patents and analysis of chemical procedures for the elimination of technical and chemical difficulties appearing in the qualitative development of technical systems

led to the formulation of new methods which have importance in the creation of technical systems.

83. Mieszkowski Z. (I)

Initial Design Team
Department of Architecture,
Silesian Technical
University
Pstrowskiego 7,
44-101 Gliwice
Poland

Elements of architecture design
1986

This work attempts to define the factors (physical, biological, psychological, and social) influencing architecture.An analysis was made of the factors isolated against the background of men's primary and secondary needs and against the background of the social and geographical environment.

84. Mieszkowski Z., (II)
Grzybowski A., Glazer A.
Rendchen G.

Developing single family housing in highly industrialized areas
1984-1986

This work defines the special functional features of the home and housing comple. in highly industrialized areas, hence in a specific social and geographical environment. An attempt was made to formulate programs, systems and technologies for single family construction adapted to the conditions of the environment.An idea was also presented for the development of forms of urbanistic complexes of great intensity, simultaneously ret ining the full program for satisfying the needs of residents.

85. Miller D.

Design Methodology Unit,
Department of Praxiology and
Science of Science,
Institute of Philosophy and
Sociology
Polish Academy of Sc.
Nowy Swiat 72, 00-330 Warsaw
Poland

Informational aspects of design
1986

Design is considered here as an information process.It is assumed that the knowledge of the designer is material which he processes during the design-creative process and an instrument by means of which he penetrates reality. The purpose of the research is to discover what knowledge the designer has in practice,what the relationships are between the amount of this knowledge and design conditions. Some topics studied were: what knowledge the designer has and would like to have, limitations in acquiring the necessary knowledge, what individual traits of the designer influence the communication process among designers, on which basis the designer judges that the knowledge obtained is correct.

86. Mitropulos M.

Educational Video Resources
M.I.T.
Massachusetts Avenue
Cambridge, Mass. 02139
USA

Citizen participation as access in cable TV systems in USA
1981

This work reviews 3500 cable TV systems in the USA, then reducing the number of systems worth further analysis to around a dozen. The author concentrates on those which ensure two-way communication. Comparative studies were made considering technical-economic and socio-political parame-

ters of participation in the system. Problems connected with this were analyzed, especially the possibility of abuses. The work shows the practical implications of the systems analyzed in urban design and also in organization of link-ups of the islands of the Mediterranean and Aegean Seas in Greece.

87. Murashkowsky Y.S.,
Murashkowska I.N.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Formulation of theories of artistic systems
1979-1985

The work is an attempt, based on Altshuller's theory of the development of technical systems, to construct a theory of the creation of artistic systems. The basic assumptions of the theory are the following: the process of solving an artistic task is examined as a process of revealing and overcoming an artistic contradiction; the basic object is the means of expression; artistic systems develop according to objective laws. The studies are presently concentrating on: discovery of laws of synthesis of artistic systems; improving methods for the creation of artistic systems; formulation of an algorithmic program for solving artistic problems; formulation of a method for teaching theoretical foundations.

88. Murzewski J.,
Sowa A., Machowski A.,
Gwozdz M., Mlynarczyk A.,
Majcher K.

Department of Metal Structures
Institute Materials and Design of Building
Cracow Technical University
Warszawska 24, 31-155 Cracow
Poland

New problems of the theory of construction safety
1985

Design problems of steel structures are discussed with the use of the probability theory of reliability.

89. Nadler G.,
Perrane R., Peterson J.,
Yussen S.

Department of Industrial and Systems Engineering,
School of Engineering,
University of Southern California
Los Angeles, Ca. 900089-1452
USA

Decision aids in the planning and design of high technology processes
1985-1989

This work attempts to construct a suitable paradigm indispensable for transferring already existing theoretical points of view and practical methods in the decision making field and also creating new decision making aids to the planning and design of advanced technology processes. For the development of contemporary technology clearly shows that decision making methods are indispensable when engineers and managers of productive systems need support and stimulation in familiarizing themselves with new technologies. These situations require creative definition of options and alternatives. Existing decision making techniques are unreliable in untypical situations, however, apart from the fact that they are burdened with serious flaws connected with the ways of linking interests of people and organizations. Furthermore, what is most dangerous is that they model existing systems, making them dependent on existing technologies. Hence in situations requiring intuition, capacity for making judgements and evaluating information, in situations of uncertainty and incomplete knowledge new decision making aids should support new technologies.

90. Nalimov V.V.,
Drogalina J.N.

Interdepartmental Workshop for
Statistical Methods
Moscow State University
Laboratory of Mathematical
Theory of Experiment at the
Biological Department
Leninskiye Gory, Moscow V-234
USSR

Probabilistically oriented
philosophy
1970-1990

The inquiries aim at formulating a vision of the world conceived in a system of probability concepts. The idea of the probabilistic approach to the design of experiments was presented in two books /1/, the probabilistic interpretation of language in another work /2/. The approach presented here is close to Zadeh's idea of fuzzy sets, Derrid's criticism, and Korzybski's general semantics, and even Nitch's conception of infinite interpretations of a text. The authors also take up the philosophy and methodology of science in the probabilistic aspect /3/, the probabilistic understanding of processes taking place at low levels of consciousness, and also the probabilistic understanding of global evolutionism. In preparation are works concerning the human personality and ecology.

Publications

(1) Teoriya eksperimenta (Theory of experiment) Nauka, Moscow 1971;
(2) Probabilistyczny model języka (Probabilistic model of the language). PWN, Warsaw 1976;
(3) Faces of science, ISI Press 1981.

91. Narbut N.N., Narbut A.P., (I)
Gorodkin V., Budyko V.,
Kanevsky B.,
Konovalenko V.,

Social Laboratory of the Theory
of Invention
(see Altshuller G.S.)

Meleshko O., Peregrin G.,
Sorokous V., Jatsenko M.,
Altshuller G.S.

Dialectics of the design of technical
systems
- 1985

This work examine analogies between the use of technical dialectical materialism and historical materialism, pointing out the objective character of the development of technical systems and their dialecticalness. Also considered is the shaping of the worldview of the designer during the practical application of the theory for the solution of technical systems, stressing its dialectical-materialistic direction.

92. Narbut N.N., Narbut A.P., (II)
Gorodkin V., Budyko V.,
Kanevsky B.,
Konovalenko V.,
Meleshko O., Peregrin G.,
Sorokous V., Jatsenko M.,
Altshuller G.S.

Physical antinomies in technical
systems
1985

An important example of the appearance and elimination of technical antinomies in technical systems is a physical antinomy (we encounter this when for realization of a particular function of a system one of its elements should have the opposite properties). The work analyzed 35 cases of the elimination of physical antonomies and classified many of the physical effects and phenomena, showing how they may be used in the design of new technical systems.

93. Narbut N.N., Narbut A.P., (III)
Gorodkin V., Budyko V.,
Kanevsky B.,
Konovalenko V.,
Meleshko O., Peregrin G.,
Sorokous V., Jatsenko M.,
Altshuller G.S.

Long-range forecasting of technical systems
- 1985

Studies are discussed which concentrate on an analysis of hidden technical antinomies appearing in technical systems, which, in the opinion of the authors, will determine the development of technology on the future.The work analyses future technical systems that have no counterpart in contemporary technology, e.g. new sources of energy of the aurora borealic type and also shows the possibility of forecasting scientific discoveries in the long-range design of technical systems.

94. Oredelin A.P., — Social Laboratory of the Theory of Invention
Altshuller G.S. — (see Altshuller G.S.)

Formulation of a general model of the development of technical systems
- 1984

A logical-mathematical model is presented covering all of the laws of development of technical systems and subordinating them to the laws of dialectics. The graphical form of the model is designated by a line passing through points whose coordinates are the mean values of basic and positive indices of technical systems. The model also reveals a new law, in accordance with which the development of technical systems first proceeds on the level of the subsystem and

then the supersystem.Thanks to this there is specialization and universalization of technical systems, which is the basic form of their development.

95. Partyka M.A., (I) — Department of Mechanics and Machine Construction Foundations, Institute of Machine Construction, Engineering College, Oleska 114, 45-263 Opole, Poland
Anigacz W.,
Krzyzak A.,
Pankiewicz J.,
Pruszynski M.

Use of numerical systems structures for computer-aided design
1983

The work introduces structural notations to complex mathematical models of technical objects which are usually made up of a set of algebraic-differential-integral equations. The advantage of the use of numerical systems structures is the possibility of guiding the solution of complex mathematical models according to their real operation and not only according to abstract mathematical methods.

96. Partyka M.A., (II)
Anigacz W.,
Krzyzak A.,
Pankiewicz J.,
Pruszynski M.

The use of logical methods for the automatic creation of functional schemas of technical objects
1983-1986

The work concerns automation of the creation of functional schemas of technical objects; this requires consideration of typical functions which a designed object should perform as well as typical elements. For this purpose one should introduce the generation of functional schemas, as-

sessment of solutions obtained, and also the possibility of modifying and optimizing the solutions.This requires formalization of successive stages of computer-aided design based on information resulting from a physical model and also from the existence of interactions between the designer and the designed objects or the object of design. To accomplish this various algorithmic and heuristic methods as well as mathematical operator recordings of the physical model can be used.

97. Rubin M.S.,
Altshuller G.S.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

The irreversible dislogement of nature by technology
1982-1986

This work formulates the thesis that the expansion of technology and the dislodgement by it of the world of nature is irreversible. The existence of a world without nature, though in people's fealings terrible and impermissible, is unavoidable in the distant future. That is why one should prepare now for the take over by technology of all functions of nature, both technological as well as psychophysical.The work formulates foundations for long-range global forecasting consisting in an analysis of all of the basic functions performed by nature and the ways they man be realized by technical means.

98. Salamatov Y.P.,
Kondrakov I.M.

Krasnoyarsky Engineering and Construction Institute
Prospekt Swobodny 92,
Krasnoyarsk
USSR

Model of the evolution of technical systems
- 1984

Findings of studies are presented on regularites of the general structure of mechanisms of the development of technical systems. The studies consisted in a systems analysis of development processes of concrete systems made on a large collection of patent information. General regularities were revealed of technical systems at the stage of synthesis, utilization, liquidation as well as synthesis of a new technical monosystem. The model developed makes it possible to combine in one structure well-known laws of the development of technical systems and use them in the creation of new systems.

99. Samuel A.E. (I)

Engineering Design Group,
Mechanical and Industrial Engineering,
University of Melbourne
Grattan St., Parkville,
Victoria 3052
Australia

Educational objectives in engineering design

Studies are described whose aim was to test hypothesis on planning and characteristics of design engineering in the context of an attempt to connect the work of students in the department of industrial and mechanical engineering with the formal structure of education proposed by Bloom.

Publication
Education Objective in Engineering Design. International Journal of Instructional Science, 1984.

100. Samuel A.E. (II)

Creative design projects
1984

A revision is made of the general accepted and common view in design that the absence of structuralization of cre-

113. Strzalecki A. (II)

Methods and techniques for
developing creative attitudes
1985-1987

This work presents a conception and results of studies aiming at developing cognitively based methods for stimulating creative attitudes and the creative solution of problems. The subject of the studies was presented in the context of two fields: psychology of creativity and heuristics. With the tools constructed two groups of representatives of the practical sciences were studied: designers and scientists. Statistical analyses supplied data allowing a more through interpretation of psychological mechanism in the solution of problems.

Publication
The style of solving design problems: a note from the study of design creativity. Design Methods and Theories, 1981, 4, p. 127-136.

114. Strzalecki A., Amanowicz M. (III)

The design process and evaluation of
the relevance of design solutions
1980

The aim of the work is to answer the question: to what extent and in which aspects does correctness of the design process influence the level of relevance of design solutions. Correctness of the design process is understood as conformity of the individual manner of designing, evaluated by means of a questionnaire constructed for this purpose, with the accepted theoretical design model. Findings obtained in a specially constructed semantic differential measuring three factors were used as an operational measure of relevance: logical construction (form) of the design solution, level of its importance and effectiveness. The studies showed that the relevance of design solutions depends on the degree of use of designers' abilities and skills and also on the use of non-obligatory information, resulting from a designer's own inquiries and non-routine work methods.

Publication
Process projektowania a ocena relewancji rozwiazan projektowych (Wyniki badan empirycznych). (The design process and evaluation of the relevance of design solutions). Projektowanie i Systemy (Design and Systems), Vol. VIII, Ossolineum, Wroclaw 1986.

115. Strzalecki A., Targowska M. (IV)

Criteria for evaluating creative
design solutions
1974-1977

This work presents the findings of empirical studies whose aim was to define the semantic space of the concept creative design solution. A specially constructed semantic differential was used to study two groups: specialists from the Polish Patent Office and a group of designers. Independently carried out factor analyses made it possible to isolate the same set of three factors: formal clarity of the solution; degree of its importance and efficiency. The lack of statistical differences between the groups inclines one to believe that these dimensions (criteria) can be regarded as an operational definition of a creative design solution useful in basic research and at various levels of professional and social evaluation.

Publication
Semantic structure of the concept of creative invention: An explanatory study. Design Methods and Theories, 1976, 2, p. 112-117.

116. Stupniker Y.I. — Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Levels of technical systems
1985

Studies are described whose aim is to discover new regularities in the solution of inventive tasks with the passage from the system of one level to the system of another level.

117. Synowiec J.

Institute of Inorganic Technology and Mineral Fertilizers,
Wroclaw Technical University
Wybrzeze Wyspianskiego 27
Wroclaw
Poland

Technological design for chemical engineers
1986

This work, intended for technological engineers, discusses approaches to the comprehensive solution of problems connected with improvement of existing technological processes and the development of new ones.

118. Szücs E.
Balogh T., Bérczi S., Déri J., Drommer B., Földi T., Kardos Z., Nagy D., Schiller I., Urban I., Endrei W.

Eötvös Lorand University
Faculty of Sciences, Department of General Technics
Rakoczi, 5, H-1088, Budapest
Hungary

Studies on technology
1985

This work takes up i.a. the following problems: the general meaning of technical culture and its place in general education and culture; the use of microelectronics and robots in general education; equipping schools with computers; the systems approach in technics, information technics; modeling; studies in the history of technics; methods of studies, classification and systematization; the relationship between industrial design, ergonomics, and technical culture.

119. Takeshige A.,
Maeda Y., Koguchi T., Tomiyama T., Yoshikava H.

Department of Precision Machinery,
Faculty of Engineering,
The University of Tokyo,
Hongo 7-3-1, Bunkyo-ku, Tokyo 113
Japan

An operational frame system for computer-aided design
1985

This work presents the design process as tracing a series of points in a space of attributes and making them convergent in the final solution. To describe the design process in this understanding the authors used the concept of frames within which one can approach both objects as well as design methods. The operational frame system was used to develop an intelligent computer-aided design system (Designer's Work Bench) and an operating system for general use FRODRID (Frame Operating Systems for Design Integration with Relational Database).

120. Teisseyre W.

Institute for Organization and Management,
Warsaw Technical University
Narbutta 85, 02-524 Warsaw
Poland

Designing modernization and development of industrial plants
- 1986

This work takes up i.a. the following problems concerning the development and formation of industrial plants: relationship between the development of the construction of products and the development of plants; organization of the

design process; design in conditions of uncertainty; flexibility and adaptability; repeatability of design solutions; conditions of the effective operation of productive subsystems; assessment of design solutions; evaluations and decisions in the design process.

Publication

Wybrane zagadnienia metodologiczne projektowania technicznego. (Selected Methodological Problems of Technical Design). Wydawnictwo Przemyslu Maszynowego "WEMA", Warsaw 1978.

121. Tikhomenko I.G.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Methods for teaching children theoretical foundations of the development of technical systems - 1986

Findings are presented of studies whose aim is to develop teaching methods in physics lessons of the theoretical foundations of the development of technical systems. The aim of the methods is to develop habits and creative imagination and also the ability to perceive contradictions in technical objects, to anticipate qualitative jumps in the development of technical systems. The studies showed i.a. the influence of the experimental problems solved on increasing activity of children during physics lessons.

122. Timoshchuk A.A.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Studies of technical polysystems and nonlinear technical systems with the aim of creating foundations of a theory - 1995

The work concerns studies of technical polysystems (consisting in an analysis of large amounts of patent information), which led to the discovery of characteristic regularities of the development of these systems. Studies are also being conducted on nonlinear technical systems, characterized by the fact that they violate some of the practical principles of human thinking and action. The results obtained are presently limited to nonlinear geometrical systems.

123. Tomiyama T.,
Yoshikava H.

Department of Precision Machinery,
Faculty of Engineering,
The University of Tokyo
Hongo 7-3-1, Bunkyo-ku,
Tokyo 113
Japan

Production rule system for conceptual design PROSCODE-2

This work presents a description and specifics of the PROSCODE-2 system, serving e.g. as a controlling system with an integrated method of data description. It was conceived as an instrument of general use in computer-aided design (Designer's Work Bench). Among the essential features of this system are that the grammar of laws governing production does not require knowledge of computers by the user, that it makes possible progressive and regressive procedures, that it contains intuitive logic indispensable for obtaining the logical value called interminacy (besides "truth" and "falsity"), that it makes possible reasoning of the indeterminate type, and also that is contains calculus of predicates of a higher order.

124. Tomiyama T.,
Takeshige A.,
Asami N., Emoto K.,
Yoshikava H.

Department of Precision Machinery,
Faculty of Engineering,
The University of Tokyo
Hongo 7-3-1-, Bunkyo-ku,
Tokyo 113
Japan

128. Vertkin I.M.,
Altshuller G.S.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Social and technical forecasting based on an anal sis of the development of man's needs in society
- 1985

This work is devoted to incorporating in the theory of the solution of inventive tasks forecasting mechanisms based on studies of the needs of society. Since the application of the theory itself also changes man by developing his creative abilities, further studies were devoted to the problem of features of the creative personality and methods for evaluating it as well as the features characterizing the creative society.

129. Vikentiev I.L.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Creation of an information bank on the effectiveness of geometrical forms.
Regularities of the use of geometric forms in engineering
- 1992

The aim of the work is to create an information bank on various geometrical forms and to discover the regularities of using them in engineering. Collections of patents from various countries are being analyzed.

130. Vlček J.,
Petr J., Hora V., Sura M., Křemen J., Klvaňa J., Demel J., Vilhelm V., Přeučil M., Jelinek O., Hass S.

Faculty of Civil Engineering
Prague Technical University
Thakurova 7, Praha 6
Czechoslovakia

A systems theory of the dynamics of technical complexes
- 1985

The work analyzes systemic features of technical objects, their modeling and design, with the main emphasis on the dynamics of systems. The following topics are discussed: systems features of the technical object; idea of a model depicting systems features of an object; behavior of a system; architecture of a system - top-down design strategy and down-top design strategy; outline of a language for presenting the dynamics of systems, their analysis and synthesis as well as a computer program for implementing this language.

131 Volkema R.T.

Department of Business Administration, University of Wisconsin, Eau Clair, Visconsin 54701
USA

Problem formulation: a purposive activity

The work presents studies aimed at an understanding of the multiplicity of goals which can be supplied by posing problems at the stage of formulating a planning strategy. These goals can be functional as well as nonfunctional. Variables are studied which can help to identify nonfunctional goals.

132. Wales Ch.E.,
Nardi A.

Center of Guided Design,
West Virginia University
P.O. Box 6101,
Morgantown
USA

Teaching decision-making with guided design

147. Zhongyuan D., (II)
Keci Y., Wenzhi W.,
Xin L., Zongzh. G.

A survey of the development of design methodology
- 1985

A critical survey was made of the development of design methodology abrad which gives a general impression of its present situation, and tendencies in the near future.

148. Zhongyuan D., (III)
Keci Y., Wenzhi W.,
Xin L., Zongzhi G.

Application of design theory in technical systems. Suggestions for design in China
1985-1986

This work mainly concerns the industrial application of the results of design methodology.

148. Zhongyuan D., (IV)
Keci Y., Wenzhi W.,
Xin L., Zongzhi G.

Design methodology
1985-1986

This is a book for Chinese students and technical people who wish to get some basic knowledge and techniques in the field of design methodology.

150. Zlotin B.L.,
Vishnepolskaya S.V.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Use of the laws of the development of technical systems in forecasting the development of technology
1984-1985

Based on the theory of inventive tasks, studies are presented on the development of technical systems with the aim of discovering the concrete operating mechanisms of these laws and to use them in forecasting the development of technical systems. The findings of studies were compared with forecasts obtained by the use of traditional methods of technical forecasting.

151. Zlotin B.L.,
Zusman A.V.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Application of the theory of the solution of inventive tasks in functional-cost analysis
- 1985

The aim of these studies was to test the practical value of the methodology of the solution of inventive tasks in functional-cost analysis. The effectiveness of various elements of the theory were studied and the sequence of their application determined in analytical stages of functional-cost analysis of various types of objects and technical processes.

152. Zmyslowski A.,
Makomaski M.,
Kulczycki Sz.,
Slomski M.

Institute of Power Engineering and Metallurgical Equipment,
Department of Metallurgy,
Silesian Technical University
Krasinskiego 8,
40-019 Katowice
Poland

General methodology of the design and construction process
- 1990

The assumption is made that the design-construction process is an element of the superior process of the satisfaction of needs, which includes five stages: identification of the need, design, constructi ı, production, exploitation. The principle of achieving an optimum is a necessary and sufficient condition for an adequately rapid convergence of the process of satisfying needs with the identified need. The system and construction were defined in such a way as to obtain the greatest uniformity of the process of satisfying needs. The optimization process is later defined as the search for the optimal classification of technical needs. Further elements of the process of satisfying needs are described: construction, production, exploitation. It is assumed that fully adequate actions in all stages of the process of satisfying needs the verification process runs in an opposite direction. The object and structure of each of these stages are defined, especially design and construction.

153. Zusman A.V.

Social Laboratory of the Theory of Invention
(see Altshuller G.S.)

Formulation of the methodological foundations of the development of creative thinking in children based on the theory of the solution of inventive tasks
- 1985

A program and method are presented for teaching children (aged 12 to 17, classes 5-10) the foundations of creative thinking, containing dialectical thinking, i.e. techniques for discovering and resolving contradictions, the systems approach, ways of counteracting mental intertia and the development of imagination. The aim of the studies is to test assertions that teaching children is more effective than teaching adults in the development of creative thinking thanks to a higher level of imagination and lack of mental intertia. Methodological recommendations and specific subject matter content are made.

DESIGN METHODOLOGY UNIT, DEPARTMENT OF PRAXIOLOGY, INSTITUTE OF PHILOSOPHY AND SOCIOLOGY OF THE POLISH ACADEMY OF SCIENCE
Nowy Świat Str. 72, 00-330 Warsaw, Poland

QUESTIONNAIRE

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2. Name(s) of other participants in research (study), (indicate principal participant(s) with "x") .....

3. Title of research (study): .....

4. Name and address of the research unit (4.1) and its parent (sponsor) organisation (4.2.)
4.1 .....
4.2 .....

5. Date study was completed, or expected date of completion (study in progress), or expected dates of commencement and completion (study planned for near future): .....

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