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ALGORITHM OF LOGICAL OPTION AT THE DRAFT DESIGNING STAGE OF TECHNICAL OBJECT

Abstract: *In the paper scientific-technical problem of rising intelligence process level of choosing and designing technical objects is considered. As a result of comparative analysis of computer-aided design for the different areas of industry a basic problem, which envisages creation of the generalized scheme of automation of search and option of projects on the beginning stages of development of technical systems, on the example of gripper of industrial robot, times is certain. The algorithm of procedure of option gripper of industrial robot from the prepared constructor projects is realized stage-by-stage method. As in the article the problem of development of gripper of IR for machine building, consequently passing comes true to the division "Machine building" is executed.*

Key words: *computing design, logical option, draft design, gripper of industrial robot.*
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Introduction

With the purpose of development of separate industries of industry applications of innovative methods for automation of more universal systems of the constructor, technological designing are required. Researches of problems on creation of computer-aided designing for different areas of industry educed that consideration of the some unsolved problems present scientific and practical interest. It was defined that the worked out informative and mathematical supports of computing design of the technical systems software created a good basis for further development of direction of the computing design both in part of research-and-developments and in part of practical introduction [1, p. 35-36; 2, p. 234-240].

Taking into account experience of designing, creation and introduction of the technical systems, modern state of problem of application of the algorithmic and programmatic providing the computer designing, the following basic problems of researches are defined in the article:

- decision of a problem of inputting and saving necessary initials data in the database (DB) of designer;
- comparative analysis and choice of the existent projects;
- development of block-scheme of option of the projects from DB_i of corporate network of designers;
- creation of scheme of automation of option of the prepared project from DB_i of designer;
- development of algorithm of procedure of logical option [3, p. 23-31] from the prepared constructor projects (PCP);
- development of algorithm of option of the prepared projects from the database of Internet.

On the basis of the higher considered problems the general aim of the article is certain. The aim of the article is research of problems on creation of algorithmic methods for automation of process of complex option of the prepared projects [4, p. 454-460] and their preliminary designing.

Decision

The problem of designing of technical objects on the initial stage envisages procedure of automation of entry of basic data of requirement specification, where an application domain, name, setting, dates of planning project works, accordance of the designing object to the standard or non-standard elements, information about a customer and other necessary data, are determined [5, p. 18-21]. In the article, as an object of designing the problem of development of new gripper for industrial robots

functioned in the conditions of machine-building enterprise is considered. At first the automated option of industrial robots (IR) and technological equipments worked on the same manufacture module are executed.

Further from the educed designer, animation presentations of the grippers as a result of searching in the data base of the designers - international experts (IE_i), their types and models are determined. Control system of data base of the international experts - designers functions in Internet within the framework of the corporate informative system of designers [6, p. 12-16]

An important problem on the initial stage of designing is an analysis of basic data by the presence of the designed gripper for industrial robot. A comparative analysis and option of the existent projects is realized stage-by-stage in the different databases of the designers:

1. In the database of designer (DB_1);
2. In the database of the prepared projects of corporate network of the scientific research center (DB_2) of designers;
3. In the database of the prepared projects of Internet (DB_3);
4. Option of the list of the prepared projects from DB_1, DB_2, DB_3.

At first, algorithm of option of the projects from DB_i of the designers within the framework of local workstation is worked out. A query for option of projects includes the variants of basic data of the requirement specification, which were before saved in DB_1. In accordance with the expressions from the basic data and technical parameters of a gripper of an industrial robot [7, p. 121-130] for more exact option (Mammadov J.F. and Huseynov A.H., 2003), the following function is given:

$$W = \underset{x}{extr}\left\{f_1(X), f_2(X), ..., f_n(X)\right\} \qquad (1)$$

where f_1, f_2,..., f_n are constituents of the function: force of clamping of gripper of industrial robot F, geometrical sizes of gripper of industrial robot (fig. 1, presented in the constructor and illustrative program).

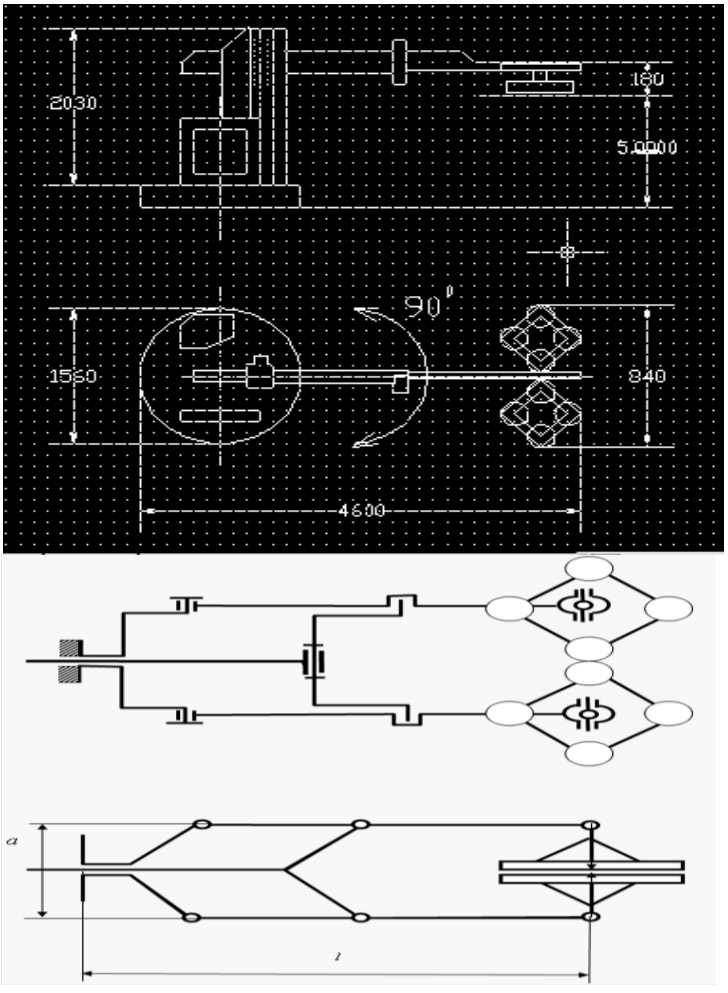

Figure 1 - Constructor draft and kinematics scheme of gripper for an industrial robot.

Taking into account the values of mass of the manipulated object of m_{ij} and predominance of mass of the gripper of m_{gij} from m_{ij} (coefficients taking into account mass of gripper of c_g and taking into account the type of drive of gripper of c_d) by means of the following terms, the gripper of industrial robot (IR) gets out with the required carrying capacity (C_i):

$$\textbf{\textit{If}}\ (\,[m_{i1}] \Rightarrow \text{gripper of IR} \cup (C_i = m_{i1}\ c_g\ c_d)\,)$$

(where $m_{i1} \rightarrow c_g = 1.4 \wedge c_d = 1.1$ for hydraulic motor),

Then (on the basis of characteristic parameters from a database, the search of the required type of gripper of IR is realized).

Thus, the following condition of limitation is taken into account:

$$C_i \le C_{\max}, \qquad (2)$$

where C_{max} - maximal value of carrying capacity of gripper of IR, that gets out from a database [8, p. 35-37]. Accordingly depending on their carrying capacity, type and construction parameters of gripper of IR is got out. Maximal tension in the cross runner of the manipulated object allows to choose a drive for the gripper of IR.

Setting the following condition

If ($\sigma_{mo} \le [\sigma]_u$)),

Then (from the database of the standard drives of gripper of IR, the most near by value of forces of clamp of the manipulated object is got out ($F = \sigma_{mo}S$), S – area, which exposed to the clamp (mm^2)) & (($F - F_{st}$) $\rightarrow min$, where F_{cm} – standard value of clamping the gripper of IR).

Presence of types of the gripper of IR, given in the database, and also the standard value of force of clamp and maximal value of carrying capacity of gripper of IR (C_{max}), which was determined on the higher presented query, allowed to executive computer option of non-standard element for the flexible automated cell (FAC_i) from DB in the system of MS Access.

At presence of variants of the prepared projects of gripper of IR its type and model is determined [9, p. 45-50]. The required constructor, technological calculations and drafts of the prepared projects get out from database of a designer, that are saved as a result of the informative cooperating with the experts of project (by a designer, technologist, mathematician and programmer). Terms of work of designer and experts of project are based on corporate informative cooperation, as a result of that list of working documentations saved in the complex control system of the bases of project (CCSBP). CCSBP includes requirement specifications of projects, their draft, working designs and results of experiments of these projects.

Under the general name of project of the personal database of designer, the scientific descriptions as articles, presentations, graphical and animation, mathematically calculation, technologically planned, control programmatic [10, p. 15-20] , and also programmatic bases of knowledge of logical search and option of project data.

The algorithm of procedure of option from the prepared constructor projects is realized stage-by-stage as follows:

1. From the list of menu "Application area", the suitable for an user area of setting of project is got out.
2. As in the article the problem of development of gripper of IR for machine building, consequently passing comes true to the division "Machine building" is executed.
3. In this area a menu of "Prepared constructor projects in $DB_1 \rightarrow DB_m$" is got out, where DB_m is database of prepared constructor projects of the machine building.
4. After activation of base of the prepared constructor projects 2-measure frame-clamping, separate drafts and their specifications are considered.
5. Decision-making about accordance of the prepared constructor projects to the requirement specification of a designer exists.

Conclusion

In the article the following results were got:

1. As a result of comparative analysis of computer-aided design for the different areas of industry a basic problem, which envisages creation of the generalized scheme of automation of search and option of projects on the beginning stages of development of technical systems (on the example of gripper of industrial robot) times is certain;
2. On the example of gripper of IR the problem of logical option from a database on its technical parameters is realized.

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