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Knowledge management in the design of welding conjugations

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Abstract: - In the process of welding the objective and subjective factors areexisting and the defects of welded joints may occur under their influence. The higher level of welded joints can be reached while using the weld joint design on the computer based programme. The expert system and it stucture of non-defect design of welded joints has been reviewed in the work. The programme helps to select the optimal welding parametres and allows decreasing of objective and subjective defects to occur as well as correcting welding arametres if any defect occurs.

Key-Words - knowledge management, database, expert system, non-defective design, database system, welding joints.

1 Introduction

Projecting welding conjugations and construction generaly are used universal systems of computer designe. But there are passinely polarised to particulary of projekting welded conjugations. Projector, non welding specialist, has “difficulties” to projekt qualitative welding construction, which would suit to constructional and technological specifications. Also there are used engeneering computer programs, where using of multiplex algorythm give tipical answers in doing tipical problems, but the algoryths doesn’t change. These programs sloves numeral information, but mostly problems of welding is very difficult to describe in numeral form. Mostly it is the selection priority of operation fulfill, welding tipe, equipment, material and ect.
That is why interest in expert system, where is used program tools of collective work, is growing. Suchlike expert systems alows to automize the solution of warious different problems, like projecting, design, diagnostic. It lets to colaborate effectively in generating projects.

2 Architecture of expert system

Information in existing expert systems mostly is designed to fixate. But major section of information (database) is changing constantly (like standarts, norms, materials, equipment and other) or may be unknown at all. In the intelectual system is the search of analogues and the acumulation of results. It means, system is shifting and perfecting constantly. Most inportant there is work of proceses computerising: creation of information base for single stage and for all process (intelectual algorythms), the designing of projecting enviroment (norms, materials, technologies).
Projecting the expert system of welded conections the were used program product of IBM – Lotus Notes & Domino, which is intended for tools of collective work.
The work success determines information, which is nessesary to compose new technology of conjugations, choosin equipment and material and prosecute welding operation. These

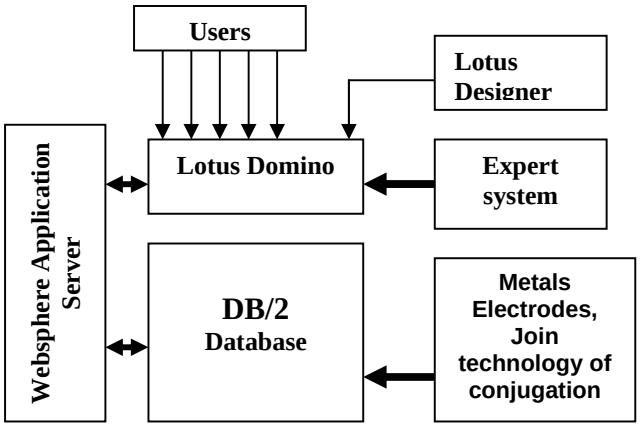
problems are confusing and contradictory. Of late years the change of situation in welding material and equipment market made difficulties for arrangment of technology. Besides, welded conjugations mostly are complicated construction and there is variety of used material.

Using tools of collective work gives new facilities for projecting systems (1 pic.):

1. one make connect to expert system server when he is far away;
2. database constantly is supplement with newest and most actual information;
3. user in each time can connect and use expert system and database;
4. various users can be connected contemporaneously.

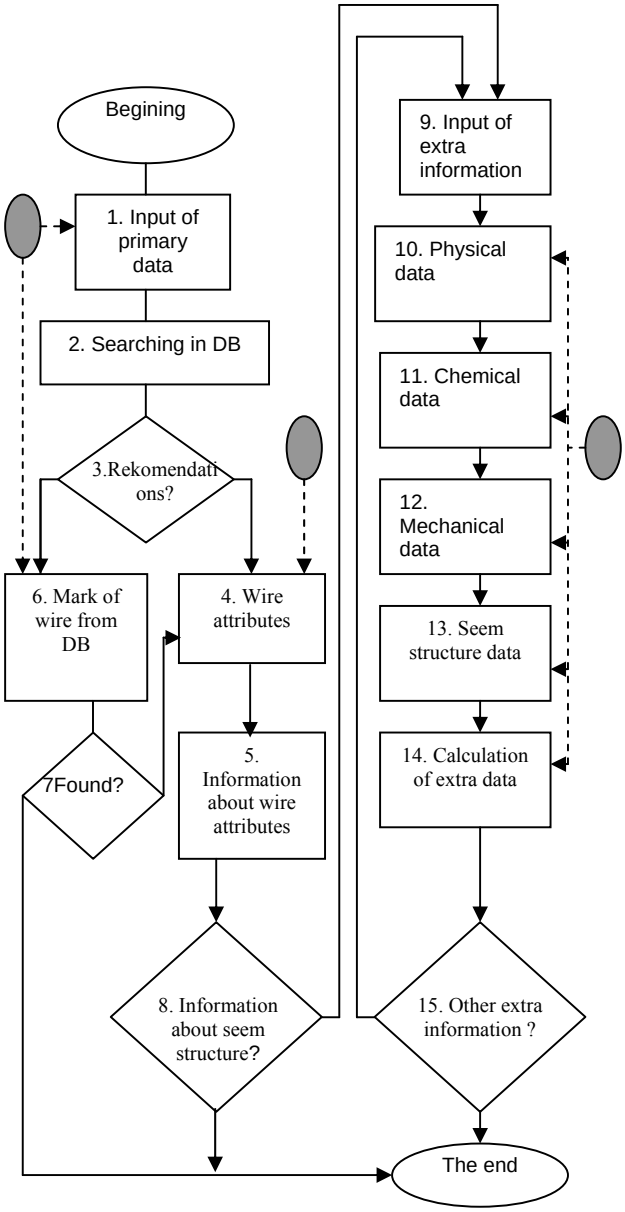
It secures quick and exact preparation of technology considering how quick situation will change.

Projected expert system by entered task (thickness of metal, tipe of conjugation, way of preparation, condition of welding, leading material) chooses the parameters for welding technology (number of passe, thickness of extra metal, current, kind and polish of current, intensy and ect.). The expert system operating when that user gives the task and he is instructing about the technology of works accomplishment and when there are welding problems – offering recommendations, how to eliminate or repair deffect and gives information about the reason of uprise.



1 pic. Administrate of information in projecting of welded conjugations.

Overlook the algorythm of working the expert system by example of selection welding wire (2 pic.).



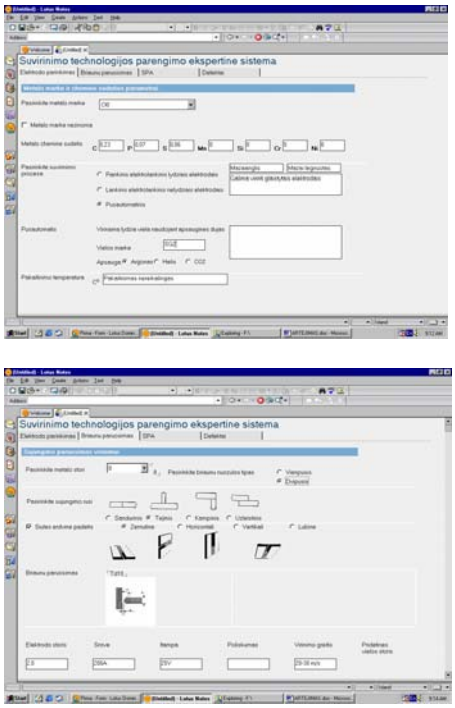
2 pic. The algorythm of choosing welding seem.

A traditional projecting system restricts first 5 blocks (1 – 5 bocks). User request, system in database (2 – 4 blocks) fill search is no welding

wire for choosen steel in database, system informs user about it (block 6).
The scheme of solution problem like this is easy, but doesn't supply user every time, because gived recommendations are inaccurate. In pic.2 (6 – 9 blocks) gived hardest – intelectual decision of solution of this problem.
Say, that if the user wants to have decision, he has to have information about seem structure and attributes of metal. In this case he answer "YES" to the question of 8 block, and he has an offer to give the parameters, which are in coments of block 9. The expert system gives parameters (attributes of seem metal and characteristics of stucture), which were counted by empyrical formules.
On dialog time is possibility of laxity; in soluting them there is needed big database. All decisious on dialog time takes user.
On pic.2 by dotted lines is showed work of user in computer system. Block 15 makes easier finding the optimal decision.
According to the user's answers, the software selects suitable variants from the database using the filter function. In such away, is easier for an engineer to select the most suitable welding parameters.

The expert system offen provides several possible variants of technological solution. As electrode thickness and current are not given in exact numbers, but in a range of possible numbers, this is the engineer who has to choose the exact onr. It is also in the competence of the engineer to choose the best variant from the several possible ones provided by the software.
Pic.3 shows a dialog window of variant selection. The user has to fill in the form and the welding joint output parameters are described.

The expert system provides the user with instructions of how to weld according to the given task and in case of problems should suggest how to eliminate or correct the defect or incorrect weld position. Having gathered all the necessary information about the defect, the software can make recommendations.



3 pic. The window of the expert system dialog.

In this expert system there is supsidiary function, which takes the choosen information and saves it in "welding procedure history" window, which suppose to Lithuania Respublic standarts LST EN 288-2+AI: 1998 and Europe standarts EN 288-2: 1992. The software fill in full window, using the information, which wrer given to expert system and the results.

3 Conclusion

1. The created expert system alows for the user to extend database, to change information and efectively collaborate in creating, using and controling information with other welding specialists.
2. The algorithm allowing the storage of databases and determining the connection with welding technologies is created.

3. The software able to make welding technology (calculate specific welding parameters) is created.
4. The created expert system can be used for selection of low-carbon steel welding parameters and data printing.
5. The program algorithm allows the regular expansion of databases and connections depending on concrete tasks.

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