SLIDE 1

Good morning, colleagues!

I glad to greet you. Today, I'm going to represent my work which has theme "Software package for optimal planning of polymeric material production with using genetic algorithm". That study was made in framework of Saint-Peterburg State Technological Institute's contract with the German companies Klokner Pentaplast and Maria Soel. That research was made as my graduation qualification bachelor's work.

SLIDE 2

Optimal planning of production is a hard task for multi-assorted production of polymeric materials where dozens of production lines and hundreds of orders with various types of materials are included into planning process. A qualified professional staff is needed to plan such enormous production. Whatever, if you have a qualified professional staff, task of planning may continue for two days.

Nevertheless, what to do if new orders appear, or re-planning of production is required? Only computer's technologies can help get resolve exactly and quickly.

SLIDE 3

The polymeric production is several production lines and order’s package to distribute between them. Each types of polymeric materials has its own time of production. There is time of line’s reconfiguration between each types of materials.

SLIDE 4

Unfortunately, we can’t reduce time of production materials, but we can reduce summary time of reconfiguration, replacing orders between lines. As a result, you create an optimal production plan for the distribution of orders over production lines in time. To draw up the optimal plan, a genetic algorithm was chosen.

SLIDE 5

The propose of the work is to develop a software package for optimal planning of multi-assortment production of polymeric materials using the genetic algorithm.

SLIDE 6

According to the problem, we can made the propose of this work. It is development of software package for optimal planning of multi-assorted production of polymeric materials using genetic algorithm. Now let's see work's tasks.

SLIDE 7

I’d like to note, more than 60 enterprises for the production of polymer materials in Russia are potential customers of the software package. Some you can see on slide:

SLIDE 8

What we can suggest? The expected economic effect will be more than 47,000 euros per year per extruder and includes the following on screen.

SLIDE 9

Now you can see formalized description of formation the optimal planning. We have three vectors: input vector – pack of orders, collection of product lines, parameters of reconfiguration; management vector – parameters of genetic algorithm; output vector contains production plan of distribution of orders between production lines.

SLIDE 10-11

Let’s define the problem of the creation optimum plan. We need to create distribution plan defined orders pack between defined production lines collection for same period of planning which time of reconfiguration or cost of production is minimum.

SLIDE 12

Our program has two parts: web-service and back-end server with database. Web-service manages a user’s interfaces and user’s information input/output, back-end server calculate optimal plan and manage work with database.

There is the main algorithm of program work, from user input information to output optimal plan.

SLIDE 13-14

Now you can see how a user can use our program. There are two types of users: administrator and production manager. Administrator can manage database, production manager able to calculate optimum plan for chosen orders and lines.

SLIDE 15

Maria Soel provided data on 58 orders, each of which has the following characteristics: film type, number of rolls, roll width, customer; 1 extrusion line with the following characteristics: restrictions on the mother roll, maximum speed, types of supported films. And data on the reconfiguration of the extruder when changing the nozzle, type of film, roll width and film thickness.

SLIDE 16

As a result of testing, it was found that these orders can be completed in 60 days 8 hours and 42 minutes, when according to Maria Soel these orders were completed in 60 days 10 hours and 45 minutes.

The constructed plan allows you to complete the same number of orders 0.13% faster.

SLIDE 17-18

* a formalized description of the process of constructing an optimal production plan for enterprises manufacturing polymer products was developed;
* a database structure has been developed for storing the characteristics of polymer products, the characteristics of production lines, cost indicators of production and orders;
* developed an application using information, mathematical and software;
* testing of the developed software package according to the company Maria Soell

As a further development of the project, it is possible to add:

* accounting for restrictions of the second kind (deadline for the execution of orders);
* reading a set of orders and parameters of production lines from Excel files and placing read information in the database;
* UI optimization for mobile applications;
* customization of the user interface depending on the selected company manufacturing polymer products