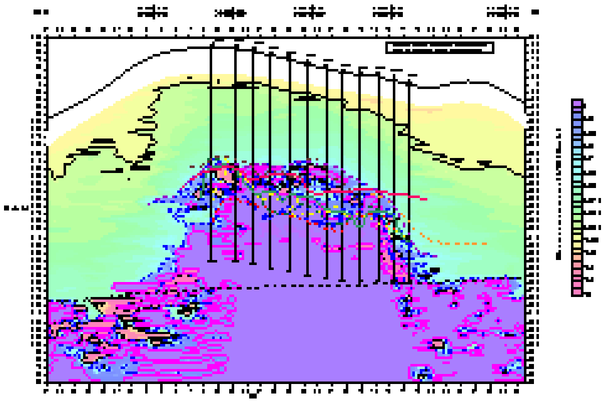

Fig. 3. Distribution boundaries of buried brines and level of Upper Cambrian aquifer system defined by electrical survey data

TDEM application yields good results for highly mineralized drainage brine investigations and it can be used to study permafrost rocks, to search for fault-fissured zones to establish landfill sites; moreover, to monitor distribution of injected brines in sites (Fig. 3). The main features of the method are large-scale depth and area coverage, high accuracy of measurements, enhanced value resolution with respect to cross-section parameters; great range of studied depths, simple operational technology.

Under certain conditions zones of regional tectonics in the upper part of sedimentary mantle, particularly, in cryolithosphere of West Yakutia can be referred to as proper structures for burial of drainage brines. Icy texture in frozen rocks being affected by highly mineralized brines, gravitational reservoir cavity occurs which makes it possible to use ecologically safe sections for mineralized water disposal.

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AUTOMATED DESIGN OF STIRRED VESSELS AND ITS 3D PARAMETRIC MODELING

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With implementation of computer technology into modeling of chemical equipment and productions moving higher capabilities of quick designing appeared with the use of programs such as HYSYS, Delphi etc. It is good implement into computer modeling of chemical – technological processes, but still a potential of applying of programs to calculating of chemical equipment is not fully achieved.

At the moment there are some services which let us to organize the automated design, but there are no real programs with special possibility to check different variants of alternate design of stirred vessels during mechanical calculation. This owes to difficulties of making design algorithms and scale of all sorts construction solutions which influence on technical data in a different ways.

Goals of this project are: automated design of vessels with stirring devices via Mathsoft MathCAD 14 and its 3D parametric modeling with the aid of table parameterization in Autodesk Inventor.

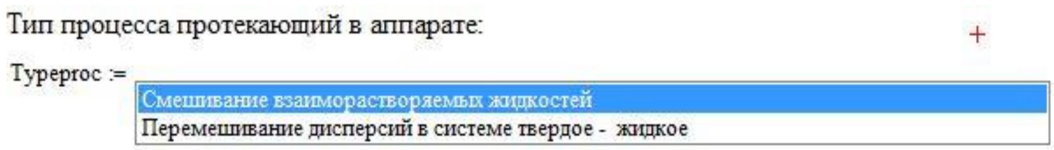

Fig. 3. Control element: «list box»

Automated calculation is based on writing sub-scripts, functions and using of control elements (Fig. 1). Realization of 3D model is made through exporting of a particular geometric data to Excel and its further Importing to Inventor (Table), (Fig. 2). Full calculating of stirred vessel is located in two separated data files with (.xmcd) extension.

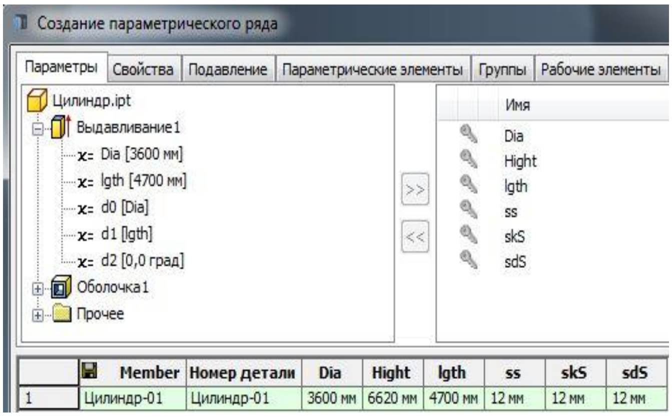

Fig. 2. Data file import

Purposes of automated technological calculation are: selection of geometrical dimensions of vessel; vessel thermal design with selection of heat-exchanging devices; selection of optimal construction of stirring device from condition of minimum expenses involved in manufacturing and maintenance; vessel hydraulic design; electric motor optimal selection.

Purposes of automated mechanical calculation are: cylinder and bottom wall thickness calculation in terms of strength and stability from mutual influence of inner and external pressure in the case of using a cylindrical jacket on vessels case; heads stress analysis from interior pressure; stirrer stress calculation from bending moment acting when dealing with stirred liquid; stirrer shaft vibration stability, stiffness and stress analysis. All calculations make with the help of special literature and GOST [1-11].

We shall deal with calculating of cylindrical course, where writing sub-scripts and functions let us automate design of cylindrical course with getting a result at the end of calculating. Calculating control realize within control element as «List box» (Fig. 1)

Length, width and height of cylinder are determined according to a given vessels volume defined in the standard GOST 20680-2002 [4]. Cylinder wall thickness is determined from mechanical calculation of strength and stability according to GOST 52857.2-2007 [6]. Stirrer shaft vibration stability, stiffness and stress analysis RDRTM 26-01-72-82 [11]. Calculations are right if stress, stability, vibration stability and stiffness conditions hold true.

One must write down data to Excel file which are necessary for designing of 3D model (Table). In section «parametric sweep workbook» one should choose current Excel data file with parameters (Fig. 2).

Table

Excel data export

Dia	**3600**
Hight	**6620**
lgth	**4700**
ss	**12**
skS	**12**
sdS	**12**

Therefore, we can carry out automated calculating and 3D design of stirred vessel. Such way of engineering let choose a suitable vessels construction and save time for calculating and designing.

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SORBENSHERSTELLUNG DURCH TABLETTIERUNG

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Die Benutzung der Sekundärrohstoffe und insbesondere Abfälle ist heute sehr bedeutsam für moderne Betriebsentwicklungen.

Das Untersuchungsobjekt der vorliegenden Arbeit ist die Ablagerung Tomsker Wasserableitung. Sie stellt ein feines rot-braunes Pulver dar und ist ein Abfallprodukt.

Die Sorbensherstellung (auch aus Abfällen) ist ein technologisches Verfahren, dessen Rentabilität direkt von der Anlagefördermengenkapazität abhängig ist [1]. Die Tablettierung wird in der Industrie mit spezieller Ausrüstung – Tablettierungsmaschine durchgeführt. Der Einfluss der Presskraft auf den resultierenden Tablettierschaden wird sehr kontrovers diskutiert [2].

Bei der Sorbensherstellung durch Tablettierung wird die manuelle hydraulische Presse mit der Zugabe verschiedener Bindeflüssigkeiten 1% Glyoxal, Glycerin, 0,1% Carboxymethylcellulos- (CMC), Polyacrylamid- (PAA) und Methylcelluloselösungen (MC) benutzt.

0,5 Gramm des Pulvers und 1 – 4 Tropfen Bindemittelflüssigkeiten werden gründlich gemischt und gepresst. Die Tablettierung dieser Mischung wird in der Metallform mit inneren Teflonschichtung unter dem Druck von 2 MPa durchgeführt. Der Stempeldurchmesser ist 10 mm.

Die Untersuchungen haben gezeigt, dass die Benutzung mehr als 5 Tropfen der Bindeflüssigkeit zur überschüssigen Feuchtigkeit in der formbaren Masse führt. Es ist unmöglich dann diese Masse in der Matrix zu pressen. Die rohen Tabletten sollen bestimmte geometrische Abmessungen und Festigkeit haben, die nicht nur Form der Tabletten während aller Operationen sichert, sondern auch die notwendige Festigkeit der fertigen Sorbenstabletten. Nach dem Pressen wurden die Tabletten bei Raumtemperatur bis zur Gewichtskonstanz getrocknet.

Die Masse der Tabletten aus der Pressmaterialien muss der Masse des hergestellten Produkts entsprechen. Ihre Festigkeit soll ausreichend sein, um die Form von Tabletten während Lagerung, Transport und Verwendungsoperationen bei der Produktherstellung zu sichern.

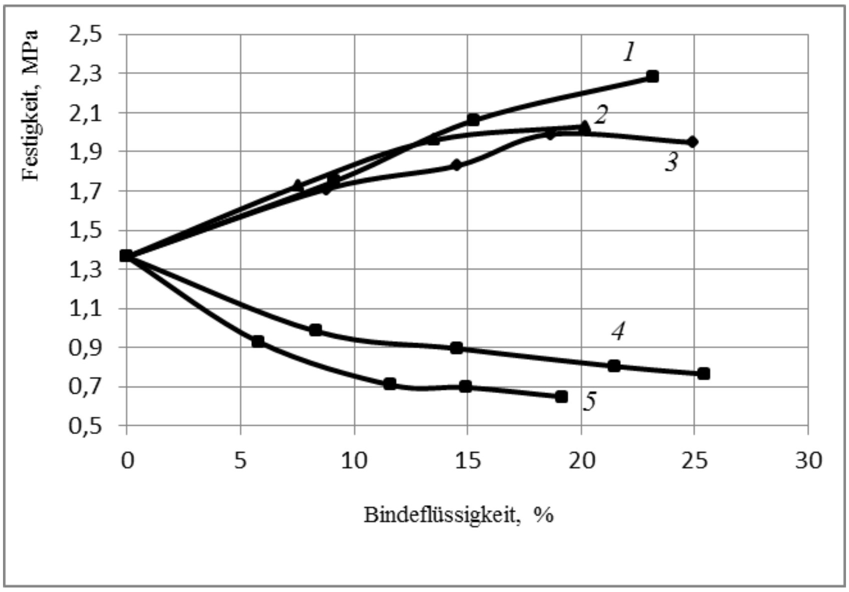

Abb. 1. Abhängigkeit der Tablettenfestigkeit vom Bindemittel: 1 – 0,1% PAA, 2 – 0,1% MC, 3 – 0,1% CMC, 4 – Glyoxal 1%, 5 – Glycerin

Die Tablettengröße hat einen gewissen Einfluss auf die Stabilität der Tablettenmasse, auf die Genauigkeit der Substanzdosierung, auf ihre Fließfähigkeit und Qualität (Aussehen, Rauheit, Stärke, Porenvolumen usw.). Im Ausgangpulver dominieren die Partikel mit der Größe von 40 bis 90 μm, deren Ausbeute 80 % beträgt.