IMPLEMENTATION OF A KAOLIN DEPOSIT MODEL IN VISUAL STUDIO 2015

26.1 INTRODUCTION

The article describes a part of the project TA CR TE02000029 - Competence Centre for Effective and Ecological Mining of Mineral Resources (CEEMIR), whose main objective is to review selected non-energy resources, which are among the critical commodity EU [1]. One part of the project's Work Package WP 4 - Spatial modeling of mineral deposits, which deals with the transfer of selected deposits into digital models with appropriate mathematical methods based on the study and a review of data from archival materials. One of the selected deposits is a kaolin deposit in the surroundings of the municipality of Jimlíkov in the Karlovy Vary region.

This article is based on article Staněk, F., Jarošová, M., Staňková, J.: Dynamic model of a kaolin deposit, exactly on methodological procedure creation and visualization of 3D model of the deposit kaolin (subchapters):

2.6 3D visualization of the input data for the kaolin deposit in the Voxler environment, creation of 3D grids of the content of technological parameters, and export of the 2D grids in individual horizons in the grd Surfer format (program Kaolin_A).

2.7 Categorization of the blocks of reserves in 2D grids (in individual horizons) based of both the grids of technological parameters (exported using the program Kaolin_A) and predefined parameters for the categories of reserves, transformation categories of the blocks of reserves into a 3D grid and estimation of the reserves of the deposit (program Kaolin_Viz).

2.8 2D visualization of horizontal sections in the Surfer software environment (program Kaolin_Viz).

2.9 2D visualization of the series of vertical sections in the Surfer software environment (program Kaolin_Viz).

2.10 3D visualization of categories of blocks of reserves in the Voxler software environment (program Kaolin_Viz).

### 26.2 Working with Objects Voxler a Surfer in Visual Studia 2015

Voxler and Surfer can be called from any automation-compatible programming languages such as VB.NET. It is this approach which was taken for the implementation of programs *Kaolin_A* and *Kaolin_Viz* in Visual Studio 2015. For the usage of applications Voxler and Surfer in this environment, it is necessary for the project program to add a reference to that application.

![Fig. 26.1 Voxler automation model [3], objects (the yellow boxes), methods and properties (the gray boxes)](image)

In the Fig. 26.1 is automation model of hierarchy Voxler objects (Application and CommandApi), methods and properties. The model displays a flow-path to create the type of module desired using automation and shows you which objects provide access to other objects in the hierarchy. The Application object is at the top of the hierarchy and all objects are directly accessible from the Application object. To access many objects you must traverse from the Application object through one or more layers of sub-objects. The CommandApi object contains all of the properties of the various modules in the Voxler program. CommandApi refers to the accessing the commands from the Application programming.
interface. Using the CommandApi object requires accessing the property with the Construct method, specifying any settings with the Option method, and making the action with the Do or DoOnce method.

In the Fig. 26.2 is Surfer automation object model. This chart shows objects that provide access to other objects. Surfer groups most objects in collections. Collection objects are containers for groups of related objects. Although these collections contain different types of data, they can be processed using similar techniques. Non-container objects represent a specific part of Surfer. Several objects shown in the Fig. 26.2 share common features (for example PlotDocument provide SaveAs, Activate, and Close methods). The online Surfer help is the complete reference for all of the Surfer automation objects, their properties, and their methods.

![Fig. 26.2 Surfer automation object model [4], collection objects (the gray boxes) and objects (the blue boxes)](image)

### 26.3 PROGRAM KAOLIN_A

After starting the program Kaolin_A it is necessary to enter an initialization file that sets the appropriate input parameters necessary to run the program (Fig. 26.3). These input parameters can possibly be modified by the user after the program starts.
Fig. 26.3 Window program of Kaolin_A for setting the calculate parameters

The next example from step 2.6 of methodology (see Introduction) contents a part of code language VB.NET (Fig. 26.4) using Voxler automation model for gradual creation 3D models of five technological parameters kaolin whose are crucial for determining categories of blocks of reserves: Contents of the Outwash, Al₂O₃, Fe₂O₃, TiO₂ and Fe₂O₃+TiO₂ (the order of parameters presents a variable Cislol_Par in the code). This example implements import of input data for WellData modul (Fig. 26.5), setting their parameters and creating of connections between input data and WellData modul.

The example of one of the outputs of the program Kaolin_A is in the Fig. 26.5 – 3D visualization of the kaolin outwash content. In the left panel of this figure a structure of individual Voxler modules generated by Kaolin_A is shown.

26.4 PROGRAM KAOLIN_VIZ

The program Kaolin_Viz implements steps 2.7 to 2.10 of the methodological procedure (see Introduction). After its launch, it is necessary to specify an initialization file that sets the appropriate input parameters necessary to run the program (Fig. 26.6). These input parameters can possibly be user modified after the program starts.
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The next example from step 2.9 of methodology (see Introduction) contains a part of code language VB.NET (Fig. 26.7) using Surfer automation model for visualization of the series of vertical sections (Fig. 26.8). This example implements drawing Post map of data about individual blocks of reserves (object Bloky) and Base map of segments of selected drill holes for the section with samples of the K1, K2, ..., NEG categories (objects Base_K1, Base_K2, ..., Base_NEG) (see Fig. 26.8).
Fig. 26.6 Window program of Kaolin_Viz for setting the calculate parameters

```vba
' Dim SurferApp As Object
' SurferApp = CreateObject("Surfer.Application")
' Dim Plot As Object
' Plot = SurferApp.Documents.Add(srfDocPlot)
' Dim Shapes As Object
' Shapes = Plot.Shapes
' Dim MapFrame As Object
' Dim PageSetup As Object
' 'Assigns the plot document page setup to the variable named
' 'PageSetup'
' PageSetup = Plot.PageSetup
' PageSetup.Orientation = srfLandscape
' MapFrame = Shapes.AddPostMap(DataFileName:=Dir_Gridy + Pom + Sou_Rezu + " .dat")
' Dim PostMap As Object
' PostMap = MapFrame.Overlays(1)
' PostMap.xCol = 1
' PostMap.yCol = 2
' PostMap.LabCol = 3 ' Cislo bloku
' PostMap.LabelFont.Size = 1
' PostMap.LabelFont.Face = "Arial CE"
' PostMap.Symbol.Size = 0.1
' PostMap.Symbol.Index = 120
' PostMap.Name = "Bloky"
' PostMap.Visible = False
```
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LITERATURE, REFERENCES

IMPLEMENTATION OF A KAOLIN DEPOSIT MODEL IN VISUAL STUDIO 2015

Abstract: This paper focuses on research within the project TE02000029 Competence Centre for Effective and Ecological Mining of Mineral Resources, granted by The Technology Agency of the Czech Republic, and, more specifically, on the research within its work package WP4 - Spatial modelling of mineral deposits. The focus of this work package is digital modelling of selected non-energetic raw materials, which belong to the critical commodities, as defined by the European Union. For modelling these deposits, suitable mathematical procedures, based on study and reevaluation of archived data, are needed. One of the selected deposits is a kaolin deposit near the village Jimlíkov near the city Karlovy Vary. The article describes the implementation of the methodology used for processing deposits of kaolin in Visual Studio 2015 by means of objects of Surfer and Voxler created by Golden Software. This software solution is installed at the company Sedlecky kaolin a.s. and thus is fully exploited in practice.

Keywords: kaolin deposit, Visual Studio 2015, spatial modeling, Surfer, Voxler

IMPLEMENTACE MODELU LOŽISKA KAOLINU V PROSTŘEDÍ VISUAL STUDIO 2015


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Mgr. Marcela Jarošová
VŠB-TU Ostrava
Katedra matematiky a deskriptivní geometrie, Institut čistých technologií těžby a užití energetických surovin
17. listopadu, 708 33 Ostrava-Poruba
tel.: +420 597 323 827, e-mail: marcela.jarosova@vsb.cz
Doc. RNDr. František Staněk, Ph.D.
VŠB-TU Ostrava
Katedra matematiky a deskriptivní geometrie, Institut čistých technologií těžby a užití energetických surovin
17. listopadu, 708 33 Ostrava-Poruba
tel.: +420 597 325 484, e-mail: frantisek.stanek@vsb.cz

RNDr. Jana Staňková, Ph.D.
VŠB-TU Ostrava
Katedra matematiky a deskriptivní geometrie
17. listopadu, 708 33 Ostrava-Poruba
tel.: +420 597 325 484, e-mail: jana.stankova@vsb.cz