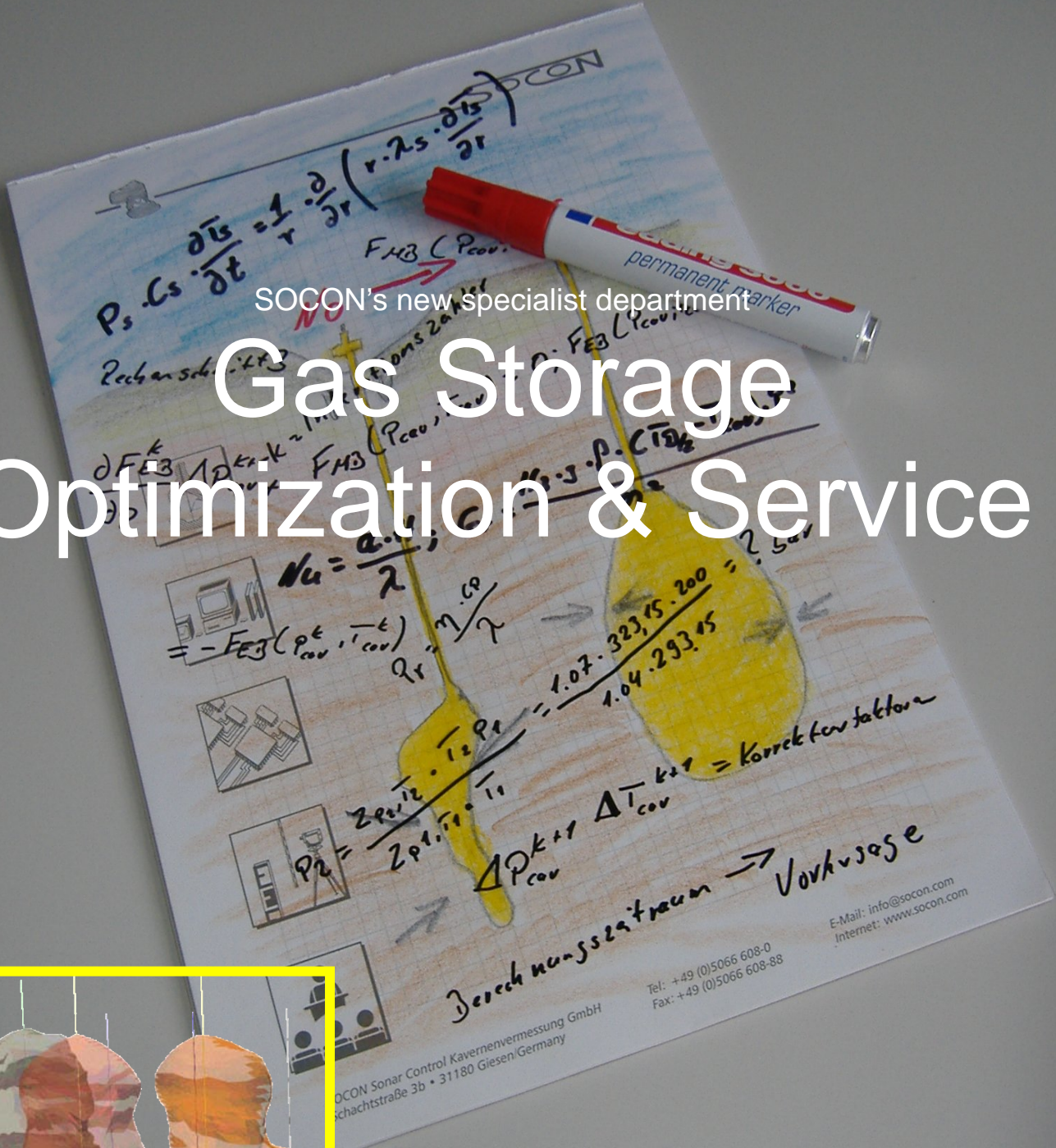




SOCON's new specialist department

Gas Storage Optimization & Service

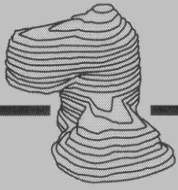


Lively reports:
SOCON reports with 3D PDF animation

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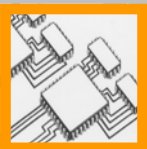
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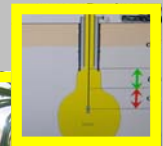
Hohlraumvermessung
Cavity surveying



Auswertung
Interpretation



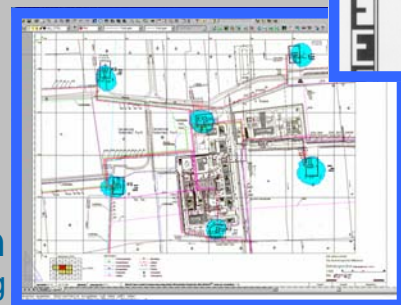
Forschung & Entwicklung
Research & Development



Gasspeicher - Optimierung & Service
Gas Storage - Optimisation & Service



Seminare
Seminars



Markscheidewesen
Mine - surveying

Gas storage optimization

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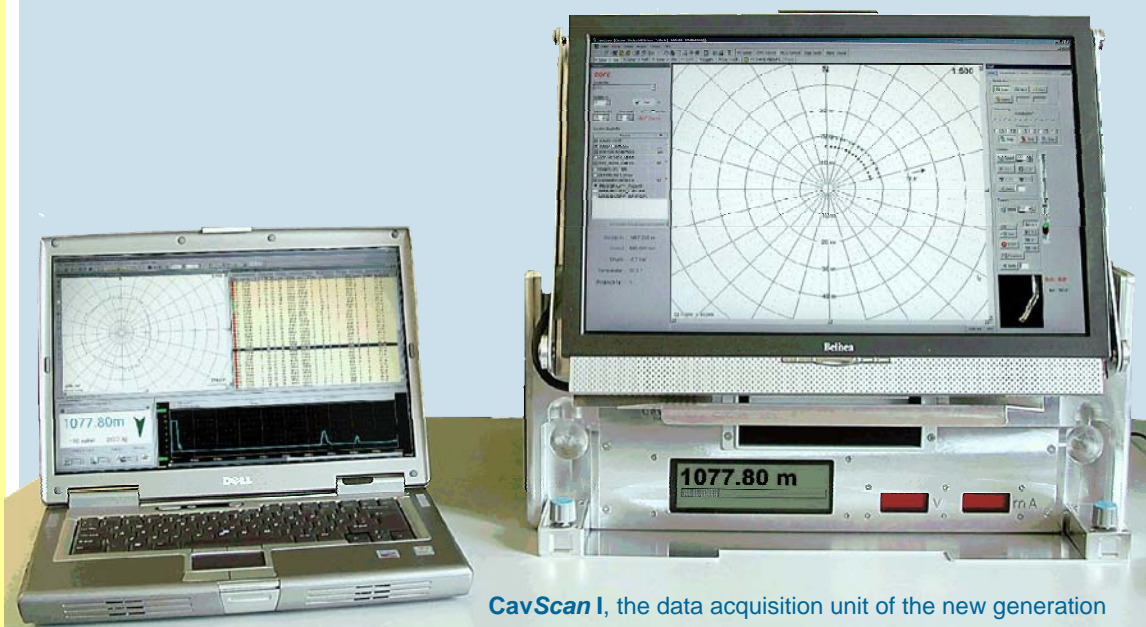
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CavScan I, the data acquisition unit of the new generation

GSOS – Gas Storage, Optimization & Service

SOCON's new specialist department

At SOCON a new department has been established to provide our customers with scientific consulting and support services in connection with gas storage. The customer-oriented approach is focused on thermodynamic and rock mechanics aspects.

The new department is called **GSOS** (Gas Storage, Optimization & Service) and is headed by Dr. Michael Krieter, who joined SOCON on 1 August 2007.

Dr. Krieter has been working for some 15 years in the field of underground gas storage, 14 years of which were with the E.ON Ruhrgas group. His experience gained as a senior engineer responsible for major projects and as project manager in cavern engineering will put the new GSOS department on the right track to becoming an interface between underground and surface engineering.

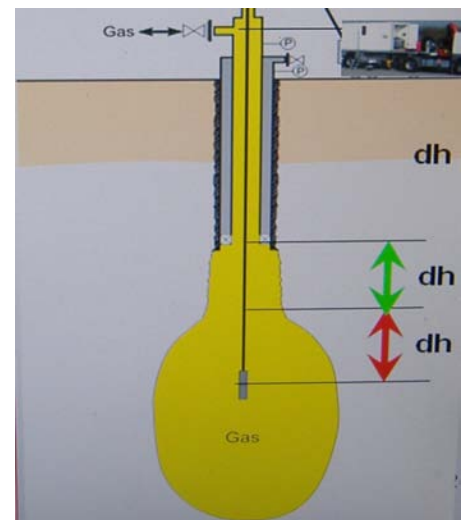
In cooperation with Prof. Hagoort (TU Delft), Dr. Krieter further developed the content as well as engineering aspects of the GASSTORE software. This software carries out thermodynamic calculations associated with gas caverns. From this was developed, in close cooperation with SOCON, the cavern simulation program CavBase Gas Storage, which has already been supplied by SOCON as the license holder to a number of gas storage operators. In each case the software is modified individually to customer requirements and then handed over ready for use.



Dr. Michael Krieter



Dr. Michael Krieter at his new SOCON workplace as head of the GSOS department



Enquiry response times shorter than ever

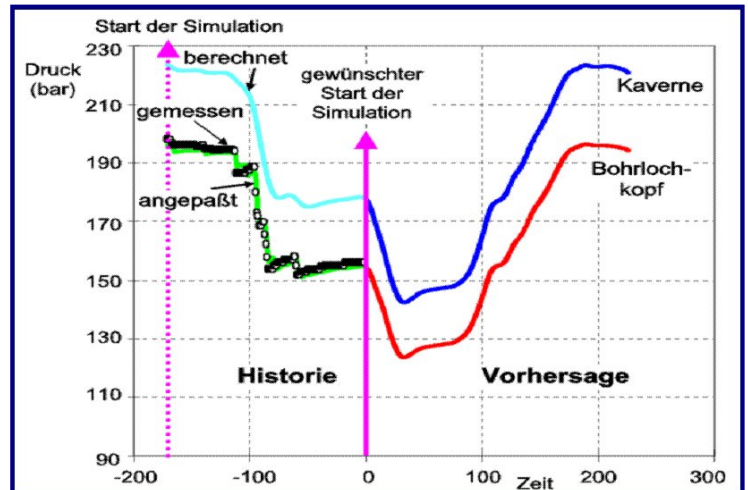
Response times to enquiries relating to gas storage are becoming shorter all the time. This is important considering that the annual operating routine of storage caverns will in the near future become more like that of traditional storage, in which gas injection and extraction can alternate on as much as an hourly basis.

SOCON is constantly further developing its cavern software so as to be able to properly handle future changes as they occur.

Dr. M. Krieter

Focus and areas of application of the new department

- ⇒ Scientific consulting and support of customers regarding gas cavern surveying as well as the evaluation and analysis of the sonar survey results
- ⇒ Further development of the thermodynamic cavern software CavBase Gas Storage :
 - Calculation of predictions on hourly basis
 - Inclusion of realistic hydrate formation conditions and estimation of optimized inhibitor quantities
 - Calculation of pressure and temperature losses in the surface pipelines and at installation
- ⇒ Further development of and project-specific add-ons for the rock mechanics program module, e.g. with reference to CDM (Continuous Damage Mechanics)
- ⇒ Consulting and support services relating to thermodynamic and rock mechanics simulation in the planning, construction and operation of storage caverns
- ⇒ Development of optimized concepts for the operation mode of storage caverns

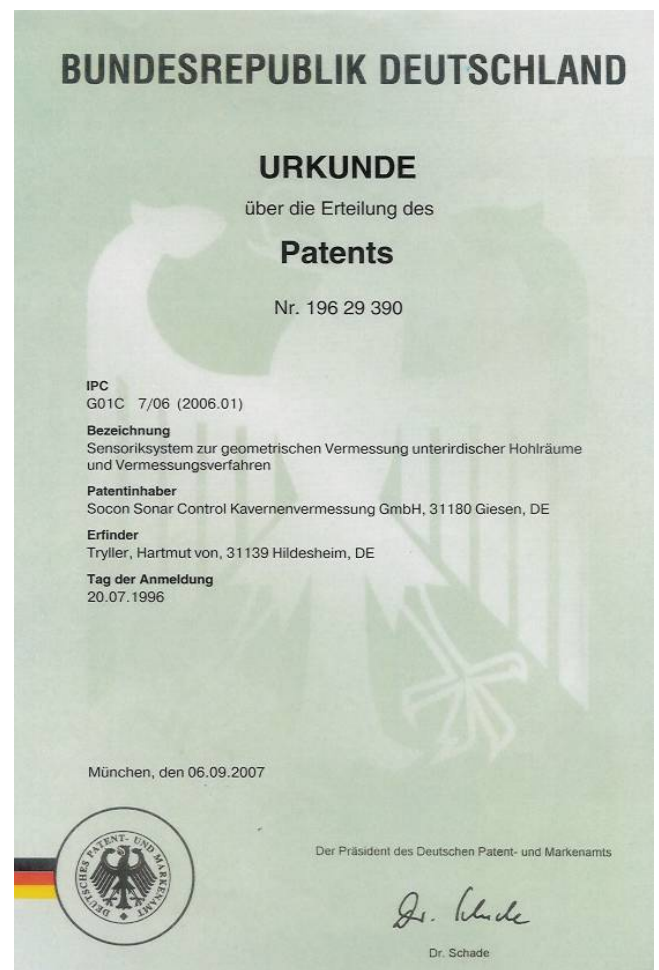


SOCON obtains yet another patent

In September 2007 the German Patent and Trade Mark Office, Munich, granted SOCON Sonar Control Kavernenvermessung GmbH a patent entitled "Sensor system for geometrically surveying underground cavities and surveying technique".

One of the features of the patented sensor system is that the tool has several sonic sensors fitted on a rotatable sensor carrier which cover a 360°-area and owing to its receiver characteristics can to a certain extent achieve spatial superposition. By slightly rotating the sensor carrier and repeatedly emitting the survey signal it is possible to significantly increase the spatial resolution by applying mathematical correlation techniques. The resolution of a multi-sensor system therefore no longer depends on the number of receiver sensors but instead on the amount in degrees the sensor carrier turns with each step. Here the survey signal can be emitted either from an omni-directional sensor or from a segmented impulse transmitter.

Dr. A. Reitze



Permanent pressure and temperature test

At the spring 2007 meeting of the Solution Mining Research Institute (SMRI) in Basel, Enterprise Products Operating LP, Houston, was contracted to carry out research work for the SMRI “Deep Cavern Sealing & Abandonment Test” project. Within the framework of this project it is required to measure the temperature and pressure within a closed cavern, and SOCON developed a special tool to do just this. This P/T monitoring tool will be suspended in the cavern at a depth of about 1000 meters for the entire planned test period of about four years and will continuously record the temperature and pressure values. The tool is connected with a data acquisition system/control unit at the surface via the borehole cable, which passes through a pressure-tight cable outlet connector at the cavern head.

Hajo David

Technical specifications of the tool :

Diameter:	42 mm Ø
Length:	1300 mm
Drucksensor:	Keller PAA33X , Measuring range: 0 - 300 bar, Measuring accuracy: ± 0,06 bar, Resolution: 0,006 bar, stainless steel membrane with special protection against corrosive brine, digital output
Temperature sensor:	Pt1000 class A, Measuring range: 0 > + 100°C, Measuring accuracy: ± 0,05 K, Resolution: 0,01 K
CCL:	Standard CCL available during installation of tool when operating from SOCON cable truck
Cable head:	Standard SOCON tool connection or Gearhart-Owen 1-wire connection
Power supply /	
Data transfer:	DC 40...120V, DIN-Messbus (SOCON Standard)
Operating temperature range:	-10 bis +80°C



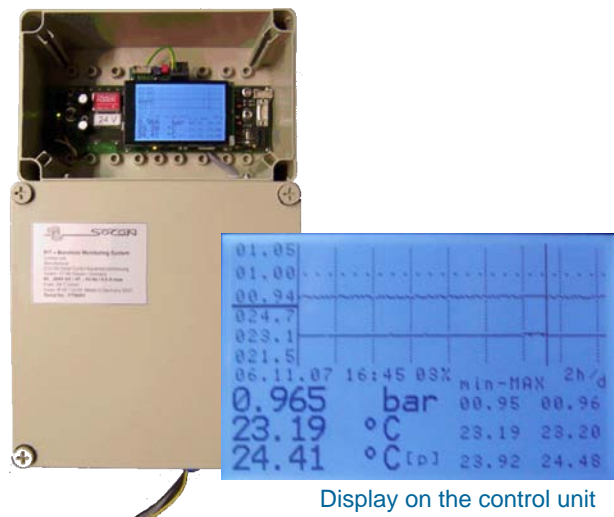
Data-logger / Control unit :

The control unit developed for the tool shows numerically and graphically on a 240x128 pixel monitor the values of pressure and temperature.

Certain parameters can be set, such as the sampling rate of the graphic display, the scale of the two axes for pressure and temperature and the speed of storage in the internal data-logger.

The fitted data-logger allows more than 10,000 datasets to be saved including the time and date of each measured value.

All the saved data can be transferred via the serial interface in ASCII format, which is suitable for spreadsheet programs.



SOCON expands fleet of survey trucks

Five more survey units under construction

The considerable increase in demand for interface and cavern surveys has prompted SOCON to substantially increase its fleet of survey trucks. As some of the major projects that are currently starting up will each tie up a survey truck for some time, SOCON has decided to expand its fleet by adding five extra trucks over the next two years. The first standard survey truck should be ready for operation this year.

Standard survey trucks

Two identical standard survey trucks are being built. Each is equipped with a 4-core cable (cable length up to about 3500 meters) on an electric winch manufactured in our own workshops. Such winches feature various devices for increasing safety and are extremely robust. The use of rapid-change cable drums makes the survey trucks more flexible, for instance when a fiber-optic cable is to be used for measuring temperatures. Basic equipment on the truck includes an underfloor generator for producing power and a small loading crane.



Survey truck for logging

Our smallest unit is a 5-tonne survey truck specially equipped for logging, SoMIT and shaft surveys. Owing to its compact design this truck is also ideally suited to working in places where the space is limited.



Survey container

Our survey container is mounted on a trailer and equipped with a cable winch for flexible surveying operations. It will be delivered shortly.

Survey truck with long cable

Our biggest new vehicle will be a three-axle truck with a winch capable of holding cable lengths of up to more than 6000 meters. Owing to the large diameter of the cable drum and also because of the load that has to be raised, this survey truck is fitted with a hydraulic winch. Whereas the above trucks will all be extra units, this unit will replace an existing cable truck.

Frank Haßelkus



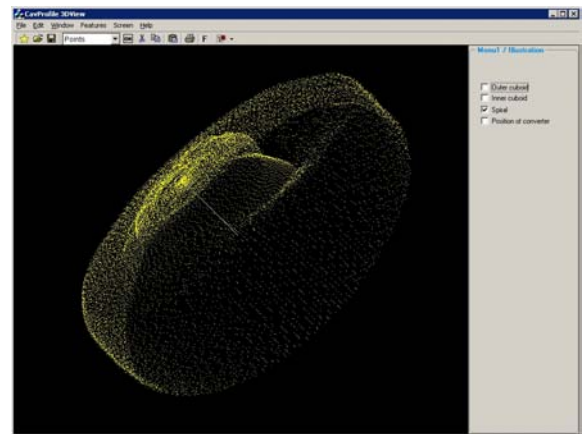
CavProfile - Display and interpretation of spiral measurements

Software development is a long and a very costly path that a company has to take to ensure that it constantly has cutting edge technology.

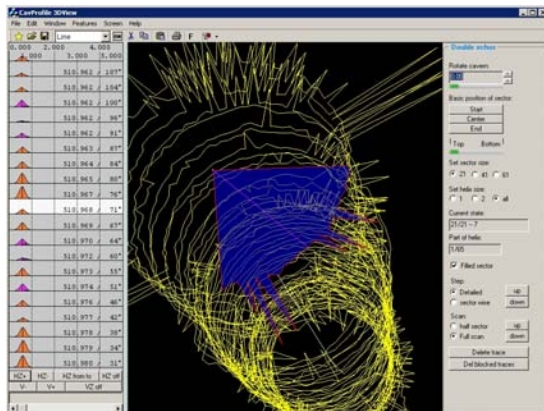
New generations of tools, modern hardware components and even further development in the field of computer technology have for SOCON always been reason enough to keep the company software constantly up to date. The CavScan software for survey data acquisition as well as CavView II for assessing and interpreting echometric cavern surveys have paved the way for a successful transition from computers with Motorola processors to PCs running the WINDOWS operating system. In the next step the interpretation program CavProfile for spiral surveys is to be converted. Naturally all the possibilities offered by a modern software development environment, such as color graphics, three-dimensional displays and up-to-date menu navigation, will be taken advantage of to the full. Considering the amount of changes being made it is not so much simply a migration of the present program package to a new operating system, but rather a new software development.

CavProfile – Interpretation in 3D

CavProfile is a 3D software application for processing the data obtained from spiral surveys. Included in the software to aid the interpreter are the latest 3D technologies, filter functions for finding multiple echoes as well as functions for processing spiral sections and individual echo traces. The current stage of processing can be viewed three dimensionally at any time.



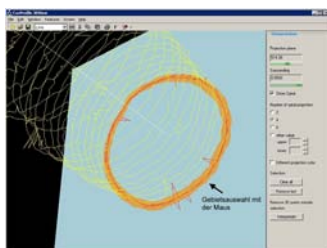
S. Wieber-Klocke



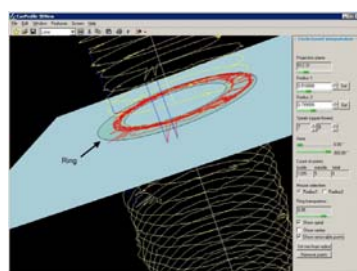
Processing of selected echo traces

Options in spiral interpretation

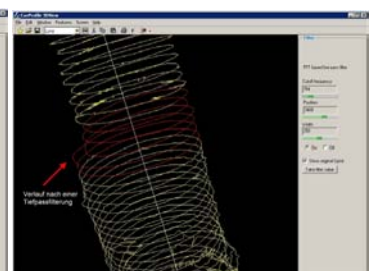
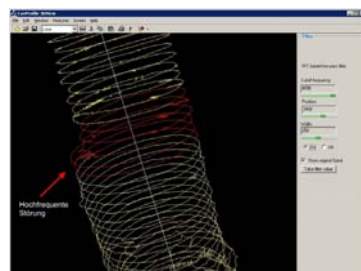
- ⇒ Stacking of several coils
 - Mark an area by mouse click or define two circular areas which enclose the actual echo signals
 - Remove all the echo signals that are located outside of these areas
- ⇒ Processing of selected echo traces
- ⇒ Low-pass filtering to remove high frequency interference



Stack of several coils with area marked by the click of the mouse



Stack of several coils with two circular areas defined



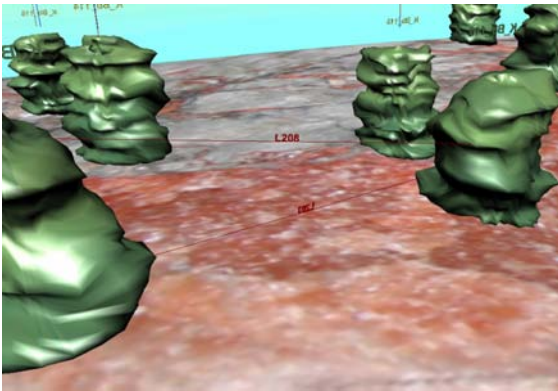
Spiral coil before and after the low-pass filtering

CavWalk Professional - updated version with new functions

It came out 10 years ago – CavWalk, a software package with which the results of echometric cavern surveys can be easily presented and animated three dimensionally. The software was developed in house by SOCON. One of its main characteristics is the simple data transfer from CavView II for separate caverns and from CavMap for entire cavern fields. This allows the user to generate quickly and efficiently 3D models without him having to have any special knowledge of 3D modeling.

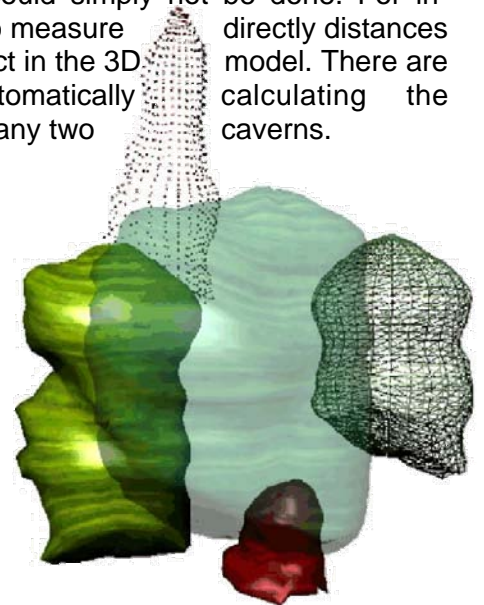
What CavWalk is able to do has been regularly expanded over the past few years and during this time it has been adapted to the special needs of users in the cavern industry. For instance the standard version of CavWalk includes already a broad range of functions for displaying boreholes, casing shoes and various interfaces in the cavern as well as for tying in the surface situation, in the form of topographical maps, and the geological situation .

(The standard version of CavWalk can be downloaded free of charge from the DownloadCenter at www.socon.com.)



At the beginning of 2007 the new CavWalk Professional software was released, and this contains even more functions. Yet CavWalk Professional is not simply another upgrade of the established CavWalk software, instead, thanks to its newly structured 3D model functions, it offers the user various functions that previously could simply not be done. For instance, it is now possible to measure directly distances between any selected object in the 3D model. There are also preset functions for automatically calculating the shortest distance between any two caverns.

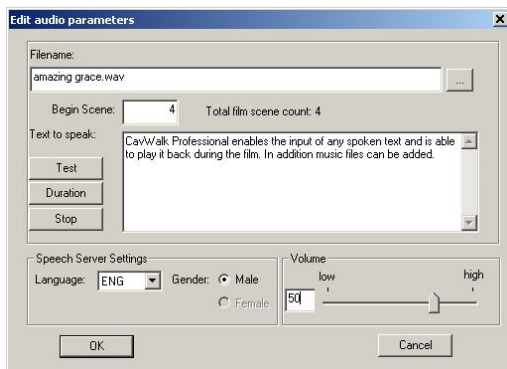
There are also improvements in the modeling of 3D objects. Caverns can now be displayed as area models, line models or as scatter diagrams. Furthermore geological interfaces can now be displayed transparently, which makes the three-dimensional views of the models even clearer. The level of transparency can be set to be anywhere between 0% and 100%. Importing and exporting complete 3D models can be done simply using the generally used dxf format .



CavWalk films learn to speak

Besides extra film functions, CavWalk Professional now includes an integrated speech editor (speech server) with which the user can input any spoken text and have it played back during the film at a set scene. Presently there is the option to input speech in English or German, but other languages can be made available on request. Applying these new functions you can add any explanations necessary to films created with CavWalk Professional. In addition, the speech server also gives the option of adding music files, which together with the explanatory spoken word create the right setting for the 3D animation.

You will find an example of a film created with CavWalk Professional at our website www.socon.com.

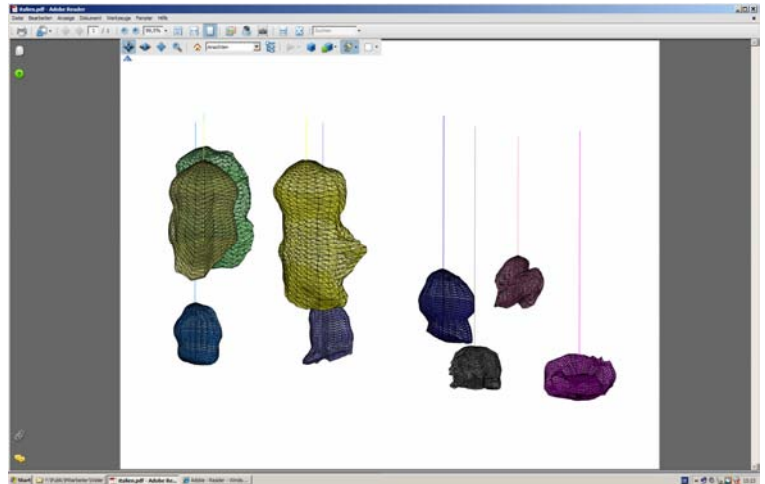


SOCON reports with 3D PDF animation

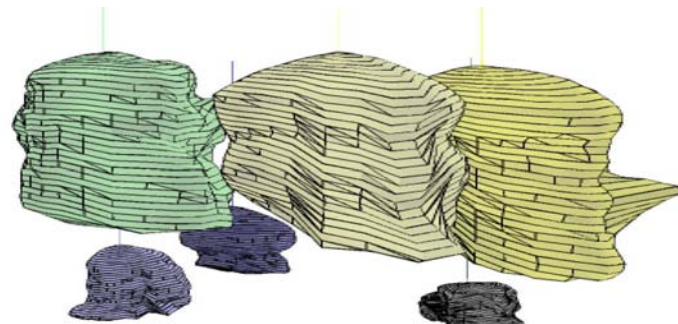
“When the picture learned to move ...“ is the title of a TV series from 1966/67 and came straight to my mind when I saw the new Adobe® 3D PDF Reader. Indeed, it is now actually possible with Adobe® Acrobat® 3D software to generate three-dimensional images as an animation and to publish this as a PDF file.

Lively reports

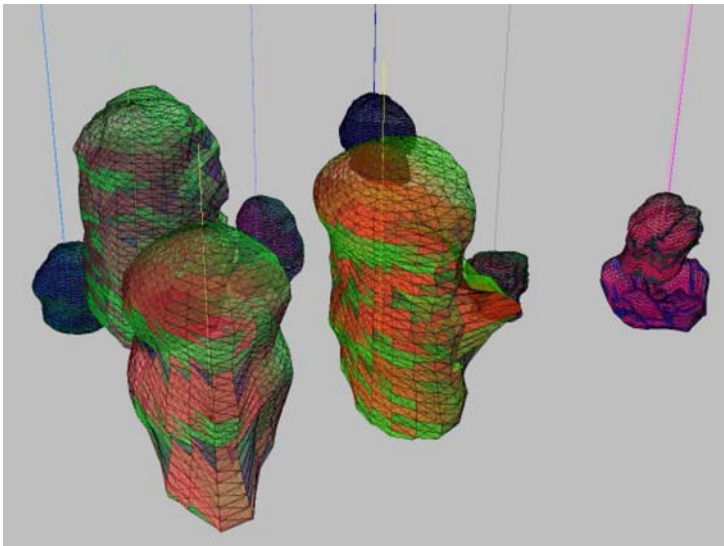
Our customers are used to getting six perspective views of their cavern with every SOCON survey report. These displays can now be replaced by a lively 3D PDF animation in a report. The advantages of this new form of reporting are evident, for instance it enables the customer to decide for himself what view, what perspective, and what extent, total or partial view, is important to him. Furthermore the Adobe® 3D PDF Reader provides a range of functions and display options that are most useful for a quick and simple presentation of survey results. As of now customers can request 3D animations to be included in a SOCON report.



Adobe Reader 8.1 with the 3D menu bar



Shaded display, with cube light

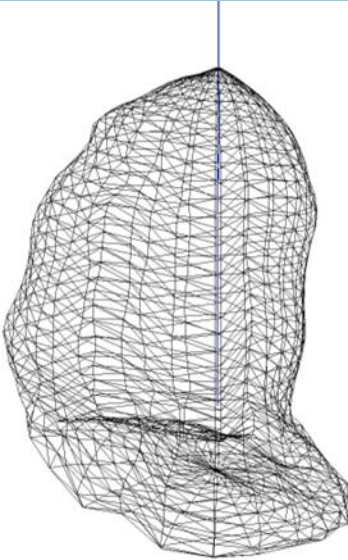


3D view of a cavern field as
> transparent wireframe graphic,
> lighting in base colors

From the sonar survey to a 3D PDF

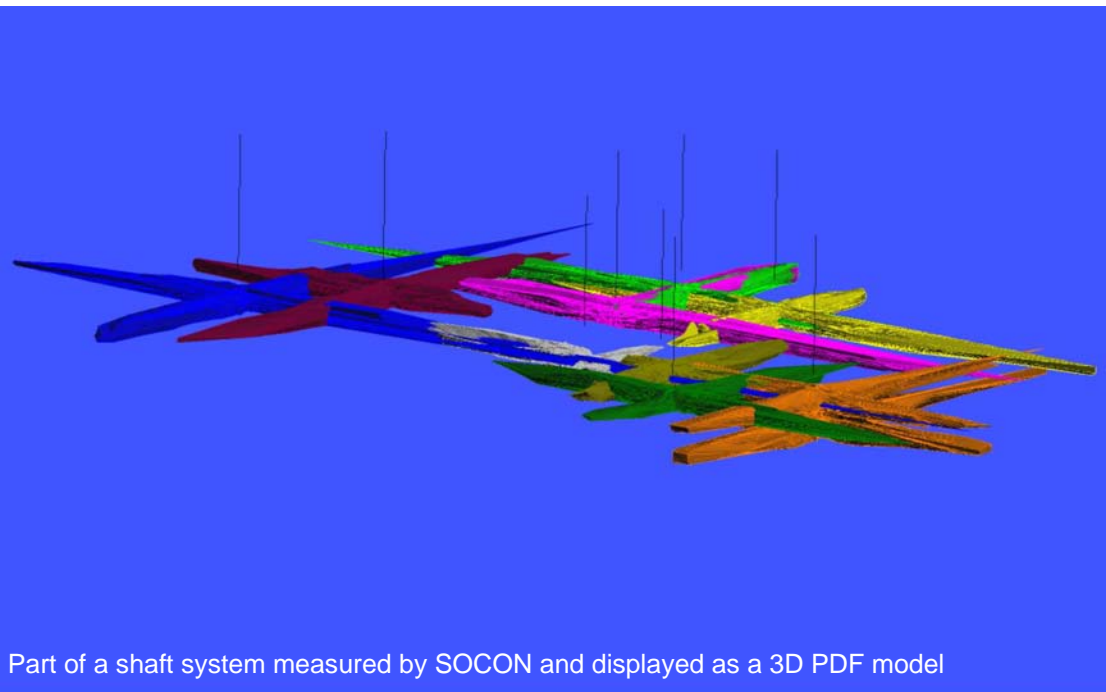
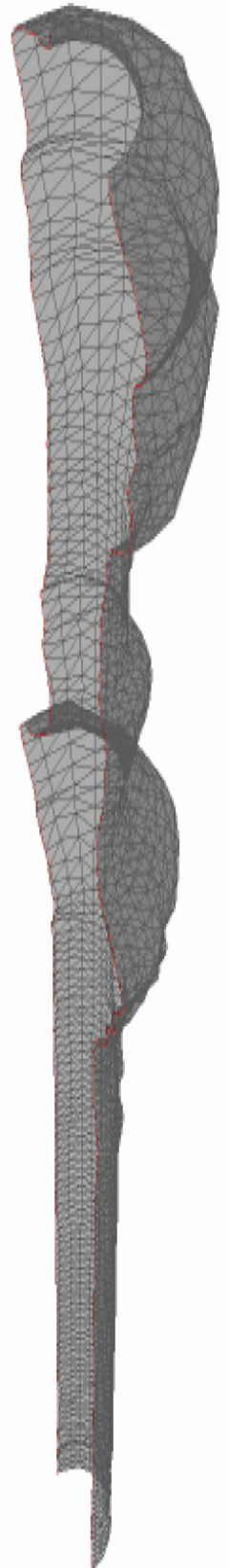
Once the sonar survey has been carried out by SOCON and the survey data have been interpreted, the final data are exported from our CavView II software to CavWalk Professional as a DXF file. This DXF file is then converted by Adobe Acrobat 3D to a PDF file. The results of this method are adequate for quickly generating a PDF file for displaying simple moving 3D models.

As an extra service we can prepare the data of entire cavern fields as 3D PDFs. For this we require the coordinates of the caverns (XYZ of the drilling location and the casing shoe) so as to be able to display the cavern field at the correct locations with our CavMap software. Then from CavMap the data can be exported as a DXF file for conversion to 3D PDFs. By including an intermediate step, namely from CavMap to CavWalk Professional, it is possible to convert to 3D PDFs also extra graphic objects such as layers and textures.



An overview of some of the functions and display options of Adobe 3D Reader:

- > Variable zoom function, with option to rotate and tilt the display
- > Choice of your own background color
- > Lighting at 11 levels
 - e.g. lighting in base colors, night-time lighting, cube lighting, red/blue lighting etc.
- > Model rendering mode
 - e.g. solid, transparent, solid contour wireframe, vertex etc.
- > Printout of views generated



Part of a shaft system measured by SOCON and displayed as a 3D PDF model

Requirements for displaying 3D PDFs

To display 3D PDFs, and of course also PDF files of previous versions, you need to have Adobe Reader 8.1, which is available for free download from the Adobe website at www.adobe.com (size is approx. 23.6 MB).

System requirements for Adobe Reader 8.1

Windows

Intel® processor of Pentium® III class
 Microsoft® Windows® Vista, Windows XP Professional, Home or Tablet PC Edition with Service Pack 2, Microsoft Windows 2000 with Service Pack 4, Windows 2003 server
 128 MB RAM (256 MB recommended for complex formulas and large documents)
 Microsoft Internet Explorer 6.0 or 7.0, Firefox 1.5 or 2.0, Mozilla 1.7, AOL 9

Refer to the Adobe website for the system requirements of other operating systems

Cross-section of a potash shaft generated by Adobe Acrobat 3D

Seminars in 2008

After holding two successful seminars during the course of this year with the topics

>Application of CavBase Gas Storage for optimizing the operation of gas caverns <

and

>Physical background and practical execution of cavern surveys <

we at SOCON are planning again on offering seminars next year. As usual we will inform you in writing in good time about the dates and the topics; in addition you will be able to browse through our program and the dates on our website at www.socon.com.

The editor



Gerardus Mercator
1512-1594

New coordinates for Germany

As part of the process of creating a uniform coordinate system for Europe the former Gauß-Krüger coordinate system is being replaced in the Federal Republic of Germany by the European Terrestrial Reference System 1989 (ETRS89), which is based on the Universal Transverse Mercator Projection (UTM). This will mean in the medium term that mine plans and documents complying with mining law (§ 63 BbergG) will also have to be converted to the new reference system.

Dr. A. Reitze

Paper on successful application of SoMIT technique

At the last SMRI Meeting in Halifax, Sebastian Boor (KBB Underground Technologies GmbH) and Dr. Andreas Reitze presented a joint paper on the successful application of the SoMIT method for integrity testing. The text version of this paper can be downloaded from the DownloadCenter at www.socon.com. The specialist journal ERDÖL ERDGAS KOHLE also published an article on the SoMIT technique in its November 2007 issue (issue 11).

Dr. A. Reitze



SOCON survey report subject of literary criticism

Criticism is always welcome at SOCON and is simply a part of the daily business, as is surely the case with every company in the world. Indeed criticism provides an essential contribution to improving our own efficiency.

However, it is really something quite special when a generally known literature critic talks about SOCON. And of course we do not want to hold this back from our readers.

You will find the text in our DownloadCenter → RRaniki.zip as an mp3 or as a video → Reisebericht.zip on our website at www.socon.com

The editor



H. von Tryller and Dr. Z. Ma discussing with representatives of the Technical University of Liaoning in Fuxin how cooperation can be intensified

market, but also to intensify the universities.

Holding a position as honorary professor at the Technical University of Liaoning in Fuxin, Dr. Ma had the opportunity to give two lectures on the subject of cavern surveillance.

Dr. A. Reitze

SOCON expands its team

Our employees are our most important asset. And for that reason we are particularly happy that over the last year we were able to welcome eleven new employees to our ranks. This considerable increase in manpower has been necessary not only to adjust our capacity to the current market requirements but also so as to be able to replace our employees who will soon be going into retirement.

André de Buhr and Lars Wendt have joined us in our branch in Wiesmoor.

Our surveying operations in Giesen have been strengthened by the addition of Rudi Ansorge, Stefan Johanköke, Peter Bauer, Ingo Schelm, Stefan Schuboth and Peter Ernst.

Our Development and Service department in Giesen is pleased to welcome Andreas Lochte and Henning Kalkhoff.

And since the beginning of August 2007 Dr. Michael Krieter has been head of the GSOS department at SOCON.

We sincerely welcome all our new employees and wish them all the best for their future with SOCON and are looking forward to working together with them.

Oliver Busjahn

Round trip in China

During a trip around China in October 2007 Harmut von Tryller and Dr. Z. Ma held a number of talks with our Chinese customers. This trip was used not only to continue building on our present activities in the Chinese existing cooperation with Chinese

