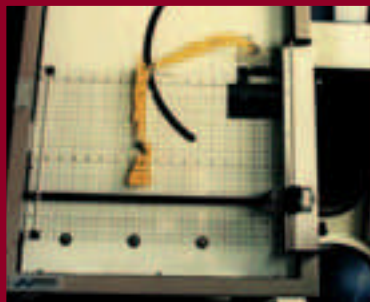


# Digital terrain remodelling with an XPM NG (eXcavator Position Monitor Next Generation)



70's mechanical monitor

## Introduction

In 2003 IHC Systems completed the development of its fourth generation excavator position monitoring system. The first generation, developed in the 70's by Meconaut, was a mechanical device, Digviewer, which visualised the configuration of boom, stick and, above all, bucket below the waterline with a moving mechanical model.

The need for efficient dredging was especially triggered by rock dredging projects in Scandinavia, which proved prohibitively expensive per cubic meter. The second generation represented a big leap forward, with monochrome monitor supported by custom made electronics and transducers. By this time in the late 1980's, Meconaut as well as IHC Systems were gradually incorporating more functions. A separate "top view" monitor was added and various positioning systems and survey programs were coupled to the "Digviewer" and "Backhoe Monitor".

## Windows on an excavator

The take-over of the Meconaut Company by IHC Systems with subsequent joining of development resources, and a strong demand for more and better interfaces with other dredging appliances, stimulated in 1992 the emergence of the 3rd generation.

A major decision was to develop a Windows 3.11/industrial PC platform. Among its advantages were colour monitoring and a standard capacity for interfacing with other equipment. An important feature was also the expected ability to sustain the PC platform for about five years and go on supporting it for at least another five years. An important attitude change in the market was that clients expected training of their crews on new equipment. In those years computer technology was being introduced in most aspects of dredging and IHC Systems was instrumental in grooming excavator operators for the digital era. "In house" and "on the job" training of crews gave IHC Systems the interchange to specifically meet their clients' demands in this specialised part of the dredging market. The eXcavator Position Monitor became a highly regarded, essential instrument in dredging projects where precision counted.

Increasing demand for precision dredging and the XPM's versatility, as well as the ease with which it could be fitted in any excavator and enjoy IHC Systems' service support and training, boosted world-wide sales.

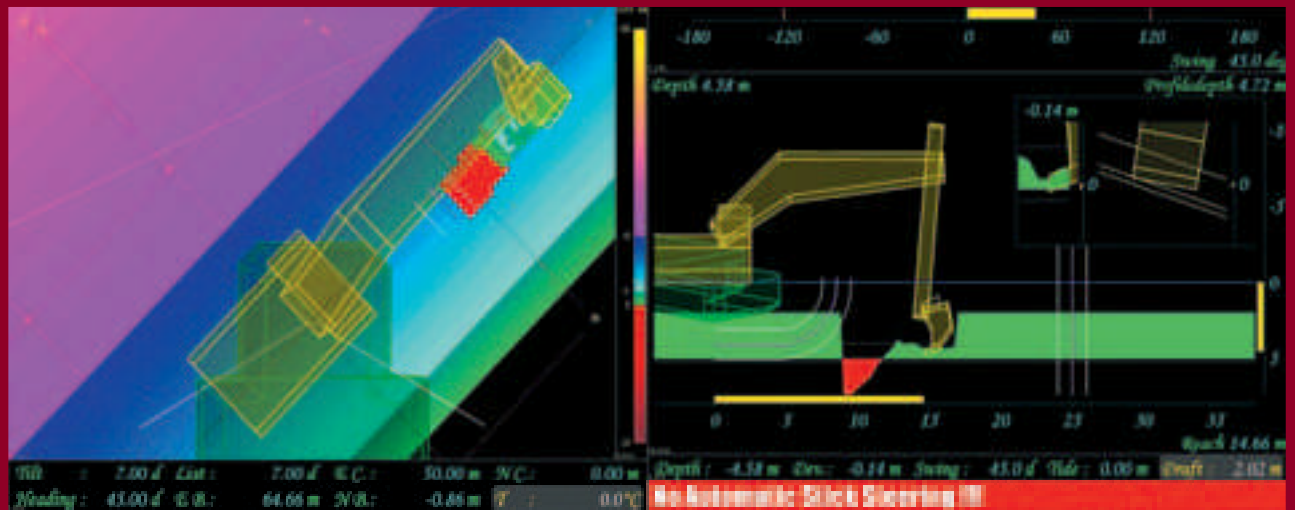
By the end of the 20th century it became clear that users were habitually connecting positioning and survey software to their XPM platform.

Many excavators cost less than the electronic appliances to monitor the dredging process, which they were actually carrying out.

Josef Möbius Bau Gesellschaft AG in Germany was the first to deploy a fully automated DEMAG 185, capable of automatically repeating the profile of tracks. This pointed the way to the future: excavators would not only be expected to work with utmost -and provable- precision, but also automatically, carrying out dull jobs where deviation would not be allowed.



Training the BELFI crew from Chile



Three dimensional views on the real time update of a dredge job

#### 4th generation eXcavator Position Monitor New Generation (XPM NG)

By 2002 it dawned that 3rd generation XPM's hardware and software were becoming inhibiting factors in meeting the precision requirements, which were clearly evolving on large dredging projects. It was further to be expected that product support would grind to a halt in five to seven years, since crucial components were no longer produced and software development would be curtailed. In these circumstances the contracting companies Van Oord ACZ in the Netherlands and Josef Möbius Bau Gesellschaft AG in Germany ordered the new generation before it had even been developed; a fine example of mutual trust between client and supplier! IHC Systems was committed to deliver a system with at least the same capabilities as the existing XPM for the same price.

Windows XP/industrial PC was chosen as a platform, incorporating real three dimensional mathematics and visualisation.

Since many dredging contracts require data logging and Digital Terrain Modelling (DTM) these days, such features are incorporated in the XPM NG software, like they are in IHC Systems' Dredge Track Presentation System (DTPS). These traits are also necessary in order to allow, in the near future, full automation of an excavator to the same level as IHC Systems' present generation of "Automatic Cutter Controller" for cutter dredgers.

With ever expanding software applications, IHC Systems faced the stark choice between the devil of an ever more complex XPM for the dredger

master who wants to have it all, or the deep blue sea of the Keep It Simple and Practical principle. The result was a decidedly practical and versatile XPM that is still fathomable, with help of a thoroughly revamped training program. This gives crews the know how to take full advantage of the XPM NG's traits and properly maintain the system, even when working on distant shores, far away from IHC Systems' service department.

Further support is provided by an XPM NG to USB to Bluetooth to GSM phone connection, to enable IHC systems to "have a look on the spot", to check and assist whenever necessary.

#### Interfaces and automation

For the user the generation gap seems to be mostly in the software, although much effort has also been put in ironing out the snags in the hardware, which have surfaced during the 3rd generation's life. Significantly more accurate transducers enable large machines such as the Liebherr 996 and Komatsu PC 3000, to operate with far greater precision. With both eyes firmly on the future, the automation software has been drastically renewed, especially with large machines in mind. A new electronic interface was built to ensure maximum safety during automatic DTM digging operations.



Rohde Nielsen's accurate PC 3000

Built in a small cabin...



A noticeable development is that, triggered by demand, manufacturers of excavators now habitually make their products fit for mounting an XPM NG system.

To make the XPM NG actually act as intermediary between operator and machine, it has a suitable interface to steer the hydraulic cylinders of the boom, stick, bucket and rotation engine. The XPM NG has virtually everything, but that is not necessarily the case with the excavator in which it is supposed to direct the dredging process. The craft's cabin must be sufficiently spacious to allow an ergonomically arrangement, in which the operator can keep his eyes on his instruments as well as on the job, and, where necessary, reach components of the XPM NG for servicing.

Squeezing instruments such as XPM NG and DGPS in the small craft that are increasingly used for environmental dredging has become an art in itself and requires a broader range of functions in the software. Space for additional PCs, data logging or DTM is rarely available. In that case the job can be prepared ashore, and the DTM, loaded with profiles, transferred by USB stick to the XPM NG.

At the end of the working day the updated

DTM can be transported back to the office and be inspected, or the recorded dredge track may be e-mailed to the client.

### Experience and future

Being an entirely new generation instrument, the XPM NG will need at least a few years further maturing before it can embrace all conceivable appliances for the dredging jobs of the future. The layout of the system ensures that existing XPM NG's can constantly be adapted to evolve with the trade.

World-wide working methods are changing: computers have definitely

found their way into the dredging world and operators have come to grips with them. This has certainly improved the full and proficient use of digital technology, which, in turn, will further stimulate the drive for transparency requirements in dredging contracts. XPM NG with Windows XP, USB and GSM technology and connection with DGPS will do nothing to stop that trend. In a modern dredging environment, excavating without an XPM NG is like shooting crows in the dark.

A dedicated website can be found on [www.xpm.nl](http://www.xpm.nl)



*AXPM NG & DGPS guided "small" Liebherr 974 in Peru*