Press Release
Long version

INDEX Xpanel®

A look into the future

INDEX now supplies the newly developed Xpanel® operating system. It allows easy setup and control of the INDEX machines as usual. In addition, even in its standard version, Xpanel® offers extensive added user assistance through complete integration into network structures. Drawings, setup sheets, user manuals, circuit and hydraulic diagrams, etc. are available directly on the machine without additional hardware. Xpanel ® unfolds its full strength with an additional industrial PC installed in the control cabinet. This allows the user to run 3D simulations coupled with the machine in real time or even create complex programs using a CAM system. There are (almost) no limits to data communication.

Developers in all possible industries include increasingly more functions in components to be machined. Workpieces are becoming more and more complex.. To produce them economically, the machines must be powerful and very flexible in most cases. For lathes, this means: multiple tool holders and a variety of axes. This increases the demands on programmers and operators. To ensure a smooth production process, they need plenty of information and, for safe processes, ideally a reliable 3D simulation directly on the machine. Exactly this is where lathe manufacturer INDEX aims its new Xpanel® operating system.

It focuses on the optimal control of the machine for the effective machining of workpieces with maximum productivity. But the operating system also provides a direct connection between the machine control and the operations organization within the company. Besides job and setup information, the operator also receives drawings and quality requirements or even own documents on the control panel screen. Xpanel® thus creates the conditions for the use of INDUSTRY 4.0 that is demanded everywhere.

Network-integrated control technology and a high-resolution touch-screen

Before the idea of such a control system could be implemented in detail, the necessary basic conditions had to be created: INDEX made the step to a network-integrated control technology already with the new C200 sl control generation, which has been on the market for more than a year and is now standard for all new, Siemens-controlled INDEX machines. It is based on the Siemens Sinumerik 840D sl (solution line) control, Sinamics drives, 1FT7servo motors and the ET200S ProfiBus peripherals. Another fundamental component is the 18.5" touch-sensitive wide-screen monitor that initially does not require a Windows PC. The user interface works with a separate controller, running INDEX's proprietary software among others.

Already the new control panel concept of the C200 sl is a small revolution: INDEX has succeeded to include not only the ABC keyboard but also many non-safety-related rotary and tip switches from the machine control panel directly on the touch-screen. This creates space for the 18.5" monitor with WXGA resolution (1366 x 768 pixels), 16:9 aspect ratio (WideScreen) and LED backlight with 300 cd/m^2 brightness. These characteristics make it possible even to use the monitor for high-resolution simulations on the machine itself. Thanks to the latest capacitive touch technology, the screen can be operated even with gloves. A touch is sufficient to activate the desired function.

Thanks to the eliminated hardware elements, the machine control panel located under the monitor has become significantly leaner and clearer. The remaining keys have been provided with LED backlight and are protected against accidental operation. If they are operational by the current machine status and the associated movements are allowed, they are selectively backlit, while invalid keys remain dark. Flashing keys must be enabled by the operator, directly guiding the operator and preventing errors.

With Xpanel® the screen can be used for many more applications

The touch-screen has a separate controller. For this mini-computer with an 8 GB memory card and USB port, INDEX developed its own software, which lays the functional foundation for the Xpanel® concept. By using the integration with the corporate network, it provides the machine operator with useful information for his current activities.

With Xpanel®, INDEX primarily wants to make the machine operator's and setup engineer's jobs easier as well as increase the productivity of the machines. The practical

orientation of this system prepared for Industry 4.0 is already reflected in the start page. After starting up the machine, the familiar control screen appears with the information of axis positions, etc. On the right side, where hardware keys used to be, there is now a vertical, differently colored control strip that contains the ABC keyboard, number pad, cursor keys, and some other touch buttons. One of them is the so-called "i4.0-ready" button that is used to launch "Xpanel® Industry 4.0". Its use is not absolutely required, but it is merely a support option provided by INDEX. If it is not pressed, the operator sees the usual control environment.

By touching the i4.0-ready button, the control strip on the right edge of the screen changes to an activity-driven display. It contains the preselectable areas of Production, Setup, Programming, Maintenance, General, and Diagnostics, which are associated with additional function keys labeled with intuitive icons. They enable operators, setup engineers or maintenance personnel to obtain additional information on the screen of the machine.

Screen with a second face

The Xpanel® software developed by INDEX allows the user to open a second view on the screen. Pushing a special button on the touch-monitor, the user can toggle between the "normal" control view and this "second page" at any time. For example, if the user selects the icon for the workpiece name in Xpanel® Industry 4.0 mode, it will be displayed on the second screen page, and the user can then navigate to it repeatedly by pressing a button. Other buttons allow him to retrieve and view also job or quality requirements, and always return to the control page.

Similar assistance is also available for setting up tools for a new job. Here Xpanel® can provide setup sheets and tooling information on the second page. Full-page display of PDF formats in combination with extensive and intuitive navigation and zoom functions on the touch-screen enable safe transfer of all information.

However, before retrieving the documents, e.g. DNC of the NC program, they must be stored in the workpiece folder provided – for which mostly other departments are responsible (another change of the organization structure is not required). When the program starts, Xpanel® then searches these folders for stored information and, if it finds any hits, enables the corresponding button. If nothing can be found, the button remains gray.

The entire user and machine documentation is available as background information in Xpanel® already when the machine is delivered. This includes both the operating and programming instructions as well as the complete set of circuit and hydraulic diagrams, which previously have been shipped on a separate DVD. So, the user no longer needs to look for the proper DVD and a PC workstation. Everything is available directly on the machine.

Xpanel® offers even an editor, which allows the machine operator or programmer to add his own notes to the workpiece job. If the workpiece program is used again at a later time, the documented empirical values help to get back to an error-free production in the shortest possible time. This function is very helpful also for passing information during a shift change.

Additional PC allows 3D simulation on the machine

All the above-mentioned functions are included in the standard version of Xpanel®. But many more possibilities open up with an optionally available industrial PC, the so-called VPC Box, installed in the control cabinet. It can be connected with the operating panel via an Ethernet interface and also uses the second page of the control screen.

Touch functionality and wide-screen view of Xpanel® then allow the use and consistent operation of Virtual Machine (VM) developed by INDEX, which previously could be used only on a separate PC outside the machine. "VM on board" now takes 3D simulation directly to the machine control panel. Based on the new technical capabilities that the Siemens Sinumerik 840D sl provides, INDEX has developed additional functionality in the VM. For example, the virtual NC core can now be run coupled with the real machine. This enables collision monitoring in a completely new dimension.

INDEX offers different operating modes for VM on Board. Crash-Stop and RealTime use coupled operation with the NC core of the real machine. CrashStop allows the advance simulation of workpiece programs on the machine. In case of a virtually detected collision, the function triggers a timely machine stop to prevent the real collision. Using RealTime, the machine program can be simulated on the operating panel simultaneously, thereby enabling real-time analysis of the machining sequence in difficult-to-access work area situations. Of course, VM on Board is useful also for creating and testing new NC programs, for which direct connection with the machine is not required.

Programming assistance and openness for customer applications

Xpanel® offers also useful assistance for machine programming via INDEX's proprietary VPro ProgrammingStudio that can be used with the VPC Box not only as part of VM on Board, but also directly on the machine control. Self-contained machining operations are generated with VPro as NC code by repeated sequential selection of individual technology steps. The functionality of the machine and control equipment is taken into account at every step. The generated NC code can be viewed and also edited manually.

The VPC Box even allows the use of the NX-CAM system with an INDEX postprocessor directly on the machine under the "CAM on Board" button. Of course, other CAM systems and other customer-specific applications can be used as well. INDEX has opened the industrial IPC for access by the user's IT department for this purpose. The open system

allows the customer to adapt Xpanel® to specific user needs and to integrate its own applications and functionalities.

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Figure 1:

The Xpanel® philosophy promotes the machine control panel to a command panel for optimum productivity. Alternating with the control view, a second screen page becomes the information center on the machine: The operator receives exactly the information that best supports him in his current work.

Figure 2:

An integral part of Xpanel® is the 18.5" touch screen, to which numerous rotary and tip switches have been moved from the machine control panel. Its high resolution makes it suitable even for 3D simulations.

Figure 3:

Xpanel® can provide useful information such as setup sheets or tooling lists while operating the control. They are displayed on a second screen page, which the operator can switch to by pressing a button.

Figure 4:

The entire user and machine documentation is available as background information in Xpanel® already when the machine is delivered. This includes both the operating and programming instructions as well as the complete set of circuit and hydraulic diagrams, which previously have been shipped on a separate DVD.
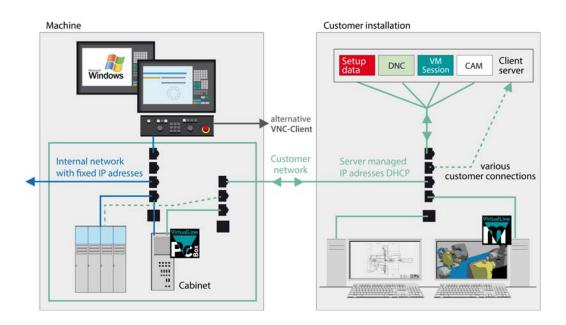

Figure 5:

In connection with an industrial PC installed in the control cabinet, Xpanel® offers more exciting capabilities for the production process, for example, "Virtual Machine on Board". Various simulation modes – coupled with or independent of the current machine operation – ensure high process reliability.