



## **New HMI Software Solutions for Process Monitoring: A Modular System**

**Operability and functional control are important features of industrial production systems for achieving a high production yield with consistent quality. Process controllers and control units perform control and monitoring functions. These devices are equipped with functions that are growing continuously more extensive and more intelligent to meet production requirements. In contrast, system planners and operators would like to place these systems in service and operate and maintain them quickly and easily. In is just these requirements that HBM addresses with the new HMI\* software solutions of FASTpress Suite.**

For the first time, HBM is presenting the new HMI software for the field of industrial process control. It is part of the FASTpress software suite and works together with the process controllers of the FASTpress and EASYswitch families. Innovative new technologies were used in the development of the software. Attention was continually focused on high availability and a wide range of application options. The HMI software can also be adjusted and expanded country- and application-specifically.

\* = Human Machine Interface

### **The Technology**

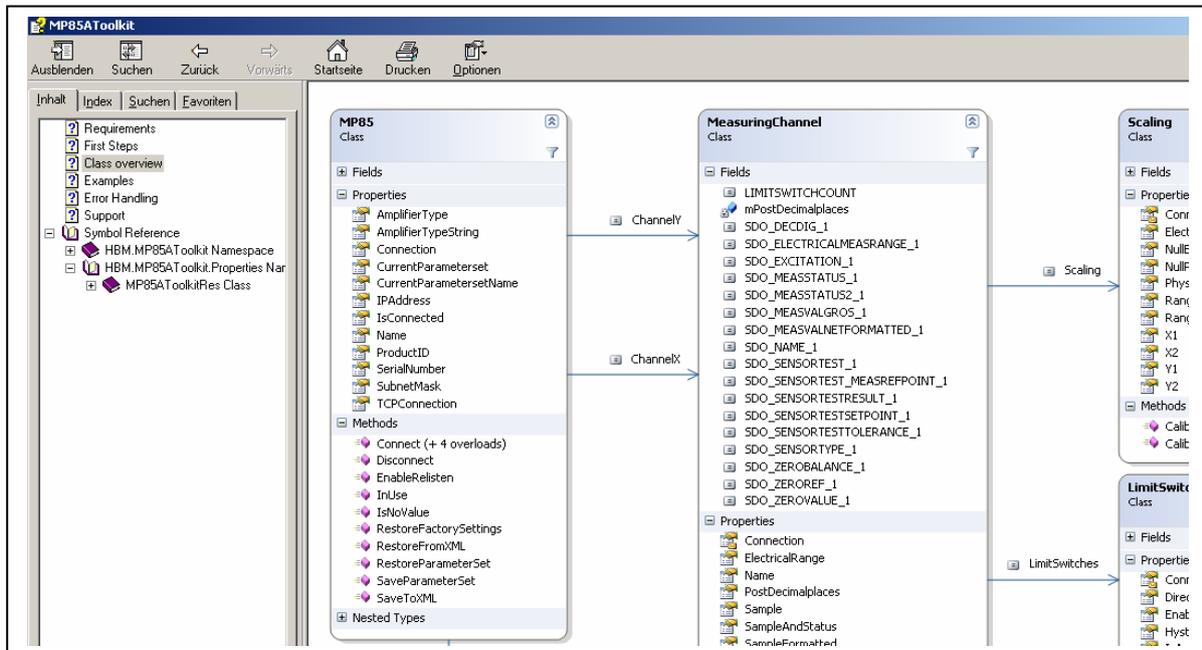
The technological foundation of the HMI software is the Microsoft .NET software structure, which is now widely disseminated. Since the performance and operating reliability of Windows-based systems have risen enormously in recent years, there will be many solutions based on .NET in the future. Viewed in a worldwide perspective, this will further support the ongoing process of merging office and manufacturing communication. Due to the high market penetration of Microsoft Windows-based applications, these solutions represent a future-proof investment for the long term.

.NET is a software platform developed by Microsoft. It includes a runtime environment, a collection of class libraries (APIs) intended for programmers as well as attached utility programs (Services). The platform is currently available in its full extent only for Windows and replaces the previous procedures of Windows programmers as well as outdated technologies such as COM. It offers more flexible possibilities for accessing operating system functions and exchanging them among each other. This makes .NET suitable for use on different device platforms such as cell phones or PDAs.

Since Windows Server 2003 Microsoft has also offered server operating systems that already have a .NET runtime environment integrated into them. In previous versions the runtime environment has to be installed manually, provided the relevant Windows variant is supported. For handhelds and mobile phones running under Windows CE or Windows Mobile, there is a pared-down version of the .NET runtime environment in the form of .NET Compact Framework.

## Class Library (API)

The Framework Class Library (FCL) comprises several thousand classes divided into Namespaces. The classes perform tasks such as formatting text, sending e-mails, but also generating codes. Categorization into namespaces serves to arrange the large quantity of information more manageably. The manufacturer provides the documentation of classes with the software (see below). All the functions of the HBM FASTpress and EASYswitch process controllers are combined in the API of the MP85A Toolkit. This makes all the implementation options for required device functions available to application programmers in their own application.



Class library (API) of the MP85A Toolkit

## Strategy, Benefits, Trends

What is special about .NET technology is not so much the technological innovation as the strategic decision (perhaps the one with the most far-reaching consequences) of the market leader Microsoft for a runtime-based system. It is intended among other things to reduce software bugs. Software development thus places less attention on performance, which has become decreasingly important as computing speed has grown faster. The focus is now directed instead at greater efficiency in program development.

This includes:

- Simple "plain text" programming with the functions of the process controller
- No knowledge of physical data transmission and associated communication objects required
- Simple and fast connection to the process controller using the popular Ethernet TCP/IP connection
- All Microsoft.NET-compatible programming languages (such as C', VB.NET) can be used.
- "Smart-IntelliSense": Only the functions/options supported by the FASTpress and EASYswitch process controllers are provided.



```
Logger.StartLogging();
mDevice = new MP85();
}

private void buttonGo_Click(object sender, EventArgs e)
{
    int Status;

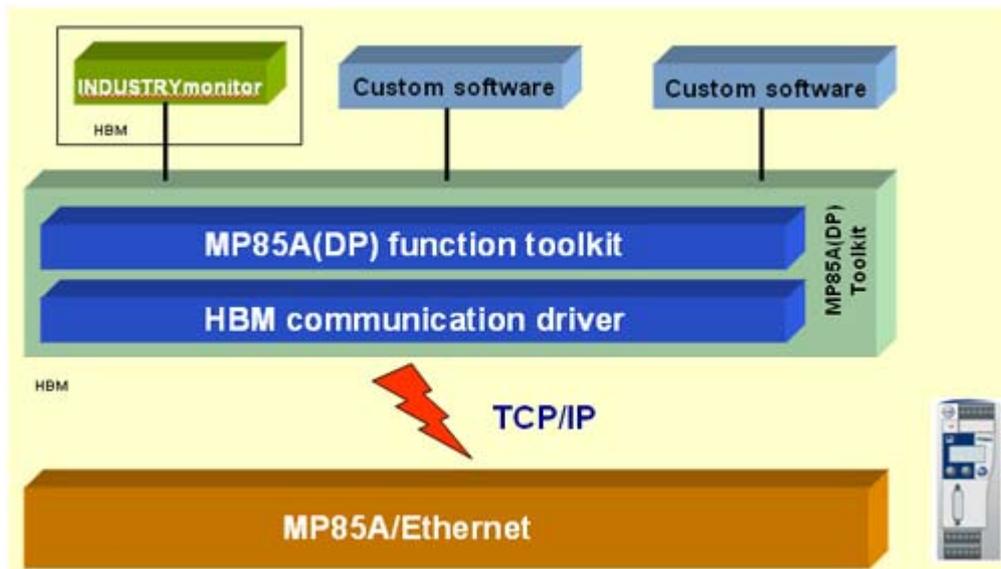
    try
    {
        Status = mDevice.Connect(textBoxIPAddress.Text);
        timerStatus.Enabled = true;
        UpdateUI();
        mDevice.LowPassFilter.Frequency = LowPassFilter.claFrequency;
    }
    catch(Exception exc)
    {
        System.Windows.Forms.MessageBox.Show("Could not connect to");
    }
}

private void FormMain_Load(object sender, EventArgs e)
{
    InitUI();
    UpdateUI();
}
```

*Example of code from a sample application*

## System Architecture

Process controllers of the FASTpress and EASYswitch series are used as hardware platform. Their physical connection to the host system on which the user's target application is running consists of the standardized Ethernet interface. The non-real-time TCP-IP protocol runs on this interface at 100 Mbit/s. Now with the MP85A Toolkit, HBM has created a tool that sets up and maintains the connection to the host system and also makes a library available from which the user can create a software application for the production process.



*MP85A Toolkit structure*

## Availability and Tools

The manufacturer Microsoft offers .NET in various versions: as a simple runtime environment together with the required class libraries (framework), as a free SDK for developers or sold as an integrated development environment (IDE) in the form of Microsoft Visual Studio .NET. Especially for beginners and students, Microsoft Visual Studio Express Editions is available at no cost. It has restrictions compared to the expensive standard or professional versions. This makes it easy for both beginners and professional application programmers to get started. The HBM MP85A Toolkit also provides extensive help with numerous explanations and sample programs. These examples are available in the source code and can easily be adjusted and expanded.

## System Integration

The MP85A Toolkit offers more flexible possibilities for accessing operating system functions and exchanging them among each other. This makes it possible to integrate different target devices on which the .NET environment is installed. Different device platforms such as mobile phones or PDAs can then be easily integrated. Both stationary applications on site in the production system or a machine and mobile service and diagnostic terminals can be incorporated. It makes no difference whether these systems are wired (e.g. line PC or industrial PC) or wireless (e.g. WLAN, WiFi). The possibilities are limited only by the speed and performance of the devices.

## Application Examples

All software solutions are included in the FASTpress software suite family of HBM. Following are a few examples of how MP85A Toolkit applications can be used on existing systems in the production area. The displays and function can be further adjusted and refined in reference to the requirements of the production area. Country- and user-specific adaptations are also possible. This is especially important as companies become increasingly global with production locations distributed worldwide. As a positive side effect, this also makes it possible to achieve a recognizable "look and feel."

Operating terminals are frequently available already in production systems and on machines. The performance of these modern devices is sufficient to represent HBM process monitoring in addition to system monitoring. Integration uses the touch button to start the HBM "EASYmonitor CE" monitoring application. However, parts or separate sequences can also be added to the machine application. The standard Ethernet interface is also used in this case for the connection.

HBM makes the "EASYmonitor Mobile" available for use in mobile device. This fully functional example can be used to call up results and the status of FASTpress and EASYswitch process controllers. WLAN (WiFi) is used for the interface connection.



*"EASYmonitor Mobile" mobile application*

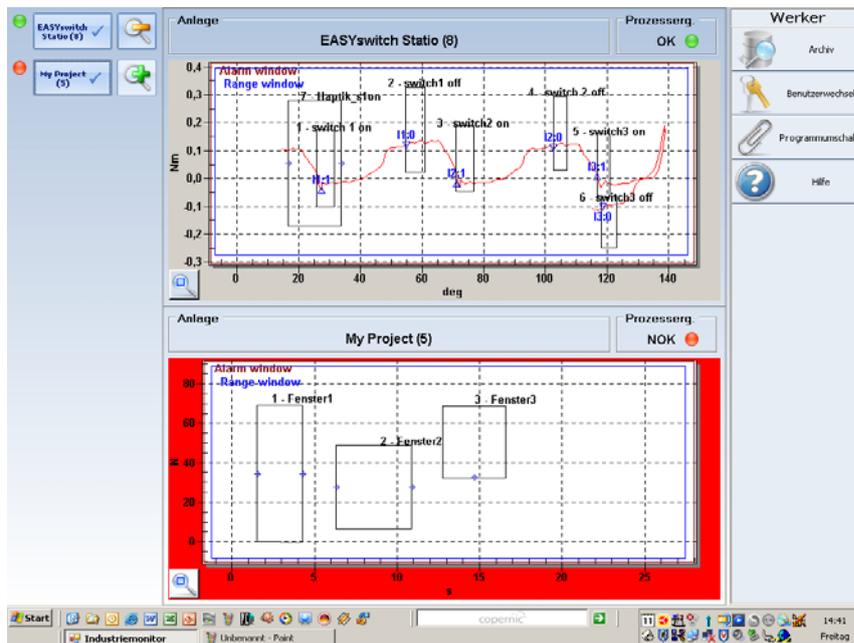
### **Powerful production software – INDUSTRYmonitor**

To make it possible to use the full performance of HBM process monitoring, a completely new user interface was created based on .NET technology. This tool is used to record process data, for visualization and to save data. In addition to the functions and information made available by the process controllers of the FASTpress and EASYswitch series, workpiece designations can also be read via bus interfaces (CAN, Profibus, Ethernet) or barcode scanners (USB). This information is displayed and saved and facilitates a clear overview and simple archiving of acquired process data. Up to 12 process controllers can be operated over the Ethernet network. Cycle times measured in seconds with display and storage of process data in the background can be implemented. This software can also be used on all target systems on which WindowsXP is installed as the operating system.

Significant features of the INDUSTRYmonitor include:

- Operation of 12 process controllers with simultaneous display of four selectable processes
- Parameterization of the sensor – process controller measurement chain
- Support of TEDS sensor identification
- Parameterization of monitoring criteria for the production process
- Automatic creation of envelope curves or tolerance windows
- Parameterization and recording of desired process parameters

- Creation and administration of measurement programs (backup administration up to 1000)
- All process information at a glance:
- Automatic time and date transfer from line or system PC
- Transparent graphical display of all measurements
- Individual and total display (curve history) for production processes
- Log printout
- Data backup on a system PC
- Monitoring and display of network status
- Error saving and display (log file)
- Other programs can be called with the touch button
- User administration on 3 levels: user, installer, superuser
- Integrated help with text and images



*INDUSTRYmonitor – process view*

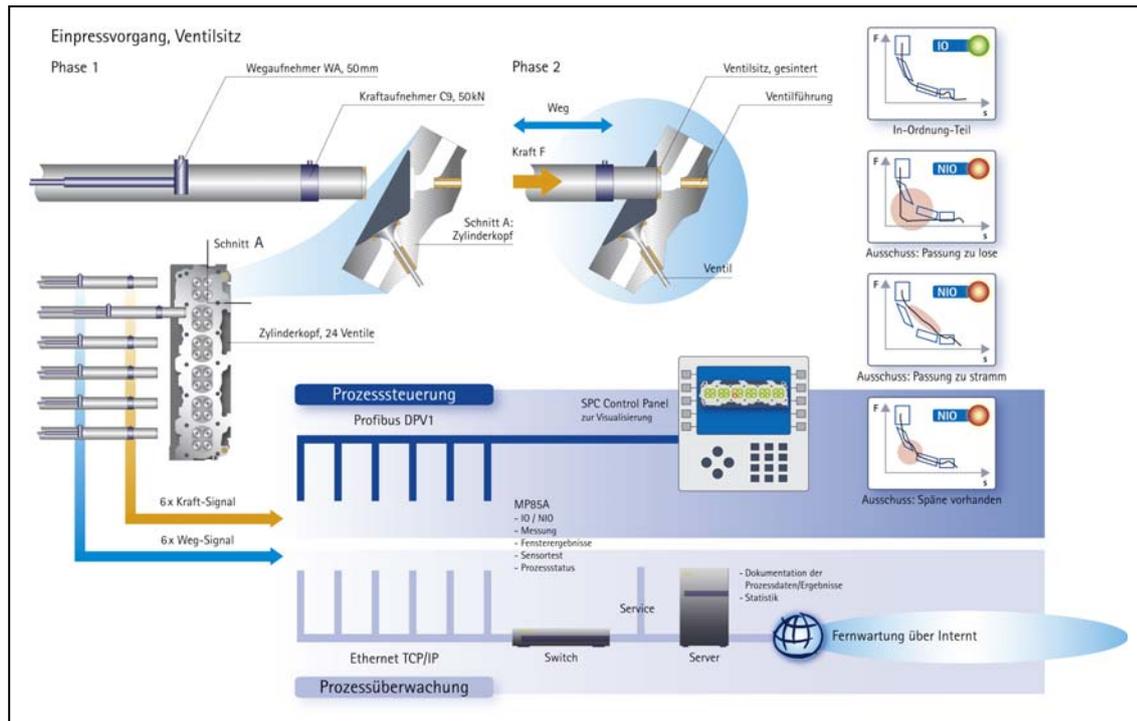
Scalability and user administration make INDUSTRYmonitor the ideal multi-purpose tool for process monitoring. The user levels feature the following options:

- User mode: In this mode the machine operator can monitor production and see the status of the machine or system. Saved process curves and results can be checked and printed out.
- Installer mode: On this level the evaluation criteria of the production process can be set up and saved. Up to 1000 measurement programs can be created and administered. In installer mode, measurement curves, results and monitoring states can be recorded and analyzed.
- Superuser: This level is designed for plant engineers and installers, for parameterizing process monitoring and measurement chains. This makes it possible to adapt to available production tools and machine parameters.

To avoid incorrect usage or misuse, the software "jumps" back to user mode after a defined amount of time.

## Modern production

In modern production systems, process monitoring and control tasks are implemented in two separate circuits within the system. First, deterministic control operations are administered by a machine control unit. In addition, process data are saved and diagnostics are performed using a network-capable connection. This ensures access to the system throughout the factory. However, a shared display, increasingly designed for touch operation, is used for operation and visualization. Remote access to maintenance and service tasks is also possible via corresponding safety components such as firewalls. This saves time and money and also protects the environment.



## Conclusion

With FASTpressSuite and the associated software modules, HBM provides a powerful, modern and easy to operate program for users and plant engineers. The advantages for users: increased production and easy integration into existing machine concepts.

The operator interface as a link between humans and machines is becoming ever more important. Simple, secure and easy to learn operation are the features that plant operators ask for. Constant production monitoring, complete documentation and preventive maintenance are important aims for factory management and maintenance personnel. Both goals can be achieved with INDUSTRYmonitor and FASTpressSuite from HBM - a user-friendly system and functional control.



**Michael Guckes**

Product and Application Manager  
Industrial Measurement Solutions

HBM Test and Measurement

Email: [michael.guckes@hbm.com](mailto:michael.guckes@hbm.com)

**HBM Test and Measurement**

www.hbm.com  
Email: [info@hbm.com](mailto:info@hbm.com)

Tel. 06151 803-0  
Fax 06151 803-9100

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