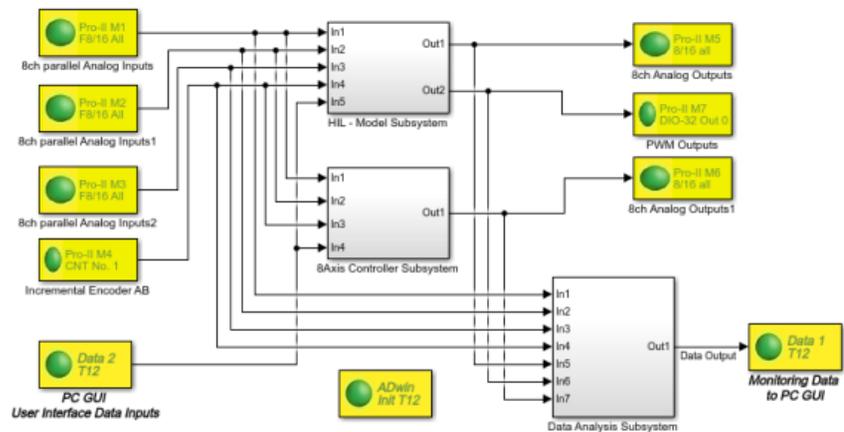


ADwin

Fast Real-Time Systems

- *Real-Time Models in Simulink[®]*
- *Data Acquisition with Matlab[®]*



Standard Systems and Products

ADwin offers a large variety of different hardware and software products, developed by experienced engineers. All applications and functions always run absolutely deterministically and very fast in Real-Time.

Models for **ADwin** systems are built by Simulink® using the blockset **ADsim** and the development tool chain.

ADwin runs Simulink® models with 'µs' cycle times, and with a 'ns' timing precision, while applications with Matlab® may run on an even higher speed.



Simulink® on ADwin in Real-Time

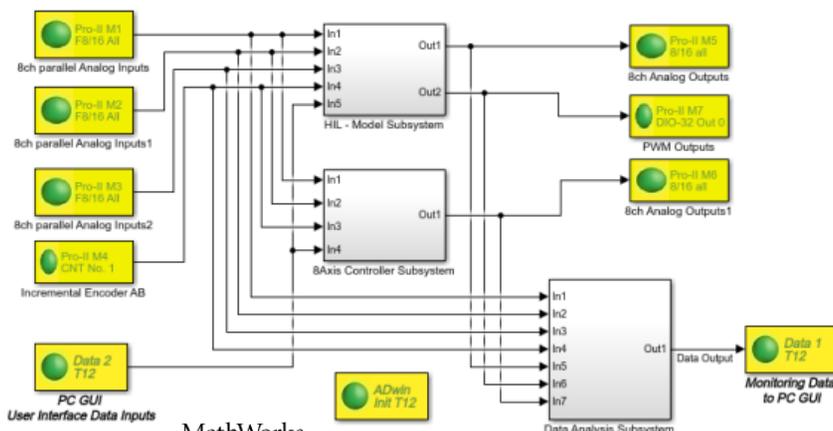
- Complex large models @ high speeds
- Parallel models, multitasking, priority controlled
- Controllers, data acquisition, signal analysis, filters, bus communication, state machines, ...
- Benchmark example: 16 x PID @ 300 kHz
- RT cycle frequency up to 500 kHz / 1 MHz

DAQ with ADwin and Matlab®

- Acquisition of various signals
- Parallel acquisition of channels from kHz to MHz
- Analog, digital, counter, serial bus signals
- Real-Time pre-analysis, intelligent acquisitions
- Matlab® based analysis and visualization
- Complex triggers, data reduction

Application Fields

- Test stand control and data acquisition
- Customized machine automation
- Dynamic component testing
- End-of-Line (EOL) testing
- Hardware-in-the-Loop (HIL)
- Rest-bus simulation
- Fast machine control applications
- Experiment control (Physic world)
- Automotive, Aerospace
- Green Energy and White goods
- Scientific Physics Experiments
- Research applications and Prototype development



ADsim Blockset - Simulink® models in fast Real-Time

With the blockset **ADsim**, you easily run Simulink® models on **ADwin** hardware systems in Real-Time, very fast with 'µs' cycle times, and with a 'ns' timing precision.

With a few clicks only, just insert **ADwin** hardware I/O blocks into the model and build your own Real-Time model. After compilation, what takes a few seconds only, the model runs on the **ADwin** system fast in real-time, absolutely deterministically, and with a high timing precision. Typical model execution frequencies are from high kHz range, via hundreds of kHz, up to 500 kHz/1 MHz.

The Simulink® models are executed inside **ADwin** by a local system CPU, on a highly optimized multitasking Real-Time operating system. The Real-Time process cycle time is adjustable in 1 ns steps. Benchmark Example: With a few clicks you run for example 8 x analog inputs + filter + controllers + analog outputs at 500 kHz. **ADsim** allows multiple I/O trigger synchronization modes in order to cover flexible application requirements.

ADsim is available for **ADwin-Pro-II** and **ADwin-X-A20**.

Typical **ADwin** & **ADsim** applications are test stand control and data acquisition, customized machine automation, dynamic component testing, End-of-Line (EOL) testing, Hardware-in-the-Loop (HIL), Rest-bus simulation, and many more.

Please feel free to receive further information about **ADwin** & **ADsim** or get an **Online Demo** with just a click:

www.ADwin.us



Fast and deterministic Real-Time

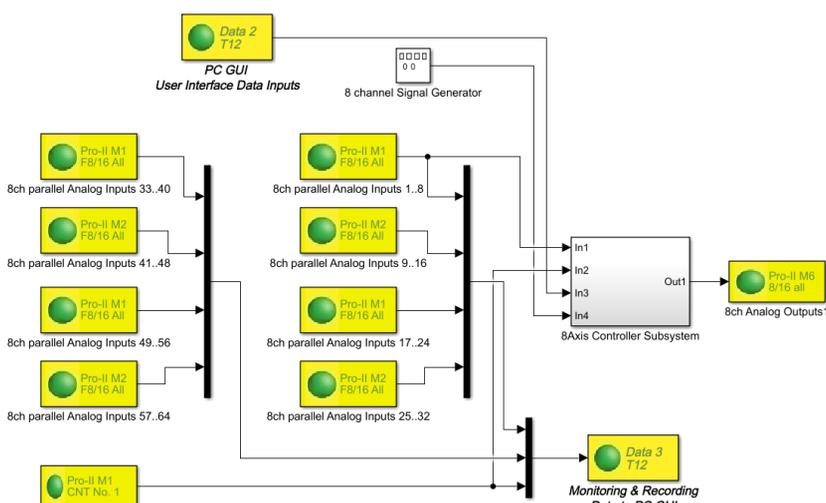
- Complex models running
- From kHz, hundreds of kHz to MHz
- Accurate and deterministic timing
- 'µs' cycle times with 'ns' timing precision
- Some seconds for code compilation only

ADwin Systems

- **ADwin-Pro-II** and **ADwin-X-A20**
- Local Real-Time CPU
- Analog-I/O, digital-I/O
- Counter, incremental encoder
- CAN®, CAN-FD®, SENT®, LIN®, etc.
- PROFIBUS®, PROFINET®
- EtherCat®, DeviceNet®, etc.
- Standard **ADwin** systems
- Additional OEM customized systems

Driver tool chain

- Matlab® and PC programming languages and DAQ environments
- **ADtools**, **ADsimDesk**
- Data exchange between PC user interface and Real-Time model
- Online tuning of Simulink® blocks
- Ethernet for PC communication
- Windows®, Linux, OSx



The ADwin concept

ADwin systems are freely programmable by the user so that the software of the system can be adapted for any kind of a customized solution. This makes **ADwin** an universal platform, suitable for many different types of functions, applications, and industries. Just use **Simulink®**, **ADbasic**, **Matlab®** and/or **ADlab** on **ADwin** for fast and precise Real-Time models or intelligent data acquisition.

ADwin systems are characterized by a deterministic execution of intelligent data acquisition and control applications. This is achieved by a local CPU, the Real-Time heart of every **ADwin** system. The CPU is responsible for all Real-Time functions and guarantees a fast, precise, and deterministic process execution, independent of the PC and its workload. User-created Real-Time code may be executed with kHz, hundreds of kHz up to MHz range.

ADwin systems work in close cooperation with the PC, running Windows or Linux on it, or OSx on a Mac, but there is a clear job sharing:

- The job of the **ADwin** system is to execute fast and deterministic processes in Real-Time,
- while the PC performs standard functions such as displaying graphical user interfaces for applications, visualization of data, and data base accesses.

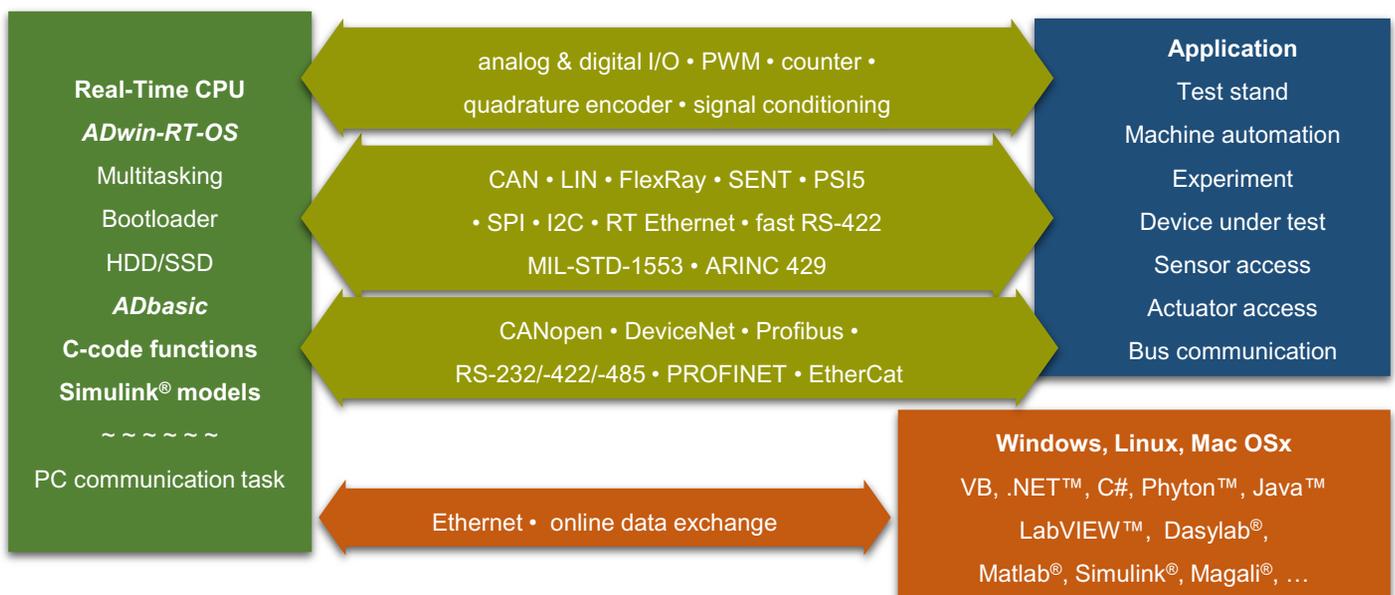
Real-Time Functions

- Intelligent data acquisition
- Fast digital closed loop controller
- Multi axis controller, PID, state space, and others
- Online analysis of measurement data
- Complex trigger applications
- Online data reduction
- Signal generation, arbitrary and adaptive
- **ADbasic** Real-Time code
- Simulink® models in Real-Time

ADwin systems add Real-Time capability to a Windows or Linux PC; if the PC crashes, the **ADwin** system will continue to run, maintaining the integrity of the application.

ADwin products cover a large variety of I/O types and interfaces, as well as a selection of different Real-Time CPUs. In addition to the CPUs, there is a large local memory for program code and measurement data, analog I/Os, digital I/Os, counters, different kind of serial interfaces for automotive, avionic and industrial serial busses, various expansions and options.

The communication between the **ADwin** system and the PC is done via Ethernet. Industrial bus interfaces allow the connection to PLCs and NCUs, while a bootloader supports complete stand-alone operations of the **ADwin** system if needed.



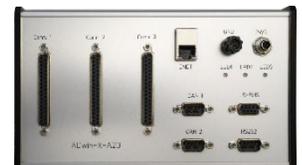
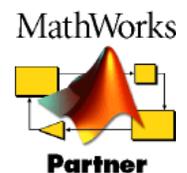
ADbasic is an easy-to-use Real-Time software development tool for deterministic, time-critical processes on **ADwin** systems. Whether you need to run intelligent data acquisition with online analysis or complex trigger conditions, to use open- and closed-loop controllers such as multichannel PID and others, or to generate any kind of periodic or non-periodic waveforms, **ADbasic** is the key! We provide the development of various Real-Time applications with precise and deterministic operations and timings.

ADbasic is an integrated development environment that runs under Windows with many online debugging features. Its easy-to-learn, standard command syntax has been expanded with a number of functions to access all inputs, outputs and interfaces of an **ADwin** system, as well as functions for process control and for communication with the PC.

Along with **ADbasic**, the **ADwin** Real-Time operating system is optimized for the shortest possible response times. It manages parallel processes which can be executed on the same CPU in a multi-tasking mode, with different priorities and process cycle times.

ADbasic is source code compatible to previous versions; the same code can be executed on different **ADwin** systems with different CPUs. This means that by using **ADbasic**, the **ADwin** concept gives you a great advantage by using future hardware together with your currently-developed code. This saves on development costs over the long-term.

In the latest version, **ADbasic** 6.2 for T12-based CPUs in **ADwin-Pro-II** and **ADwin-X-A20** provides a strong link to Simulink® and/or Matlab®.



ADwin Real-Time – with Sub-Microsecond Precision!

ADwin applications always run in Real-Time! Every sampled value can be evaluated in the same sampling step, so that a control function or an online analysis can immediately follow. The best solution for fast Real-Time applications is to place a dedicated CPU close to the signals with its own resources for flexible and freely programmable processing of measurement data. The **ADwin** CPU runs an optimized **ADwin** Real-Time multi-tasking operating system—only this combination provides exact, predictable process response times with less than 300 ns.

For even more precise timing, some **ADwin** systems provide a **TiCo** co-processor with response times down to 10 ns. The **ADwin** system can run multiple parallel tasks, each task with its own functionality, cycle time, and individual priority. Depending on the CPU, you can run applications with process cycle times from 'ms' down to 'µs' range, from kHz up to MHz, perfectly executed on **ADwin** with a high timing precision in Real-Time.

Drivers are available for a wide range of PC programs under the Windows and Linux operating systems, as well as for OSX on Mac computers. **ADwin** drivers provide functions for communications between **Matlab**® or any other programming language or DAQ software environment on the PC and the **ADwin** system.

ADwin Real-Time processes, such as **ADbasic** code and Simulink® Real-Time models, may exchange data along with system status. Communication between the **ADwin** system and the PC is done via Ethernet (10/100/1000Mbit). One **ADwin** system can be addressed by several PCs, while a single PC can handle several connected **ADwin** systems.

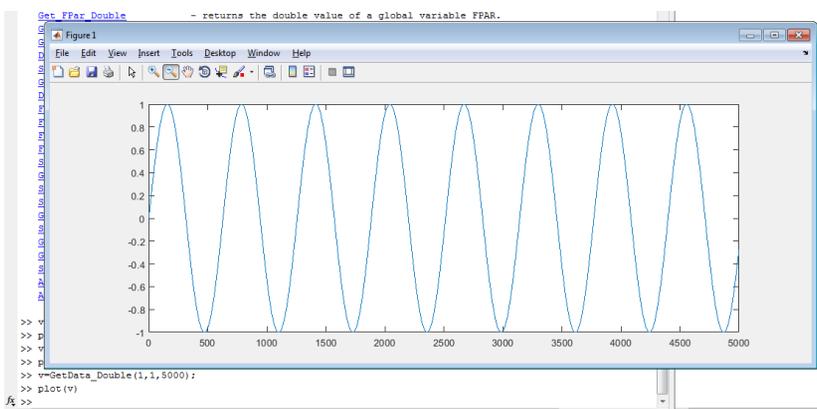
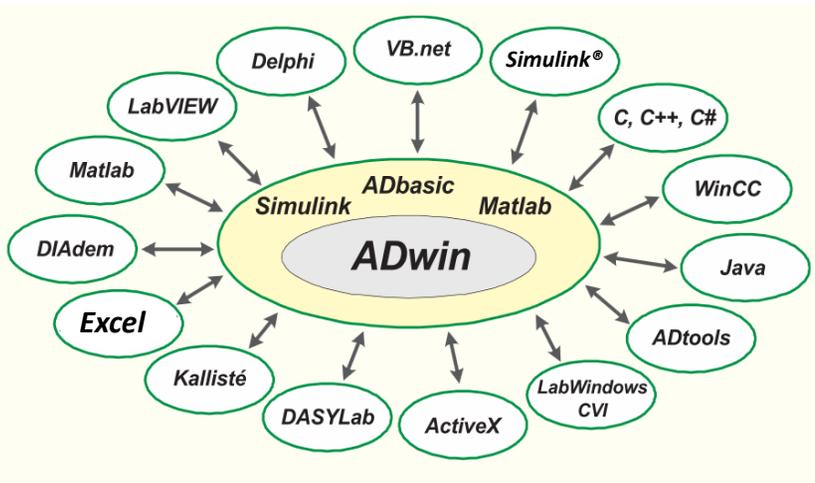
One of the key benefits in the **ADwin-to-PC** communication is the possibility to run fast, absolutely deterministic Real-Time processes, and also to communicate data and parameters between the PC and the **ADwin** system at the same time. Neither has influence on the other: the communication does not disturb the deterministic timing of the Real-Time processes and vice versa.

Matlab® and ADwin / ADlab

- Intelligent Data Acquisitions
- Acquisition of various signals
- Parallel acquisition of channels
- Pre-analysis in Real-Time
- Complex triggers
- Data reduction
- Matlab® based analysis
- Visualization via Matlab®

- Key specifications:
- kHz ... hundreds kHz ... MHz
- Various signal types
- Parallel synchronized acquisition OR individual acquisitions rates
- ADbasic and Simulink® collaboration

- Analog Inputs, fast parallel & synchronized, with one ADC/channel or multiplexed (MUX)
- Analog outputs, Digital I/O, counter, incremental encoder, SPI®, ...
- Filters, Thermo, Precise-RTD, LVDT®, ...
- PROFIBUS®, PROFINET®, EtherCAT®
- CANopen®, DeviceNet®, Modbus®, ...
- CAN®, CAN-FD®, LIN®, SENT®, PSI5®, ARINC 429®, MIL-STD-1553®
- SPI® master/slave, Manchester code, Generic RT Ethernet (UDP), ...



ADwin always provides a very accurate, precise, and deterministic timing, with a high speed process execution.

ADwin-X-A20 is the newest member of the **ADwin** Real-Time systems family. It is compact and is designed for OEM applications to be used inside machines and devices. Like all **ADwin** systems it executes a fast, robust and flexible Real-Time code.

There are standard versions of ADwin-X-A20, as well as fully customized versions for OEM series applications.

ADwin-X-A20 is freely programmable by the user. The software of the system can be designed using the **ADbasic** tool chain or **Matlab® /Simulink®** and it can be adapted just in software for many kinds of applications and solutions. For the data exchange with a PC, all drivers are available for **ADwin-X-A20**.

In general, **ADwin** offers more than 25 years of experience in automation and deterministic Real-Time applications. With software solutions since 1987, and with **ADwin** hardware systems since 1992, many thousands of users and applications worldwide rely on these precise and robust systems.

ADwin systems are the core of various test stands, machines and scientific experiment controls.



For Lab applications, desktop or DIN-rail



For 19" enclosures

<p>8 analog in 18bit, +/-10V, MUX</p> <p>alternatively, optional: 8 analog in 18bit, +/-10V, Parallel</p>	<p>ADwin-X</p> <p>CPU T12.1 CPU ZYNQ, ARM Dual Cortex-A9, 667MHz, 64-bit Floating Point Unit, 1GB RAM, Fast RT-OS</p> <p>1Gbit Ethernet to the PC</p>	<p>32 DIO TTL</p>	<p>2 CAN</p>	<p>2 Counter TTL, Up/down, quadrature, PWM, pulse</p>
<p>2 analog out 16bit, +/-10V *1)</p>		<p>1 RS232</p>	<p>1 ETHERCAT</p>	<p>2 Counter diff TTL, PWM, pulse, Up/down, quadrature,</p>
<p>4+4 TTL DIO 1 EVENT In</p>		<p>7+2 DIO diff TTL</p>	<p>1 PROFIBUS</p>	<p>2 Counter 12V/24V, PWM, pulse, Up/down, quadrature</p>
		<p>Bootloader</p>	<p>1 PROFINET</p>	<p>32+ DIO 24V Up to 15x32 channel 24V I/O via LS bus</p>
<p>Standard</p>		<p>Optional</p>		

The ADwin Pro-II System

ADwin Pro-II is a modular, scalable, expandable, intelligent Real-Time system for fast data acquisition and control applications in industrial and scientific environments.

The modular design of **ADwin Pro-II** offers a flexible, adaptable solution for various applications. It supports signal counts from single channels up to hundreds of channels.

A wide range of different analog & digital I/O module types, many kind of interfaces, various enclosures, processors and memory options, allows a customization of the system for a universal use, especially in industrial applications.

ADwin-Pro-II systems are the core of various test stands, machines and scientific experiment controls.



The **ADwin Pro-II** enclosures are available in different form factors and power supply options.

<h3>ADwin-Pro-II</h3> <p>CPU T12 CPU ZYNQ, ARM Dual 64-bit Floating Point Unit, 1GB RAM, Fast RT-OS</p> <p>1GBit Ethernet to the PC</p>	Analog inputs Parallel / synchronized 18bit, 16bit, 14bit, 500kHz, 4MHz, 50MHz	Counter Up/down, quadrature, pulse, event	CAN / CAN-FD	SENT®, LIN® PSI5®, SPI®
	Analog inputs MUX, 18bit, 500kHz	DIO TTL	ETHERCAT	RS232
	Analog outputs 16bit, 300kHz or 50MHz	DIO 24V	PROFIBUS	RT-Ethernet
	Bootloader	PWM Input & output	PROFINET	Many more additional I/O module types
	Up to 480 I/O channels per system			



Please find additional information in the current full **ADwin** brochure
“Simply more realtime, available as PDF or printed in different versions :

- English
- French
- Italian (Short version)

Please request Your PDF version by Email,
or feel free to visit **ADwin** online for additional Information.



ADwin

Fast Real-Time Systems

Jaeger Computergesteuerte Messtechnik GmbH

Rheinstraße 2-4

D-64653 Lorsch

Germany

Phone: +49-6251-963-20

Fax: +49-6251-9632-99

E-Mail: info@ADwin.de

Web www.ADwin.de or www.ADwin.us



JÄGER
Computergesteuerte
Messtechnik GmbH