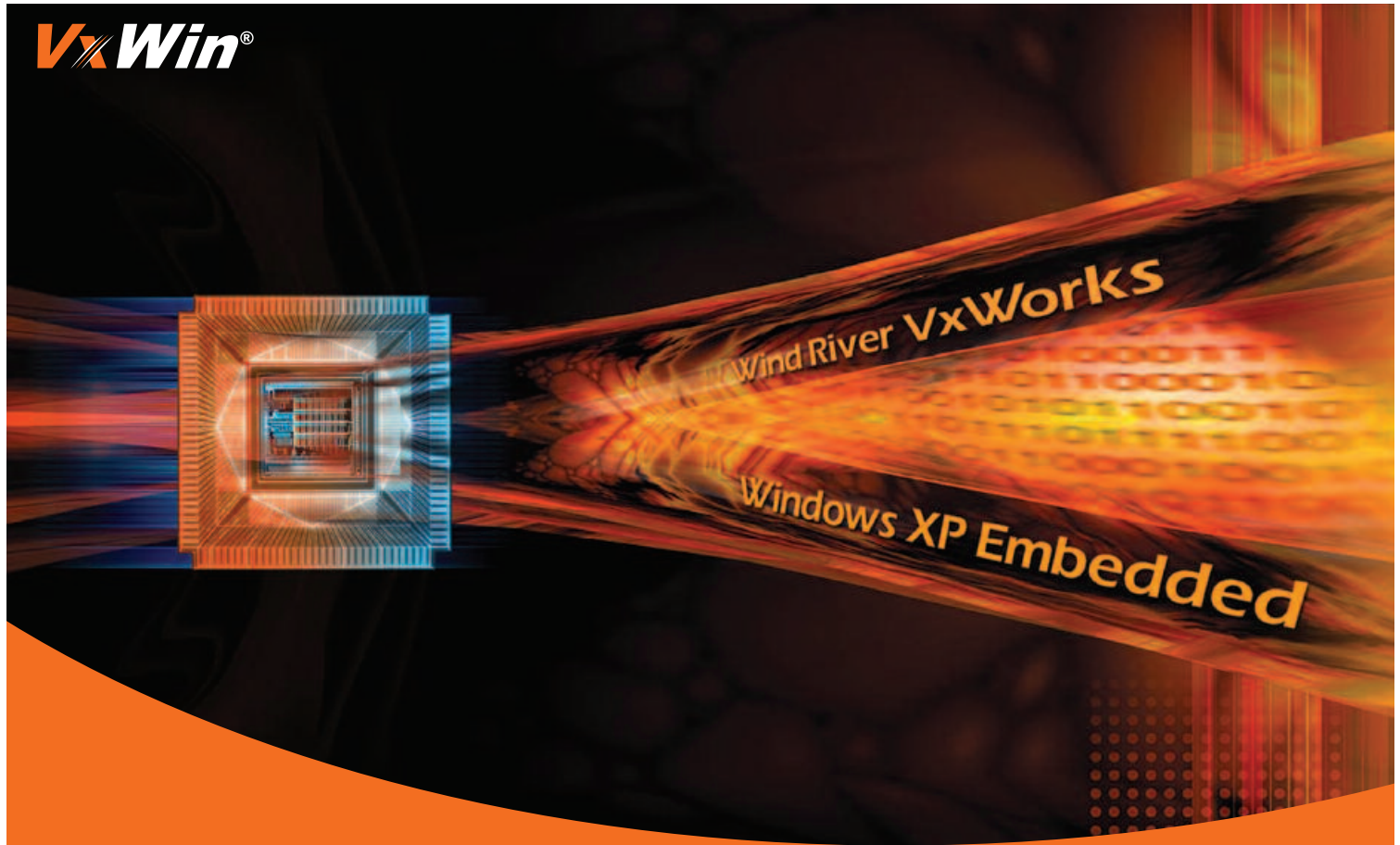# VxWin®

Wind River VxWorks

Windows XP Embedded

KUKA

VxWin

HARD REAL-TIME – COST-EFFECTIVE – HIGH RELIABILITY

- WIND RIVER VxWorks®
- WINDOWS® XP EMBEDDED

VxWin®

KUKA

VxWin ○ KUKA ROBOT GROUP WORLDWIDE

KUKA Robot Group is a leading developer of hardware and software for real-time critical applications and has delivered over 75,000 systems worldwide. Founded in 1986, KUKA is one of the world's leading robotics manufacturers. KUKA Robot Group is a part of IWKA, a holding company with sales over 2 billion dollars annually. Our products are developed and marketed from locations in Augsburg, Germany and Clinton Township, USA. Technical support is available throughout the world.

FLEXIBILITY

GIVE YOUR NEXT SYSTEM NEW FLEXIBILITY AND CAPABILITIES WITH KUKA'S COST-EFFECTIVE TECHNOLOGY:

○ Hyperthreading, multiprocessor and APIC support

○ Matlab/Simulink/Real-time workshop support

○ Full .Net support

○ Java virtual machine

○ High-end graphical Windows interfaces

○ Access to powerful Windows XP API

○ Outstanding connectivity

○ Hard real-time performance

○ High-resolution real-time timer, granularity 0.8 microseconds

○ Lowers hardware costs, drastically increasing reliability (MTBF)

○ Non-proprietary – built on COTS operating system

○ Availability of numerous hardware drivers

○ Full support from a worldwide company

STRATEGIC ADVANTAGE –
SINGLE PROCESSOR OPERATION

KUKA's technology extends WIND RIVER VxWORKS with Windows XP Embedded and allows both to reside concurrently on a single processor. KUKA's VxWorks adds Microsoft Windows XP capabilities to WIND RIVER's VxWORKS real-time operating system, eliminating the need for a second system running an HMI. VxWin lowers hardware and development costs and delivers superior reliability in an industry-standard solution.

VxWIN EXTENSION TECHNOLOGY

Real-time control must be accurate, reliable and cost-effective. Extending the proven real-time performance of WIND RIVER VxWORKS with the flexible attributes of Windows XP Embedded on the same machine, results in a powerful real-time system with access to all Windows XP features.

Think of the many possibilities for new products or significant product enhancements that KUKA's technology offers: increased GUI capabilities, standards-compliant connectivity, lower hardware costs, lower development costs, and greater reliability. A new, yet proven, way to increase your competitive edge. Products using VxWIN technology have years of operational experience in critical applications. Tens of thousands of industrial robots, industrial automation, process automation, medical equipment and other applications are in operation throughout the world. We have established a long-term relationship with WIND RIVER and Microsoft assuring seamless interoperability of our products. Users also have the support of our applications engineers worldwide and our ongoing commitment to continuous product improvement.

VxWin®

WIND RIVER
PLATFORM
PARTNER

APPLICATIONS

(AUTOMATION DATA INTEGRITY)

(PRECISION MACHINE CONTROL)

(CRITICAL MEDICAL RELIABILITY)

PRECISION MACHINE CONTROL

AUTOMATION DATA INTEGRITY

VxWin real-time applications

○ PC-based industrial automation including plc, motion control, robotics, cnc

○ Real-time test and measurement/data recording

○ Medical devices and equipment

○ Military and Aerospace

○ VxWorks target simulation with real-time behavior and hardware access

AUTOMATION DATA INTEGRITY

VxWin technology runs Occubot, a leading automobile seat wear testing application. Tests consist of thousands of continuous cycles run over hundreds of hours. The integrity of continually-recorded test data is maintained regardless of events occurring on Windows. VxWin enables robot control, force monitoring and dynamic path adjustments to run alongside the graphical operator interface and data display on a single processor.

PRECISION MACHINE CONTROL

Schleicher Electronic's cnc, ProNumeric, delivers industry-leading performance using VxWin to combine state-of-the-art cnc coupled with an advanced graphical user interface. The PC-based system interpolates up to 64 axes simultaneaously coupling external sensors input to NC operations.

CRITICAL MEDICAL RELIABILITY

VxWin technology provides the reliability and stability necessary to precisely and safely position the Accuray X-Ray delivery system during full-body radio surgery treatment. VxWin software enables the motion control apllication, VxWorks and the operator interface running on Windows OS, to coexist on a single system. This eliminates the need for a separate dedicated user interface.
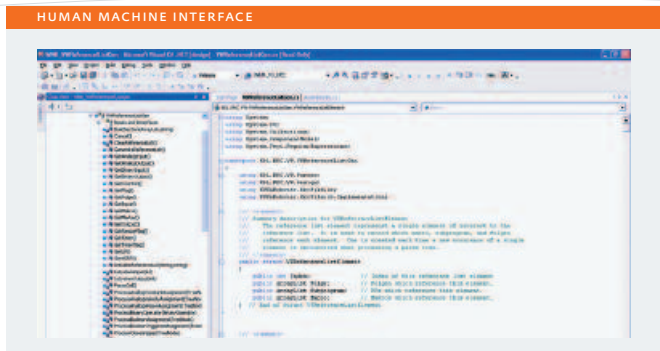
PRECISELY

A USER-FRIENDLY ENVIRONMENT

The Windows environment assures ease of programming, debugging and implementation. VxWin technology adds to the hard real-time performance of VxWorks with the extensive high-end graphical features and applications available through Windows XP Embedded. Programmers realize all the hardware and real-time features of VxWorks plus access to a wide range of third party drivers and analysis tools available on the market. VxWin supports all applicable WIND RIVER VxWorks features.

REDUCE HARDWARE
INCREASE RELIABILITY

With VxWin, high-end GUI features can be added to VxWorks without adding a second processor. Because hardware component count is significantly reduced, MTBF is drastically increased. Costs are further reduced because system size and weight can be cut. System resources are allocated individually for either VxWorks or Windows XP Embedded, guaranteeing that hardware-based interrupts allocated for VxWorks are handled in real-time. In addition, the design of VxWin guarantees VxWorks real-time application performance regardless of Windows XP occurrences.

HUMAN MACHINE INTERFACE
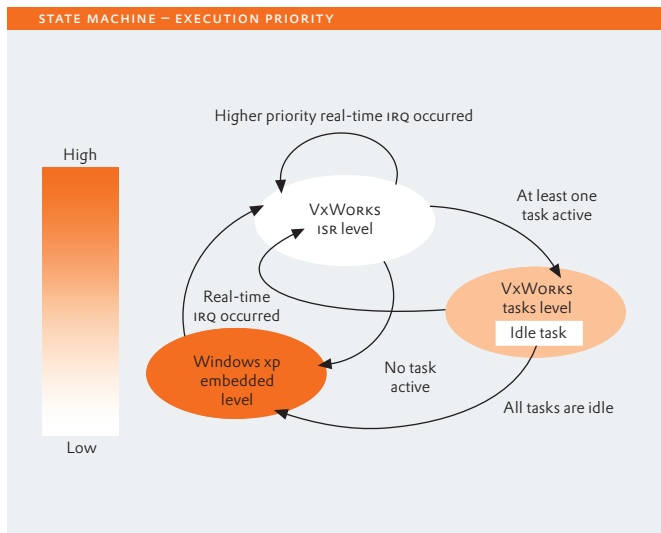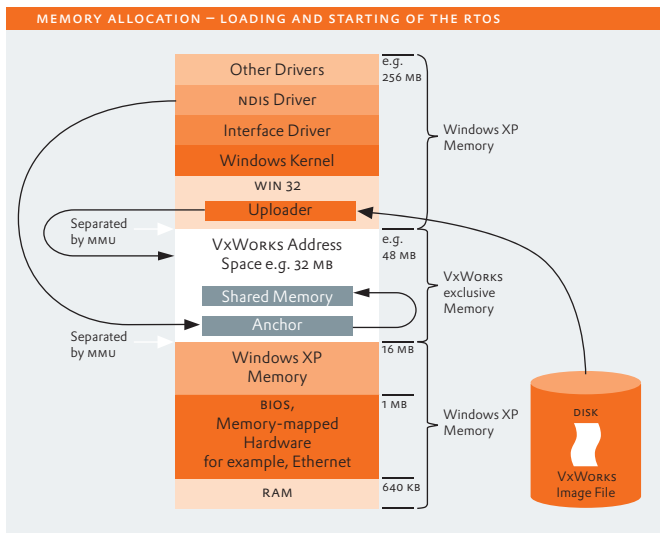

HUMAN MACHINE INTERFACE
Familiar Microsoft development tools speed development.

MEMORY ALLOCATION
KUKA's VxWin utilizes the x86 MMU to protect VxWorks memory from Windows XP.

STATE MACHINE
KUKA's VxWin assures complete execution of all real-time tasks before switching back to Windows XP.

MEMORY ALLOCATION – LOADING AND STARTING OF THE RTOS

Other Drivers
NDIS Driver
Interface Driver
Windows Kernel
WIN 32
Uploader
e.g. 256 MB — Windows XP Memory

VxWorks Address Space e.g. 32 MB
Shared Memory
Anchor
e.g. 48 MB — VxWorks exclusive Memory

Windows XP Memory
16 MB

BIOS, Memory-mapped Hardware for example, Ethernet
1 MB — Windows XP Memory

RAM
640 KB

Separated by MMU

DISK
VxWorks Image File

STATE MACHINE – EXECUTION PRIORITY

Higher priority real-time IRQ occurred

VxWorks ISR level

At least one task active

VxWorks tasks level
Idle task

Windows xp embedded level

Real-time IRQ occurred

No task active

All tasks are idle

High
Low

FASTER DEVELOPMENT CYCLES

VxWin developers enjoy a faster develop-
ment cycle working in the well-known
and thoroughly proven WIND RIVER and
Microsoft environments. VxWin allows
users to leverage familiar development
tools and API's in the development of
their real-time applications. Using familiar
development suites such as Visual Studio/
Workbench/Tornado for the development
of visualization and real-time applications,
programmers can reuse existing Windows
or VxWorks code and knowledge instead
of having to port to another proprietary API.

WIND RIVER VXWORKS ADVANTAGES

WIND RIVER VxWorks is used worldwide
in embedded control systems, medical ap-
plications, test and measurement systems
and industrial automation applications. It
offers a number of distinct advantages: a
small footprint, very fast response and
hardware control interrupts can be ac-
cessed easily.

- Real-time deterministic responce
  measured in microseconds
- Hardware access to ISA and PCI plug-in
  boards, no kernel driver to develop
- Communication between Windows XP
  and VxWorks via TCP/IP (virtual
  network) or shared memory
- Optional products available,
  e.g. VXDCOM, OPC server
- Availability of many existing
  VxWorks drivers, e.g. fieldbus,
  measurement hardware and more
- Familiar Tornado and Workbench
  development tools
- Powerful, graphical real-time analysis
  tools, e.g. Scopetools
- Comprehensive documentation
  (HTML, newsgroups)

SCALABILITY

VxWorks applications can be quickly in-
tegrated into a VxWin system without any
added hardware costs. Because standard
TCP/IP communications for connecting to
the Windows operating system are used,
porting to existing VxWorks application
is easily accomplished. Users also have the

option to use the same VxWorks applica-
tion in an embedded system, for example,
Xscale architecture.

WINDOWS XP ADVANTAGES

Application development with Windows XP
provides:

- Multitasking, intertask communication
- Components for Windows XP
  Embedded included
- Connectivity: TCP/IP .NET, Java, Win-
  sock, COM/DCOM and file sharing
- HTTP Server, ISAPI, ASP, SOAP
  Server, SOAP Client
- Programming languages:
  C, C++, C#, Visual Basic
- Known development tools –
  Microsoft Visual Studio

EVALUATE VxWIN

KUKA's VxWin technology is used in ap-
plications worldwide. KUKA invites you to
contact your KUKA representative for a copy
of VxWin extension software for a time-
limited evaluation. For further informa-
tion please contact us on the web at:
www.kuka-rtos.com

Sales and Support.

IWKA ROBOTICS

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