

Overview

Process Intellect is a software suite that enables you to monitor, predict, and optimize industrial processes to manage product and process performance. Process Intellect is used in chemical manufacturing, oil and gas processing, aerospace, food processing, power generation, utility management, consumer products and other industries.

Process Intellect enables you to realize value from your distributed control system, data historian and relational database investments and delivers live predictions of product and process performance, machine behavior and the ability to run closer to performance targets.

Process Intellect employs proven Microsoft technology to deliver sophisticated capabilities in an easy to use Windows environment. Process Intellect can offer full product and process optimization and problem avoidance capabilities. If a process is headed out of specification or if an operator or engineer desires to fine-tune a process, Process Intellect can help find new, improved operating conditions to increase yield, tighten results to specification and reduce unwanted results, emissions or by-products.

Process Intellect provides value for discrete, batch, continuous or hybrid process manufacturers. Whether you are making batches, assembling parts, running a continuous process or a combination, Process Intellect delivers.



Key Benefits

Process Intellect enables you to ...

- Predict Product Performance On-Line
- Correct Problems Before Impact
- Tighten Conformance to Specifications
- Reduce Product Variability
- Increase Process Capacity
- Increase Process and Product Understanding
- Spend Less Time Chasing Problems

Applications

Process Intellect is solving problems and enhancing performance in many applications, including ...

- Oil and Gas Property Enhancement
- Predictive Chemical Drying
- Power Generation Heat Rate Enhancement
- Emissions Reduction
- Food Processing
- Utilities Management
- Aerospace Parts Assembly Optimization
- Paper Making

Main Features

Process Intellect offers you unique capabilities...

- Interface to Leading Data Historians and Control Systems
- Predict Product Performance
- Predict Process States
- Optimize Performance with Multi-Objective, Constraint-based technologies
- Monitor Abnormal Process or Product Behavior
- “Close The Loop” with Distributed Control Systems
- Deploy with Easily Supported Microsoft Windows Technology



Process Intellect Server

Process Intellect is server software that provides the framework for deploying the prediction, optimization and machine monitoring solutions created with our desktop tools, such as iManageData, iUnderstand, ilmprove, Anomaly, Live Optimizer and Process Modeler. Process Intellect is the software you use to go from off-line analysis to on-line (real-time) results and benefits.

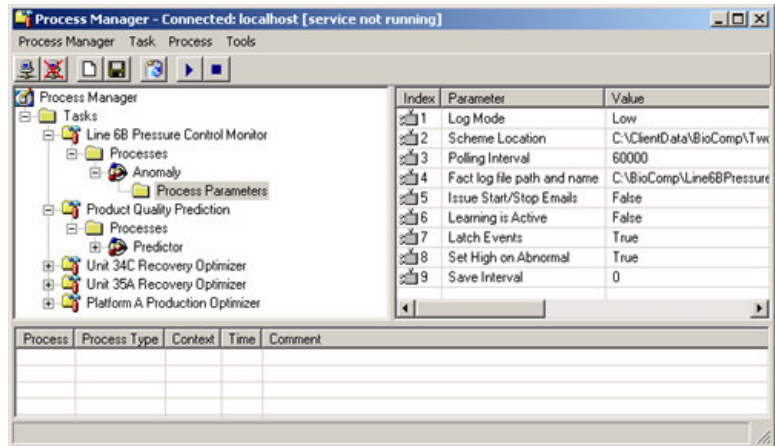
Process Intellect is comprised of a Console application where you define and manage your solutions and a suite of functional components that deliver the value. These software components can be assembled in many ways to deliver a wide variety of applications within the same Process Intellect server. As one customer refers to it, it is the “Lego¹ blocks of industrial optimization”. You can optimize performance on one unit operation, or many. You can monitor compressors while optimizing distillation.

In industrial environments, it is important to provide robust operations. Process Intellect runs as a “service” that restarts automatically in case of power failure, provides “heartbeat” signals to control systems to prove availability and its functional processes have auto-reconnect and restore capabilities built-in to assure reestablishment of operations in the event of communications failures. Process Intellect provides system activity logging to record all events, configurable down to the sub-process, to provide historical records of activities. Process Intellect’s robust “set and forget” nature enables customers to lock it away in a cabinet in the back of the control room, producing valued results sub-second.

Console

The Process Intellect Console is the easy-to-use operations center for Process Intellect. Here tasks are defined and within those tasks, one defines predictors, optimizers, machine monitors, interpreters, alerters, loggers, flaggers, emailers and other processes. You can link processes together through messaging create the solutions, from simple to sophisticated, to achieve the benefits. You can define, start, stop and save your system with mere mouse clicks. No programming or scripting is required.

The console is so quick and easy to use that a predictor, for example, can be defined and put into operation within just a few seconds.



Runtime Capabilities

The Process Intellect Server is an extensible COM/DCOM framework that enables us to provide standard and custom capabilities easily, tailored to your specific requirements. The following standard functional processes are available for Process Intellect:

Performance Predictor

Deploys predictor systems created in iUnderstand or Process Modeler. This process uses the systems saved from those products to access on-line data sources such as OSIsoft’s PI system and OPC-compliant Distributed Control Systems on a timer, filter it, and make predictions that are written to one or more data destinations such as PI and OPC-compliant systems. These predictions can also be routed to one or more Process Intellect processes through messaging within Process Intellect. For example, a product performance prediction may be interpreted by an Interpreter, compared to control specifications and if product quality is expected to go beyond limits, the Interpreter sends a message to an optimizer to tell it to determine new setpoints to bring product performance back into conformance. Performance Predictors come in two versions: standard and self-calibrating “Tracking Predictors”. Standard predictors are used when there is no on-line performance measure. “Tracking Predictors” take advantage of on-line readings to adjust their predictions for unmeasured disturbances.

Interpreter

Process Intellect Interpreters receive data from other Process Intellect components and compare to specified High-High, High, Low and Low-Low thresholds to determine if subsequent next-steps are needed and if so, create events to one or more listening processes, such as optimizers or alerters. The decision thresholds can be fixed or dynamically set based on values in a data source (DCS or historian).

¹ Lego is a registered trademark of the Lego Company. The reference to Lego does not imply an endorsement of this product.

Model-Based Performance Optimizer

Process Intellect Optimizers deploy model-based optimization schemes developed with the ilmprove desktop application to minimize problem likelihood, maximize performance or minimize deviance from target. Upon command, typically from Interpreters, model-based optimizers access the current process state and search for optimal setpoints to achieve the specified desired results. Within the ilmprove optimization scheme, you can specify that this optimizer do so with minimal process impact (smallest process changes to achieve the desired result). Setpoints can be routed to operators and/or engineers for manual implementation or they can be applied closed-loop to OPC-compliant DCS's and/or logged into data historians. The objective targets may be fixed, as defined in the ilmprove optimization scheme, or dynamic, obtaining the target values from values in a data source (DCS or historian). Model-based optimizers can be started/stopped either by console instruction or by a "command-and-control" data access template pointing to a data source (DCS or historian). This enables optimizers to be disabled based on operator instruction or by process events, such as abnormalcy events (line shut down). Model-based optimizers come in two versions: standard and self-calibrating "Tracking Optimizers". Standard optimizers are used when there is no on-line performance measure. "Tracking Optimizers" receive messages from Tracking Predictors to adjust their models for unmeasured disturbances.

Live (Direct) Performance Optimizer

Process Intellect Live Optimizers deploy model-free sense-change-sense optimization schemes (much like process controllers) developed with the Live Optimizer desktop application. They are used to minimize problem likelihood, maximize performance or minimize deviance from target. Live optimizers access the current process state and determine setpoints to achieve the specified desired results. Setpoints can be routed to operators and/or engineers for manual implementation or they can be applied closed-loop to OPC-compliant DCS's and/or logged into data historians. The objective targets may be fixed, as defined in the Live Optimizer scheme, or dynamic, obtaining the target values from values in a data source (DCS or historian).

Anomaly Process

Process Intellect's Anomaly processes deploy machine monitoring schemes developed using the Anomaly desktop tool. Based on a timer, Anomaly processes poll data sources (OPC-compliant DCS's or data historians) and determine if the situation is abnormal. If so, Anomaly issues events used by other processes, such as flaggers or emailers to raise operator, engineer or other stakeholder awareness. Anomaly processes can log abnormalcy events to disk and are capable of adapting while operating on-line.

Flagger Process

A Flagger process is a simple component that receives event messages from other components and writes binary on-off flags to historians or DCS systems. These flags can be used for control actions, alerts, alarms, or to start/stop other Process Intellect operations (prediction, optimization, etc.)

Email Alerter

Email Alerters receive state messages from other Intellect processes and create email notifications to one or a list of recipients. Emailers support POP3/SMTP accounts and "folder-drop" messages for Microsoft Exchange.

Model Tester / Sensor Assurance™

The Model Tester / Sensor Assurance Intellect process is a process that compares predicted values to actual sensor values. The Sensor Assurance process issues the difference in messages to Interpreters that determine if the deviation is actionable. If so, the interpreter then issues email/text paging events, flaggers to set states in a DCS or historian or start other Intellect processes. Taking only moments to deploy, the Sensor Assurance processes can check your sensors every few milliseconds and let you know if there are problems. Customers use Sensor Assurance processes to keep an eye on critical measures of process operations and environmental conformance.

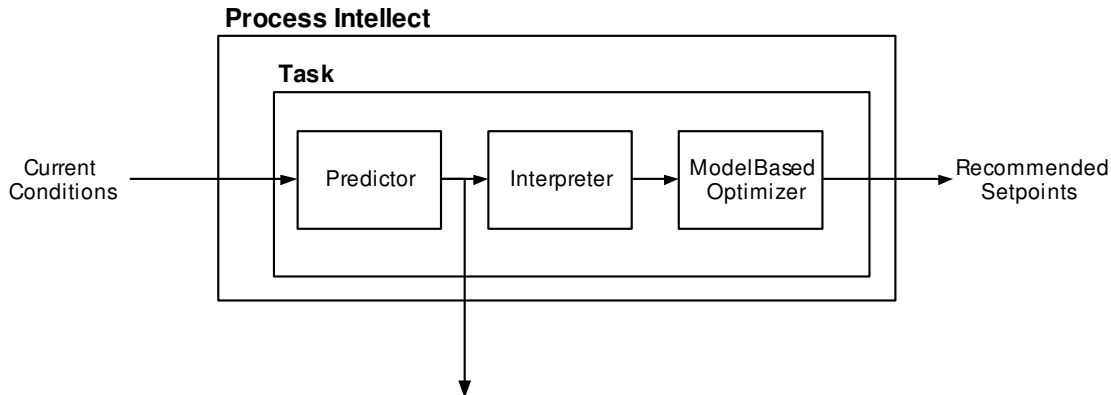
Heartbeat

The heartbeat process sends a confirming signal to a DCS or historian to assure systems are up and communications links are engaged. DCS systems can monitor this heartbeat and if it is unchanging in a defined interval, take action, such as setting control loops managed by Intellect to manual and alerting the operator.

Example Applications

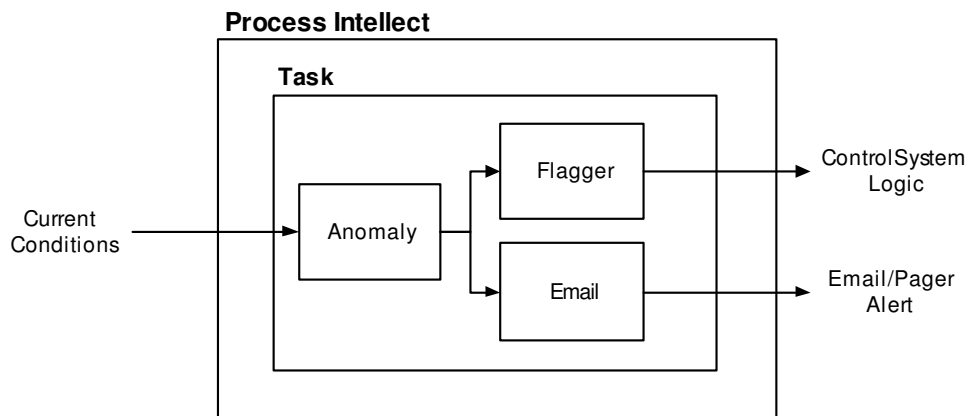
Example 1

In the first example, a task is defined within Process Intellect containing a performance predictor, an interpreter and a model-based optimizer. The predictor runs on a time interval set in milliseconds. When it “fires”, it obtains current values for model inputs from an on-line (real-time) data source (OPC or data historian) and writes its predictions to a data destination (OPC to a control system or data historian). These predictions are compared to performance thresholds in an interpreter and if they fail to meet criteria, the interpreter “fires off” the model based optimizer. The optimizer also obtains current conditions (not shown) and determines optimized setpoints and writes them to a live data destination (OPC or data historian) so that they can be picked up by the DCS, checked and implemented.



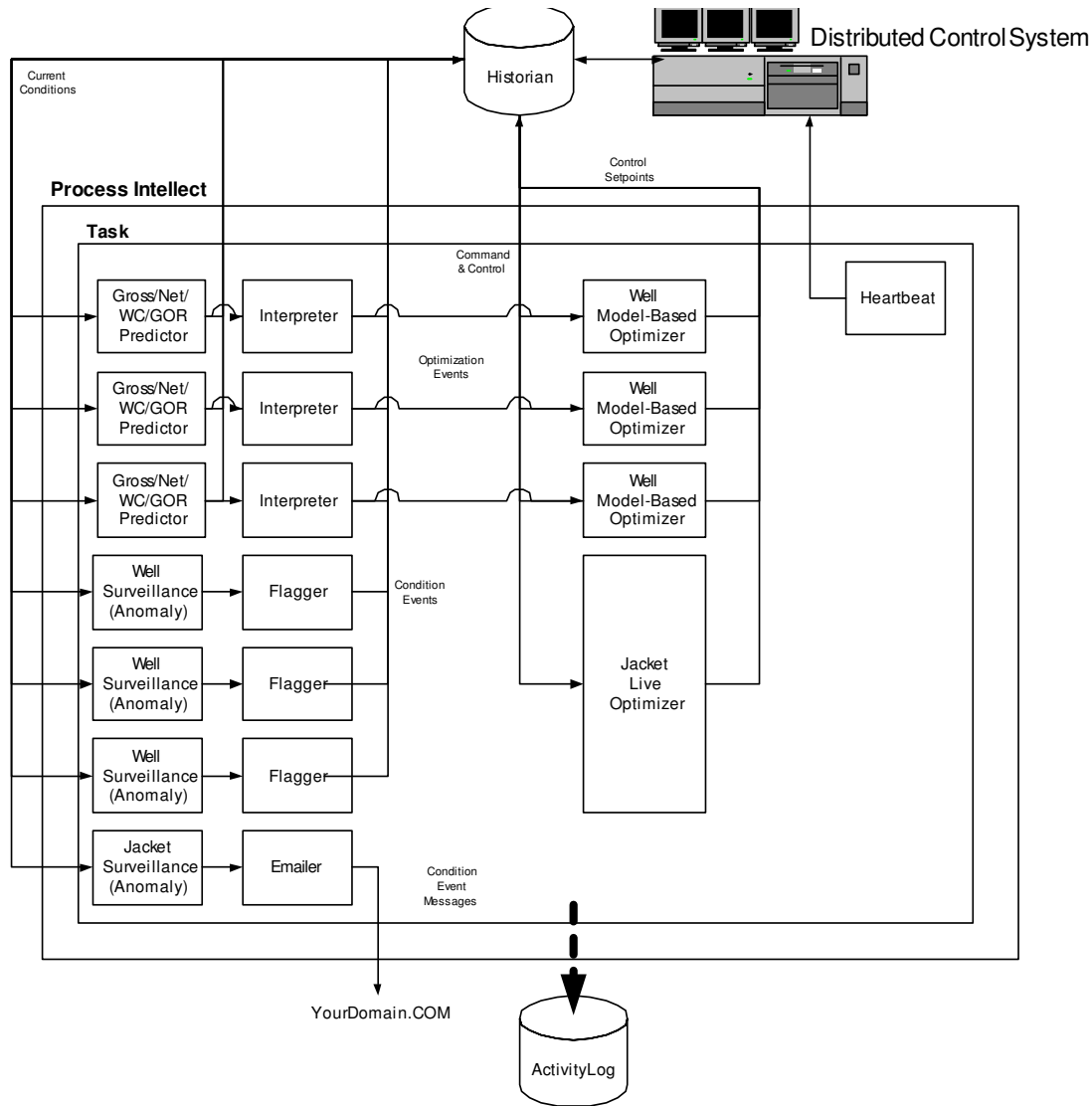
Example 2

In this second example, a task is defined within Process Intellect containing an Anomaly machine monitoring process, a flagger and an emailer. The Anomaly process runs on a timer and obtains current process state data from a live data source (OPC or data historian) and if one or more variables are determined to be abnormal, an event is issued. The Flagger and Emailers are subscribed to this event. The flagger then writes a 1/0 to its destination (OPC or data historian) for subsequent control action or alerts to the operator. The emailer receives an email message from the Anomaly process and queues/sends to defined subscribers. If one has email enabled paging, text messages can be received by the user.



Example 3

In this third example, we illustrate a combined well and jacket (the collection of wells together as one unit) optimization scheme to demonstrate that sophisticated solutions can be created using the components and mouse-clicks. In this case, we have three (3) oil well production estimators (predictors), three (3) well surveillance processes (Anomaly) with associated interpreters and flaggers and emailers. There is also one (1) jacket level surveillance process (Anomaly) and one (1) jacket-level “Live Optimizer”. Through command and control signals from the DCS or historian, operators can switch wells on and off-line and the system automatically switches predictions and optimizations on and off. Additionally, through the surveillance processes, the system can also switch processes on and off as well as alert operators by flags in the DCS and stakeholders by email. A heartbeat is implemented to assure awareness of system availability.



These are but a few examples of the creative solutions that can be built using Process Intellect and its flexible component architecture. You can create many such solutions on the same Process Intellect server, up to the performance capacity of the computer upon which it is installed.

Hardware / Operating System Requirements

The recommended hardware/operating system for your application should be determined through a requirements review. However, here are the minimum requirements for a typical system:

- Intel-based Pentium 4 single or dual CPU, 1 GHz or faster
- Windows XP or Windows 2000 Server operating system
- Tower or rack mount configuration
- 1 GB RAM
- 250 MB hard disk space minimum, 100 GB typical total drive size
- 10/100 Mbps TCP/IP LAN Network Interface Card
- Recommended to be placed upon same sub-net as DCS and historian
- CD Drive
- Keyboard (switchable ok)
- Mouse (switchable ok)
- 1024 by 769 color monitor (switchable ok)
- Terminal Services or equivalent for remote access and management

Integration

Process Intellect integrates with these on-line (real-time) data sources and destinations:

- OSIsoft PI Data Historian
- OPC 2.0a Compliant Servers, local or remote (OPC servers are at additional cost if needed and provides interfacing to nearly all DCS / SCADA systems) including, but not limited to:

ABB (Bailey) INFI 90 / Network 90 - CIU NCIU01	Fischer & Porter DCI System 6 Fisher Provox (CHIP)	Moore Quadlog MTL Modbus
ABB Advant Controllers (AC410, AC450 AC460)	Fisher ROC Fisher-Rosemount RMV9000	NDC Pro.Net Nova Biomedical Analyzers
ABB Enterprise Historian	Fisher-Rosemount RS3 RNI	NTCIP
ABB GCOM	Fisher-Rosemount RS3 SCI	ODBC
ABB IMS (Information Management Sta	Foxboro FoxSCADA	OECD
ABB Kent DCS	Foxboro I/A (Object Manager)	OpenVMS Applications
ABB MasterPiece	Foxboro I/A FoxAPI (Solaris)	Oracle (OCI)
ABB MOD300 DCN	Foxboro I/A FoxAPI (Windows NT)	PowerLogic System Manager Software
ABB Unitrol 5000	Foxboro AIM*AT	Profibus
Air Liquide ADACS	GE CIMPLICITY	PROMORE FibreNet DTS
Alien Technology Nanoscanner	GE Genius	QUICS IV
Allen-Bradley ControlLogix / 1756 Syste	GE Mark V (GSM)	QUICS SCADA
Allen-Bradley MicroLogix 1000 / 1200 / Series	GE Mark VI (GSM)	Quindar QUICS
Allen-Bradley PLC 5 Family	GE VersaMax (SNP / SRTP)	RSSql
Allen-Bradley RSLinx	General Purpose Interface	Sensa Sensor Highway
Allen-Bradley SLC 500 Family	General Serial Interface	SICS
Anybus (DeviceNet- Master and Slave)	HMS Anybus-PCI	Siemens LSX
Anybus (Profibus DP- Master and Slave)	Honeywell Measurex	Siemens MPI (SIMATIC C7)
AS-Interface (AS-I)	Honeywell PHD	Siemens MPI (SIMATIC M7)
AspenTech (Setpoint) Setcim	Honeywell TDC3000 AxM	Siemens MPI (SIMATIC S7-300)
AspenTech Cim/21	Honeywell TDC3000 CM50S	Siemens MPI (SIMATIC S7-400)
AspenTech Infoplus-X	Husky Host	Siemens PPI (SIMATIC S7-200)
AspenTech InfoPlus.21	ICCP	Siemens Quadlog
Automation & Electronics AutoCom	IEC 60870-5-101	Siemens SIMATIC TI505 / 525 / 545 / 56
Baker	IEC 60870-5-104	SNMP
Barber Colman Network 8000	IEC 870-6-503 TASE.2	TIBCO Rendezvous
Baytek International WinBLISS	Intellution FIX	Triconex Tricon
Bristol Babcock 33XX Controller	Intellution iFIX	Triconex Trident
Bristol Babcock BSAP	Intellution iHistorian (Proficy)	TVA DatAWARE
Citect	Inter Control Center Protocol	Valmet CQ-120
Daniel Modbus	Kaye Instruments Digilink 4 Plus Server	Valmet DAMATIC XD
DDE (DDE Client)	Kaye Instruments Digistrip 4 Plus Server	Valmet Micro-1C
DeviceNet	Kaye Instruments Netpac	West Series 3010 Digital Indicators
DNP3	LonWorks	Willowglen (Datek) RTU
Encore RMS	Lufkin Modbus	Willowglen SCADA DACP
Enron Modbus	Macroview	Wonderware IndustrialSQL
ESC E-DAS	Matrikon GenCS	Wonderware InTouch
Eurotherm 2000 Series Controllers	Mettler Toledo Balances	Yokogawa Centum CS
Eurotherm 800 Series Controllers	Modbus Plus and Quantum	
Eurotherm TU Series	Moore APACS	
	Moore MYCRO Controllers	

Contact us if your DCS or Historian is not listed. It is likely an OPC server can be obtained.

Licensing Information

- Desktop tools are licensed separately on a per seat basis
- The console and sub-processes are licensed on a per server basis without limit to the number of processes implemented per server, up to the physical performance limits of the server
- Licenses to sub-processes are purchased individually
- System capabilities will vary based on sub-processes licensed and customer requirements
- The base Intellect system includes Performance Predictor capabilities
- Custom capabilities available under contract
- Optional services are available for:
 - opportunity identification, business benefit quantification, requirements definition workshops
 - Installation and Checkout
 - Implementation and project management including:
 - Acceptance Testing
 - Field Validation
 - Performance Monitoring
 - Support and Maintenance

Please request a quotation for a system specifically tailored to your needs.

Additional Benefits

- Upgrades to licensed products are provided as a part of support and maintenance
- Process Intellect website for tips, techniques, "How-to"s and product update downloads
- Extended Support services are available on request
- Local support services may be available in your region through authorized partners. Contact us for more information.

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