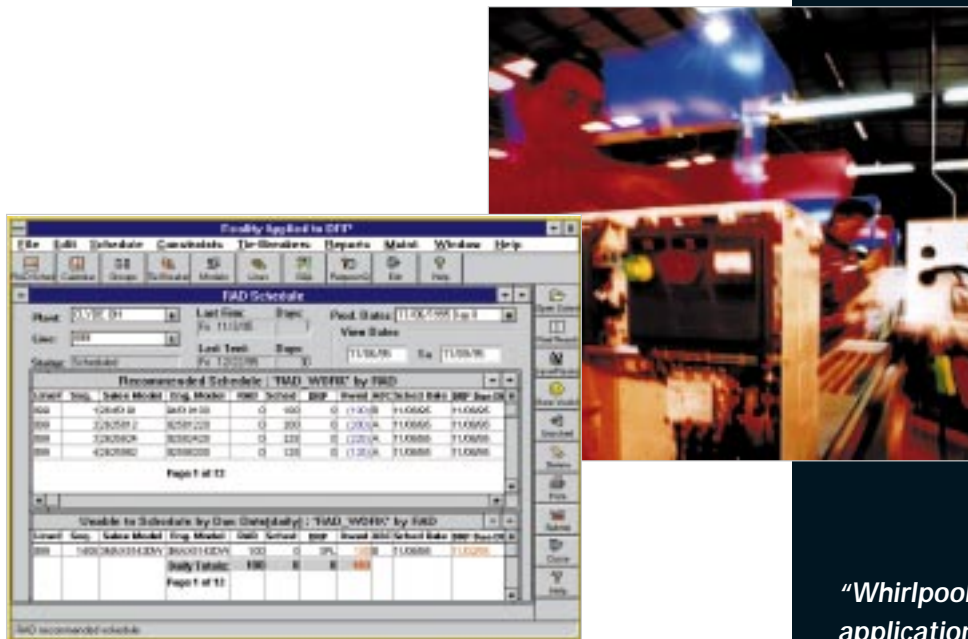# WHIRLPOOL

From push to pull manufacturing

W hirlpool Corporation is the world's leading manufacturer and marketer of major home appliances.

Until recently, Whirlpool relied on push manufacturing, a system of producing as much inventory as possible, then pushing it out to the distribution channels. Although this system allows plants to operate at capacity, it has the disadvantage of creating periodic oversupply and consequent discounting pressure in the distribution channels. Furthermore, since production schedules were based on a weekly time step, a minimum four week delay was required to fill non-standard orders.

The Whirlpool logistics team's goal was to reduce inventory, work in progress, and product obsolescence: in short, fundamentally alter Whirlpool's manufacturing model from push to pull. Pull manufacturing bases factory production on actual customer demand, and therefore requires both timely relay of orders to the plant and a highly optimized production scheduling process to fulfill orders. The time step of production schedules had to be slashed from a weekly to a daily basis to reduce response time to customer orders from four weeks to five days.

"Whirlpool's application using ILOG Solver is one of the strongest links in the company's logistics strategy. ILOG Solver provided the most comprehensive functionalities needed for the application."

■ *Keith Immink, Project Manager, North American Information Systems*

Whirlpool

Whirlpool is the leading manufacturer and marketer of home appliances. The company manufactures in 12 countries and markets products in more than 120 countries under major brand names such as Whirlpool, KitchenAid, Roper, Estate, Bauknecht, Ignis, Laden and Inglis. Whirlpool is also the principal supplier to Sears, Roebuck and Co. for many major home appliances marketed under the Kenmore brand name.

About ILOG

ILOG is the world's leading provider of advanced software components for graphics and resource optimization. ILOG products deliver: high performance data visualization for 2D and 3D user interfaces; integer, linear and constraint solvers for resource optimization, scheduling, logistics and planning applications; dynamic rule systems for intelligent agents and real time data flow control, and components for integrating modules with real time and relational data sources. ILOG was founded in 1987 and now employs approximately 310 people in seven countries. Visit http://www.ilog.com/ for more information.

ILOG is a registered trademark.
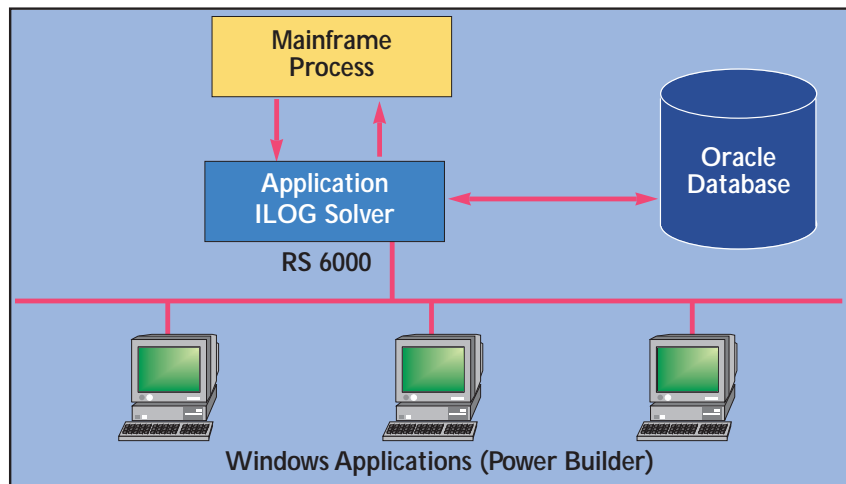
Architecture of the RAD application

Solution

Whirlpool production planning is based on a statistical application, Distributed Resource Planning (DRP,) which generates 52 weeks of unconstrained production requirements. To adapt DRP to the demands of pull manufacturing, the Whirlpool logistics team developed an application called Reality Applied to Distributed Resource Planning (RAD.)

The RAD project team selected ILOG Solver™, which optimizes production planning based on pull manufacturing constraints. DRP requirements are loaded into the system every day via the graphical user interface by the master scheduler at each plant. The output from RAD is passed along to the MRPII manufacturing system, which handles bill of material explosions, vendor parts releasing, shop floor scheduling, etc.

Pulling production

The RAD application developed with ILOG Solver has enabled Whirlpool to switch to pull manufacturing. Appliances are now built to satisfy actual customer demand, and response time has been reduced from four weeks to five days. Products on display in dealer showrooms are automatically replenished as they are sold. Production costs, work in progress and inventories of finished goods are dramatically reduced, while response to customer demand is significantly improved.

The RAD system currently supports eight Whirlpool manufacturing plants. It helps Whirlpool assign production priorities more accurately, create achievable production schedules that leverage available plant capabilities, and monitor unsatisfied requirements resulting from production constraints.

Project

RAD was completed on schedule by two developers in four months. The graphical user interface is a Windows application residing on multiple workstations in the factories, while the ILOG Solver engine resides on a central RS-6000 workstation. The two program modules communicate remotely via SQL*Net Oracle Server. The user interface was implemented with PowerBuilder on the Windows client system.