AN EXECUTIVE WHITE PAPER ON:

THE GLOBAL MARKET FOR INDUSTRIAL ELECTRONIC TEMPERATURE CONTROLLERS, EIGHTH EDITION

AN EXECUTIVE WHITE PAPER FOR SENIOR MANAGERS INTERESTED IN MAXIMIZING GROWTH AND PROFITABILITY

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TECHNOLOGY MARKET RESEARCHERS AND STRATEGISTS SINCE 1971

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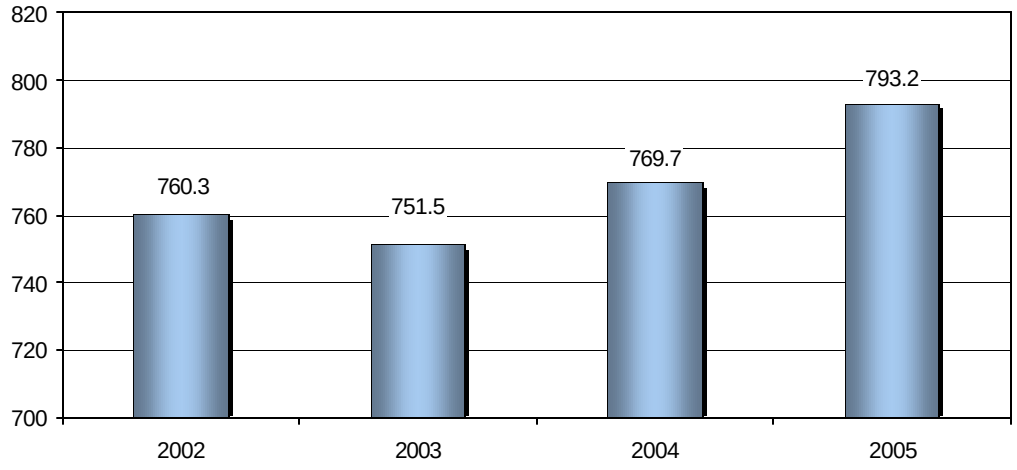
MARKET OVERVIEW

WORLDWIDE

The 2002 worldwide market for industrial electronic temperature controllers totaled $760.3 million. The market is forecast to grow at a 1.4% compound annual growth rate (CAGR), reaching $793.2 million in 2005 (Exhibit I-1). This rate will not be constant, however, as economic conditions and falling prices are expected to cause the market to decline through 2003 before recovering in 2004. Unit shipments are forecast at a 4.7% CAGR, with price declines of microprocessor-based controllers lowering dollar volume growth. The decline in prices will be primarily driven by global competition among temperature controller vendors and competition from alternative means of controlling temperature such as with DCSs, PLCs and PCs.

Exhibit I-1
Worldwide Shipment Forecast for Industrial Electronic Temperature Controllers
(Millions of Dollars)



GEOGRAPHIC REGIONS

Consumption of industrial electronic temperature controllers is highest in the Asia-Pacific region, followed by Europe, and then North America.

Among the major regional markets, North America is forecast to exhibit the highest growth rate through 2005. The European market is forecast to grow at a slightly lower rate. The Asia-Pacific market is expected to be stagnant. Some of the smaller markets in the Asia-Pacific region, such as in China, are expected to have high growth rates. However, the overall market for the region is expected to be held back by economic woes of the more developed countries, particularly in Japan.

The highest consumption growth rates are forecast for the small markets in South America and "Rest of World" regions respectively. Growth in industrial automation is expected to be high in many countries of these regions.

MARKET SEGMENTATION AND GROWTH

In 2002, microprocessor-based single loop controllers accounted for $590 million, or 77.6% of the industrial electronic temperature controller market. Microprocessor-based multiple loop controllers accounted for 15.9% of the market and analog controllers for 6.5%.

The highest shipment growth rate is forecast for microprocessor-based multi-loop controllers, despite competition from the use of DCSs, PLCs and PCs. The worldwide market for analog controllers is expected to continue to fall, declining at an annual rate of 2.6% through 2005. This decline is primarily due to the on-going shift toward microprocessor-based controllers, which provide more features and functionality.

INDUSTRY/APPLICATION MARKETS

Overall, about 52% of worldwide industrial electronic temperature controller shipments in 2002 were for OEM & systems integrator applications, and 48% for end users. OEM and system integrators accounted for the higher shares for analog and single loop microprocessor-based controllers, and end users the larger share for the multi-loop microprocessor-based controllers.

The OEM/system integrator segment is expected to exhibit relatively higher growth (or slower decline in the case of the analog controllers) through 2005 for all three product types. In mature markets like these, it might be expected that the trends would be toward greater shares of shipments for end user applications, as replacements account for larger shares. However, shifts in the opposite direction are expected here. One reason for this is commoditization of temperature controllers. This is expected to result in stronger downward price pressure on the product types being purchased by end users, which tend to be older models (particularly those purchased as spares and as replacements for failed units).

An even more important reason for the trend is the on-going reduction of engineering, installation, and maintenance staffs by end users. Much of the design, installation, and maintenance work, which end users have done themselves, continues to shift to OEMs and systems integrators.

Analog Controllers

In 2002, “hot runner” plastics injection molding applications accounted for the largest share of both the OEM/systems integrator and end user segments. Food and beverage processing and packaging applications were the next largest segments in 2002. These are expected to remain the top three applications through 2005 even though shipments for all three are forecast to decline.

Microprocessor-based Single Loop Controllers

The largest 2002 OEM/system integrator application for microprocessor-based single loop controllers was for ovens and furnaces. Plastics extrusion accounted for the largest end user consumption in 2002. These are expected to remain the largest applications through 2005.

In the OEM/system integrator segment, the highest growth rate is forecast in shipments for the small pharmaceutical processing equipment market. In the end user segment, the highest growth rate is forecast for the small waste treatment market.

Microprocessor-based Multiple Loop Controllers

Plastics extrusion applications accounted for the largest share of the end user segment in 2002. Oven and furnace applications led the OEM/system integrator segment. “Hot runner” plastics injection molding was the second largest application in both the OEM/system integrator and end user segments, and accounted for more than 15% of the total market for microprocessor-based multi-loop controllers.

In the OEM/system integrator segment, the highest growth rate is forecast in shipments for the very small textile manufacturing equipment market. In the end user segment, the highest growth rate is forecast for the small oil and gas industry market.

PRODUCT CHARACTERISTICS AND TRENDS

Packaging Styles and Sizes

Panel mount styles accounted for the vast majority of microprocessor-based single loop controller shipments in 2002. The most popular sizes were 1/16 DIN, 1/4 DIN and 1/8 DIN. Above average shipment growth rates are expected for the smaller panel mount sizes including 1/8 DIN, 1/16 DIN and 1/32 DIN. Among all single loop packaging styles, the highest shipment growth rate is forecast for the small DIN rail controller market segment. This will result from the increasing demand for controllers mounted within chasses and connected by networks/buses to other controllers, operator interfaces, etc.

DIN rail controllers accounted for a third of total microprocessor-based multiple loop controller shipments in 2002. The market for this style also is expected to be among the fastest growing. Of the panel mount controllers, 1/4 DIN accounted for the largest shipment share in 2002. The highest shipment growth rate through 2005 is expected for the smaller 1/8 DIN market segment.

Control Loops in Microprocessor-based Multi-Loop Controllers

Dual loop controllers accounted for the largest share of the multiple loop controller market in 2002 and are forecast to be the largest segment in 2005, albeit with a slightly lesser shipment share. Eight loop controllers made up the second largest segment in 2002, and are forecast to account for the greatest increase in share through 2005.

Displays

The overwhelming majority of microprocessor-based single loop temperature controller shipments in 2002 were of products with LED displays. LCD displays made up the second largest segment of the market in 2002. A slight decline in share for single loop controllers with LED and LCD displays is expected over the forecast period due to increased networking capability eliminating the need for displays, reduction in multiple displays on units, and a small trend toward a greater shipment share of units with gas plasma displays.

LED displays also are by far the most used on microprocessor-based multiple loop controllers. However, a large share of shipments in 2002 were of products without displays, as a large share were of DIN rail mount and board level controllers that connect via networks/buses to other products which provide display information.

Methods of Adjustment/Configuring/Programming

Almost all 2002 microprocessor-based single loop controller shipments were of units with one or more means of adjustment/configuration/programming. The vast majority had front panel adjustment/configuring/programming means, and a large share of shipments was in products that can be programmed remotely from a PC. The share of shipments with remote programming capabilities is expected to increase.

The portion of microprocessor-based multiple loop controller shipments with front panel adjustment/ configuration/programming means is smaller than for single loop controllers as a result of the large share of DIN rail and board level products. A high majority of shipments in 2002 was of products that can be programmed remotely, and the share is expected to increase even further.

Customization of Products

Standard products made up the majority of shipments of all three types of temperature controllers in 2002, with modified standard products making up the second largest share, and custom-designed products the smallest share. The largest shipment share in standard products was for microprocessor-based single loop controllers. There is lower need for modification to standard designs or for custom-designed single loop microprocessor-based controllers with the large number of vendors and options available to users.

The share of modified standard and custom-designed microprocessor-based multi-loop controller shipments is somewhat larger than for the single loop microprocessor-based products, due to the inherent complexity of configuring multiple temperature control loops.

The highest shipment shares of modified standard and custom-designed products in 2002 were for analog controllers. Those continuing to purchase analog temperature controllers may do so because of application specific needs that require custom designs, or modification to standard analog controller models. Also, as the markets for these products continue to shrink, there will be fewer suppliers, with narrower product offerings. Thus, the need for a larger share of modified standard and custom designs is expected for 2005.

USER REQUIREMENT TRENDS

Summary of findings among OEMs, systems integrators and end users surveyed include:

- Users are increasingly looking to other means of temperature control, and shares of new loops controlled by temperature controllers are forecast to decline through 2005. Users expect PLCs to gain the most share of new temperature control loop implementations during this time.
- Although a noticeable shift from temperature controllers to PLCs, DCSs and PCs is expected, these none-the-less should still account for the largest share of new implementations in most industries and applications through 2005.

- The most identified selection criteria were accuracy, ease of adjustment/configuring/programmability and quality/reliability. The majority of users do not expect their selection criteria to change drastically during the forecast period.

- A high majority of respondents reported use of thermocouples with their temperature sensors. RTD sensors and 4 to 20 mA signal inputs also are widely used. Increasing use of smart digital input signals is expected, although still limited in 2005.

- User respondents most often identified using 4 to 20 mA current analog output signals in applications using temperature controllers. This was followed by on/off relays.

- In 2002 about 49% of the microprocessor-based single loop, and 55% of the microprocessor-based multi-loop temperature controllers purchased by the users in our survey was of products with bus/network connectivity. These shares are expected to increase. A wide variety of bus/networks are used, however in 2002 the largest shares of purchases of the microprocessor-based single loop controllers had RS-232, RS-485, and Ethernet connectivity. For the multi-loop microprocessor-based controllers the largest shares had RS-232, Ethernet, and Modbus connectivity.

- The largest shares of procurements expected in 2005 are for with Ethernet connectivity. Increasing shares also are expected for products with CANopen, DeviceNet, Foundation Fieldbus, Profibus, and wireless connectivity.

- The vast majority of temperature controller units purchased in 2002 had auto-tuning features. The greatest share of this feature was for microprocessor-based single loop controllers.

- The purchase of products with adaptive self-tuning was highest for users of microprocessor-based multiple loop controllers. The largest increase in the share of units purchased with this feature over the forecast period is expected for microprocessor-based single loop controllers.

- Fuzzy logic is a feature in more than a third of the microprocessor-based single loop and multiple loop controllers purchased by these users in 2002. The shares are expected to increase through 2005.

- The PID control mode is being used by the majority of microprocessor-based single loop and multiple loop controller users. The largest segment of the analog controller users identified using on/off control, although those using this mode are expected to decrease in favor of PID control.

- Price and availability/delivery were the non-product vendor selection criteria most identified by the users. Other frequently identified criteria included technical/application/service support, documentation and experience with the vendor.

- Product problems most identified by users are that the controllers are difficult configure/program/ setup. Non-product problems the users have with vendors include poor product documentation, delivery/availability and poor service/support.

- The most common sources of information about temperature controller products and vendor among the users in the survey include the Internet, trade periodical ads and vendor product literature.

COMPETITION

Channels of Distribution

Sales Organizations Used- The majority of 2002 worldwide sales for all three product types were by company field sales personnel. Sales by manufacturers' representatives and agents accounted for almost all the rest. Sales via the Internet remained very low for all product types, although sales by distributors over the Internet were not included in this study and are likely higher.

Customer Classes- Sales to OEMs made up the largest share of the worldwide temperature controller market in 2002. Distributors and end users were the next largest segments. Private label resellers, systems integrators and catalog house accounted for the remaining sales shares.

Leading Vendors

The top five suppliers of industrial electronic temperature controllers to the global market in 2002 were:

1. Eurotherm/Invensys
2. Omron
3. Yamatake
4. RKC Instruments
5. JUMO (M.K. Juchheim)

ABOUT THE FULL REPORT

Product Types Analyzed

The markets for analog and microprocessor-based single and multiple loop industrial electronic temperature controllers are analyzed in this report.

Geographic Markets Analyzed

- Regions-Asia-Pacific, Europe, North America, South America, Rest of World
- Countries-Canada, China, England, France, Germany, Italy, Mexico, Japan, South Korea, United States

OEM/System Integrator Applications Analyzed

Boilers, Chemical Industry Process Controls, Electronics Processing Equipment, Environmental Chambers, Food/Beverage Processing Equipment, Laboratory Equipment, Medical/Clinical Equipment, Ovens & Furnaces, Packaging Equipment, Pharmaceutical Processing Equipment, Plastics Blow Molding Equipment, Plastics Extrusion Equipment, Plastics Injection Molding

Equipment (“Hot Runner”, Other), Other Plastics Manufacturing Equipment, Semiconductor Processing Equipment, Textile Manufacturing Equipment, Other

End User Industries/Applications Analyzed

Chemical, Electrical Utility, Food & Beverage, Glass & Ceramics, Military/Aerospace, Oil & Gas, Packaging, Petrochemical, Pharmaceutical, Plastics Blow Molding, Plastics Extrusion, Plastics Injection Molding (“Hot Runner”, Other), Plastics-Other, Primary Metals, Pulp & Paper, Waste Treatment, Other

Insights, Segmentations, Forecasts/Trends Provided

- Industrial Temperature Control Implementation Means (DCSs, PCs, PLCs, Temperature Controllers), Overall, and by Industries/Applications
- Packaging & Styles-Board Level, DIN Rail, Panel Mount (Full, 1/2, 1/4, 3/16, 1/8, 1/16, and 1/32 DIN, and Other), Rack Mount
- Control Modes-On/Off, P, PD, PI, PID, Auto-Tuning, Adaptive/Self-Tuning, Fuzzy Logic,
- Inputs-Analog (4 to 20 ma. and others), Digital Signals, Infrared, RTD, Thermistor, Thermocouple, Others, and Trend to Use of IEEE 1451 Smart Sensor Standard
- Outputs-Analog and Digital Signals, On/Off Relay, Proportional, SCR, SSR, Triac, Others
- Communication Bus/Networks-AB Remote I/O, CANOpen, DeviceNet, ControlNet, Ethernet, Foundation Fieldbus, Modbus, Profibus, RS-232, 422, 485, Wireless, Other Open and Proprietary
- Displays-Electroluminescent, Gas Plasma, LCD (STN, TFT), LED, VF, Other
- Adjustment/Configuration/Programming Methods-External Programmer, Front Panel, Remote From PC, etc.
- Customization (Standard, vs. Modified Standard, vs. Custom Designed Products)
- Channels of Distribution-Sales Organizations (Company Field Sales Forces, Manufacturers’ Representatives & Agents, Internet, Other), and Customer Classes (Catalog Houses, Distributors, End Users, OEMs, Private Label Resellers, Systems Integrators)
- Current and Expected Future User Needs and Preferences, Including Selection Criteria For The Products and Vendors
- Software Requirements and Sources in Implementation of Electronic Temperature Controllers With Bus/Network Connectivity
- User and Competitor Perceptions of Temperature Controller Vendors
- Vendor Shipments and Market Shares, and Profiles of Leading Vendors

REPORT AVAILABILITY

"**The Global Market for Industrial Electronic Temperature Controllers, Eighth Edition**," is published by Venture Development Corporation of Natick, MA.

The report is available for $6,450 in PDF files by E-mail. Printed volumes are an extra $200 each.

REPORT SOURCE

Venture Development Corporation is a technology research and management consulting firm serving the worldwide electronics industry. It was founded in 1971 by graduates of the Harvard Business School and MIT. VDC offers in-depth market research, as well as custom strategic planning and consulting services in the areas of industrial automation, instrumentation, electronic components, computers and peripherals, communications, office equipment, and consumer electronics.

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