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MEASUREMENT SPECIALTIES INC

Form 10-K

May 28, 2003

UNITED STATES SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

FOR THE FISCAL YEAR ENDED MARCH 31, 2003

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

FOR THE TRANSITION PERIOD FROM \_\_\_\_\_ TO \_\_\_\_\_

COMMISSION FILE NUMBER 1-11906

MEASUREMENT SPECIALTIES, INC.

(EXACT NAME OF REGISTRANT AS SPECIFIED IN ITS CHARTER)

NEW JERSEY  
(STATE OR OTHER JURISDICTION OF  
INCORPORATION OR ORGANIZATION)

22-2378738  
(I.R.S. EMPLOYER  
IDENTIFICATION NO.)

710 ROUTE 46 EAST, SUITE 206,  
FAIRFIELD, NEW JERSEY  
(ADDRESS OF PRINCIPAL EXECUTIVE OFFICES)

07004  
(ZIP CODE)

REGISTRANT'S TELEPHONE NUMBER, INCLUDING AREA CODE (973) 808-3020

SECURITIES REGISTERED UNDER SECTION 12(B) OF THE ACT:

TITLE OF EACH CLASS COMMON STOCK, NO PAR VALUE	NAME OF EACH EXCHANGE ON WHICH REGISTERED AMERICAN STOCK EXCHANGE
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SECURITIES REGISTERED UNDER SECTION 12(g) OF THE ACT: NONE

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes  No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is an accelerated filer (as defined in Rule 12b-2 of the Act) Yes  No

At November 1, 2002, the aggregate market value of the voting and non-voting common equity held by non-affiliates was approximately \$19.8 million

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based on the closing price of the registrant's common stock on November 1, 2002. Trading of the registrant's common stock on the American Stock Exchange was suspended from July 15, 2002 until November 1, 2002.

At May 13, 2003, 11,922,958 shares of the registrant's common stock were outstanding.

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## DOCUMENTS INCORPORATED BY REFERENCE

THE INFORMATION REQUIRED TO BE FURNISHED PURSUANT TO PART III OF THIS FORM 10-K, EXCEPT FOR ITEMS 14 AND 15 OF PART III WHICH ARE INCLUDED HEREIN, IS SET FORTH IN, AND IS HEREBY INCORPORATED BY REFERENCE HEREIN FROM, THE REGISTRANT'S DEFINITIVE PROXY STATEMENT FOR THE ANNUAL MEETING OF SHAREHOLDERS TO BE HELD ON SEPTEMBER 23, 2003, TO BE FILED BY THE REGISTRANT WITH THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO REGULATION 14A NOT LATER THAN 120 DAYS AFTER THE FISCAL YEAR ENDED MARCH 31, 2003.

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PART I

ITEM 1. BUSINESS

INTRODUCTION

NOTE: AS MORE FULLY DESCRIBED BELOW UNDER "CHANGES TO OUR BUSINESS," WE DISCONTINUED CERTAIN OF OUR BUSINESSES AND SOLD ASSETS DURING THE FISCAL YEAR ENDED MARCH 31, 2003. EXCEPT AS OTHERWISE NOTED, THE DESCRIPTIONS OF OUR BUSINESS, RESULTS AND OPERATIONS CONTAINED IN THIS REPORT REFLECT ONLY OUR CONTINUING OPERATIONS.

Measurement Specialties is a designer and manufacturer of sensors and sensor-based consumer products. We produce a wide variety of sensors that use advanced technologies to measure precise ranges of physical characteristics, including pressure, motion, force, displacement, angle, flow, and distance. We have two businesses, a Sensor business and a Consumer Products business. We are a New Jersey corporation organized in 1981.

Our Sensor business designs, manufactures, and markets sensors for original equipment manufacturer applications. These products include pressure sensors, custom microstructures, accelerometers, tilt/angle sensors, and displacement sensors for electronic, automotive, medical, military, and industrial applications. Our Sensor business customers include manufacturers such as Alaris Medical, Texas Instruments, the Allison Transmission Division of General Motors, St. Jude Medical, and Graco.

Our Consumer Products business designs, manufactures and markets sensor-based consumer products. These products include bathroom and kitchen scales, tire pressure gauges, kitchen accessories and distance estimators. These products are typically based on application-specific integrated circuits, piezoresistive, and ultrasonic technologies. Our Consumer Products customers include retailers such as Bed Bath & Beyond, Linens 'n Things, Sears, Costco and Target, and European resellers such as Laica, Ole Bodtcher Hanson and BabyLiss.

Each of our businesses benefit from the same core technology base. Our advanced technologies include piezoresistive silicon sensors, application-specific integrated circuits, micro-electromechanical systems (MEMS), piezoelectric polymers, foil strain gauges, force balance systems, fluid capacitive devices, linear and rotational variable differential transformers, electromagnetic displacement sensors and ultrasonics. These technologies allow our sensors to operate precisely and cost effectively. We have a global operation with manufacturing, engineering, R&D facilities and sales offices located in North America, Europe and Asia. By functioning globally we have been able to enhance our applications engineering capabilities and increase our geographic proximity to our customers.

Our strategy is to utilize our expertise in sensor technologies to target expanding market segments and develop new products and applications, thereby increasing demand for our sensors and sensor-based consumer products. Our global design teams support our production facilities and engineering resources in the United States and in China. By combining our manufacturing expertise with our core technology, we strive to provide our global customers with an advantageous price-value relationship.

OUR SENSORS

The majority of our sensors are devices, sense elements and transducers

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that convert mechanical information into a proportionate electronic signal for display, processing, interpretation, or control. Sensors are essential to the accurate measurement, resolution, and display of pressure, motion, force, displacement, angle, flow, and distance. Our other Sensor products are transducers that convert an applied electrical signal into a mechanical motion corresponding to the amplitude and frequency of the electrical input.

### MARKETS

Sensor manufacturers are moving toward smart sensors that use digital intelligence to enhance measurement and control signals. The shift toward sensors utilizing digital signal processing technologies has enhanced applications in the automotive, medical, military, and consumer products markets. Examples of our sensor applications include:

- automotive applications in braking, transmission, fuel pressure, diesel common rail pressure monitoring, security sensing, and onboard tire pressure monitoring;
- industrial sensors for regulating flow in industrial paint sprayers and agricultural equipment, monitoring pressures in refrigeration and heating/ventilating/air conditioning compressors, controlling valves in process control and electrical power generation equipment and traffic monitoring, vehicle speed and red light enforcement:

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- medical sensors for invasive blood pressure measurement, drug infusion flow monitoring, electronic stethoscopes, vascular health diagnostics, sleep disorder sensing, and body activity feedback in heart pacemakers;
- military applications, which continue to drive sensor development, with new systems requiring small, high performance sensors for smart systems such as navigation and weapons control systems, pressure monitoring, and collision avoidance systems; and
- consumer products applications including the measurement of weight, distance, and movement, digitizing information for electronic white boards and pen input devices for laptops, acoustic devices for musical instruments and speakers, and imbalance sensors for appliances.

In recent years, advances in microprocessor technology have fueled the demand for sensors. As microprocessors have become smaller, more powerful and less expensive, they have been incorporated into an increasing number of products and applications. The growth of sensors parallels the growth in microprocessors, which require sensors to deliver critical information. A number of factors affecting the growth in the sensor market include:

- a strong increase in customer demand for low-cost, highly accurate measurement solutions;
- the proliferation of silicon micromachining technology in micro-electromechanical systems (MEMS) devices as a low-cost alternatives to traditional technologies;
- manufacturers' increased use of advanced technology to customize products with various features to meet customer demands; and
- investment in research and development spending in order to introduce new products and expand applications for existing products.

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### TECHNOLOGY

In the rapidly evolving markets for sensors and sensor-based consumer products, there is an increasing demand for technologies such as:

**Piezoresistive Technology.** Piezoresistive materials, most often silicon, respond to changes in applied mechanical variables such as stress, strain, or pressure by changing electrical conductivity. Changes in electrical conductivity can be readily detected in circuits by changes in current with a constant applied voltage, or conversely by changes in voltage with a constant supplied current. Piezoresistive technology is widely used for the measurement of pressure, load and acceleration, and its use in these applications is expanding significantly.

**Application Specific Integrated Circuits (ASICs).** These circuits convert analog electrical signals into digital signals for measurement, computation, or transmission. Application specific integrated circuits are well suited for use in consumer products because they can be designed to operate from a relatively small power source and are inexpensive.

**Micro-Electromechanical Systems (MEMS).** Micro-electromechanical systems and related silicon micromachining technology are used to manufacture components for physical measurement and control. Silicon micromachining is an ideal technology to use in the construction of miniature systems involving electronic, sensing, and mechanical components because it is inexpensive and has excellent physical properties. Micro-electromechanical systems have several advantages over their conventionally manufactured counterparts. For example, by leveraging existing silicon manufacturing technology, micro-electromechanical systems allow for the cost-effective manufacture of small devices with high reliability and superior performance.

**Piezoelectric Polymer Technology.** Piezoelectric materials convert mechanical stress or strain into proportionate electrical energy, and conversely, these materials mechanically expand or contract when voltages of opposite polarities are applied. Piezoelectric polymer films are also pyroelectric, converting heat into electrical charge. These polymer films offer unique sensor design and performance because they are thin, flexible, inert, broadband, and relatively inexpensive. This technology is ideal for applications where the use of rigid sensors would not be possible or cost-effective.

**Strain Gauge Technology.** A strain gauge consists of metallic foil that is impregnated into an insulating material and bonded to a sensing element. The foil is etched to produce a grid pattern that is sensitive to changes in geometry, usually length, along the sensitive axis producing a change in resistance. The gauge operates through a direct conversion of strain to a change in gauge resistance. This technology is useful for the construction of inexpensive, reliable pressure sensors.

**Force Balance Technology.** A force-balanced accelerometer is a mass referenced device that under the application of tilt or linear acceleration, detects the resulting change in position of the internal mass by a position sensor and an error signal is produced. This error signal is passed to a servo amplifier and a current developed is fed back into a moving coil. This current is proportional to the applied

tilt angle or applied linear acceleration and will balance the mass back to its original position. These devices are used in military and industrial applications where high accuracy is required.

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Fluid Capacitive Technology. This technology is also referred to as fluid filled, variable capacitance. The output from the sensing element is two variable capacitance signals per axis. Rotation of the sensor about its sensitive axis produces a linear change in capacitance. This change in capacitance is electronically converted into angular data, and provides the user with a choice of ratiometric, analog, digital, or serial output signals. These signals can be easily interfaced to a number of readout and/or data collection systems.

Linear Variable Differential Transformers (LVDT). An LVDT is an electromechanical sensor that produces an electrical signal proportional to the displacement of a separate movable core. LVDT's are widely used as measurement and control sensors wherever displacements of a few micro inches to several feet can be measured directly, or where mechanical input, such as force or pressure, can be converted into linear displacement. LVDT's are capable of extremely accurate and repeatable measurements in severe environments.

Ultrasonic Technology. Ultrasonic sensors measure distance by calculating the time of flight between transmitting and receiving an acoustic signal that is inaudible to the human ear. This technology allows for the quick, easy, and accurate measurement of distances between two points without physical contact.

### BUSINESS SEGMENTS

Our financial results by business segment for the fiscal years ended March 31, 2003, 2002 and 2001 are presented in Note 17 to the consolidated financial statements included in this Annual Report on Form 10-K.

### PRODUCTS

Sensors. A summary of our Sensor business product offerings as of March 31, 2003 is presented in the following table:

PRODUCT	TECHNOLOGY	BRAND NAME	APPLICATIONS
Pressure Sensors	Micro-Electromechanical Systems (MEMS)	IC Sensors	Disposable catheter blood pressure, altimeter, dive tank pressure, process instrumentation, fluid level, and intravenous drug administration monitoring
	Piezoresistive	microFused	Fertilizer and paint spraying, diesel engine control, hydraulics, and automotive power train
	Strain Gauge	Schaevitz	Instrumentation-grade aerospace and weapon control systems, deep-sea well head pressure, ship cargo level, and steel mills
Accelerometers	Piezoelectric Polymer	PiezoSensors	Transportation shipment monitoring, audio speaker feedback, appliance imbalance and consumer

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exercise monitoring

	Micro-Electromechanical Systems (MEMS)	IC Sensors	Traffic alert and collision avoidance systems, railroad, tilt, and instrumentation
	Force Balance	Schaevitz	Aerospace, weapon fire control, inertial navigation, angle, and tilt
Rotary Displacement Sensors	Linear and Rotary Variable Displacement Transducer	Schaevitz	Aerospace, machine control systems, knitting machines, industrial process control, and hydraulic actuators
Tilt/Angle Sensors	Fluid Capacitive	Schaevitz	Tire balancing, heavy equipment level measurement, and consumer electronic level measurement
Traffic Sensors	Piezoelectric Polymer	PiezoSensors	Traffic survey, speed and red light enforcement, toll, and in-motion vehicle weight measurement
Custom Piezofilm Sensors	Piezoelectric Polymer	PiezoSensors	Medical diagnostics, ultrasound, consumer electronic, electronic stethoscope, and sonar
Custom Microstructures	Micro-Electromechanical Systems (MEMS)	IC Sensors	Atomic force microscopes, optical switching, hydrogen and humidity sensors

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Consumer Products. A summary of our sensor-based consumer products as of March 31, 2003 is presented in the following table:

PRODUCT	TECHNOLOGY	BRAND NAMES*	TYPES OF PRODUCTS	PRICE RANGE
Scales	Piezoresistive, Application Specific Integrated Circuits	Thinner, Health-o-meter, Laica, Salter, and BabyLiss	Bathroom Scales	\$ 5.00-45.00
			Kitchen Scales	\$ 3.00-25.00
		Royal	Postal Scales	\$ 8.00-11.00
Tire Pressure Gauges	Piezoresistive	Accutire	Digital and Mechanical Tire	\$ 0.50-15.00

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Pressure Gauges

Distance Measurement Products	Ultrasonic	Accutape	Interior Distance Estimator	\$13.00-22.00
		Park-Zone	Distance Estimator for Parking	\$10.00-25.00
Kitchen Tools		Dalla Piazza	Kitchen Tools	\$ 1.75-45.00