New study finds:

- Demand for filters in the US is forecast to increase 4.8 percent annually to $8.9 billion in the year 2005.

- Home water purification systems of both conventional and membrane construction are becoming increasingly competitive as new competitors enter the market, attracted by strong growth opportunities.

- The ten largest producers -- Donaldson, Honeywell, CLARCOR, ArvinMeritor, Pall, Dana, Parker-Hannifin, Cummins, Millipore and General Motors -- accounted for about half of the market in 2000.
Filters, a new study from The Freedonia Group, provides you with an in-depth analysis of major trends in the industry and the outlook for product segments and major markets -- critical information to help you with strategic planning.

This brochure gives you an indication of the scope, depth and value of Freedonia’s new study, Filters. Ordering information is included on the back page of the brochure.

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• Demand for filters in the US is forecast to increase 4.8 percent annually to $8.9 billion in the year 2005.

• The consumer market is poised to emerge as a significant factor in the filters industry over the course of the next decade. Home air and water quality is increasingly a subject of concern, and a wide variety of air and water filters have been developed to combat the problem.

• Due to slow growth in both motor vehicle sales (which impacts OEM filter demand) and the number of vehicles in use (which moderates aftermarket demand), this market will soon be overtaken by fluid filters, used in a variety of industrial, utility and consumer applications.

• Membrane filters offer significant growth opportunities, advancing 7.3 percent per year. Home water purification systems of both conventional and membrane construction are becoming increasingly competitive as new competitors enter the market, attracted by strong growth opportunities.

• The ten largest producers -- Donaldson, Honeywell, CLARCOR, ArvinMeritor, Pall, Dana, Parker-Hannifin, Cummins, Millipore and General Motors -- accounted for about half of the market in 2000.
**Study Highlights**

**Filter Products Demand, 2000**

**SUMMARY TABLE**

<table>
<thead>
<tr>
<th>Item</th>
<th>1990</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>00/90</th>
<th>05/00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturers’ Shpts (bil $)</td>
<td>2767</td>
<td>4273</td>
<td>5207</td>
<td>6464</td>
<td>4.4</td>
<td>4.0</td>
</tr>
<tr>
<td>$ filters/000$ shpts</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filter Products Demand</td>
<td>4358</td>
<td>7012</td>
<td>8860</td>
<td>11240</td>
<td>4.9</td>
<td>4.8</td>
</tr>
<tr>
<td>Motor Vehicle Filters</td>
<td>1832</td>
<td>2758</td>
<td>3355</td>
<td>4020</td>
<td>4.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Fluid Filters</td>
<td>1580</td>
<td>2689</td>
<td>3465</td>
<td>4525</td>
<td>5.5</td>
<td>5.2</td>
</tr>
<tr>
<td>Air Purification Filters</td>
<td>946</td>
<td>1565</td>
<td>2040</td>
<td>2695</td>
<td>5.2</td>
<td>5.4</td>
</tr>
<tr>
<td>- net imports</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filter Products Shipments</td>
<td>4288</td>
<td>6917</td>
<td>8740</td>
<td>11080</td>
<td>4.9</td>
<td>4.8</td>
</tr>
</tbody>
</table>

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The Market Environment Section discusses factors influencing filters demand, including consumer spending, motor vehicle trends and environmental factors.

This information provides you with an understanding and an analysis of the climate in which the filters industry operates.

**Health & Environmental Factors**

The most significant health and environmental factors are the passage of water and air pollution regulations by Congress and their implementation by the Environmental Protection Agency. The original federal Clean Air Act was passed in 1963, and has been amended several times since. The most recent amendments (in the early 1990s) have had a notable impact on the investment strategies of firms whose operations involve the use or generation of potential air pollutants, given the phased-in nature of the amendments' provisions. Specific pollutants targeted by the amendments include ground level ozone, sulfur oxides, nitrogen oxides and potentially hazardous pollutants such as heavy-metal particulates. In fact, the amendments established an initial list of 189 toxic pollutants which may be regulated by the Environmental Protection Agency (EPA). In 1997 new air quality guidelines were enacted by the EPA which tightened existing standards. Although there was considerable opposition in Congress to the new rules, attempts to pass legislation blocking them failed. Due to ongoing societal trends (e.g., increasing concerns over the potential health hazards of secondhand tobacco smoke), regulations governing the quality of indoor air may become more important in the future, although it is likely that most early activity will remain confined to the state and local levels.

The Clean Water Act of 1977, amended by the Water Quality Act of 1987, provides grants for wastewater treatment plants and sets limits on pollutant discharges. The act was reauthorized in 1998. Ninety percent of the funding of this bill finances sewage treatment. Remaining funding is devoted to aiding states in controlling toxic chemical runoff from nonindustrial sites and cleaning up the Chesapeake Bay and other estuaries. Recent amendments address nonpoint source pollution, toxins, sludge disposal and estuary management.

The Safe Drinking Water Act, passed in 1974 and last amended in 1996, requires the EPA to set standards for over 80 chemicals found in drinking water. Facilities that provide drinking water in the work place must also comply with these...
Products

The Products Section provides demand for historical years and forecasts growth to 2005 and 2010.

This information helps you:

• Analyze your company’s growth potential in the industry.

• Outline your strategic plans for five and ten years out.

• Establish sales goals.

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This information helps you:

• Analyze your company’s growth potential in the industry.

• Outline your strategic plans for five and ten years out.

• Establish sales goals.

Air Purification Filters - Cartridge Filters

Demand for cartridge filters will increase 6.5 percent annually from a relatively small base to $170 million in the year 2005. Growth will stem from increasing use in applications where the gas streams are smaller and most of the particulates involved are fairly large. In particular, cartridge filters are taking market share from fabric filters, due to lower capital expenses and filter replacement costs. Cartridge filters are making inroads in the oil refining industry, where they are used in deodorizing and hydrogenation processes.

Cartridge filters consist of replaceable paper filters, pleated to increase surface area and contained within a cartridge housing to maximize collection and simplify replacement. In operation, cartridge filters function in a manner similar to fabric filters, in that filtered particulates collect on the filter in the form of a dust cake, which can be removed in order to extend the life of the filter. Once the filter reaches saturation, however, the entire filter cartridge must be replaced. There are limits to the usefulness of cartridge filters, though, since they also are not suitable for wet gas streams, have temperature limitations and are not particularly effective at removing small particles.

Cartridge filters are in general more expensive than bag (fabric) filters in industrial dust collection applications, but are much easier and less labor intensive to change. As a result, the total expense for utilizing cartridge filters can be less than competing fabric filters.

Producers of cartridge filters include Camfil Farr, Donaldson and Whatman.

<table>
<thead>
<tr>
<th>Other Fluid Filter Demand (million dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Annual Water Use (tril gal)</td>
</tr>
<tr>
<td>$ filters/mil gal</td>
</tr>
<tr>
<td>Other Fluid Filters Demand</td>
</tr>
<tr>
<td>Muni &amp; Industrial Water Treatment</td>
</tr>
<tr>
<td>Consumer Water Treatment</td>
</tr>
<tr>
<td>Miscellaneous Fluid Filters</td>
</tr>
<tr>
<td>% other fluid filters</td>
</tr>
<tr>
<td>Fluid Filters Demand</td>
</tr>
</tbody>
</table>

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Order form on last page
Markets

The Markets Section analyzes trends and considers the threats and opportunities in each of the major markets for filters.

The information presented will help you:

- Focus your sales and marketing efforts on high growth areas.
- Propose new areas for development.

**FILTER MARKETS**

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Industrial Pollution Control

Demand for filters used in industrial pollution control applications will increase at a 6.3% annual rate to $780 million in the year 2005. Growth will derive primarily from ongoing efforts to reduce the impact of industrial and manufacturing activity on the environment. In particular, industries which utilize significant amounts of process water (such as the pulp and paper industry) will show strong growth, primarily because of the increased workload placed on the system by water recycling efforts.

The pulp and paper industry is a significant market for water purification filters, being among the first to be targeted under more stringent environmental regulations. In pulp and paper production, manufacturers are actively attempting to reduce overall water consumption for both environmental and economic reasons. Filters are used to remove a variety of impurities from pulp and paper wastewater in order to meet more stringent environmental regulations. Contaminants include organic compounds which give effluent water an unpleasant color and odor, chemical compounds formed during pulp bleaching, and residues of chemicals and minerals used to surface treat paper. While the primary demand driver in the past was the Clean Water Act, outlays for water filtration equipment are continuing as a result of the new "Cluster Rules" promulgated by the US Environmental Protection Agency (EPA), which specifically target paper producers for additional water treatment. In addition, stricter state and local regulations with respect to water quality and the pursuit of "closed loop" systems are also boosting demand for filters. Of course, the increasing recycling and reuse of process waters means greater demands are placed on the water treatment system to remove contaminants, boosting demand for replacement filters.

---

**Motor Vehicle Aftermarket for Filters**

(million dollars)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Vehicles in Use (mil)</td>
<td>188.4</td>
<td>201.5</td>
<td>220.0</td>
<td>241.0</td>
<td>259.0</td>
</tr>
<tr>
<td>$ filters/vehicle</td>
<td>9.0</td>
<td>10.2</td>
<td>11.6</td>
<td>12.9</td>
<td>14.3</td>
</tr>
<tr>
<td>MV Aftermarket Filters Demand</td>
<td>1704</td>
<td>2064</td>
<td>2548</td>
<td>3100</td>
<td>3715</td>
</tr>
<tr>
<td>By User</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do-It-Yourselfers:</td>
<td>942</td>
<td>1053</td>
<td>1223</td>
<td>1370</td>
<td>1505</td>
</tr>
<tr>
<td>Auto Parts Stores</td>
<td>455</td>
<td>480</td>
<td>535</td>
<td>580</td>
<td>620</td>
</tr>
<tr>
<td>Discount Stores</td>
<td>435</td>
<td>514</td>
<td>617</td>
<td>705</td>
<td>785</td>
</tr>
<tr>
<td>Other Stores</td>
<td>52</td>
<td>59</td>
<td>71</td>
<td>85</td>
<td>100</td>
</tr>
<tr>
<td>Dealers, Mechanics &amp; Others</td>
<td>762</td>
<td>1011</td>
<td>1325</td>
<td>1730</td>
<td>2210</td>
</tr>
<tr>
<td>By Brand Type:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Brands</td>
<td>1176</td>
<td>1404</td>
<td>1707</td>
<td>2040</td>
<td>2405</td>
</tr>
<tr>
<td>Private Label Brands</td>
<td>528</td>
<td>660</td>
<td>841</td>
<td>1060</td>
<td>1310</td>
</tr>
<tr>
<td>% aftermarket</td>
<td>93.0</td>
<td>92.4</td>
<td>92.4</td>
<td>92.4</td>
<td>92.4</td>
</tr>
<tr>
<td>Motor Vehicle Filters Demand</td>
<td>1832</td>
<td>2240</td>
<td>2758</td>
<td>3355</td>
<td>4020</td>
</tr>
</tbody>
</table>

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Industry Structure

Gain a better understanding of your competition and analyze your company's position in the industry with information about:

- industry concentration
- market share
- competitive strategies
- industry restructuring
- cooperative agreements
- marketing & distribution
- research & development

INDUSTRY STRUCTURE

Research & Development

Research and new product development is an ongoing process in the filter industry, with more extensive research being conducted in higher value, more sophisticated filtering products (such as membrane filtration systems) than in standardized, commodity-type products (such as motor vehicle filters). It is important to note that the latter have not ceased to evolve. On the contrary, a number of producers have introduced new products and materials that enhance their longevity and/or cost attributes of their products. For example, DuPont has developed polyacetal monofilament filter media as a replacement for nylon media in automotive fuel filters (the use of oxygenating agents in gasoline has led to faster degeneration of nylon filters) while 3M has developed new grades of its FILTRETE media for use in automotive cabin air filters. In addition, Purolator (ArvinMeritor) has developed a reusable automotive oil filter housing that could drastically reduce waste by allowing the replacement of only the filter medium rather than the entire filter structure. Honeywell has introduced FRAM DOUBLE GUARD oil filters which impart a TEFLON (DuPont) engine additive to the oil during filtration to improve engine protection.

In the more research intensive, higher value-added segments of the industry (primarily large industrial filters, membrane filtration systems and high technology medical and electronics products), advancements are primarily centered around improving filtration efficiencies through the development of new materials and products. As a result, manufacturers in this end of the business tend to spend considerably more money on product research and development, since competition is based more on performance and technical sophistication than on price.

Research is also continuing in higher technology products, such as continuous fiber reinforced ceramic matrix composites. These silicon nitride and silicon carbide materials are more durable than monolithic ceramics, and have potential applica-
The Profiles Section analyzes 28 companies active in the U.S. filters market. These profiles represent a sampling or cross-section of the types of companies involved in the industry.

Divisions, subsidiaries, joint ventures, etc., are discussed under appropriate parent companies.

Sources for profiles included:

- Information provided by key staff members in the respective companies
- Annual reports
- 10-K reports
- Security analysts reports
- Corporate product literature

Millipore Corporation
80 Ashby Road
Bedford, MA  01730
781-533-6000
http://www.millipore.com

Millipore is involved in the analysis, identification and purification of fluids using separation technology. The Company operated through two segments in 2000: Bioscience and Microelectronics. In August 2001, Millipore spun off approximately 20 percent of its Microelectronics business segment as an independent company called Mykrolis Corporation through an initial public offering. The Company intends to distribute its remaining 80-percent interest in Mykrolis to Millipore shareholders in early 2002. In 2000, Millipore had sales of $954 million to the Americas. The Company employed 5,000.

The Company is active in the filters industry through the Bioscience segment. The segment includes products and services sold to pharmaceutical, biotechnology, and food and beverage companies; life sciences companies engaged in genomics, proteomics and drug discovery; university, government and private laboratories and research institutes; and microelectronics companies. The segment's manufacturing facilities are located in Bedford and Danvers, Massachusetts; Jaffrey, New Hampshire; Cidra, Puerto Rico; Molsheim, France; Cork, Ireland; and Yonezawa, Japan. Millipore sells filtration products primarily to the biotechnology and pharmaceuticals, and life science markets.

Biotechnology & Pharmaceuticals Market -- For the biotechnology and pharmaceuticals market, Millipore's products include AEREX 2, AERVENT-50, DURAPORE, BEVIGARD-L, LIFEGARD, OPTISEAL, MILLISTAK+ and PELLICON 2. AEREX 2 hydrophobic cartridge filters are high-performance gas...
Companies Profiled

ArvinMeritor Incorporated
Purolator Products Company
Camfil Farr Group
Farr Company
Caterpillar Incorporated
CLARCOR Incorporated
Airguard
Baldwin Filters
Facet International
Filter Products Incorporated
Purolator Products Air Filtration Company
United Air Specialists
Clorox Company
BRITA Products Company
Corning Incorporated
Crane Company
Cochrane Incorporated
Environmental Products USA Incorporated
Cummins Engine Company Incorporated
Fleetguard/Nelson
Kuss Corporation
Universal Silencer
CUNO Incorporated
MacClean
Dana Corporation
Wix Filtration Products
Delphi Automotive Systems Corporation
Donaldson Company Incorporated
Aercology
AirMaze
Eaton Corporation
Ford Motor Company
General Motors Corporation
Honeywell International Incorporated
Ionics Incorporated
Koch Industries Incorporated
Met-Pro Corporation
Flex-Kleen
Keystone Filter
Mefiag
Sethco
Millipore Corporation
Osmontics Incorporated
PACCAR Incorporated
Pall Corporation
Parker-Hannifin Corporation
Gresen Hydraulic
Wilkerson Corporation
Procter & Gamble Company
UIS Incorporated
Champion Laboratories Incorporated
Visteon Corporation
Vivendi Universal SA
Culligan Water Technologies Incorporated
United States Filter Corporation
USFilter

Filters #1475

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Freedonia does not just collect and reprint data; Freedonia develops data. Our analysts thoroughly investigate an industry by extensively interviewing key industry participants and analyzing information from sources such as associations, government and trade literature. Once this research is complete, Freedonia establishes one set of forecasts. All writing, editing and forecasting is done in-house to assure quality and consistency. In cases where data does not exist, Freedonia develops the data based on input/output ratios, bills of materials and flow charts. The following chart summarizes Freedonia’s methodology:

**Forecasting Methodology**

The Freedonia Economics Group

Consistent framework of economic indicators on . . .
- Total Annual Water Use
- Manufacturers’ Shipments
- Gross Domestic Product (GDP)
  . . . and many others

Freedonia In-house Research

- Quantitative forecasting
- Industry structure & market share analyses
- Product analyses & forecasts

Methodology for Filters

Extensive Interviews
- Key participants
- Industry experts
- End-users

Proprietary Electronic Database
- Trade publications
- Government reports
- Corporate literature
- Online databases
  . . . and many others
The Freedonia Group, Inc. is a leading international industry study/database company.

Since 1985, Freedonia has published over 1,600 titles covering areas such as chemicals, coatings and adhesives, building materials, plastics, industrial components and equipment, health care, packaging, household goods, security, and many other industries.

Freedonia has produced a wide variety of titles, including:

- *Diesel Engines & Parts*
- *World Automotive Aftermarket*
- *Membrane Separation Technologies*
- *Automotive Aftermarket in North America*

Because Freedonia is a reliable information source, our forecasts are cited in numerous publications such as *The Wall Street Journal, Purchasing* and *The Financial Times.*

**In-house operations**

Because all of our staff work at the same location, interaction between analysts and departments provides a strong system of checks and balances.

**Consistency**

Our Economics Group develops indicators that are used by all analysts. Therefore, every Freedonia study is based on a consistent set of economic assumptions (GDP, manufacturers’ shipments, total annual water use, etc.)

**Reliable forecasts**

Because all of our forecasts consider the environment in which a product or industry is operating, as well as threats and opportunities to the market, Freedonia forecasts are reliable indicators of future performance.

**One-on-one interviews**

All studies are produced by conducting interviews with key industry participants and end-users.

**Proprietary electronic database**

Freedonia’s analysts can tap into an extensive in-house electronic database containing corporate literature (including private company information), trade publications, government reports and many other sources of information.
Freedonia’s clients include major US and international companies in the manufacturing, services, consulting and financial sectors.

Typical purchasers of Freedonia studies:

- Key Executives
- Corporate Planners
- Market Researchers
- Financial Analysts
- Information Centers
- New Product Developers
- Merger & Acquisition Specialists

Since 1985 we have provided research to customers ranging in size from global conglomerates to one person consulting firms. More than 90% of the industrial companies in the Fortune 500 use Freedonia research to help with their strategic planning.

Some of Freedonia’s customers in the filters market include: CLARCOR Incorporated, Dana Corporation, Honeywell International Incorporated, Parker-Hannifin Corporation and UIS Incorporated.
Gaskets & Seals
The US market for gaskets and seals is analyzed in this study by type (e.g., metallic gaskets, nonmetallic gaskets, motor vehicle body seals, shaft seals, molded packings and seals, and compression packings), and by market (e.g., motor vehicles, industrial machinery, electrical and electronic equipment, aerospace, and rail and marine). It presents historical data (1990, 1995, 2000) and forecasts to 2005 and 2010. The study also examines the market environment, presents market share data and profiles key producers. #1472. . . . . . . . . 10/01. . . . . . . . . . $3,600

Diesel Engines & Parts
US demand for diesel engines and parts will grow 4.8% through 2005. Value gains will be propelled by technological innovations resulting from rising emissions standards. Opportunities for growth will also be driven by demand for niche products such as power generation and mining equipment, as well as further development of the light-duty trucks market. This study analyzes the $14 billion US diesel engine industry to 2005 and 2010 by product and market. It also evaluates market share and profiles key firms. #1448. . . . . . . . . 7/01. . . . . . . . . . $3,600

Activated Carbon
Market value for US activated carbon demand will grow over 6% annually, with gains primarily attributable to tightening water and air pollution laws and new applications. Liquid phase uses (e.g., water treatment) will remain the largest outlet while gas phase applications (e.g., air purification, emission canisters) grow faster. This study analyzes the 364 million pound US activated carbon industry to 2004 and 2009 by type and application. The study also reviews trade, evaluates market share and profiles key firms. #1355. . . . . . . . . 11/00. . . . . . . . . . $3,500

Automotive Aftermarket in North America
The aftermarket for light vehicle components and parts in North America will grow over 4% annually. Gains will be driven by the growing size and age of the light vehicle park, with the increasing durability of newer models a limiting factor. Mechanical products will remain the largest segment while electronics grow the fastest. This study analyzes the $45 billion US, Canadian and Mexican automotive aftermarket to 2004 and 2009 by country and product. It also profiles key players and presents market shares. #1323. . . . . . . . . 9/00. . . . . . . . . . $3,700

Membrane Separation Technologies
Demand for membrane materials in the US will advance nearly 8% annually, driven by expanding use in medical and food processing applications. Demand will also benefit from the ongoing development of new uses (e.g., hazardous waste remediation, air pollution control, radioactive wastewater testing and treatment). This study analyzes the $1.2 billion US membrane separation industry to 2004 and 2009 by type, application and market. It also reviews technology, details market share and profiles key firms. #1295. . . . . . . . . 8/00. . . . . . . . . . $3,500

Industrial Valves
Industrial valve demand in the US will reach $12 billion in 2004, supported by gains in the public utilities market, especially the electricity generation industry. Opportunities will also result from the continuing emphasis on modernization and automation of production processes, as manufacturers strive to remain globally competitive. This study analyzes the $10 billion US industrial valve industry to 2004 and 2009 by material, type and market. It also presents market share data and profiles key industry players. #1369. . . . . . . . . 12/00. . . . . . . . . . $3,500
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