INTERNATIONAL
FILTRATION NEWS
Your Global Source

November/December 2011
Volume 30 No. 6
www.filtnews.com

In this issue:

Sonobond's Ultrasonic Bonding Technology Played Significant Role in Gulf Oil Cleanup

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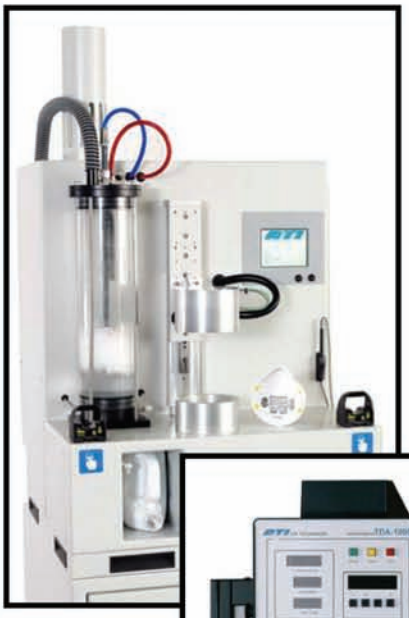

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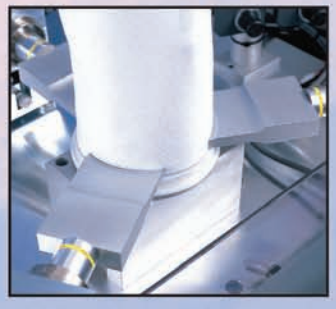

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IN THIS ISSUE

November/December 2011, Vol. 30, No. 6

Cover image courtesy of Sonobond

INTERNATIONAL FILTRATION NEWS
Your Global Source

Published by
INTERNATIONAL MEDIA GROUP, INC.
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Publication Data
Filtration News (ISSN:1078-4136) is published bi-monthly by **International Media Group, Inc.**
Printed in U.S.A., Copyright 2011.
This publication has a requested and controlled subscription circulation - controlled by the staff of Filtration News; mailed bi-monthly as Periodicals Postage Paid (USPS 025-412) in Novi MI and additional mailing offices.
Filtration News is not responsible for statements published in this magazine. Advertisers, agencies and contributing writers assume liability for all content of all submitted material printed and assume responsibility for any claims arising there-from made against publisher.

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China Frames 5-Year Plan for Filtration Textiles

By Jason Chen, China Correspondent

At the China International Industrial Yarn & Technical Textiles Forum held this autumn in Wujiang, China, associations and experts explained China's 12th Five Year Plan (2011-2015) for filtration textiles and illustrated the market trends and technologies.

The Chinese filtration textile industry recorded double-digit annual growth rates in the last five years. "China's filtration textiles output grew at an average annual growth rate (AAGR) of 16.7% from 2005 through 2010 and reached 559,000 metric tons by 2010," said Dr. Li Lingshen, president of China Nonwovens & Industrial Textiles Association (CNITA).

Professor Shen Henggen

Dr. Li Lingshen

CHINA'S 12TH FIVE YEAR PLAN

Dr. Li said the Chinese government had set up the 12th Five Year Plan for the technical textile industry. "According to the Plan, from 2011 through 2015, the output of the Chinese technical textile industry, including filtration textile, will grow at a CAGR (compound annual growth rate) of 9.2% from 8.2 million metric tons in 2010 to 12.8 million metric tons in 2015," said Dr. Li.

According to the 5-Year Plan, China will focus on three developments for the filtration textile industry, including:

- Develop high-temperature resistant and erosion resistant filtration materials.
- Improve the performance of liquid filtration materials made by hollow fibers.
- Develop filtration materials for the manufacturing of machine, chemical, food and paper.

The Chinese government does not make a specific forecast for the growth of filtration textiles for the 12th Five Year period. But Dr. Li said the growth would continue. "China's output of filtration textiles grew at an AAGR of 16.7% from 2005 through 2010, while the whole technical textile output grew at an AAGR of 16.0%. In the 12th Five Year period, the technical textile industry will grow at a CAGR of 9.2%. So we expect a high growth rate for filtration textiles as well," said Dr. Li.

If filtration textiles output in 2015 account for the same percentage of technical textile output as 2010, China's output of filtration textiles will grow at a CAGR of 10% from 560,000 metric tons in 2010 to 900,000 metric tons in 2015.

FILTRATION TEXTILES MARKET

Shen Henggen, professor of the Shanghai-based Donghua University, said that growth of the high-temperature filtration materials would be boosted by fast growing industries such as power generation, and steel and iron.

The power generating industry is the largest high-temperature filtration textiles user. "In 2010, China's coal-fired plant consumed 1.921 billion metric tons of coal, which emitted a total of 13.6 million metric tons of gases. To reduce 70% of the emissions, China should consume a total of 24.6 million square meters of filtration textiles for making bag filters," Mr. Shen said, estimating the potential market size for high-temperature filtration materials for coal-fired power generation. He is also a member of the Bag Filter Committee, China Association of Environmental Protection Industry (BFC CAEPI).

Mr. Shen said that the average weight of a square meter of high-temperature gas filtration fabric is 500-600 grams. Therefore, the potential annual consumption in weight terms is 12,300-14,760 metric tons. The potential market in value terms is $231-277

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million. But according to BFC CAEPI, the real consumption in 2010 was only around 7,000 metric tons with a market value of $131 million.

China's coal-fired power generation sector will keep growing in the next five decades, according to Lu Qizhou, general manager of China Power Investment Corporation, one of the five largest Chinese electric utilities. In addition, stricter environmental laws will increase the requirements for emission reduction. Based on the above factors, the potential annual consumption of high-temperature resistant filtration textiles for coal-fired power plants may reach up to 24,670 metric tons with a market value of $462 million by 2015, so this market could grow at a CAGR of 28.7% from $131 million in 2011 to $462 million in 2015.

High-temperature resistant filtration textiles also have other applications such as cement, steel and iron, and solid waste treatment. According to BFC CAEPI, in 2010, the power generation industry consumed 37% of China's high-temperature resistant filtration textiles; the steel and iron industry consumed 25%; the cement industry consumed 28%; solid waste treatment consumed 4%; and other segments consumed 6%. China's total high-temperature resistant textile consumption was 18,900 metric tons with a market value of $354 million in 2010; and the market will grow at a CAGR of 28.8% from 2011 through 2015 and reach 67,000 metric tons with a market value of US$1.25 billion by 2015.

HIGH-TEMPERATURE RESISTANT

Mr. Shen said that there are six kinds of manmade fibers for manufacturing high-temperature resistant materials. They include:

- PPS (Polyphenylene Sulfide) fiber, which is used at the temperature of 120-160 degree centigrade and has a price of 90,000-120,000 RMB (Renminbi) yuan ($14,000-19,000) per metric ton
- P84® polyimide fibers, which is used at the temperature of up to 230 degree centigrade and has a price of approximately 420,000 RMB yuan ($66,000) per metric ton
- PTEF (Polytetrafluoroethene), which is used at the temperature of 260 degree centigrade and has a price of 250,000 RMB yuan ($39,000) per metric ton
- Glass fiber, which is used at the temperature of 180-250 degree centigrade and has a price of approximately 30,000-50,000 RMB yuan ($4,700-7,800) per metric ton
- Aramid fibers such as Kermel®, Nomex® and Conex®, which are used at the temperature of 180-220 degree centigrade
- PSA fiber, which is used at the temperature of 180-250 degree centigrade and has a price of 130,000-150,000 RMB yuan ($20,000-23,000) per metric ton

"Two other fibers, basalt fiber and high silica fiber, could be the most promising new high-temperature resistant materials. Hybrid materials can also be used for manufacturing high-temperature resistant materials with specific functions," added Mr. Shen.

LIQUID FILTRATION TEXTILES OUTPUT

According to CNITA, China's output of liquid filtration textiles was approximately 180,000 metric tons in 2010. Dr. Li said that new materials such as advanced hollow fibers would increase the performance of liquid filtration textiles and boost the market consumption. China's output of liquid filtration textiles will exceed 280,000 metric tons with a market value of $5.2 billion by 2015.

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AFS 2011 Conference Focused on Oil & Gas

Oil and gas filtration and separations was the focus of the AFS conference in Houston, Texas.

Houston, Texas was the site of the AFS Fall Focus Conference, held October 17-20 on the topic of Oil and Gas Filtration & Separations. As usual practice, the AFS provided meals to all attendees as part of the registration fee. A Networking reception was held Tuesday evening with AWC Separations Divisions sponsoring an outstanding buffet, an event most will long remember.

The Conference began Monday, October 17 with the AFS standard four- and eight-hour short courses taught by many of the foremost experts in the industry. There were nine courses in all, on subjects covering the Basics in Air and Liquid Filtration, Filtration Media and Markets, Microfiltration and Ultrafiltration Membranes, Liquid Filter Testing, Nonwoven Air Filter Media, Electrostatic Charging, and Electrets and Coalescing Principals and Industrial Operations. Anyone who hasn't attended one of these courses is missing a golden opportunity to learn in hours what takes months or years to accumulate on the job. It's a fast-track to industry knowledge consolidated in easy to follow comprehensive courses.

Sponsors for the Conference were AWC Separations Division, Dynasty Filtration, International Filtration News, Harrigan Solutions, IBR Laboratories and the AFS Southwest Chapter. The Conference Chair was Wu Chen, Dow Chemical; Co-Chair was Wenping Li, Agrilectric Research. Conference Committee members were Chris Wallace, Filtration Technology Corporation; and GuoQiang Young, Shell International.

The AFS presented a blue-ribbon Plenary Speakers line-up, which included: Jason Schenker, Prestige Economics, LLC; Prof. Kuo-lun Tung, Christian Univ.; Jose Bravo, the Royal Dutch Shell; and Sean Meenan Sr. VP, Pall Corporation. Individual sessions over three days were lead by many industry notables: Christine Sun, Donaldson Company; Jonathan Chen, Univ. of Texas; Wenping Li, Agrilectric Research; GuoQiang, Shell International; Colin Tyrie, Produced Water Society; Chris Wallace, Filtration Technology Corporation; George Chase, Univ. of Akron; Mathias Stolarski, DuPont Experimental Station; Ernest Mayer, E. Mayer Filtration Consulting, LLC; Sue

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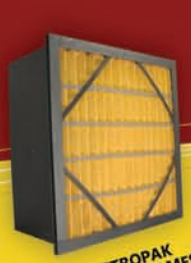
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The Corporate Sponsors Committee met Tuesday evening where several market intelligence reports were distributed and the first of several available on-line employees training Webinars was announced. The educational Webinars are exclusive to AFS Corporate Sponsors and their employees. The AFS announced its Job's Board for available open positions and AFS Corporate Sponsors will continue on the AFS website and its affordable annual dues will remain the same in 2012. The number of AFS Corporate Sponsorships increased 67 percent in 2011, largely due to many new benefits being offered to filtration and separation companies. For detailed Corporate Sponsors information, see a separate article below.

The AFS celebrates its 25th anniversary in 2012 and at its AFS Board of Directors meeting voted to submit an application to host the World Filtration Congress once again in 2020 – the first date allowed by INDEFI rules after the AFS hosted the event in 2004 in New Orleans where close to 1,500 delegates from around the world attended. The American Program Committee also hosted an earlier World Filtration Congress in the United Sates in 1984, which was the predecessor to the American Filtration & Separations Society. Next spring's AFS 25th Anniversary Conference will be located in Boca Raton, Florida, where a number of special events and a gala supper celebration are planned.

The American Filtration & Separations Society is the largest Filtration Society in the world and the principal educator of the industry. For more information visit the AFS website: www.afssociety.org or call the AFS office at 612-861-1277

AFS Distributes Market Reports & Webinars

The AFS Corporate Sponsors Committee distributed Market Landscape Reports at the 2011 Corporate Sponsors meeting at the AFS Fall Conference held October 17-20 in Houston, Texas. The reports begin the AFS process of providing market intelligence and information to Corporate Sponsors this year and going forward. The three reports distributed at the Fall Conference Corporate Sponsors meeting were:

- Unconventional Fuels
- Membrane Technology for Liquid and Gas Filtration
- U.S. Market for Residential Water Treatment

AFS Corporate Sponsors meeting

The AFS has further worked out a special arrangement where Corporate Sponsors receive a discount for any existing Business Communication Company (BCC) reports if purchased through the AFS. This effort is part of a fulfillment of Corporate Sponsors requests to the AFS for market intelligence.

WEBINARS

In addition to the Market Landscape Reports, the Corporate Sponsors requested additional education for all employees. Accordingly, the first Webinar is now available for Corporate Sponsors. The first four-hour, four-module Webinar is titled, Filtration & Separations Media Market, a comprehensive study and technical review of the eight most common media, their applications, use, market size, market trends, characteristics, and more. Additional Webinars, exclusive to Corporate Sponsors are planned throughout 2012. Sponsors will now be able to use AFS Webinars to provide in-house training to all new company employees and journeymen alike.

JOBS BOARD

The AFS will continue to provide the Job Board at no cost to Corporate Sponsors. Sponsors can list open employee positions on the AFS website. Anyone visiting the AFS website will have full access and can apply for a position directly to the Corporate Sponsor company listing the open position.

COST OF SPONSORSHIP

The AFS will continue to maintain the same low cost of membership for manufacturing companies interested in participating as an AFS Corporate Sponsor in 2012:

- Less than $5 million in sales - $1,500/year
- $5 to 10 million in sales - $2,000/year
- $10 million and above in sales - $2,500/year
- Distributor Sponsorships are available at the rate of $1,250/year

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We invite you to learn more about these expert companies by visiting their websites.

Stainless Steel in Filtration and Separation

By Robert McIlvaine

Stainless steel is a very popular material for filtration and separation equipment. It is used in the filter and separation elements as well as for the housing. The International Stainless Steel Foundation estimates the usage in filters at 200,000 tons/yr representing over $1.2 billion.

Total Stainless Steel usage:

Shape	*%*
Bar	4.0
Round wires	1.5
Shaped wires	80.0
Fine wires	25.0
Fibers	20.0

20% of stainless metallic fibers are used in filtration. Over 80% of the shaped wires are purchased for filter applications.

The McIlvaine Company estimates that the amount of stainless steel used in scrubber, precipitator, filter, clarifier, and separator housings plus associated ducts, pipes and stacks exceeds 1,000,000 tons per year. So the combined usage in internals and components plus housings is 1.2 million tons per year. Production for all applications was 31 million tons last year. So the filtration and separation segment is about 3.8% of the total market for stainless steel.

AUTOMATIC BACKWASHABLE

Oil and gas slurry filtration is accomplished with automatic backwashable filters using stainless wire filtration media. Stainless steel filters are used in amine filtration. Stainless steel mesh filters are used in many food-processing operations.

Purolator Poromet® cleanable stainless steel filter elements are utilized for high-temperature and high-corrosion processing applications.

All Poromet Series elements are made from 316L stainless steel filter media. They are recommended for temperatures up to 850° F and highly corrosive applications.

Eaton LOFMET stainless steel filter cartridges are made from fine stainless steel powders that result in fixed pore filters with high temperature, pressure and solvent resistance. Initially, this series began as flat porous sheets, which were gradually shaped and welded into cylindrical elements. These filters are recommended for steam service and are well suited for liquid or gas application. Key features and benefits of LOFMET stainless steel filter cartridges include:

- SS304, SS316 and SS316L are available for pleated cartridge
- Constructed entirely of sintered stainless steel powder for high corrosion resistance
- Cleanable and back washable for re-usability
- High temperature sintering to eliminate media migration

CLARIFIERS AND CENTRIFUGES

Water & Wastewater Equipment Company (WWEC) makes inclined plate clarifiers with 316L stainless plate housing and polished 316 L setting plates.

All Enviro Solutions CSS Clarifiers Include 3/16" Removable PVC Plates; and 1/4" Stainless Steel Construction; Andritz decanter centrifuges are available in 304 L, 316 L and duplex stainless steel.

FILTERS

Parker Hannifin filters for compressed air include stainless housings. One unique application is the filter used to protect fuel cell membranes. Electrolysis is used to generate hydrogen. The gas contains aerosols of liquid water. Parker Finite SIR stainless steel filers prevent the droplets from reaching the membrane. The head, internals, and bowl are all 316 L stainless steel.

While 316L stainless steel is the standard material of construction, Mott elements are available in a variety of materials for chemical compatibility with many liquids and gases. Other materials include: 304L, 310, 347 and 430 stainless steel; Hastelloy® B, B-2, C-22, C276, N and X; Inconel® 600, 625 and 690; Monel® 400, Nickel 200, Alloy 20 and titanium.

Pentair Nautilus® Plus NSP D.E. Filters have been designed with curved grids to maximize filtration area. The 100% premium-grade stainless steel tank ensures reliable operation, eliminates leaks and minimizes corrosion.

WET PRECIPITATORS

The materials of construction for WESP's were originally lead and lead lined steel but today most units are constructed of FRP or stainless steel. The selection of the material of construction must take into account its chemical resistance mechanical and electrical properties.

Steve Jaasund of Lundberg Associates said the best approach to alloy selection is to rely on past performance. For example, Type 304 stainless steel has been shown to provide almost indefinite life in wood drying and in many biomass-fired boiler applications.

However, in many applications

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Figure 1. Alloy Cost Ratios for WESPs

Grade	UNS #	Ratio to 316L	Descriptor
304	S30400	0.7	austenitic
316 L	S31603	1	austenitic
904 L	N08904	2.1	super austenitic
317LMN	S31726	1.6	austenitic
AL-6X	N08366	2.6	super austenitic
2205	S32205	0.9	duplex
AL-6XN	N08367	2.6	Super austenitic
C-276	N10276	7.1	NiCrMo alloy
C-22	N06022	7.0	NiCrMo alloy

such longstanding experience may not be available. In these cases designers must rely on the published data for particular alloys plus a complete understanding of their particular process. In this situation it is extremely important to thoroughly understand the vectors that may transport the corrosive elements (chlorides, fluorides, etc.) to the wet ESP. For example, a low pH gas stream with HCl gas present may appear to demand a high nickel alloy such as C-276. However, if the upstream quench ahead of the wet ESP unit has removed the soluble HCl gas, and the entrained mist has been effectively eliminated, the threat of chloride attack may have been effectively eliminated allowing a lesser alloy.

The choice of stainless steel or alloy to be used will be primarily based on its corrosion resistance in the gas and liquid environment. 316L stainless steel is suitable for many applications. However, it is not satisfactory for other applications where the conditions are more corrosive. 2205 has been selected for several big power plant WESPS just completed in the U.S. Industeel has analyzed various conditions relative to air pollution control applications and said that each application must be considered individually due to all the variables. This also involves price considerations. As can be seen, the cost varies considerably as one increases the corrosion protection.Over the past 15 years, the use of duplex stainless steels has increased extensively in many air pollution control applications. This is the result of continuous improvements in composition and properties. Higher nitrogen contents have increased the duplex stainless steels' structural stability at high temperature, and consequently, their weldability. The cost advantage of duplex stainless steels over austenitics (which contain more nickel and molybdenum) has become more and more evident during the last four years, with the continuous price increase of alloying elements. Duplex and super duplex grades became increasingly attractive compared to 317LMN and 6 MO in many applications.

SCRUBBERS

Stainless steel has many advantages in the corrosive, high temperature and abrasive environment found in scrubbers operating on coal fired boilers and industrial furnaces. These systems are subject to temperature excursions, which can be a problem for FRP.

2205 Stainless is much more cost effective than C 276. It has been used very successfully in many scrubber installations. There are, however, certain situations where other alloys are better suited.

Prior to the early 2000s, coal fired power plant FGD absorbers were designed using Type 317L stainless steel or a variation, such as Type 317 LMN. The LMN grade is fully austenitic and has controlled increased additions of nitrogen and molybdenum. The combination of molybdenum and nitrogen enhances resistance to pitting and crevice corrosion, especially in process streams containing acids, chlorides, and sulfur compounds at elevated temperatures. Nearly a decade ago, in seeking higher SO2 removal and different chloride concentrations during operations, a fundamental shift occurred in the way FGD systems were designed and operated. The price of nickel-based alloys spiked, rising by four to seven times. Manufacturers sought other metals, such as duplex stainless steels. Duplex stainless steels have a two-phase microstructure consisting of roughly 50% austenitic stainless steel and 50% ferritic stainless steel, making them about twice as strong as regular austenitic or ferritic stainless steels. Depending on their content, duplex alloys have a range of corrosion resistance. With less nickel and molybdenum, these alloys can cost significantly less than austenitic stainless steels, and because of their increased strength, they can be manufactured with reduced section thickness. Initial evidence indicates many affected FGD systems are fabricated with one of the most common duplex stainless steels, Alloy 2205, a 22% chromium, 3% molybdenum, 5%–6% nickel, nitrogen-alloyed stainless steel. Some affected systems are made of a similar duplex alloy, 255, with a slightly different composition. Concern is mounting that earlier-generation absorber vessels fabricated with austenitic stainless steels may be subject to corrosion as well, but that the attack has gone undetected.

The coal fired power industry and its research arm EPRI are investigating the problems and funding various analytical efforts. DNV is one of the firms doing investigations. One of the conclusions was that scale build up in the

scrubber allowed acids to accumulate between the shell and the scale and create abnormally corrosive conditions.

Brett Tossey of DNV has reported that 2205 duplex stainless steel was not able to resist localized corrosion in the immersion zone of the WFGD absorber. Leaks occurred as a result of rapid localized corrosion in Duplex 2205 near the weld. The attack occurred along welds and in the base metal exclusively beneath deposits, leading to crevice corrosion. The attack selectively dissolved the austenitic phase in the duplex stainless steel. The austenite phase was preferentially attacked due to its lower molybdenum and chromium contents when compared to the ferrite phase. There was no evidence that microbial activity played a role.

EPRI and its contractors are collecting information on corrosion in FGD absorber vessels, piping, and spray headers/nozzles, along with detailed data on materials, fabrication techniques, construction quality assurance/quality control, operating environments (basic water chemistry, scaling, etc.), and corrosion levels and locations. With the survey results, the EPRI team will document all FGD system designs, chemistries, and materials susceptible to accelerated corrosion. Early indications point to chemistry issues—evidenced by the presence of hard, tenacious scales and deposits on walls and floors—and/or a factor associated with the fabrication of the metallic vessels.

COALESCERS

All Ovivo EnviroSep oil water separators are constructed of stainless steel. Various alloys are selected based on the corrosion potential. Thousands of units are installed at terminals, refineries, power plants and in many other industries. The plate packs are fabricated from flat stainless steel sheet to maximize coalescing of oil droplets.

Ecofine Filtration Products, a Chinese supplier of Stainless steel Horizontal Coalescer Vessels manufactures in both 304 and 316 SS.

Velcon Process offers a full line of ASME Code Chemflo Vessels, Sanitary Vessels, and Coalescers Vessels. Products include high flow rate vessels, liquid-liquid coalescers, and electropolished stainless steel filter vessels.

The Allen Coalescer-Separator system removes free and emulsified water down to the saturation level. The complete Coalescer-Separator system consists of a pre-filter vessel, a coalescer-separator vessel, and an optional final filter. It is available in carbon steel, 304 or 316 Stainless.

For more information contact:
Bob McIlvaine, President
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Website: www.mcilvainecompany.com

New Option for Ultrafiltration Pretreatment

By Gregg Poppe, Dow Water & Process Solutions

Depending on its intended use, water is treated to various degrees of purity. And depending on the raw water source, whether it is seawater, surface water, ground water, or wastewater, it typically requires multiple steps to effectively treat the water. Each step progressively removes smaller and smaller contaminants. Sure, the fine filtration provided by reverse osmosis (RO), which specializes in removing even dissolved contaminants, can also reject bigger particles such as colloids and suspended particles, and larger. But the most cost-effective treatment system does not rely on the reverse osmosis for this duty because RO elements are not optimally designed for that task, and require more frequent cleaning or replacement when employed in that manner.

The solution, then, in this example is to pretreat the water in advance of RO to remove most of the suspended solids using some type of water treatment technology that is more economically viable for suspended solids removal. For centuries, media filtration has been used for this purpose. Over the last couple decades, ultrafiltration (UF) is being recognized as a cost-effective and more reliable pretreatment for RO (more details available in "The Basics of Ultrafiltration and Reverse Osmosis" in the November/December 2010 issue of International Filtration News).

Analogously, for a robust water treatment system, successive pretreatment steps are advisable all the way back to the water source. Each step backwards specializes in cost-effectively removing larger solids, commonly with less technologically-advanced techniques, but some of these steps can still be expensive considering the size of equipment, the amount of land, or the operating expense (i.e., chemicals, electricity and air) that can be involved.

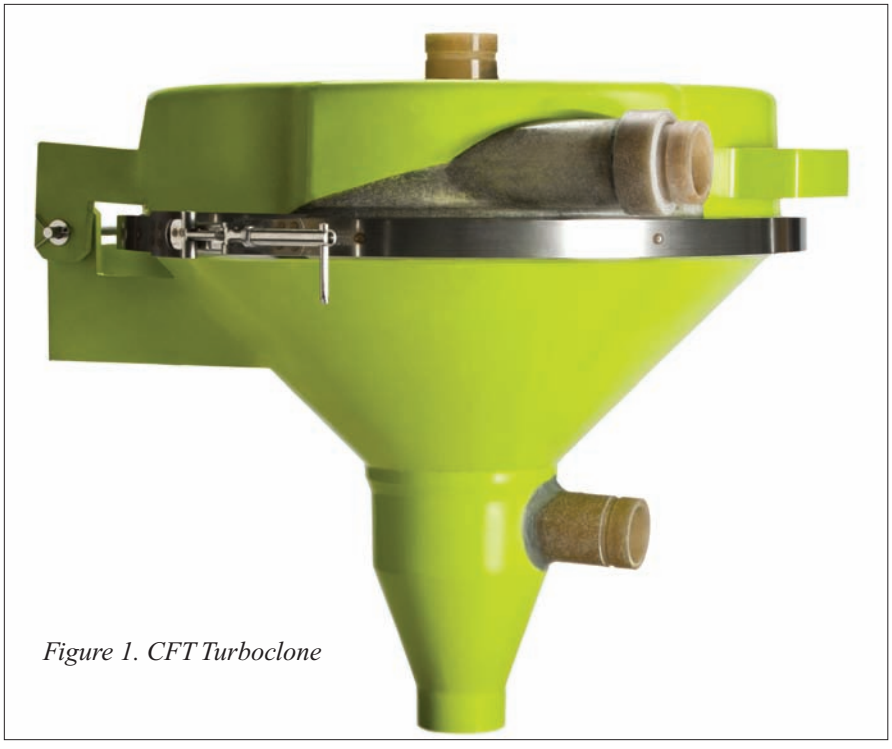

Figure 1. CFT Turboclone

For example, typical pretreatment steps to ultrafiltration might be clarifiers, dissolved air flotation (DAF), settling ponds, and hydrocyclones. For the highest UF operating flux and recovery, resulting in the smallest capital and operating expense for the UF plant, the feed water into the UF is commonly recommended to have a turbidity of 5 NTU or less. So the pretreatment for UF should be able to achieve this level of filtration consistently, and ideally along with other attributes such as very high water recovery, low operating and maintenance expense, and a small footprint.

To compete against this list of common low-tech, large-footprint options such as clarifiers, DAF, and settling ponds for UF pretreatment, some more compact, self-cleaning filtration devices have entered the market. One of the latest entries is the patented CFT Turboclone™ Filter supplied by Clean Filtration Technologies, Inc.

From the outside, the CFT Turboclone resembles a traditional hydrocyclone (Figure 1), but on the inside it is completely different. It has been designed and optimized with computational fluid dynamics to not only remove large particles by centrifugal force, but also to remove smaller particles by cross-flow filtration through a proprietary, durable metal filtration membrane. The smallest particles (those less than the pore size of the

metal membrane) are allowed to pass easily through the specially-engineered filter material. The particles that do not pass through the filter are all captured in the lower part of the housing and eliminated through the drain valve.

Also unique to the device is a water-propelled, self-cleaning brush mechanism that sweeps the surface, keeping particles away from the metal filter membrane to optimize performance (Figure 2). This cleaning assembly moves with the flow of the feed so no additional motor is required.

Unlike conventional dead-end filtration systems that operate at a high differential pressure, the CFT Turboclone operates consistently at a very low differential pressure up to 1.5 psi because, unlike dead-end filters that produce a "cake layer" requiring increasing amounts of pressure to produce the same amount of flow, the Turboclone is designed to keep the particles away from the filter screen and prevent caking, which results in a consistently low differential pressure and uniform filtrate flow. Actual flow rate through the Turboclone can vary depending on the quality of water and the filter pore size selected, but approximate flow rates are 5-15 gpm for the smallest unit, 20-60 gpm for the mid-size unit, and 80-240 gpm for the largest unit.

The CFT Turboclone has some key product features:

- Well-controlled filtration down to 10-µm cut-off (15-µm and 20-µm filters are also available)
- Operates independent of solids specific gravity; can filter solids with a specific gravity close to water
- Filters a wide dynamic range of particles from 10-µm up to coarse particles such as sand and even larger
- Flexibility to handle varying inlet water quality
- Able to handle feed water with high turbidity (> 100 NTU) and high total suspended solids (TSS > 100 mg/L)
- Very high water recovery up to

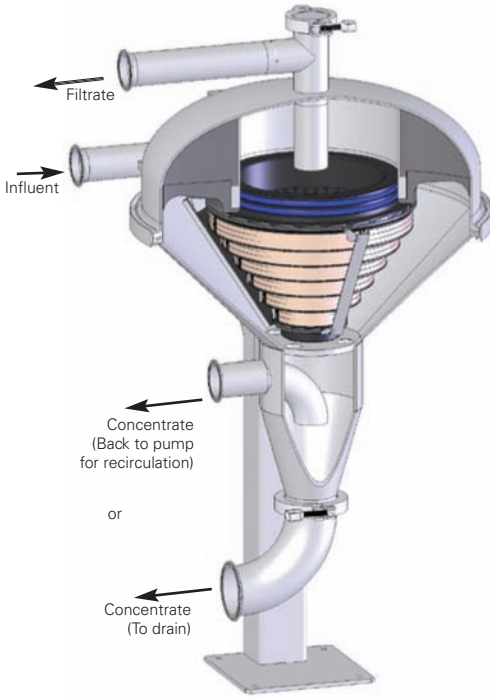

Figure 2. CFT Turboclone inlet/outlet ts and interior view of cleaning mechanism

99.5% or even 99.9% by recirculation
- Easily scalable by installing parallel units with a range of unit sizes
- Small footprint, high capacity
- Chemical-free
- Virtually maintenance-free
- Low power consumption, with an operating pressure drop up to only 1.5 psi

FIELD TRIALS

The associated benefits of these features have been demonstrated by several completed field trials.

In one trial, the Bear Valley Water District (BVWD) in Alpine, California, tested the CFT Turboclone as an alternative to dissolved air flotation in the pretreatment step prior to ultrafiltration in order to ultimately produce California Title 22 reuse water. The specific objective was to reduce the turbidity in the feed source from > 15 NTU to ultrafiltration feed quality of < 5 NTU. For this trial, a 20-µm membrane was used in the Turboclone.

BVWD judged the trial to successfully meet their objectives. The pressure drop across the unit was very low over the entire test period, using 20 psi of feed pressure. In a 3-month period, the feed turbidity typically ranged from 6-10 NTU with an extreme of 14 NTU, but the CFT Turboclone filtrate consistently met the < 5 NTU goal, ranging from about 3-5 NTU, allowing the downstream UF to consistently produce water at only 0.05 NTU. The Turboclone filtrate quality was so consistent that the initial plan to install a 5-µm cartridge filter between it and the UF was deemed unnecessary, saving additional expense. As the trial concluded, the CFT Turboclone + UF system accom-

plished the treatment goals at less than half of the projected capital cost of the proposed DAF + UF system.

In a second trial, the Sewer Authority Mid-Coastside (SAM) Wastewater Treatment Plant in Half Moon Bay, California, evaluated the effectiveness of the CFT Turboclone as pretreatment to a UF membrane plant in producing California Title 22 reuse water for irrigation customers. The specific goal of the trial was to reduce the turbidity in the feed from > 10 NTU to ultrafiltration feed quality of < 5 NTU.

The pilot trial was considered successful by SAM management. As observed in the previous trial, the pressure drop across the test unit was very low over the entire test period, with 20 psi of feed pressure. Over a 1-month period, the feed turbidity usually ranged from 7-13 NTU, with a spike as high as 19 NTU, but the CFT Turboclone filtrate quality was always < 5 NTU, averaging about 3.5 NTU, allowing the UF to consistently produce filtrate of very low turbidity. Throughout the same period, the flow rate through the unit was consistently 35 gpm and its membrane never fouled, nor required any maintanance or operator intervention; not even a single backwash was required during the trial period. And as seen before, the quality of the water from the Turboclone was so consistent that it eliminated the need for the cartride filter, which is generally recommended by the UF system manufacturer.

As the popularity of ultrafiltration continues to grow, innovative cost-effective pretreatment solutions that offer consistent feed water to the UF while also delivering high recovery in a small footprint with low maintenance requirement, such as this option with the CFT Turboclone, will continue to be more and more interesting in order to optimize the overall operation of the water treatment plant.

In addition to pretreatment for ultrafiltration, CFT currently has installations in the oil & gas industry for salt water disposal prior to injection and on offshore oil platforms as pretreatment to RO for potable water. CFT is also evaluating the technology for water treatment in the pulp and paper industry. The Dow Chemical Company is studying the CFT Turboclone in seawater, surface water, ballast water, and wastewater applications. Dow is also an investor in Clean Filtration Technologies, Inc.

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Comparing Garnet for Filtration Media

SpinTek Filtration, a leading manufacturer of solvent extraction (SX) coalescing filters, provides American produced anthracite and garnet filtration media for the worldwide mining industry. While the company appreciate a desire to source locally, the question is, "Why ship media from America and not buy locally?"

In an effort to support clients in Africa and worldwide with consistently low cost and high quality product, SpinTek undertook an extensive investigation of African garnet and anthracite to determine whether they would stand up to SpinTek's very exacting standards.

Dual Media filters are crucial to the operation of an SX circuit to provide entrained organic removal and filter solids and crud down to 10 microns. The garnet and the anthracite are essential to both of these functions with special characteristics.

The SpinTek Dual Media cut-away shows the top anthracite layer that can vary in depth depending on plant operation but is typically 18-24" (457-610 mm) and the garnet layer in the same depth ranges. The relative dimensions shown are 450 mm of garnet, 450 mm of anthracite and a freeboard for media expansion of 600 mm.

AMERICAN GARNET

Garnet is used in SpinTek filters to remove suspended solids from the aqueous stream, typically electrolyte, providing excellent filtration down to 10 microns and high solids holding capacity in the range of 15 kg/m2 of filter area. Garnet is used in lieu of sand as the filtering media as particle distribution of garnet is typically much narrower; is more acid resistant than sand; and also has significantly less dust—a serious consideration for operator safety during loading of the filters with media.

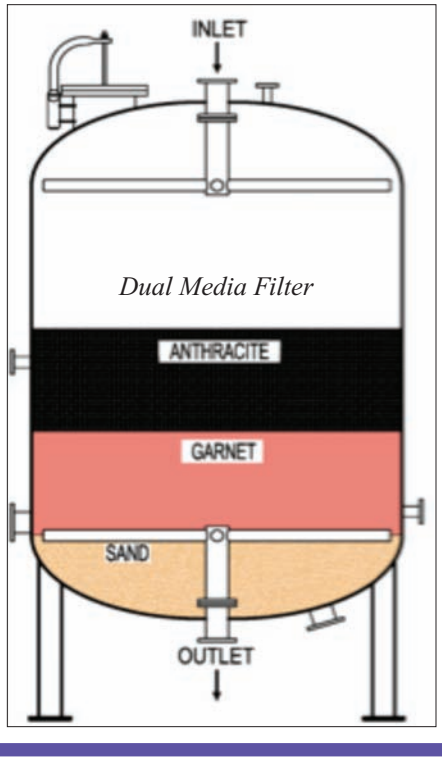
The name "garnet" comes from the Latin granatus ("grain"), possibly referring to Punica granatum ("pomegranate"), a plant with red seeds similar in shape, size, and color to some garnet crystals. Quality garnet brands are called ruby red, etc., with garnets very clear in color when held to the light.

SPINTEK GARNET

The SpinTek garnet is sifted carefully to make a product that has a narrow pore distribution of between US 30 and 40 mesh (425-600 microns). A garnet layer with an extremely fine pore distribution acts as a filter effectively removing solids from the electrolyte or raffinate stream down to ten microns. When the distribution of garnet particles varies, this adversely affects the ability of the garnet to remove smaller suspended solids.

Not only is SpinTek garnet low in dust, which can be a serious hazard to operators during loading but dust particles can cause high pressure drops in the filters. Since garnet is more acid resistant than sand, it is naturally preferred in SpinTek filters.

SpinTek garnet is manufactured and sieved to our exacting specifications and come with certificates of conform-



Dual Media Filter


SpinTek Garnet in large photo with African Garnet showing Calcium, Ilmenite in inserted photo.

	SIZE ANALYSIS				
DATE:	1/29/2010				
GRADE:	Ruby 36#				
ASTME	SIEVE	WEIGHT	% WEIGHT	CUM. %	WEIGHT
MESH	MICRON	RETAINED	RETAINED	RETAINED	PASSING
10		0.00	0.00	0.00	100
20	850	285.30	57.06	57.06	100
30	600	170.20	34.04	91.10	99.81
40	425	44.30	8.86	99.96	65.98
50	300	0.20	0.04	100.00	2.54
60	250	0.00	0.00	100.00	0.00
Pan	-250	0.00	0.00	100.00	0.00
	Total =	500.00			
D10% =850µ	12#				
D40% =596µ	17#		Effective Size =608µ	30#	
D60% =828µ	21#				
D90% =608µ	30#				
			Uniformity Coefficient =1.03		

SpinTek Garnet Size Analysis Chart

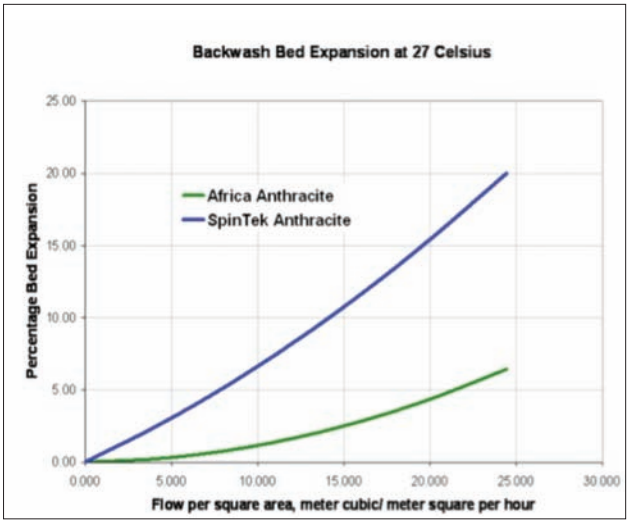


Chart 1

ity. Small "fines" plug laterals and radials causing high-pressure drops; an additional sieve is added to ensure products meet specification.

AFRICAN GARNET

SpinTek obtained garnet samples from several sources currently supplying the African SX mining industry. The goal was to find a local supplier who met the company's specifications or one it could work with to raise their product to their standards. The product most prevalent on the continent is referred to as "Africa Pegmatite Garnet."

A sample of this material was obtained, and this is not truly garnet but a mixture of various materials with various shapes and sizes. The material was tested and was found to have a good deal of ilmenite mixed in with the garnet. Ilmenite is a very brittle mineral that is used for manufacturing paints and various metal products. It breaks down very easily and creates a black powder dust. When this dust is mixed with water it can cause staining on stainless and aluminum parts. While it is not known for certain there is strong evidence that causes experts to believe this "garnet" is actually the waste product from an ilmenite mine in Africa.

There also seems to be a calcium buildup on the garnet particles. This is the white chalky material. This calcium will slowly release as the particles rub together and create a white dust that will be seen in the electrolyte and in the air as dust particles when the garnet is being loaded into the filters.

The material when used in a SX filter will not provide filtration in the 10 micron range as SpinTek specify, it will create fines that lead to high pressure drops, and as it is easily crushed, will break apart blinding the filter flow distribution systems.

Note the very sharp cut off and size distribution of SpinTek garnet in the Size Analysis Chart above. This is a typical Certificate of Conformity form supplied with every SpinTek shipment.

The material captured by the US 50 mesh screen must be below 1.5% and 100% retention on any smaller screens. As seen in the above Size Analysis Chart, the SpinTek garnet has a 0.04% garnet retention on the 50 mesh screen.

GARNET CONCLUSIONS

The relative cost of dual-media filters is expensive but they are crucial to modern SX-EW operations. If compromised by the use of replacement media that are off specification, a much more costly plant shutdown can occur.

The comparison analysis shows that while American garnet require importation, the higher shipping cost is truly insignificant compared to the performance benefits. It is disappointing but clear that the locally supplied product is not up to specification and further processing cannot help.

The African product contains contaminants and very brittle causing filter malfunction. A summary of the effects are listed below:

- High brittleness leads to loss of "garnet" and frequent replacement.
- Brittle garnet generates "fines" and clogs upper or lower distribution system and air distribution leading to high pressure drops and reduced service flows.
- Fines migrate into anthracite bed causing flow distribution problems.
- Garnet sheds calcium and other elements that enter SX electrolyte stream.

SpinTek's conclusion is that the use of this material will very quickly adversely affect the operation of SX Dual-Media filter.

ANALYSIS OF ANTHRACITE

While garnet is very crucial for filtration of aqueous hydromet streams the use of anthracite is equally important as both a pre-filter for the garnet and as a coalescer of organic. Anthracite is a hard, coal-based product and the removal of organic is due to the anthracite's affinity for organic. Organic will first coat the surface of the anthracite and then further coalescing will occur as other organic fine droplets "touch" the organic coated anthracite, form larger organic droplets and are removed from the aqueous stream.

Much of the organic removed by

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TRACT I: SOLID-LIQUID SEPARATION SESSION INCLUDE:

- Filtration
- Membrane filtration
- Adsorption
- Filter testing
- Novel Separation technologies
- Fundamental studies
- Bio-energy applications
- Nano Filtration

Solid-liquid separation continues to be one of the most important step for many industries. This tract will continue the AFSS long history of addressing the most important issues in filtration and separation.

The technical program will cover various topics including fundamental, latest technologies, and bio-energy applications. The program will focus on solutions related to the solid-liquid separation. Any engineer, scientist, and sales administration will find this conference quite useful.

Keynote speakers are planned to introduce the latest information in the dynamic world of solid-liquid separation.

TRACT II: AIR FILTRATION SESSION INCLUDE:

- Indoor Air Quality (IAQ)
- General Air Filtration
- Industrial Air/Gas Cleaning
- Cabin Air
- Nano-Filtration
- Filter Media
- Filter Testing
- Filtration in Transportation.

Air filtration is the process of removing contaminants from air, and was originated to protect equipment or valuable substances. After 9/11, awareness of air filtration systems to protect building environments for commercial/industrial and residential HVAC (heating, ventilating and air-conditioning) units has substantially been increased. Indoor Air Quality (IAQ) is becoming a dominant concern for human health effect.

The program will be well-rounded including test methods, procedures, evaluations and applications. Most types of filters will be addressed including filter aids, coalescers and equipment. Of course, conventional media, cartridge,bag, and strainer testing will also be covered. Keynote speakers are planned to introduce latest technology and how they can be applied to real life applications.

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Richfield, MN 55423

the anthracite will be caught within the matrix of the entire bed of anthracite though larger droplets of organics can be formed. These larger droplets can break free from the anthracite, float to the top of the filter for discharge as almost 100% organic.

These two removal methods of organic 1) collection within the bed and 2) coalescing to large droplet size are dependent on the anthracite meeting the specifications required for this type of hydromet service. The anthracite must be of narrow particle size distribution and also physically hard and durable to prevent premature breakdown of the anthracite resulting in loss of anthracite, generation of fines, higher filter operating pressures, and poor organic removal capacity.

PARTICLE SIZE DISTRIBUTION

The particle size distribution of the anthracite is crucial as it affects: filtration efficiency, backwash effectiveness and even fluid flow through the bed.

SpinTek's Standard for anthracite is:

Mesh	0.8-0.9 mm
Effective Size	0.8-0.9 mm
Range	0.5-1.2 mm
Uniformity Coefficient	1.7
Density	859 kg/m^3 (58 lb/ ft^3)

As shown in Chart 1 on page 23, based upon these typical backwash velocities it is important to evaluate the bed expansion obtained by the SpinTek anthracite versus the African product. The SpinTek anthracite meets the 15% expansion when the filter is backwashed at 20 m^3/hr-m^2; the African anthracite never meets the targeted backwash value.

ANTHRACITE CONCLUSIONS

Particle size distribution is narrower for the SpinTek product providing consistent filtration and coalescing.

Width and large particle distribution of the Africa supplied anthracite results in poor backwashing.

Mohs Hardness values represent the ability of a material to resist scratching and the SpinTek product is much harder than the Africa sourced anthracite.

The organic loading of anthracite is greatly influenced by the particle distribution of the anthracite, which, if uniform, will provide a slow even flow through the bed. When calculating the surface area of a bed of anthracite the SpinTek material has approximately 10% greater surface area than the African supplied material. This small difference is at first surprising but closer examination of the particle distribution curves shows the African material has so many "fines" that create a large surface area but are near ineffective in actual operation. The higher fines do not add to the anthracite capacity of the African material but have the added negative effect of increasing pressure drop through the bed and causing an irregular flow path. The accumulated effects of the differences produce an additional 10% organic loading capacity of the SpinTek anthracite.

Sonobond's Ultrasonic Bonding Technology Played a Significant Role in Gulf Oil Cleanup

Sonobond's ultrasonic bonding technology was essential to the production of many of the oil-absorbing booms successfully used to clean up the 2010 Gulf oil spill, according to Melissa Alleman, vice president of Sonobond Ultrasonics. "For several years now, we've worked closely with Supply Pro, Inc. of Houston, Texas, and their ProBoom™ brand of absorbent booms. They are a leading provider of products for safely removing hazardous materials and for protecting workers during cleanups. Supply Pro, Inc. relies on our equipment for fast, dependable ultrasonic bonding of the materials in their ProSorbents™ line of oil-absorbing pads, booms, and pillows. In fact, Supply Pro provided 40% of the booms used by BP during the spill. So we are pleased to say that Sonobond's ultrasonic machinery had a significant part in assembling the products so essential to cleaning up this disaster, as well as other hazardous incidents," she said.

Oil-absorbing polypropylene pillows by Supply Pro for hazard spill cleanup (top) and dimpled oil-absorbent products (below) are assembled with Sonobond's fast, dependable ultrasonic bonding machinery. This cost-effective equipment can be easily integrated into most production processes.

SAFE AND CLEAN ENVIRONMENT

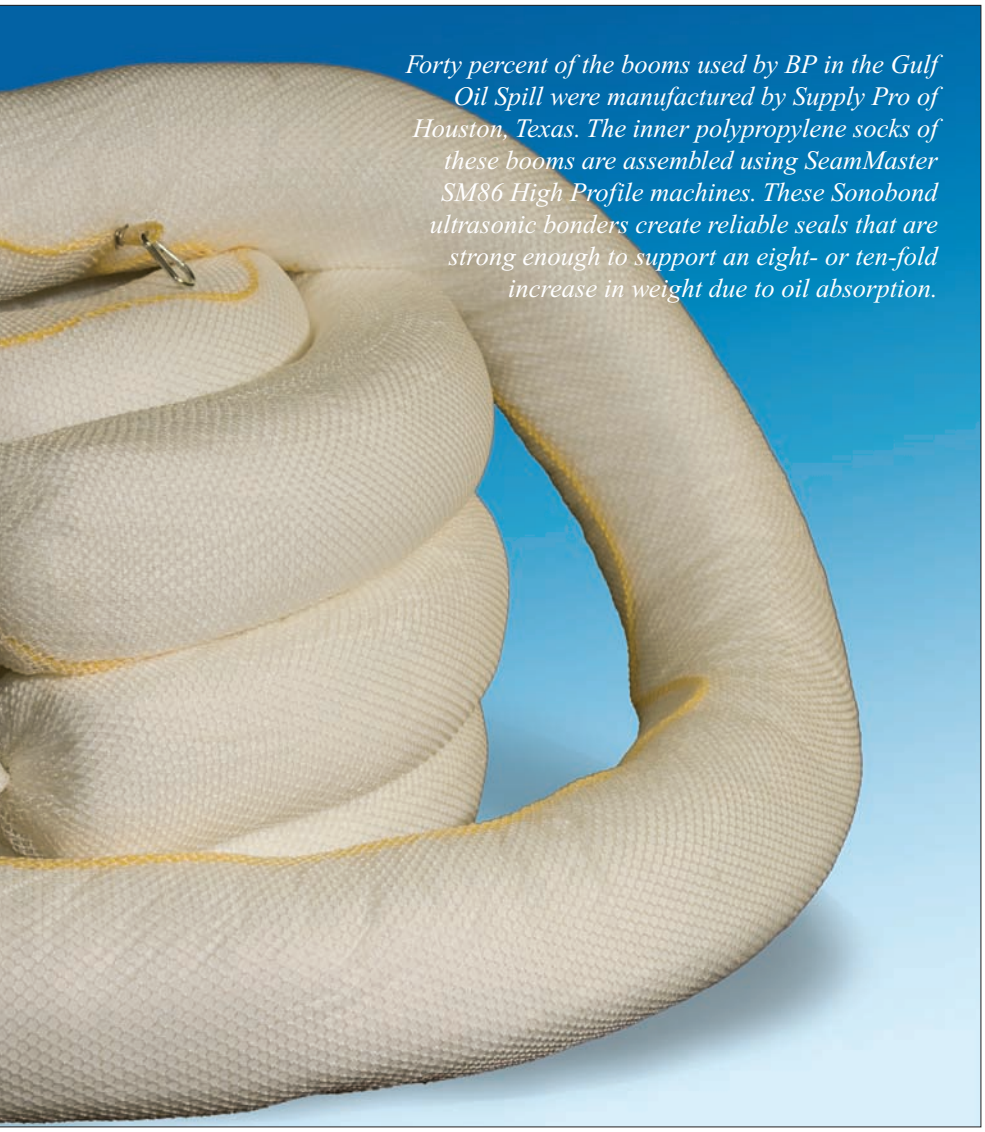
Supply Pro, founded in 1996, is an internationally-known provider of absorbent products for hazard spill cleanup and the world's largest manufacturer of absorbent booms. It is capable of producing custom meltblown products of medical, technical, sorbent, and filtration grades with specifications ranging from 1/3 to 20 ounces per square yard. Their new, nonwoven line adds cotton and polyester capabilities beyond those of competitors. It was only natural that the company supplied many of the materials needed for cleaning up BP's Gulf oil spill using their ProSorbents pads, booms, and pompoms.

SOLUTION-CENTERED APPROACH

In November 2006, company President and CEO, Harmon Fine, asked Phillip Barron to join Supply Pro as Director of Operations. Mr. Barron had over 40 years of manufacturing experience and a general familiarity with ultrasonic bonding. However, he was skeptical of the companies providing that technology.

"I thought all ultrasonic equipment suppliers were pretty much the same. Then I began talking with Sonobond. I came to realize that Melissa Alleman, their vice president, was committed to taking a team approach to problem solving. She and her associates considered themselves to be more than just vendors. They were willing to work with us to find solutions to the various

issues we faced. I like this way of doing business because I've learned you need to have the backing of your suppliers to get the job done right. So we set to work finding ways their ultrasonic bonding equipment could be an asset to us. As a result of our many conversations with Melissa, we are now using several SM86 SeamMaster™ High Profile Ultrasonic Bonders and V20 Machine Builder's Modules. This equipment has become essential to the fast, dependable assembly of important parts of our top-quality ProSorbents product line," Mr. Barron said.



Forty percent of the booms used by BP in the Gulf Oil Spill were manufactured by Supply Pro of Houston, Texas. The inner polypropylene socks of these booms are assembled using SeamMaster SM86 High Profile machines. These Sonobond ultrasonic bonders create reliable seals that are strong enough to support an eight- or ten-fold increase in weight due to oil absorption.

ULTRASONIC ASSEMBLY

Supply Pro uses Sonobond's SM86 SeamMaster High Profile Ultrasonic Bonders to make the inner polypropylene sock for its booms, such as those so instrumental in absorbing and containing much of the oil spilled during the 2010 Gulf disaster.

During Supply Pro's production process, flat sheets of spunbond polypropylene material are folded over and run through the Sonobond bonders for sealing. They are then stuffed with highly absorbent polypropylene fill. The seals created by the ultrasonic bonders are as strong as the parent material. This is important because, by the time the product is disposed of, it may weigh eight or ten times more than its original weight as a result of the materials absorbed. Once the socks are sealed and filled, they are placed into tough, pliable, polyester outer netting that is resistant to snags and debris. The booms created through this process can absorb and retain oils and oil-based liquids, such as lubricants, fuels, and cleaning agents. Supply Pro uses this same ultrasonic bonding technology to produce its absorbent pillows.

Mr. Barron went on to say: "Integrating the SM86 SeamMaster equipment into our production process was accomplished easily. We use these stand-alone machines on different assembly lines. They give us a strong, reliable bond without a brittle edge. This is superior to what we can get through standard sewing, heat-sealing, or induction heating. Sonobond machines are fast, reliable, and cost-effective."

SEAMMASTER

The SM86 SeamMaster High Profile Ultrasonic Bonder is similar in appearance to a traditional sewing machine. However, it operates four times faster than conventional sewing machines and ten times faster than adhesive methods. This equipment has a high clearance between the wheel and the horn that is ideal for hand-guided operations with tight tolerances, as well as for working around curves.

The SeamMaster combines several labor-intensive operations into one pass that saves time, labor, and money. It provides quick, reliable sealing, sewing, and trimming without thread, glue, or other consumables. Manufacturers no longer need to concern themselves about needle and thread breakage, thread color changeover, or thread unraveling. Seams bonded by this machine are so perfectly fused and sealed that they can be used to help comply with OSHA's regulations for barrier seams.

Sonobond's SeamMaster has numerous specialized uses in the textile, apparel, and engineered-fabrics industries. A variety of interchangeable pattern rollers are available for seaming, hemming, and embossing. A special fixture is available for producing pleated filters. Like other Sonobond machines, this equipment can be operated easily with only minimal training.

ULTRASONIC BONDING

Supply Pro uses other Sonobond machinery, the V20 Machine Builder's Modules, to assemble its SMS 3-Layer Sorbents.

Supply Pro uses Sonobond's V20 Machine Builder's Modules to assemble its SMS 3-Layer Sorbents and diamond-patterned, dimpled products.

The Sonobond SeamMaster SM86 High Profile Ultrasonic Bonder combines sealing, sewing, and trimming into one quick pass. This equipment is four times faster than conventional sewing machines and ten times faster than adhesive methods.

SMS (Spunbond/Meltblown/Spunbond) pads, rolls, and drum toppers are designed to have the strength and sorption capabilities to handle the most demanding industrial applications. SMS pads and rolls must be of lint-free construction for use around sensitive equipment and in clean rooms. Although the exact methodology used by Supply Pro is proprietary, Sonobond's V20 Machine Builder's Modules ultrasonically bond meltblown polypropylene between two layers of high tensile strength, nonlinting, spunbond polypropylene. This takes just seconds and the resulting bond is strong and reliable. The same technology is used to make the company's diamond-patterned, dimpled products.

Prior to incorporating the Machine Builder's Modules into their assembly process, Supply Pro used induction-heated rollers. According to Phil Barron, the Sonobond system is much better. "Sonobond V20 units give us tighter controls on heat displacement and on consistency. They assure greater reliability of product and production," he said.

FLEXIBLE ULTRASONIC CAPABILITY

Sonobond's Machine Builder's Modules are affordable and compact and have proven to be a popular choice among OEMs. They fulfill the same function as actuators and provide increased flexibility for automation applications where space is at a premium, as in filtration assembly. Available for 20 kHz or 35 kHz generators, they can also be equipped with distance measuring capabilities. The 20 kHz modules have power outputs to 3000 watts and a built-in leveling feature that permits precision alignment of perpendicularity. The 35 kHz modules have outputs of 900 watts. Both machines feature a rigid design for high pressure welding when needed. They also provide easy changeover for the converter/booster/horn. Additional features include full 360-degree rotation of the acoustic stack, a crossed roller slide for reliability, and adjustable flow controls to regulate travel speed.

SONOBOND ADVANTAGE

According to Mr. Barron, Supply Pro is very pleased with the results they've been getting from using the SeamMaster machines and the Machine Builder's Modules. In fact, he is open to finding other applications where Sonobond technology can be of help to Supply Pro.

"There are several significant reasons that Sonobond ultrasonic bonding technology is such a big asset to us. For one thing, it is very cost-effective especially in the way it makes the production process faster and easier. The longer the equipment keeps running, the less costly it is for our company. You wouldn't believe the difficulties we had when we were still using heaters. Those problems were more than a person would imagine. Now downtime is virtually not an issue. In addition, the quality of the bond is excellent, and we have strong technical support from Sonobond whenever we need it. The whole ex-

perience of incorporating their ultrasonic bonding machines into our manufacturing process has been very positive in every respect. They have allowed us to take better control of our line of booms, socks, pads, and pillows and to have more control over our own destiny," Mr. Barron said.

FREE VIABILITY TEST

Even companies in similar fields have manufacturing or assembly requirements that are unique. So Sonobond offers a no-cost, no-obligation Ultrasonic Bonding Viability Test. Potential customers are invited to submit their nonwoven or synthetic fabrics to have sample bonds made. In this way, they can be certain which Sonobond ultrasonic bonding machine is right for a specific application.

Sonobond works closely with customers to make installation of its ultrasonic bonding equipment as seamless as possible. The company is fully dedicated to providing excellent customer service and exceptional technical support before, during, and after their equipment is installed.

In summarizing his relationship with Sonobond, Supply Pro's Phil Barron said, "I would rate my overall experience a strong 10! I've been very happy with all aspects of Sonobond, from the equipment we purchased to the customer service we've received. As I said earlier, they are team players. They do the research and hard work required to help us come up with solutions that enable us to achieve our goals. Sonobond has been—and continues to be—very professional in its approach."

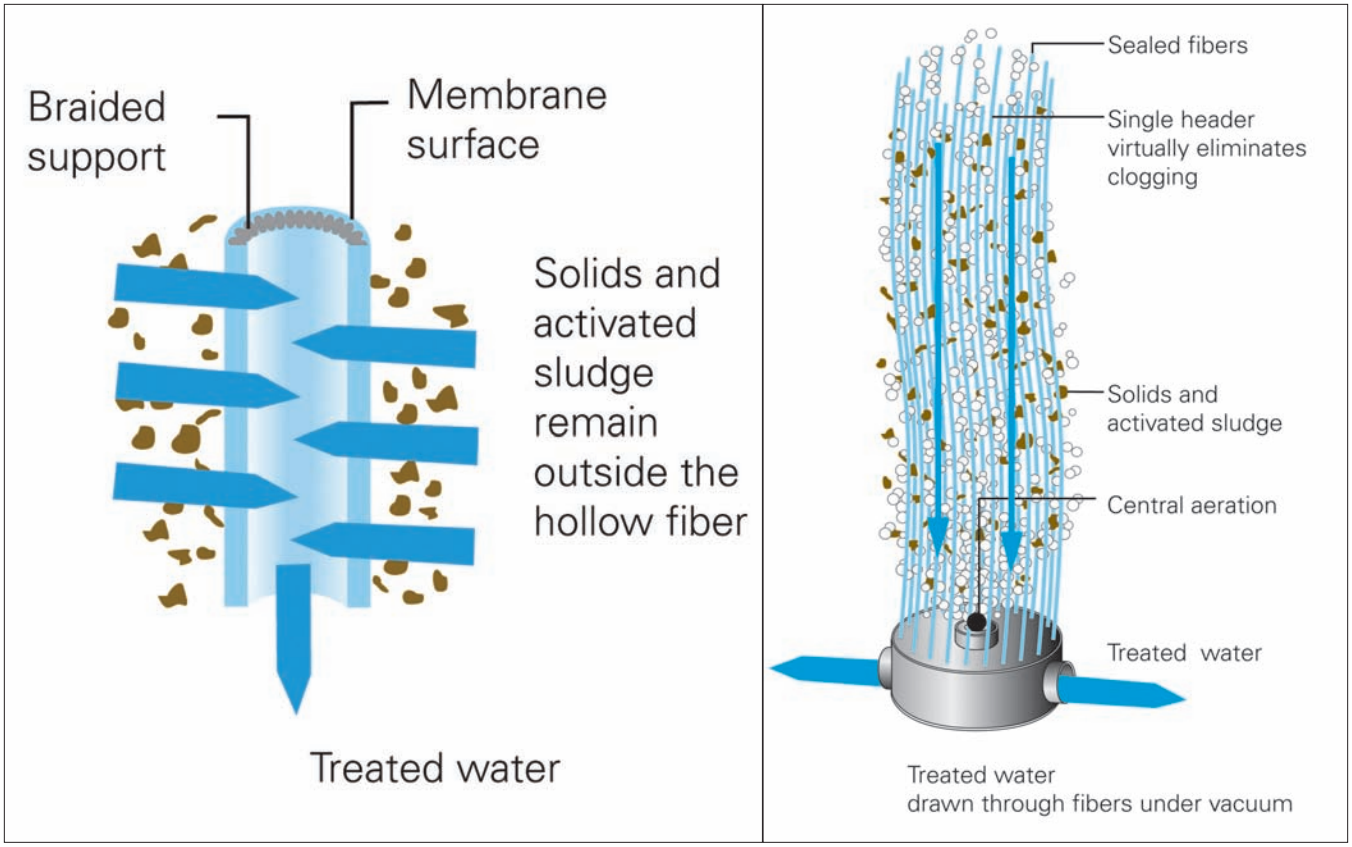
A RESPECTED LEADER

Sonobond enjoys a worldwide reputation for leadership in the application of ultrasonic welding and bonding technology. In 1960, the company—then known as Aeroprojects—received the first patent ever awarded for ultrasonic metal welding. Over the intervening 51 years, Sonobond has pioneered the development of quality-engineered products for use by leading companies in the filtration, environmental, electrical, automotive, appliance, solar, aerospace, medical, ballistics, and other industries.

For more information about **Supply Pro** and its **ProSorbents** line of products visit: www.prosorbents.com or call 1-713-672-9080.
To learn more about **Sonobond**'s ultrasonic bonding technology and their free, no-obligation Ultrasonic Bonding Viability Test, visit: www.SonobondUltrasonics.com or call 1-800-323-1269.
For immediate service, contact **Vice President Melissa Alleman** at MAlleman@SonobondUltrasonics.com

Koch's Next-Generation Membrane Bioreactor Solutions: Progress by Evolution

By Peter A. Bouchard, Koch Membrane Systems



PURON Single Header Module

The Koch Membrane Systems (KMS) family of PURON™ submerged membrane modules for membrane bioreactor (MBR) applications is providing industries and municipalities around the world with economical, comprehensive wastewater solutions.

In 2011, KMS introduced the next generation of improved, high flux PURON PSH (PURON Single Header) modules. Newly-designed and improved, the new PURON PSH1800 MBR product offers superior solids management and reduced energy and life-cycle costs with a 10 percent lower aeration requirement and a 10 percent greater surface area than competitive products, and up to a 25 percent capacity increase from previous generations of PURON products. The new module leverages the PURON module's innovative central aeration and single header design to offer 1800m2 in a 1.75m x 2.42m footprint, resulting in one of highest packing density, smallest footprint MBR modules available in the marketplace. In addition to the PSH1800, KMS is offering the PSH300 and PSH600. All PURON models are compatible with other commercial MBR systems.

WHY PURON PSH MBR?

Unlike conventional wastewater treatment technology, PURON PSH MBR modules act as a physical barrier to bacteria, produce high quality effluent, require minimal space, and eliminate the need for secondary clarification.

PURON MBR systems produce high-quality effluent that meets stringent water reuse and recycling requirements while significantly reducing the treatment system footprint. PURON membranes require the lowest energy demand of all commercially available MBR modules because only PURON modules position the aeration nozzle in the center of the fiber bundle to scour the entire fiber length, minimizing power consumption. The system is easy to operate, with features that are designed to provide significantly lower lifecy-

cle costs, including a single header design that provides better solids management in the module, braided fibers to reduce the risk of fiber breakage, and highly effective air scouring method that virtually eliminates sludging.

The use of a single header with reinforced hollow fibers that are fixed only at the bottom is an important advantage of the patented PURON module. The free floating tip design eliminates the build-up of hair and fibrous materials that typically clog the upper ends of membrane fibers in MBR module designs that employ both top and bottom headers. PURON single header design has quickly become the technology of choice for companies looking to reduce energy, minimize downtime, and increase flux, all within a small footprint.

The PURON module utilizes an outside-to-inside flow pattern critical for such applications. Solids and particulates, including bacteria, are retained by the membrane and remain on the outside, while permeate is drawn through the membrane to the inside of the fibers.

PURON PLUS ENGINEERED SYSTEMS

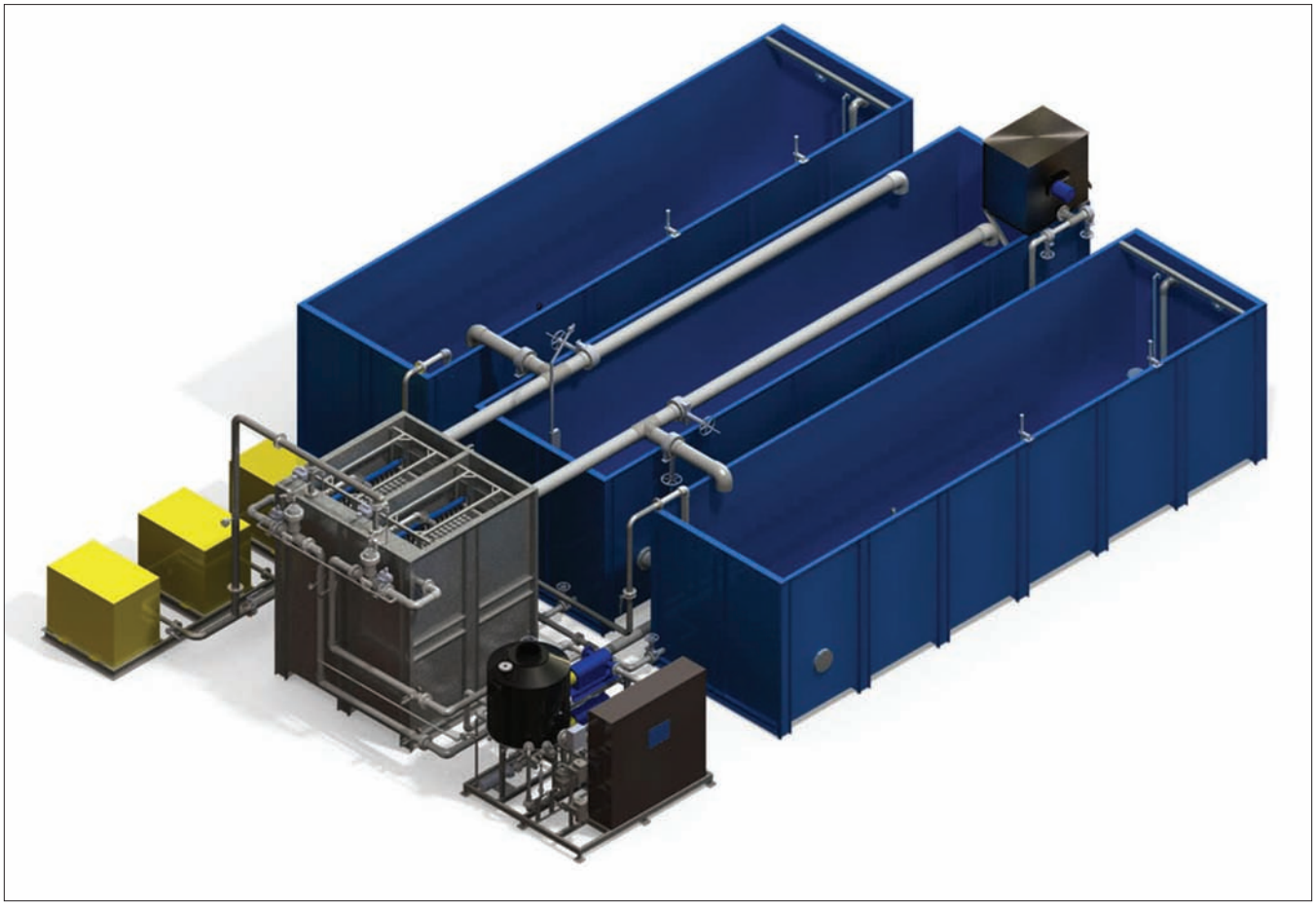
KMS isn't just a membrane company. Completing the PURON family of comprehensive wastewater treatment solutions are the PURON PLUS Engineered Systems.

KMS PURON PLUS MBR Packaged Systems offer state-of-the-art MBR technology in a skid-mounted packaged plant that provides customers with a full scope of supply, from prescreening and biological treatment through to the final membrane clarification step. The pre-engineered MBR plants are economically designed to minimize engineering efforts while addressing the unique effluent requirements of each site, with capacities up to 200,000 GPD (30 m3/hr) and a design optimized to meet most environmental discharge regulations. KMS supports each system throughout the life of the facility, from design through onsite installation and ongoing operation.

For larger flow rates, KMS offers a family of pre-engineered modular MBR filtration systems. The KMS PURON PLUS Modular System offers all the benefits of the KMS PURON PLUS Packaged System for capacities ranging from 0.2 to 1.8 MGD (30 m^3/hr to 300 m^3/hr). This modular solution is available as pre-engineered building blocks to offer flexible and economical design options while addressing specific effluent requirements. The modular MBR system focuses on the membrane unit operation; process equipment and additional scope are optional. KMS modular MBR systems can be arranged to meet any plant layout or required flow rate.

CASE STUDY: CALIFORNIA

The City of Santa Paula, California, is home to the first large MBR installation in North America to use PURON



PURON PLUS MBR Packaged System

membrane filtration modules. It is also the first water recycling facility built under a California government code to encourage private investment to solve public infrastructure needs.

The city selected the PERC Water / Alinda Capital team to design, build, operate and finance a 7.2 MGD (1,135 m3/hr) daily flow membrane bioreactor facility that will allow Santa Paula to meet current and future wastewater treatment needs while complying with environmental standards. The city also expects the new facility to enable the use of recycled wastewater for irrigation.

Santa Paula chose MBR technology because it combines biological wastewater treatment and membrane filtration into one unit process, producing a consistently high quality effluent in an extremely compact footprint. PERC Water selected the single header PURON membrane filtration modules from Koch Membrane Systems to incorporate into the MBR design because they are energy efficient and provide significantly lower lifecycle costs than other alternatives.

According to Juergen Nick, PERC Water's vice president of design and engineering, "The water recycling technology we are employing in the Santa Paula Facility sets the industry bar to help control and minimize operational energy costs within the smallest environmental footprint possible. As membrane scouring and biological aeration account for nearly half of the facility's power consumption, PERC Water chose to employ the most energy-efficient air production and usage systems on the market . . . Koch Membrane Systems' PURON membranes. In total, 24 PSH1500 modules were installed, making it one of the largest MBR installations in North America."

PURON modules are designed for today's large-scale MBR projects. Features such as an optimized permeate extraction manifold and air supply lines reduce the number of piping connections during installation.

PERC Water's innovative design uses five acres less land than would be required by a conventional wastewater treatment facility. With the equipment selected for this facility, Santa Paula's MBR promises to be one of the most energy-efficient MBR installations in the world.

CASE STUDY: BRAZIL

The Aquapolo Ambiental water reuse venture is the largest water reuse project in the Southern Hemisphere, and the fifth largest of its kind in the world. Aquapolo was created to address new regulations to restrict the industrial

Xinxiang Tiancheng Aviation Purification Equipments Co. Ltd.

Our company specializes in designing & manufacturing and supplying many kinds of filters, complete filtrating equipments and their elements with different materials according to your drawings or new & old samples.

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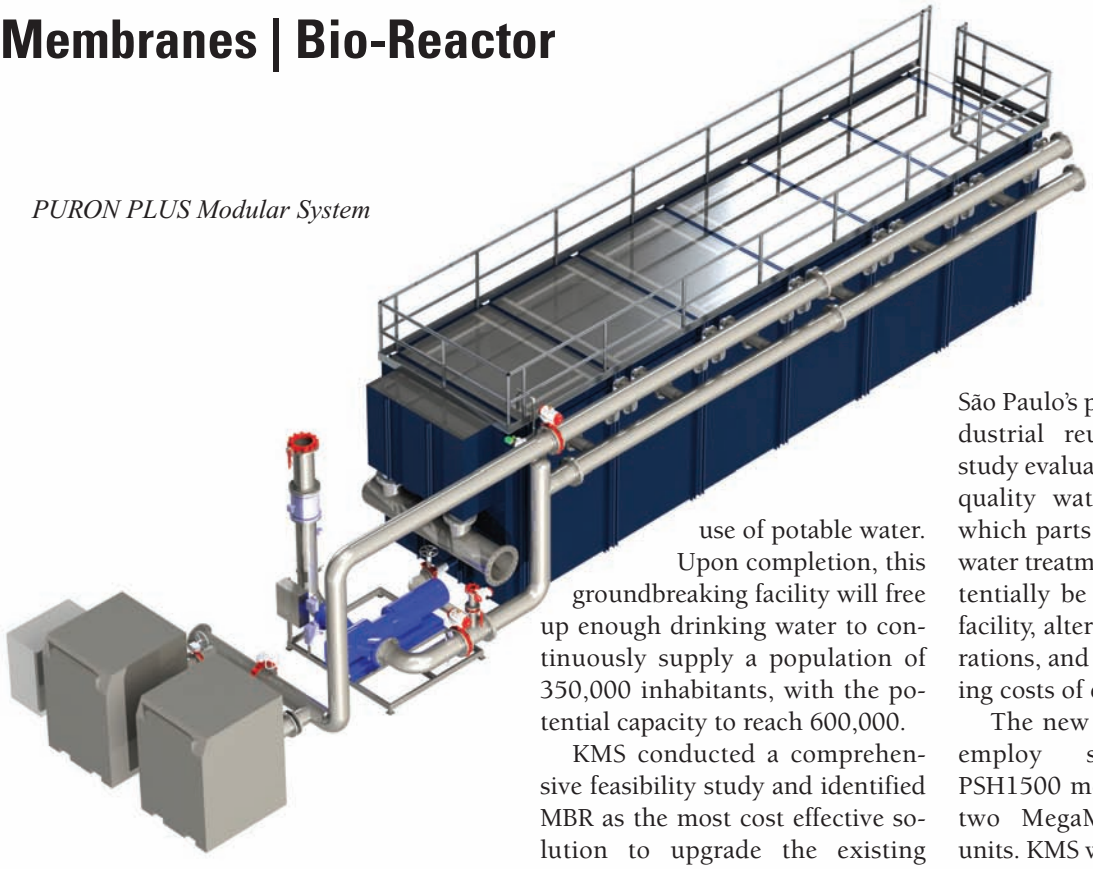

PURON PLUS Modular System

use of potable water.

Upon completion, this groundbreaking facility will free up enough drinking water to continuously supply a population of 350,000 inhabitants, with the potential capacity to reach 600,000.

KMS conducted a comprehensive feasibility study and identified MBR as the most cost effective solution to upgrade the existing wastewater treatment plant to meet São Paulo's pressing demand for industrial reuse wastewater. This study evaluated the amount of high quality water needed for reuse, which parts of the existing wastewater treatment structure could potentially be used in the upgraded facility, alternative system configurations, and the capital and operating costs of each configuration.

The new Aquapolo facility will employ sixty-three PURON PSH1500 membrane modules and two MegaMagnum® MM9 RO units. KMS will also supply the system design and controls, and after-

market support and service. The initial 2012/2014 phase of the project will produce 15 million GPD (2,340 m3/hr).

Construction started in April 2010; the water treatment portion of the project is following an aggressive schedule for start-up in November 2011.

KMS was chosen by Aquapolo for its superior technical support and biological design, the availability of MBR and RO pilot plants, its vast experience with water-recycling projects, and ability to meet an extremely accelerated delivery schedule.

"Koch Membrane Systems' willingness to work with us as our technological partner was a key factor in our decision to award them the contract," said Senior Project Director at Odebrecht, Emyr Diniz Costa. "They offered a comprehensive engineering solution and dedicated extensive pre-engineering man-hours to produce the most reliable design and the state-of-the art technology for our project. The availability of a pilot plant convinced us their solution was the best one."

ABOUT KOCH MEMBRANE SYSTEMS

For more than four decades, Koch Membrane Systems, Inc. has led the way in developing innovative membrane technologies that serve a diverse range of industries and applications around the globe. KMS provides solutions to markets including industrial and municipal water and wastewater, food and life sciences and industrial processes, helping thousands of industries reduce their water footprint, increase productivity, and reduce costs. With an installed base approaching 20,000 systems throughout the world, KMS is setting the standard as a comprehensive membrane solutions provider. FN

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Water Filtration Snuffs Hazards of Industrial Dust

Wet dust filters not only ensure regulatory compliance but can also improve worker comfort and production flow

By Ed Sullivan

The Filter 1 Hydrotron Control Booth integrates the booth enclosure and wet dust collection and is a safe and economic method of cleaning potentially volatile materials.

The potentially explosive dust resulting from metal finishing operations is a major concern among fabricators today, not only due to safety hazards but also because recent changes in NFPA regulations have toughened compliance.

The grinding and sanding of metal work pieces produces fine metallic dust that – even after filtration – can be exposed to sparks and result in smoldering, catching fire or even a dust explosion in circumstances when ordinary dry dust collection methods are used. The situation becomes even more hazardous when the dust from certain metals is "mixed" in a dry collection system. Mixing alu-

minum and steel dust, for example, is an accident waiting to happen.

Combustible metals that are common in manufacturing and machining operations include aluminum, lithium, magnesium, niobium, tantalum, titanium, zirconium and even cold rolled steel.

By switching to wet collectors, many companies are upgrading their protection against dust fires and also improving air quality for workers at the same time. Some wet collection systems can also be customized to improve ergonomics for workers by positioning work pieces at more comfortable levels or facilitating access of hoisting equipment that eliminates the need of workers to lift heavy items. Such improvements may also lead to improved production flow.

Another advantage of many wet dust collection units is that they filter explosive dust directly into water in-plant, thus eliminating another potential hazard site at the duct. These devices comply with federal regulations (NFPA and OSHA) without interfering with manufacturing processes.

"We switched most of our dry dust collectors to wet ones," said Terry Graham, equipment engineering specialist at Bell Helicopter, Fort Worth, TX. "Because we work with a variety of materials, including metals like steel, titanium, magnesium and aluminum, the wet collectors will improve our protection against any smoldering material or fire."

Mr. Graham said his plant has two major machine centers, one has six stations and the other has eight. Most of them have now been outfitted with downdraft wet collectors from Filter 1 (Garland, TX), a company that specializes in off-the-shelf and custom dust collection systems.

"Although the NFPA doesn't specify the installation of a wet collector, there is a higher risk of fire with a dry filter," said Mike Sweezy, of Filter 1. "The old school approach would be to replace the cartridges and put a fire suppression device on the dry collector if it catches on fire. But why take the risk when a wet collector can eliminate the problem altogether? Plus, if the equipment can be customized to fit the operation, then the ergonomics and productivity at the workstation can be improved at the same time."

WET COLLECTOR PROTECTION

In order to ensure compliance and cut excessive upkeep requirements, Midwest Products and Engineering (MPE), a Milwaukee-based designer and fabricator of enclosures, carts and consoles used by the medical and electronics industries, decided to take a new look at its dust collection system requirements.

The main dust concern at MPE was handling that generated fine dust during the metal finishing (grinding and sanding) of regular cold rolled steel. Due to the more hazardous situation of combining dust from alu-

Hydrotron wet downdraft table, with spark resistant blower

minum grinding with that from steel, the aluminum metal finishing area is located in a completely separate part of the shop.

"The steel that we're grinding turns into a form much like steel wool lint," explained Teresa Stortz, MPE process improvement engineer. "The hazard occurs when that lint is hit by grinder sparks, it could smolder and ignite. Of course, that is a situation that we absolutely must prevent. In addition, we want to remove as much of the very small dust particulate from the air as is possible and these units seem more than capable of helping us on both fronts."

To ensure that MPE acquired an optimum dust collection filtration system, Stortz's team talked to Filter 1.

"We wanted to replace existing dust collection systems because of shop-wide air quality," Ms. Stortz explained. "But we didn't have any pre-

conceived notions or specifications about what kind of system we should get. So, I was surprised and reassured when the president of this company, who is a filtration engineer, visited our company to see our application first hand."

This visit, which included the chief applications specialist as well, impressed Ms. Stortz. She said no other dust collection system manufacturer gave her requirements that much attention.

To add to her appreciation, the supplier loaned MPE wet collectors of the design that the engineers felt would likely suffice for the application.

"That has helped us tremendously, and no other supplier offered to give us trial equipment," said Ms. Stortz. "The units they suggested we try, downdraft table designs, worked very well. The operators loved them."

MPE decided to go with the seven Hydrotron wet downdraft tables. This system purifies air through a combination of centrifugal force and violent mixing of water and contaminated air. As the air stream passes the fixed baffles, particulate is separated by a heavy, turbulent curtain of water created by high velocity air. The centrifugal force caused by the rapid changes in airflow direction forces the dust particles to penetrate the water droplets and become entrapped. Contaminated water is then removed from the airstream by special mist filters. Dust, as sludge, settles to the collector bottom, and the water is reused.

CUSTOMIZING

Many industrial applications are better served by a customized dust collection system, rather than an off-the-shelf model. Popular custom design elements include making systems fit into tight spaces, or integrating special features such as a crane slot, adjustable up-and-down tables, multiple hoppers and wet spark traps. A choice of fan designs may also be important to optimizing performance and providing high-energy efficiency to applications with high-pressure requirements.

"The downdraft table equipment we use is fairly large, 4 ft. deep and 8 ft. wide," Ms. Stortz said. "Filter 1 customized it by lowering the surface into the tank, to just 2 ft. 2 in. off the ground, so that we are able to put large parts on it. We also had them raise the blowers upward in the back of the system. This is important to the operators because it will keep their breathing space cleaner. It will also keep them much cooler, since it gets quite warm in the area."

Ms. Stortz added that the new dust collection system also gives them the ability to build in equipment that increases the safety of handling the products MPE operators and technicians are working on.

"The parts can get fairly large, weighing in excess of 100 lbs. We have designed the equipment and area so that each operator would have lift assist equipment available at his or her workstation. This will improve worker safety as well as in-

crease productivity."

Such improvements have been seen in a variety of plants where the wet collectors have been customized.

"I believe these new [Hydrotron] wet collectors improve the working environment for employees who occupy these machine stations," added Mr. Graham of Bell Helicopter. "There have been ergonomic improvements with the wet new collection systems. The units are configured so that the work surfaces are more in the worker's power zone. Where there are stations that work on heavy parts, the filters have slots so that the crane can move a part inside the booth and load the part on the table. The improved ergonomics benefit seems to speed up production and also help employee morale as well as making it less likely that workers will be off due to an injury."

MIXED DUST APPLICATIONS

David Creaser at Elite Manufacturing Technologies, Inc. (Bloomingdale, IL), a leading sheet metal fabricator, said his company recently installed a 30-foot-long wet "control booth" to facilitate the safe collection of metal dust from the company's grinding operation.

"We work in a variety of metals, including steel, galvanized stainless and aluminum, for example," said Mr. Creaser. "We decided on the wet type of collection booth for our grinding operation primarily because of the hazards that can come from the dust from dissimilar metals, particularly aluminum and stainless steel."

Mr. Creaser explained that in the process of researching the most effective form of dust collector, he realized that the only type that would enable them to work with a variety of metals without having a separate booth for each type of material was a wet booth.

"The Hydrotron booth we chose enables us to set up the work tables and equipment used for the grinding operation," said Mr. Creaser. "It provides us with a cleaner work environment because it is arresting all this particulate matter in the air and then blows back over the workstations, which also provides a cooling effect."

For more information contact:
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Website: www.filter-1.com

Harmsco Technology Utilizes Energy to Separate Dense Solids

By Greg Willis, Harmsco Filtration Products

Harmsco, a leading manufacturer of liquid filtration solutions for commercial, industrial and municipal applications has introduced a new line of filter housings that are viewed as Green Technology while utilizing energy to separate dense solids. The new line has been named Hurricane Filtration System.

This unique product line combines cyclonic separation, cartridge filtration, and Harmsco's patented "Up-flow" technology in a compact filter housing design that delivers unsurpassed performance. The Hurricane design separates dense solids prior to cartridge filtration for extended cartridge life, increased dirt-holding capacity and reduced operating costs. The up flow design prevents air entrapment, and rotational flow around the cartridge improves cartridge-load performance.

The Hurricane housings are made of electro-polished 304 or 316 stainless steel and can be coated to resist seawater or corrosive compounds. They come in a variety of sizes with an array of filter cartridge options to meet virtually any filtration application.

HURRICANE FILTER PROCESS

The Hurricane Filter works by letting the liquid flow into the housing through a tangential entry and is channeled between the outer housing and the inner housing wall. The inner wall rises from the base to just below the top of the housing so that liquid must flow around and then over the inner wall before entering the cartridge-filtration area. This outer flow creates a cyclonic effect and a combination of kinetic energy and centrifugal forces combine to make dense solids bounce along the outer casing and lose velocity. The

Harmsco offers a large selection of cartridge options.

tangential entry is located high on the housing to reduce the velocity of liquid flow in the bottom of the outer chamber to promote the settling of these dense solids. Many of the dense solids settle out into the outer chamber thus extending filter cartridge life. There is a separate drain in the housing to bleed off this sediment either manually or with an automatic timed valve.

After dropping dense solids into the outer chamber of the housing, the liquid flows over the inner wall and into the filter chamber. The cyclonic effect of the flow continues into this chamber and it further loses velocity as liquid flows around the filter cartridges. This creates a very even loading of the cartridges and further extends cartridge life.

The flow around the filter cartridge creates a "flutter effect", which causes particulates to bounce along

NSF 61 Listed Built to ASME Design Standards

Patented Up-Flow Design

the surface of the filter before being trapped. This further improves filter cartridge life by insuring even loading of the filter element.

Each filter cartridge is placed over a stand pipe that rises to nearly the top of the filter. The liquid flows through the filter element at all levels and then has to flow to the top of the inner cartridge chamber and into the stand pipe. This up-flow technology insures that all air is expelled from the filter and further increases filter efficiency.

APPLICATIONS

The Hurricane is ideal for a number of applications including drinking water filtration, cooling tower filtration, desalinization pre-filtration, surface water treatment rule, industrial waste water treatment, reverse-osmosis pre-filtration, ground water remediation, ground water under direct influence, environmental compliance, and the Hurricane filter system is NSF listed for drinking water and liquid foods.

The Hurricane housings can accommodate a variety of Harmsco filter cartridges to meet virtually any application. At the company's website, there is a complete list of Harmsco products to meet unique specifications.

For more information contact:
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Email: gwillis@harmsco.com
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Quantachrome Expands Facility, Adds Accessory

By Ken Norberg, Editor

Quantachrome Instruments has added an economical and compact thermoelectric thermostatting device to its line of accessory equipment for its gas sorption instruments and gas pycnometers.

Gas sorption instruments are used to measure surface area and pore size of porous materials and powders. While most of such measurements are done at cryogenic temperatures using liquefied gases, many applications benefit from measurements at a very different temperature such as those around room temperature or the freezing point of water. These higher temperatures must still be well controlled, i.e, thermostatted. This is best done by actively cooling/heating to ensure temperature stability rather than, at 0°C for example, relying on melting ice. This is normally achieved by using refrigerated, heated circulator baths. While these perform very well and have quite wide temperature range capabilities, they are often too large, too power hungry, and simply too much for smaller thermostatting jobs. In contrast, the thermoelectric device uses peltier devices to both cool and heat the circulating fluid contained in a closed bath; this means very low evaporation of the fluid and fast response times.

The new accessory is also the ideal partner for Quantachrome's gas pycnometer, the Ultrapyc-T 1200e, a density analyzer equipped with built-in circulation coils with an external port for connection to a circulator-style thermostat. The peltier does away with having separate heating and cooling elements and the associated refrigerant compressor, and so the new circulator is better matched in size and thermal specifications to

the pycnometer. The thermoelectric thermostat accessory has a universal voltage input, which means no special configuring is necessary whether used domestically or internationally.

In response to a sharp increase in business and number of employees over the last five years, and to ensure manufacturing capacity for anticipated growth over the next five years and beyond, Quantachrome Instruments' headquarters in Boynton Beach, Florida, is undergoing a major expansion and renovation/refurbishment project.

Quantachrome's current facilities in south Florida houses manufacturing, laboratory services, training facilities and administrative offices. This half million dollar expansion/renovation of facilities includes a new engineering/developmentcenter, expansion and renovation of laboratory space, expansion of customer training facilities, expansion of its service/repair department, a new two-level warehouse, and renovation of its offices, meeting rooms and other common areas. Quantachrome moved to its current location in 1994 from Long Island, New York and has undergone several expansions over the years to meet growing facilities requirements as new products have been developed and new staff added to support the growing global customer base.

Scott Lowell, Quantachrome's president, commented at the commencement of work extending the facility: "This is a very exciting time for Quantachrome having recently – and very successfully – introduced new state-of-the-art products, and now creating the necessary space to accommodate that rapidly growing business. We've been sure to include improved customer support in the physical growth with expanded service, training and laboratory areas. I believe it also represents a significant improvement for our now much larger staff in providing a more comfortable, modern environment, and a commitment to the local area as an employer in Boynton Beach."

Quantachrome Instruments, founded in 1968, is a world leader in the design, manufacture, sales and service support of analytical instrumentation for characterizing properties of porous materials and powders, specializing in multi-sample-station instruments and state-of-the-art technologies. This ISO 9001:2008 registered company also offers renowned scientific application support. Dedicated to providing the highest quality scientific instrumentation and product lifetime support, Quantachrome has more than 50 sales, service and distribution offices worldwide.

For more information visit:
www.quantachrome.com

CMYK Distributors to Debut Keystone Filter's Fountain Recycling System

Keystone Filter recently announced that CMYK Distributors, Inc. will debut Keystone's Filter Klear™ Fountain Recycling System this fall. Earlier this year, CMYK Distributors became the exclusive U.S. distributor of Filter Klear Fountain Recycling System, a product of Keystone Filter, a Met-Pro Filtration/Purification Technologies Business.

Filter Klear is an innovative new product which prevents dust and gunk in water trays, enhances print quality, provides better hickey control, less plate wear, and less plate scumming and tinting. And, it is made in the U.S.A. With the Filter Klear Fountain Recycling System, the time spent cleaning dirty tanks and pans is virtually eliminated and fountain solution life is greatly increased.

"Filter Klear Fountain Recycling System is poised to revolutionize the printing and graphics industry," said Mark Williams, director of sales for CMYK Distributors.

"The results we've seen are truly astounding. Our customers immediately realize less bacteria, less odor, and less time wasted cleaning water trays and tanks. And, with zero discharge, Filter Klear is a clean and green solution."

Utilizing advanced nanofiber technology featuring ceramic nanofibers on a micro-glass matrix, Filter Klear provides outstanding reduction of virus, bacteria, cysts, endotoxin and many other submicron particles through both electro-adhesion and mechanical processes. The Filter Klear system is lightweight and portable. It is easy to install and connects directly to the press via the air supply hose. Benefits include:

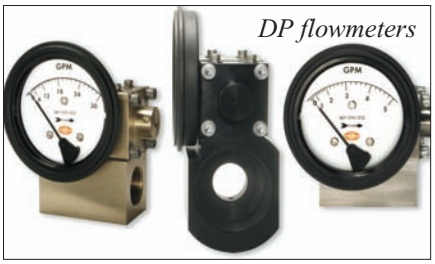
- Zero Discharge; Zero Waste of Incoming Water
- Biofilter Technology (cuts odor and bacteria)
- Reduces Press Downtime and Maintenance
- Decreases Fountain Solution Consumption and Disposal Costs
- Cost effective

For more information visit: www.keystonefilter.com

New Fully Integrated DP Flowmeters From Orange

New, fully integrated differential pressure (DP) flowmeters from Orange Research are compact and rugged, with directly connected, large-throated, non-clogging flow nozzles. At half the cost, this long life, wear-resistant design is superior to over-sized, over-priced products.

With a unique integrated design, ordering, installation, and maintenance is simplified. Simply select desired flow rate and material and everything is supplied in one compact package. The new product line features large, low-pressure-drop flow nozzles; easy-to-read 3.5-inch dials; versatile ½-inch to 2-inch NPT porting; and a choice of brass, stainless steel, or aluminum bodies suitable for a wide range of applications.


DP flowmeters

The flow nozzle is a long-life, wear-resistant design with a rounded leading face that reduces turbulence and backpressure, resulting in relatively low pressure drop. It is a low-cost solution that wears better than sharp-edged orifice plates (which often change readings over time due to wear, even with

Schroeder Industries Introduces Top-Ported Return Line Hydraulic Filter

Schroeder Industries, a widely recognized leader in filtration and fluid conditioning products, recently introduce its WKL3 series top-ported return line hydraulic filter, which is designed for applications where high water content fluids (HWCF's) are used (i.e., long wall mining).

The WKL3 provides improved serviceablility by adopting a threaded bowl design. This design allows easier removal and installation of the filter bowl during element change out. Furthermore, the exclusion of mounting flanges between the head and bowl eliminates the risk of misplacing loose parts while the bowl is removed. It is ideal for applications with limited clearance above the filter head, in which installations and removal of the flange mounted bowl become difficult.

The WKL3 offers a variety of porting options to accommodate flows up to 120 gpm. Metal mesh media packs capable of filtering contamination as small as 25 microns are available in K, KK, 27K and 18L size elements. The WKL3 is also available with a wide variety of Schroeder Industries Dirt Alarm® clogging indicators to ensure prompt element change out. With Schroeder Industries' proven track record and excellence in quality, the performance of the WKL3 is guaranteed.

For more information contact:
Schroeder Industries
Tel: 1-724-318-1100
Email:
filtrationproductsmanager@schroederindustries.com
Website: www.schroederindustries.com

The WKL3, a top-ported return line hydraulic filter

non-abrasive fluids) and competes with the performance of prohibitively expensive venturis. In our design, the flow nozzle is manifold mounted to the gauge minimizing leak paths and overall gauge size. Other designs are much larger and do not fit into tight enclosures.

Three models are available: 2510FG (0-5 to 0-10 GPM), 2520FG (0-15 to 0-40 GPM), and 2530FG (0-50 to 0-200 GPM). All models have a maximum line pressure of 275 psi, accuracy of 2% F.S., maximum pressure drop of 5 psid, and turndown of 5:1.

Orange Research gauges are known worldwide as the rugged "install them and forget them" type of flowmeters. The company offers a large selection of low-cost, rugged and reliable products for measuring differential pressure, flow and liquid level. Built to last, these products are known for long life, affordability, and reliable service under the harshest conditions.

For more information visit:
www.orangeresearch.com

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