JOSEPH MARKETING, INC.
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April 12, 1996

Diane Manning
NIOSH Education and
 Information Division
Mail Stop C34
4676 Columbia Parkway
Cincinnati, Ohio 45226-1998

Dear Ms. Manning:

Subject: Occupational Exposures to Metalworking Fluids

I received the documentation with the cover letter from Dr. Lawrence J. Fine. As he requested, I am enclosing some comments regarding the draft.

Also, I am enclosing literature on our organization. As a consultant in the industrial liquid filtration field, we are involved with cleaning, handling and dispensing metalworking fluids. This is the perspective from which we reviewed the draft and our recommendations are based on the need to include aspects of filtration and fluid management in the documentation.

Attached are copies of the two bulletins I used during the poster session at the recent AAMA Symposium in Dearborn, Michigan. As you can see, they revolve around coolant filtration and fluid management's contribution to operator safety and comfort.

With this in mind, we offer the following for you to consider:

Page 3

When you discuss applications, it may be advisable to comment on the filtration and fluid distribution system instead of just stating "low pressure" pump. Many systems may operate adequately with low pressure but there could be minimums.

The total system is important to the success of controlling flow volume and flow pressure.

Pages 198-201

This includes information in sections 10.4.1 -- Fluid Use and Application, 10.4.2 -- Fluid Maintenance and 10.4.3 -- Isolation.

Please consider inserting some of the copy from the two bulletins displayed at the Symposium. They cover the impact and influence of filtration systems on the points included in these sections. This will broaden the scope of the recommendations.

Also, there should be a thrust to consider more operator training on filtration systems. As your draft implies, this is very important and is equally important for filtration equipment and fluid distribution networks. Many operators feel they just open the valve for liquid with no concern about its source, function or destination. They have no idea of what it takes to support the flow at the correct volume, proper clarity and adequate pressure. There are many plants which have problems with fluid clarity that are created by the lack of controlling flow at the machine tools. Therefore, operator training can be an important contribution to easing the concern for workplace issues generated by undesirable splashing, misting and poor liquid clarity.

I hope you find this information helpful. Since I am a consultant in this field, I don't represent any equipment manufacturer or fluid supplier. Therefore, if you use this information, can the contributions be included in the bibliography.

Consulting Support

Also, if further work in this section is required, and you are looking for outside impartial assistance, please consider our organization. My fee is $85.00 plus travel and living expenses. We can participate in developing a copy for the section on filtration and fluid management. This could include guidelines on training manuals for more comprehensive recommendations.

If there is any interest in further work, please let us know. We can discuss the possibilities and I can submit a proposal.

Thank you for your consideration.

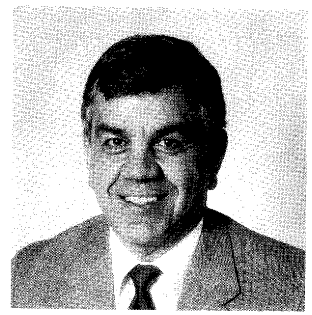
Yours truly,

JOSEPH MARKETING, INC.

James J. Joseph

JJJ/dh
Enclosures

COMPREHENSIVE INDUSTRIAL LIQUID FILTRATION SERVICES



JOSEPH MARKETING, INC. was established in 1986 when Jim Joseph recognized the need for an organization which can offer impartial, comprehensive support to those involved with industrial liquid filtration: users of filtration equipment for their processes, and suppliers of equipment and materials who serve liquid filtration applications. The company maintains the status of impartiality so it can serve its customers with total dedication to their needs.

The President's 23 years of experience in the filtration field helped him build a background of marketing, training, new product development, manufacturing, system specifications and application know-how. He has written and published "Coolant Filtration", a comprehensive book on equipment, applications and system designs.

JOSEPH MARKETING PROVIDES:

USER SERVICES: Available to small and large size installations.

- Comprehensive training sessions and seminars for the design, selection and management of filtration programs.
- Existing-system studies to update hardware, increase capacity and trouble shoot problem areas.
- Design of complete systems to include proper components necessary to ensure total system efficiency.
- Participate as a "partner" on coolant management committees to represent fluid handling and filtration aspects.

MANUFACTURER SERVICES: Available to suppliers of coolants, chemicals, media, and equipment.

- Conduct market research studies and measure field performance.
- Develop marketing strategies for new products or new markets.
- Train sales personnel in coolant filtration and fluid handling applications.
- Engage in nonconflicting sales activity for specific products in targeted markets.

ABOUT THE COMPANY:

Through the years, Joseph Marketing has continually grown serving companies of all sizes; working with users on projects of building new plants, planning expansion or managing existing facilities. Often it becomes an extension of the client's own operating department and eases their work load so they can concentrate on other projects.

Projects for filtration suppliers are in varying degrees of involvement, covering all aspects of marketing and product application. In many cases, this support accelerates the clients' field exposure which shortens the development time to allow them to reach their objectives sooner and at a lower cost.

Joseph Marketing fosters a better understanding of industrial liquid filtration with educational programs conducted independently or with various technical societies such as the American Filtration Society, SME, STLE, TAPPI and the Wire Association International.

jm

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ACTIVITY LIST

PARTIAL LIST SHOWS THAT WE WORK WITH BOTH THE USER AND MANUFACTURER OF FILTRATION PRODUCTS. THERE ARE OTHERS WHO FOR PROPRIETARY REASONS ARE NOT LISTED.

USERS

The activities cover total design of new facilities, fluid management, updating existing systems or troubleshooting equipment problems.

Saturn Corp., General Motors - Spring Hill, TN
Canada Wire - Montreal, Quebec
Phelps Dodge - Norwich, CT
Phelps Dodge - Elizabeth, NJ
Delco Products - Rochester, NY
Northern Telecom - Montreal, Quebec
Bausch and Lomb - Rochester, NY
Magma Copper - San Manuel, AZ
Inspiration Copper - Claypool, AZ
Kelly Air Base; Corps of Engineers - San Antonio, TX
Castrol, Inc. - Chicago, IL
Hoover Ball Group - Hartford, CT
ATR Wire and Cable - Danville, KY
Chicago Magnet Wire - Chicago, IL
Savage Industries - Westfield, MA
Amercord - Lumber City, GA
General Motors: CPC - Romulus, MI
The Timken Company - Canton, OH
Schick Division - Milford, CT
General Electric Aircraft Engines - Wilmington, NC
Harrison Radiator Div. - Lockport, NY
Alcoa - Massena, NY
Copeland Corp. - Sidney, OH
General Electric Wire Mill - Fort Wayne, IN
Briggs & Stratton - Milwaukee, WI
Crouse Hinds - Syracuse, NY
Machine Tool Research, Watervliet Arsenal - Rochester, NY
New Venture Gear (Chrysler) - Syracuse, NY
Owl Wire and Cable - Canastota, NY
Saginaw Div., GMC - Athens, AL
Packard Electric - Clinton, MS
Southwire Co. - Carrollton, GA
AT&T - Atlanta, GA
Carrier Corp. - Syracuse, NY
Cyprus Rod Chicago, Chicago, IL
Gibraltar Steel - Buffalo, NY
General Motors, Mansfield, OH

SUPPLIERS

Includes application studies, market research, product development and establishment of distribution channels.

Fluid Power Components - Cleveland, OH
Honeywell Brauckmann - Rochester, NY
Henry Filters, Inc. - Bowling Green, OH
Summit Scientific Corp. - Fairfield, NJ
Krebs Engineers - Menlo Park, CA
Parker Hannifin - Metamora, OH

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COOLANT FILTRATION AND FLUID MANAGEMENT CONTRIBUTE TO OPERATOR SAFETY AND COMFORT

James J. Joseph, President
November 15, 1995

Any program assessing an industrial metalworking environment must also include the plant's coolant filtration capabilities and fluid management plan. Operator health and safety can be influenced by these two facets of the metalworking industry. Often filtration is not deemed an issue since it is usually relegated to protecting machines, tools and products. However, there is a growing awareness that the filtration system approach can reduce misting, lower emissions, minimize splashing and enhance housekeeping. Moreover, cleaner liquids narrow the range of potential operator sensitivity problems when contact is frequent. Fluid management is not just filtration. It is a proactive discipline in all areas which are affected by the fluid. Some of the common milestones in a program are: testing, concentration, make-up, temperature, additives, dispensing, distribution and disposal. A program can be even more comprehensive to cover procurement, off-site testing, R&D, and continuous improvement projects. This can be applicable to any size plant; from a one-man shop to a large manufacturer like the Powertrain Facility at Saturn in Spring Hill, TN. In either case, a stand-alone sump is no longer ignored and tramp oil removal from a central system is an agenda item on an action plan. The procedure can be informal, handled by one person wearing many hats or a formal, well documented operation in a large, multistaffed installation.

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FLUID MANAGEMENT/COOLANT FILTRATION

Filtration systems greatly influence the metalworking environment beyond just removing contaminants from the fluid. Filtration capability and comprehensive system design are the foundation from which fluid management functions can set strategies and accomplish goals. The influence is not just at the point of work but also at other key operations and concerns.

1. Fluid Selection - Higher quality and safer fluids can be used because the longer life offers justification.

2. Fluid Dispensing - The system approach addresses flushing volumes and velocities to control splashing and minimize misting.

3. Health and Safety - Clean and quality fluids reduce some of the variables in operator sensitivity issues.

4. Fluid Care - There is less chemical dosing since the integrity of the fluid is protected.

5. Handling - Less manhours are consumed in dumping, cleaning and recycling.

6. Waste Treatment - Less dumping could be a major contributor to waste minimization programs.

7. Performance - Cleaner fluids enhance productivity and reduce machine wear and tear.

8. Procurement - There are less fluids to buy because of lower frequency of dumping and consolidation.

9. Storage - Consolidation and/or less usage reduces the need for space and traffic.

JAMES J. JOSEPH
AAMA SYMPOSIUM
HYATT, DEARBORN, MI
POSTER SESSION
NOVEMBER 15, 1995

The Influence of Filtration on Coolant Management

Cleaning coolant can be the foundation for other fluid-oriented functions to build their strategies and accomplish their goals.

By James J. Joseph

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Filtration has always been a form of coolant management—long before coolant management became a modern strategy in metalworking operations. Filters and separators are tools used to "manage" coolant clarity levels, maintain performance and extend life.

Nowadays, coolant management programs include other factors affecting fluids (i.e. selection, procurement, storage, handling, application, care, health/safety and waste treatment). Thus, each element of a production facility is taken into consideration, with varying degrees of attention being given to it depending on the plant's size and complexity. Each of these categories is an evaluation milestone to determine if its specific responsibilities are not jeopardized and if its daily routine can be improved.

The irony is that the attention given to filtration has a direct bearing on the value that each of these activities can bring to the management program. Cleaning coolant is not only a production support function but also the foundation from which all other fluid-oriented functions can build their strategy and accomplish their goals. Figure 1 shows the concept and offers highlights on how filtration benefits the total roster of operations, from selection to waste treatment. Effective filtration can reduce costs in every sector of the plant and even influence plans for new production equipment and plant expansion projects. Once this is recognized, the importance of filtration is elevated, and it is no longer considered a "necessary evil" — or an unfair indirect cost or production burden.

With this insight, production managers organize their action plans to include filtration reviews along with the other check points. When a plant needs to select or change a coolant, the selection process begins with isolating a fluid (or fluids) that satisfies the operation. Then the procedure calls for representatives of each production area to evaluate the proposed fluid's effect on their respective functions.

This procedure can be executed (formally or informally) by one person in a small company or by an administrative team in a larger multi-department facility. Each milestone calls for a decision on the fluid's impact at that point. The final decision will be guided by a consensus of all facts and opinions, but these will be prioritized by the respective importance of each entry. For example, the procedure acknowledges that a health/safety issue carries more weight than an inventory control issue. However, inventory control people may ask for a consolidation of coolants to reduce the number of fluids in the plant. Also, disposal personnel could veto the selection if the facility

FIGURE 1: Filtration's influence on other coolant activities

cannot discard the spent material efficiently and safely. In all of these situations, the door is open for new ideas and other fluid considerations.

FILTRATION INFLUENCE

Filtration has its own milestone where the proposed fluid is reviewed for its cleaning and care needs. Before a fluid can be sent to the next milestone in the selection process, someone will judge the existing filtration capabilities of the system in which the fluid will work, or study other cleaning possibilities within the plant.

Major questions to be answered include, but are not limited to:

1. Can the existing filtration system acceptably clean and care for the proposed fluid?
2. If not, what modifications are required and what is an estimate of the costs?
3. What impact will any change in equipment have on other support functions: i.e. media, maintenance, floor space or other systems?
4. What other ramifications will the fluid have on surrounding equipment or operations?
5. Are other fluid options acceptable to production but more compatible with the plant's filtration agenda?

Such an evaluation may require some sophisticated analysis for filterability (either in-plant or by others), or it may lead to decisions based on experience with similar equipment and fluids. "Benchmarking" is a key buzzword in this field.

If the existing filtration equipment cannot accommodate the fluid under study, it does not necessarily mean that the new fluid cannot be selected. It just means that the cost to revamp the filtration system needs to be considered as part of the cost of selecting the fluid. If there is an economic advantage with the proposed coolant that outweighs the cost of the additional filtration equipment, then the decision is good and the new fluid can be used. This is good fluid management working on the production floor and evaluating all aspects of the process. It guards against a unilateral decision to try a fluid just because "someone" says it works better than what is already there.

This procedure works on any facet of the selection process. Even when new machine tools are being considered, the fluid selection and filtration equipment needs should go through the same process.

A CASE HISTORY

The following case history shows how the filtration milestone in a coolant selection process helped change old habits — and drastically reduced the cost of buying equipment.

A large automotive plant with a coolant management program began a coolant selection procedure to find a fluid to serve a soon-to-be-purchased crankshaft machining line. The machine was a transfer line with a series of deep-hole drilling operations about halfway through the machining process. The machine tool supplier called for a viscous oil for the drilling station and specified water-based coolants for the operations before and after the drilling operation. The supplier's representatives felt that oil was needed because drill life would decrease by 50% if a water-based fluid was used. Since the oil operation was in the middle of the line, the preliminary plans called for a totally separate system for collecting, filtering, chip wringing and storage. This would have meant two independent cleaning systems on one line: one for water-based fluid, the other for oil.

When this proposal reached the filtration evaluation phase, obvious challenges became apparent:

1. Economics. The cost of an independent system to collect the dirty oil, clean it and separately process the chips was estimated at $750,000.
2. Mixing difficulties. Water-based fluids would be carried into the oil operations, and oil would contaminate the follow-up water-based operations.
3. Fluid handling. Two fluids would be dispensed to the same line.
4. Misting. Oil has a greater potential for fire hazards.
5. Housekeeping. Oil and water separation would be critical.
6. Spent media disposal. Oil laden media carries greater burdens.
7. Network complexities. Independent filter systems would need to occupy the same work area.
8. Space problems. Oil filtration would take up additional space since chip processing is required.

From all this a natural question arose. Why use oil? It was found that the objective of saving the tool life involved just four drills. A $750,000 price tag is a lot of money for four drills!

The next question was, why not augment the water-based system if the difference was only four drills? Tests were conducted, and the degradation of tool life was not as serious as originally feared. The filtration system that would serve the water-based operations before and after drilling was enhanced to provide better clarity so the same fluid could handle deep-hole drilling as well. The result is one fluid, one system, a cleaner house and lower overall costs.

This decision was filtration driven in a fluid management atmosphere. Granted, this is a large facility, but the same disciplines can apply to any size operation for any plant. The experience shows that the scope of filtration extends beyond just cleaning a fluid. Moreover, it reveals that proactive questions of "why" and "why not" at early stages in decision making can initiate cost savings at all levels. F

James Joseph is President of Joseph Marketing, Inc., of Syracuse, NY. He is a consultant in liquid filtration systems, mainly coolants, and is the author of the book Coolant Filtration.

Keeping fluids clean in GM-Spring Hill

At General Motors' Saturn facility in Tennessee, complete coolant-filtration and fluids-management systems are built in

By Jim Joseph

A FEW MONTHS AGO, Earl Hensel, one of the leaders of General Motors Powertrain business unit, sent a reminding memo to the floor teams to closely adhere to the housekeeping policy of not putting cigarette butts or debris in the coolant-return trenches. He insisted that these coolant trenches are part of the coolant-filtration system, and that they should not be considered garbage cans. Any debris should be put in proper receptacles.

This concern for the well-being of the coolant system is not new. It came into focus in 1985 when Saturn Corp began designing its new manufacturing facility in Spring Hill, Tenn. Here are some of the considerations given to coolant and fluid management during the early stages of planning, which are continuing today.

Jim Joseph, president of Joseph Marketing Inc (Syracuse, NY), is a consultant in design and application of coolant-filtration systems and fluid-management programs. He served the Saturn program for 4 1/2 years, from early planning in Troy, Mich, through production ramp-up in Spring Hill, Tenn. He has written a book, Coolant Filtration, *and many articles on this subject.*

Planning ahead

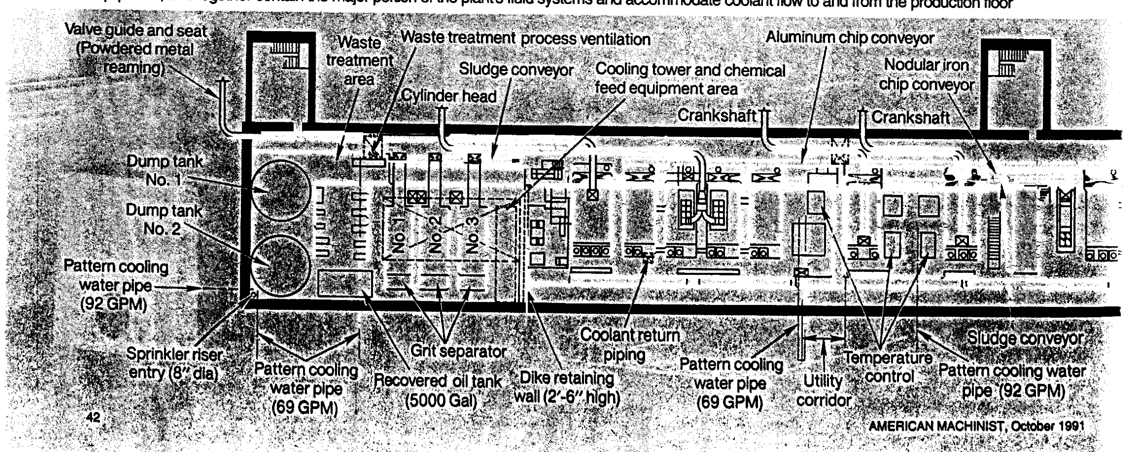
Even before the machine tools were selected, consideration was given to the coolant handling and filtration needs. Below-floor galleries to house filtration equipment were evaluated and measured against individual pits or stand-alone units. The alternatives were studied with the same sense of importance as one would expect in evaluating other critical machine tools for a manufacturing facility. A team was organized consisting of members of the different operating centers, representatives from Saturn's financial and environmental offices, and consultants. The matrix of filter and fluid parameters included not only performance on the line, but also storage, handling, distribution, service, disposal, and environmental issues.

Using sophisticated programs, they were able to simulate material-flow options to map acceptable plant layout possibilities. They then selected the best combination of below-floor galleries and strategically located pits and stand-alone units. Since the two galleries contain the major portion of the fluid systems in the plant, they were given the attention needed to make them self-sufficient and create comfortable working conditions. The central systems were selected, sized, and positioned in their respective galleries to serve their operations and accommodate the flow of liquid to and from the production floor. Consideration was also given to the chip handling, processing, and removal needs.

The net result of all this is that the Powertrain facility has two galleries. The larger (see drawing) measures approximately 585-ft x 55-ft wide x 32-ft deep. In addition to the filtration systems it also houses the intermediate waste-treatment center. This operation prepares the fluid for final treatment at another location on the site. The second gallery which supports the transmission-components manufacturing phase measures 145-ft long x 55-ft wide x 28-ft deep. Each gallery has its own chip-processing equipment where chips are treated for dry disposal.

Where applicable, recovered cutting oil is returned to its respective system. The chips are transferred out of the galleries, across the plant, and are dis-

Saturn's Powertrain gallery with coolant-handling and filtration equipment measures 585-ft long x 55-ft wide x 32- ft deep. Machining operations, except for transmission-components manufacturing in a separate 145-ft gallery, take place on the floor above. Each gallery has its own chip-processing equipment, and together contain the major portion of the plant's fluid systems and accommodate coolant flow to and from the production floor



charged into large dump trailers for transportation to a salvage operation. They are tested for percentage dryness before being released.

Also, mist, temperature, and fresh air are controlled in order to maintain comfortable and safe working conditions for the service technicians, the equipment, and even the coolant.

Coolant-return trenches

Return trenches are used throughout the facility. There are approximately 12,000 linear feet in the plant that serve a number of different types of systems. Three basic concepts in return-line design are used to meet specific needs:

- Gravity-flow trenches are installed where the starting point of the trench is flooded with liquid so that flow will be maintained without the need of in-line spray nozzles.
- Velocity-flow trenches are incorporated where spray nozzles are acceptable because misting could be kept under control.
- Conveyorized trenches are used where gravity or velocity could not be used because of elevation limitations.

The installation of the trench systems are in keeping with the Saturn promise that every cavity within the structure would be double contained. Therefore, the steel trenches have an outer liner of high-density polyethylene. The cavities between the two are fitted with inspection wells.

In that way, if there is ever any seepage from the trench, it can be detected early on. The range of applications served by trenches include grinding and machining of steel, cast iron, and three aluminum alloys.

The longer trench lines did affect the depth of the galleries. However, because the galleries were designed to house the large filtration systems with vertical pumps, the depth is put to good use. There is room for pulling pumps and service platforms. The height also aids in operating and servicing the chip-handling equipment.

All pits and sumps at the production floor level are also double contained. Regardless of the size, each installation was addressed with the concerns for efficient movement of fluid, damage control, and ease of service. There are over 30 stand-alone systems throughout the facility.

Filter selections

A selection team was organized to interview and select a filtration company that would accept the responsibility of providing the filtration equipment under the "primary supplier" philosophy. This philosophy dictates that the supplier will provide filters best suited for the application even if the device is of another manufacture, possibly even a competitor's. The selection process considered the needs of Powertrain and evaluated each potential supplier on its engineering capabilities, financial stability, history, service, technology, and reception of the primary supplier concept.

Henry Filters Inc of Bowling Green, Ohio was selected. The selection team now added members from the filter company to become the task force for equipment selection. Their charter was to select equipment, standardize where possible and finalize filtration-systems design. Where the situation called for another filter company to be involved, Saturn or consultant members attempted to be the liaison in order to ease concerns regarding competitive stance between the equipment manufacturer and Henry Filters Inc.

Most aluminum machining applications use wedge-wire drum filters. Grinding applications are served by precoated wedge-wire drum or flat-bed media filters. Deep hole applications use cartridge devices to polish the fluid as it is fed from the centralized systems. Other stand-alone systems such as individual grinders and broaching operations also use media filtration. Although the majority of equipment came from Henry Filters Inc, there are at least nine other filter manufacturers with equipment in Powertrain.

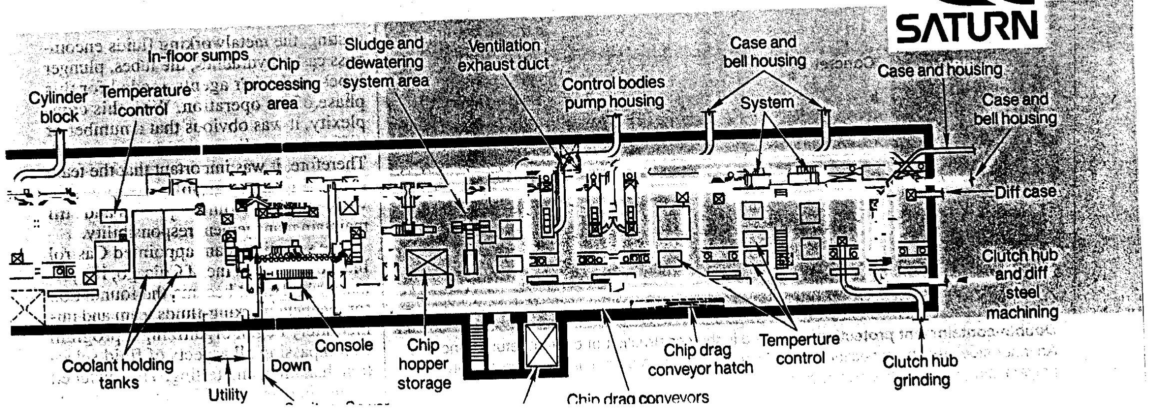
Ancillary equipment

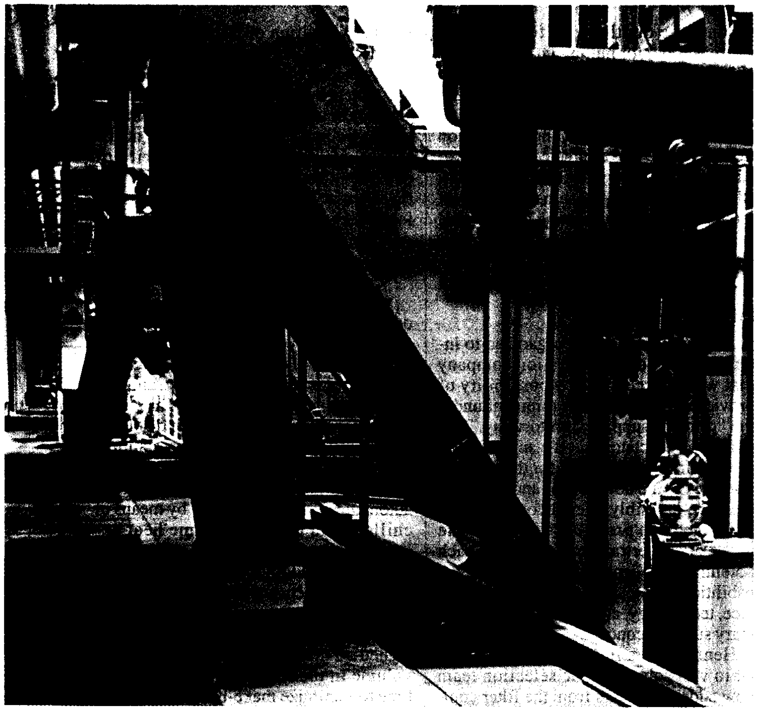
All large filters that handle machining operations are fitted with chip-handling primary conveyors for removal of chips before the fluid enters the filter chamber. The systems that experience tramp oil (particularly the transfer lines), are fitted with dissolved air-flotation devices. Other units have belt skimmers and/or decantation tanks.

Coolant temperatures are maintained automatically to within ±2°F by means of chillers and plate and frame heat exchangers. Each system using a water base fluid has an automatic make-up and premix device to ensure that the coolant concentrate is mixed properly before it enters the reservoir. Oil applications are designed so that no more than 10% of the volume in the reservoir is added at one time to minimize make-up shock.

Waste fluids from floor washing machines and other wastes are collected in specific areas called janitor dumps. These are located throughout the plant and in the galleries to facilitate disposal of undesirable waste fluid. This guards against the possibility of the waste material being dumped in the coolant trenches. This is very critical to the success of the coolants, and training programs were organized to continually stress the importance of protect-

SATURN





Filter with inclined conveyorized chute extension discharges chips into an in-floor cross conveyor. Chips are transferred out of the galleries to large dump trailers for transport to a salvage operation

Double-containment protection was used in the construction of coolant return trenches. An inner steel trench, inspection wells of concrete, and an outer lining of high-density polyethylene make up trench structure

ing the systems. Hence, the memo from Earl Hensel.

Washing considerations

Parts washing is another critical part of the operation. This is even more apparent in a facility that produces precision components for engines and transmissions. The strategy that a clean washing fluid will yield clean parts was addressed in the early stages of the plant design. This is not unusual. Most facilities are aware of the sensitivity of clean parts. However, few have gone to the extent of providing individual filtration systems for almost every washing operation in the plant regardless of the size.

The production-oriented washers that were shipped without filters were retrofitted at the site. Media filtration is used in most cases to offer flexibility to cope with the variables common to washing operations. Some units are vacuum filters, others are bag filters. There are some pallet washers that only need tramp oil or flotsam removal so they are kept clean by remote decantation and/or skimming devices.

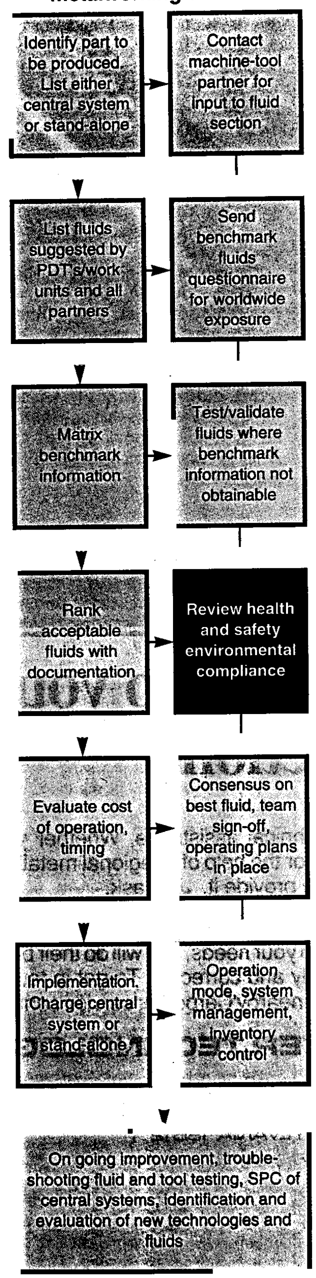
Metalworking fluids

A short time after the filtration primary supplier was well involved, another team was organized to select the primary supplier of all metalworking fluids. This team now included representatives from the filter company as well as Saturn personnel and consultants. An intensive selection process took place because metalworking fluids are defined as any fluid that could come in contact with the product during the manufacturing process.

These liquids will be managed by a primary metalworking-fluids supplier. This means that not only coolants and cutting oils are involved, but also machine lube oils, hydraulic oils, floor cleaners, machine cleaners, parts cleaners, and quenchants. Plus, because Saturn does its own casting, the metalworking fluids encompass caster hydraulics, die lubes, plunger lubes, and other agents needed for this phase of the operation. With this complexity, it was obvious that a number of different suppliers would be involved. Therefore, it was important that the team select a primary supplier who would work with other fluid suppliers and still maintain management responsibility.

The selection team appointed Castrol Industrial Central Inc of Chicago, Ill, primary supplier. It became the foundation for the metalworking-fluids team and immediately began organizing a program encompassing all aspects of fluid selection, handling, and testing. This included a complete on-site office and laboratory

Methodology for selecting a metalworking coolant



Health, safety, and environmental review are an integral and formal part of the process

with the necessary personnel to staff the operation.

Routine "buzz" words in the program included consolidation, selection process, training, and continuous improvement. In addition to Castrol personnel, the metalworking-fluids management group involved members from each product team, maintenance, finance, plant engineering, and consultants. Each member has the authority to introduce new concepts, but each new idea has to go through an approval process before being finally accepted (see diagram). Note that the steps include not only performance, cost effectiveness, compatibility and consolidation criteria, but also waste treatment. Waste treatment needs are important factors that must be evaluated in the selection process because of the impact on environmental issues.

Management at floor level

Coolant selection is just one procedure. When total management of the fluid is handled by one primary supplier and supported by a number of secondary suppliers, the administrative process is full time. The on-site staff is charged with the responsibility to handle this. This group is dedicated to managing fluids and is a resource to those who are handling the normal production-oriented day-to-day problems.

The main goal is to economically select and protect the fluid in the same manner as tooling engineers handle the cutting tools or process engineers monitor the machines. Therefore, less obvious factors in a plant are addressed by the team and where there is value they are empowered to take action. For example, condensed water from many air conditioning units throughout the plant is collected and allowed to drain into the various return trenches. This is common practice because the feeling is that if the water is "distilled" clean, the "small" volume will go toward the make-up without harm. The same technique is used for mist collectors. Because the coolant is coming from the system, it can be returned without harm.

This approach appears acceptable on the surface. However, the fluid-management team noticed in their routine testing that bacteria was entering some systems, requiring a higher dosage of expensive biocide for the cure. The bacteria "grows" on the condensing coils or in the collecting pans as the water and coolant are accumulated before draining into the trench. Rather than insist on repiping the units, the cost of which could not be justified, the team took steps toward solving the "effect" because solving the "cause" was too costly. Each potentially vulnerable line was fitted with a canister to hold a biocide packet, which treats the water before it enters the trench. The lines are regularly checked to verify the continued need for this type of coolant. The results of this low-cost step are a savings of biocide, longer coolant life, and a reduced burden on waste treatment.

Also, it continually serves as a training aid to show that the coolant trenches are not "sewers" and that an apparent innocent concept could have far reaching harm.

Training operators

Floor-level training is an on-going program. Routinely it is normal to expect that operators are trained for set-up, machine-tool performance, cutting-tool selection, and materials handling. Now they are guided on the importance of the fluids and care for the hardware used to support these functions. Usually, most operators look upon the coolant flow as they view the water faucet in their sink: just turn it on and expect flow, not knowing where it comes from or where it goes as it flows down the drain. With a proper awareness program, they are informed of its value, how it should be protected, and what happens in the filtration system, which usually is out of sight. They are also shown that housekeeping goes beyond their work area. Good housekeeping practices will save coolant, enhance productivity, reduce cost, and ease the impact on environmental issues.

Risks are controlled

The fluids-management program is never in the state of complacency. Even when all obvious milestones have been reached, there is a built-in reflex to continually improve. Continuous improvement objectives are planned not just for the sake of change, but where there are technological and/or sound business justifications. Some projects are relatively easy while others are more complex.

As in most cases where improvement can be accomplished, there could be some risks. However, the risk does not have to be a damaging factor when it can be confined to limits. To reap the rewards, a well organized action plan does not attempt to avoid risks. It initiates steps to control them. Outright avoidance of risks may result in stifling improvement possibilities. This is contrary to the overall goal of a continuing management program.

Fluids management can be instituted in almost any facility, regardless of its size. The size of the plant just establishes the depth of involvement and the economic limits on the scope of the activity. ■

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COOLANT FILTRATION

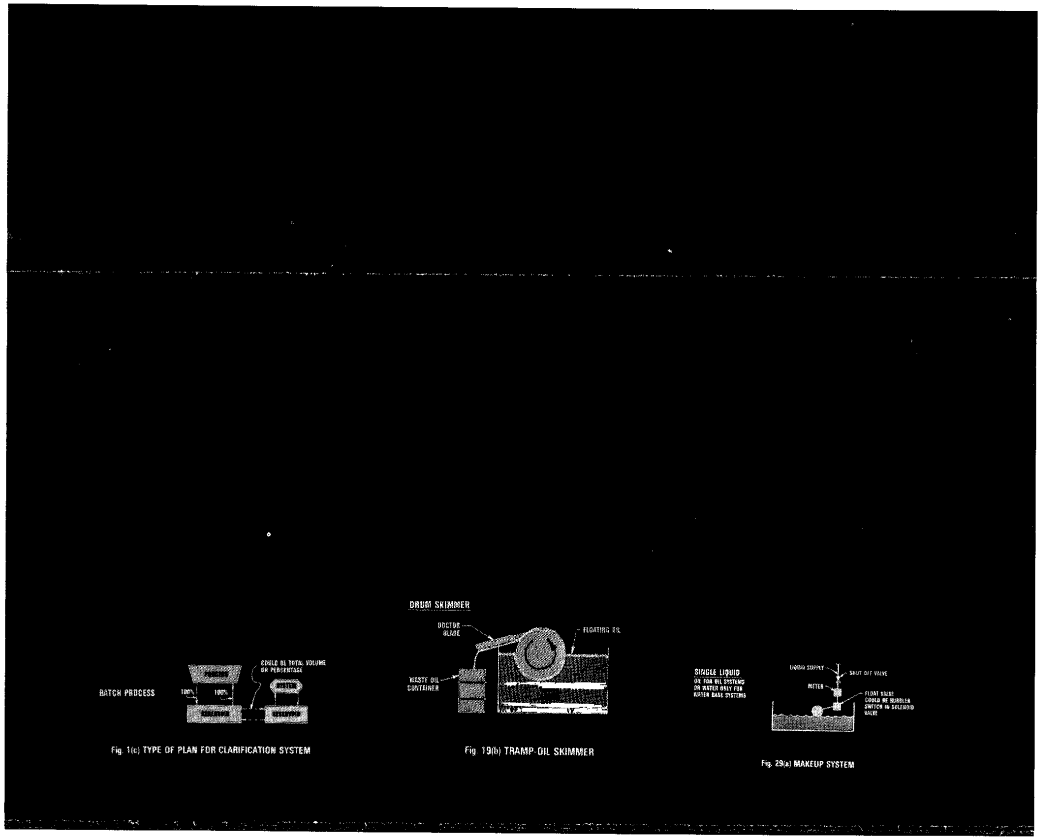

Fig. 1(c) TYPE OF PLAN FOR CLARIFICATION SYSTEM
Fig. 19(b) TRAMP-OIL SKIMMER
Fig. 29(a) MAKEUP SYSTEM

System designs and equipment guidelines to help you:

- Plan and install your new system
- Improve your current system
- Analyze your system designs and equipment options
- Meet your filtration goals for productivity, economy, quality, and environmental standards
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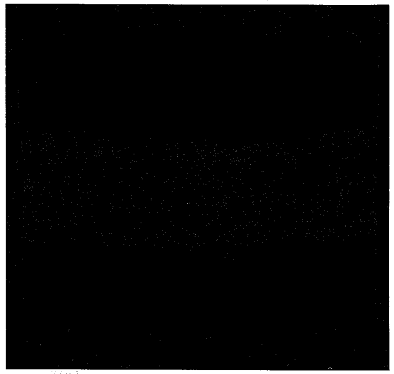

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You'll see system designs, how filtration components work, plus practical parameters and application ideas

Why your filtration system investment is a good idea

Coolant Filtration Videotapes help you understand the systems and equipment that protect your precision machined parts and your valuable tooling. This videotape program shows you why collecting and cleaning contaminated coolant is often more economical than frequent replacement or disposal.

These videotapes explain filtration terminology, show you how filtration components work, and guide you to asking all the right questions during system planning and design.

Guidelines for your project planners

Coolant Filtration Videotapes explain filtration theories, system types, system components and their functions, plus offer you a plan to analyze your application. Using these videotapes as your guide, you'll be able to consider your most practical and profitable filtration alternatives before you change your current system or invest in a new system.

You'll see why a coolant filtration system can offer you an opportunity for reducing your operating costs. This practical perspective helps you understand how your system works, as well as your system's benefits and limitations.

You'll see dozens of schematic illustrations of typical systems and their components. This helps you understand the variety of installations and techniques you may choose from for your own system.

Videotape Outlines

Videotape 1. Theory and Definitions

Setting realistic system objectives • Why clean coolant is an asset • Filtration system types—full flow, bypass, batch, "once-through" systems • System equilibriums • Measuring system performance • Practical experience guidelines for variables, causes and effects • Relationships between water-based coolants and oil, and contaminants such as air, heat, or bacteria

Length: 35 minutes

Videotape 2. Clarification Equipment

Relationships of contaminants to liquids • Separator types including flotation, hydrocyclone, and centrifuges • Filter types including flat bed, wedge wire, suction and pressure • Liquid/Liquid separators including tramp oil removal methods • Matching coolant system objectives to system types

Length: 35 minutes

Videotape 3. Total System Design

Basic designs • Return lines • Types of tanks including rectangular, cone, pyramid, cylindrical, self-cleaning, and reservoirs • Criteria for selecting clarification equipment including clarity needs, initial costs and operating costs, floor space and layout, combining new systems, updating older systems • Clarifier feed pumps • Clean supply pumps • Piping considerations such as slope lines, velocity, and dead spots • Make-up procedures

Length: 35 minutes

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4A. Adding a Filtration System to an Existing Facility

- Recognizing the value of a filtration system
- Review of closed-loop filtration systems and operations
- Strategies for adding equipment
- Economics of adding filtration systems
- Equilibrium limits and coolant life
- Dumping coolant vs. clarifying coolant
- Selecting cleaning devices and pumping schemes
- Benefits of filtration systems
- When to accept trade-offs, and how to make "less than ideal" approaches pay off

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4B. Improving Existing Filtration Systems

- Comparison of full-flow systems and by-pass systems
- Determining acceptable contaminant levels and life cycles
- Clarification costs vs. Disposal costs
- Reasons for considering filtration improvement
- Matching system objectives with appropriate equipment
- Cost considerations and practical restrictions
- Comparing impact of component additions such as feed pumps and filters
- Methodology suggestions

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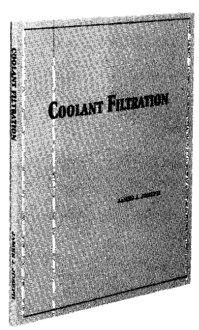

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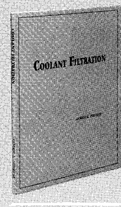

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1. Cleaning Coolants is an Asset, Not a Liability
How clean coolants reduce scrap, improve productivity, increase tool life, and improve quality

2. Clarification and Filtration Fundamentals
Closed loop systems, system performance evaluation, multiple contaminants

3. Liquid Clarification Equipment
Coolants, contaminants, types of clarification equipment, separating devices, filters, liquid-liquid separation

4. Total System Design
Return lines, tanks, clarification equipment selection, clarifier feed pumps, clarifier feed piping, clean liquid supply pumps, clean supply lines, makeup needs, central systems and individual units, updating existing systems

5. Applications
Grinding, drilling, broaching, gear cutting, screw machines, transfer machines, rolling, wire drawing

Glossary of Terms

Index

By J. Joseph, 124 pages, 30 illustrations, softcover, 1987
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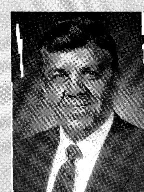

James J. Joseph has over 20 years of experience with a full range of applications in which fluids are used as a production tool. His expertise includes applications in metalcutting, forming, quenching, and washing for many industries including automotive, rolling mills, wiredrawing, plus dozens of equipment and component manufacturers.

He has published many technical papers, and has led many seminars on coolant filtration. His "hands-on" knowledge of all types of devices, and experience with filtration equipment manufacturers, make him one of the leaders in coolant management training. Mr. Joseph has been involved in all the stages of coolant filtration programs including training, manufacturing, marketing, and new product development.

He has also worked with many professional associations including Society of Manufacturing Engineers, Society of Tribologists and Lubrication Engineers, Association of Iron and Steel Engineers, The Wire Association International, and the American Filtration Society.

He is the president of Joseph Marketing, Inc., a consulting corporation in Syracuse, New York.

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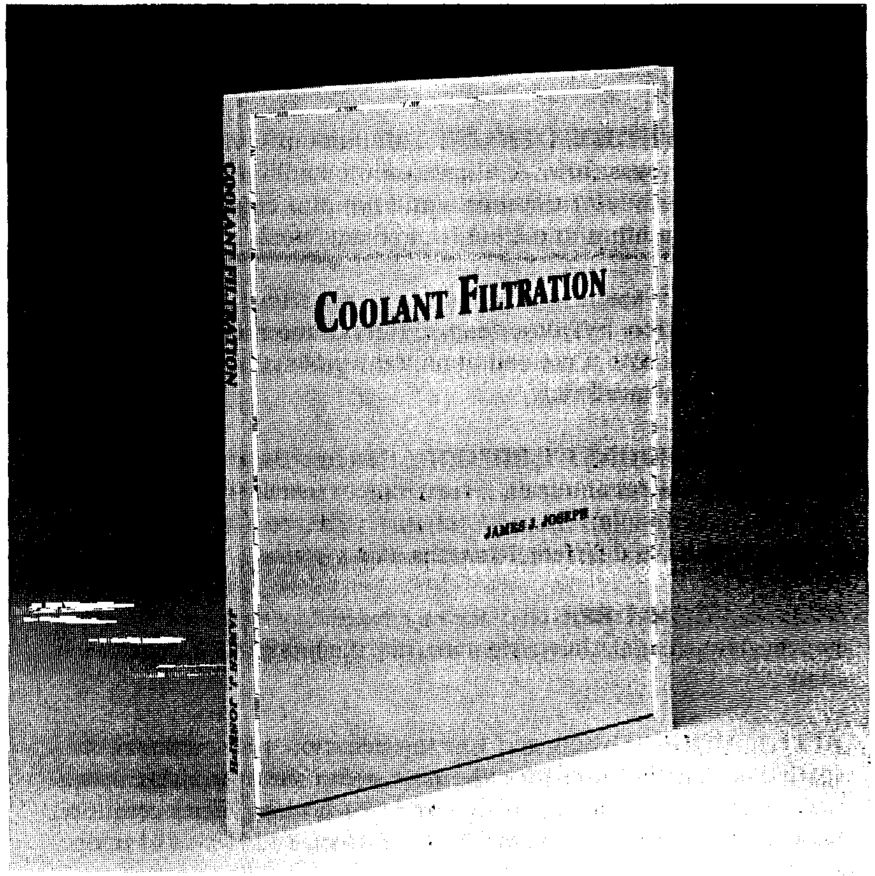
COOLANT FILTRATION

by James J. Joseph

There are many books written about filtration equipment. This book is different. It goes beyond the presentation of equipment only. It deals with the application of the equipment and the design of the complete system needed to clean an industrial coolant.



The book is 8½"x11", soft cover with 30 illustrations depicting not only equipment design but also systems.

THE BOOK TREATS THE TOTAL PROJECT OF COOLANT FILTRATION - NOT JUST SELECTION OF A FILTER.

CONTENTS

FILTRATION SYSTEM THEORY: Definition of closed loop flow, full flow, and bypass flow. A discussion on equilibrium and clarity limits. Also a study of the source and types of contaminants found and their relationship to the kinds of coolants used.

EQUIPMENT: Generic description of retention, flotation and magnetic separators; hydrocyclones, filters, tramp oil skimmers and make up units. Also a presentation on the various types of tanks and the value of balanced flow.

SYSTEM COMPONENT CRITERIA: Design data and installation techniques to select and install, return pipe, trenches (with flushing), reservoirs, and supply lines. A section is devoted to the kinds of pumps used for the different functions of a system.

TOTAL SYSTEM DESIGN: Factors needed to combine the components into a compatible system meeting the limits of time, space and money.

APPLICATIONS: Guidance for the selection of equipment and specific installation needs for the four major metal working operations; **grinding, machining, rolling, and wire drawing.** Each operation has categories on types of metal, kinds of coolant and levels of performance.

The 30 illustrations are designed to *tell* not *sell*. A set of these will show the generic function of the most popular filtration devices. The drawings are arranged so the differences in techniques are easily seen. There is also a group of drawings covering the other elements of a system including: trenches, different piping arrangements, multiple compartment tanks and schematics on typical installations.

Since the pages are 8½"x11" the illustrations are adequately sized for effective presentation of details.

Those reproduced here have been greatly reduced so a cross section of kinds of illustrations can be shown.

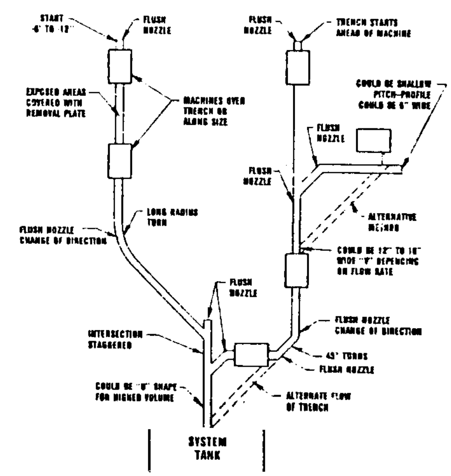


Fig. 22 PLAN VIEW OF A TYPICAL TRENCH LAYOUT

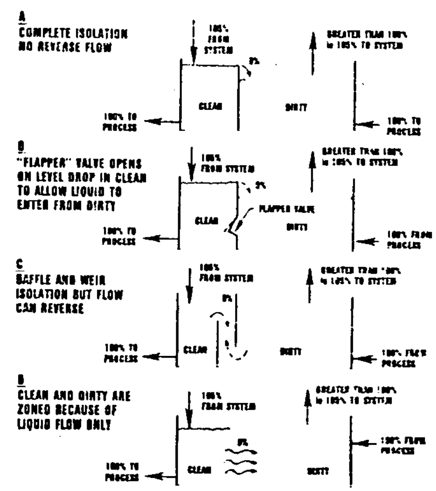


Fig. 26 FOUR TYPICAL TANK ARRANGEMENTS FOR CLEAN AND DIRTY COMPARTMENTS

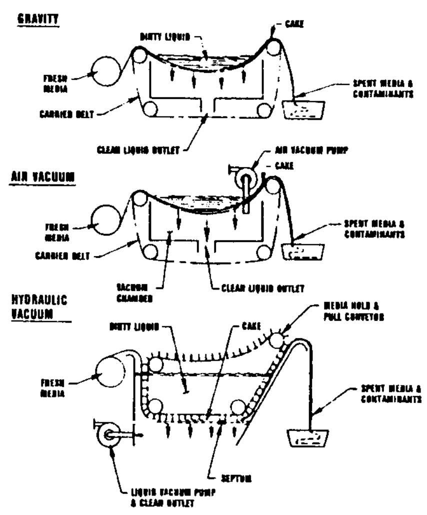


Fig. 15 FLAT-BED FILTERS

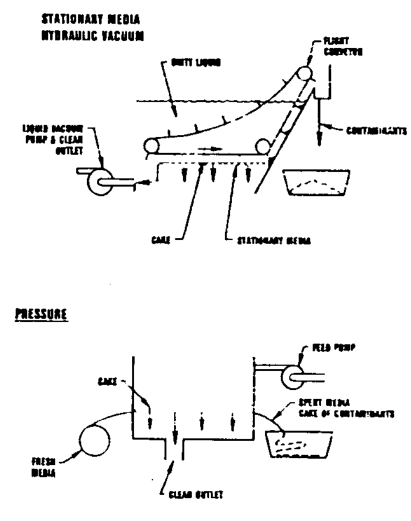


Fig. 15a FLAT-BED FILTERS

James J. Joseph is one of the industry's leading supporters of better education and effective training programs for those involved in the field of coolant filtration. His experience in this area includes numerous training sessions and seminars throughout many of the world's major metalworking centers.

Many of the author's papers and technical articles have been featured and recognized by prominent industry journals, including *Abrasive Engineering, Plant Engineering, Filtration News, The Wire Journal,* and organizations such as *SME, ASLE, AICHE, The Filtration Society,* and *The International Wire Association.*

The value of this book is realized along many different avenues of coolant filtration. This statement is best supported in the book review offered by *AMERICAN MACHINIST* (McGraw-Hill) magazine in November 1985.

Cleaning coolants

Coolant filtration. By James J. Joseph. Published by Joseph Marketing, East Syracuse, NY. 1985. 124 pages.

A practical guide on cleaning coolants for longer life or disposal, this book contains nearly everything there is to know about this subject. Various types of coolants are discussed, and the author elaborates on the need for their "clarification"—a term he proposes as a general title for any coolant-cleaning technique of which filtration is but one aspect.

Filtration, he says, is the act of forcing a liquid through a medium that intercepts suspended materials, and does not include such devices as settling chambers, centrifuges, and hydroclones, which are often classified as filtration devices but which he terms separators. The author's willingness to draw these distinctions make this book valuable. A glossary lists each term commonly used as a reference for those not familiar with such terms.

The various clarification devices are detailed. After describing each component, the author provides a systems perspective in which these components are connected to function as one system. Before planning such a system, however, the author cautions that five parts must be understood: tanks, clarification devices, supply lines, pumps, and return lines.

A chapter elaborates on coolant clarification as it applies to specific applications, including grinding, rolling, wire drawing, and such machining operations as sawing and in equipment like transfer machines and automatic screw machines.—PPB

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