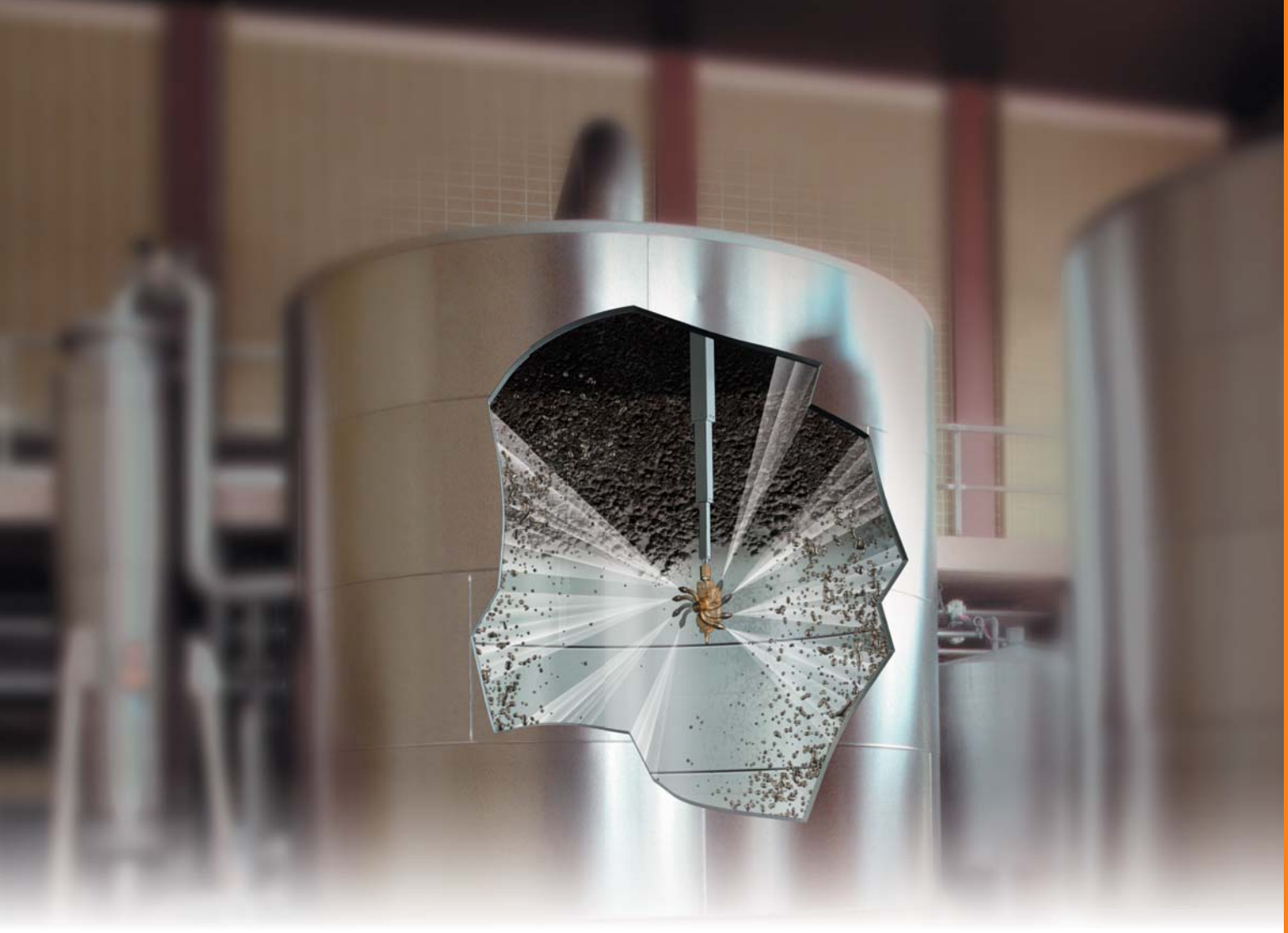

How to improve productivity and stay out of confined spaces

NLB Corp.

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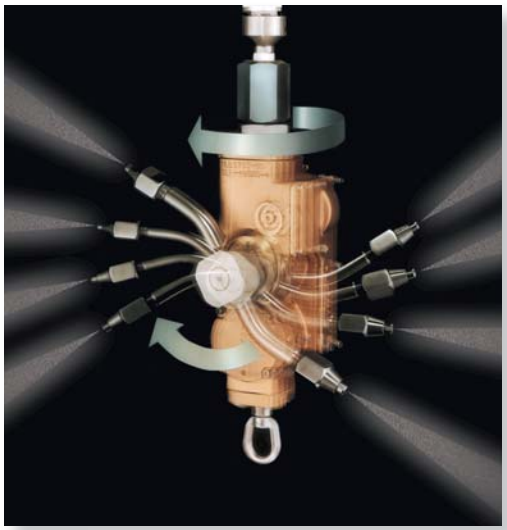
Introduction

To maintain a consistently high level of product quality, today's processing plants must ensure that their tanks and reactors are thoroughly cleaned on a regular basis. The direct expenses involved can be substantial, and adding indirect costs (e.g., downtime and compliance with safety and environmental regulations) puts extreme pressure on tight operations budgets.



3-D water jet head

To meet this challenge, more and more companies today are cleaning their tanks with high-pressure water jetting. It removes even hardened deposits thoroughly and economically (often saving thousands of dollars), and keeps operating personnel safely out of confined spaces.

The basic idea is to put a 3-D water jet head into the tank instead of a person. While the head rotates horizontally, its two high-velocity water jet nozzles spin vertically, resulting in complete, 360° interior coverage. These nozzles are driven by the reaction energy of the high-pressure water (from 4,000 psi to 20,000 psi), which cuts through virtually any product build-up on the sides of the tank, and even in its crevices. Hardened paint, resins, epoxies, and chemicals (also rust and scale) are removed in minutes and rinsed away. When a tank is large — e.g., 20 or 30 feet high — the head is mounted on a telescoping lance.

Users report five primary benefits.

Productivity

Manual cleaning is slow and labor-intensive, and production cannot resume until the job is complete. In one documented project, water jets reduced downtime for cleaning a 3,000-gallon reactor from 14 hours to just 4 hours. The downtime hours shrink proportionately with tank size… a 20,000-gallon reactor that was normally out of commission for 72 hours came back on-line in just 8 hours when cleaned with water jets. And the reductions in labor vs. manual cleaning are even more significant, as seen in the accompanying table.

Actual Tank Cleaning Projects

	Production Time Lost		Hours Spent Cleaning		Net Savings With Water Jetting	
Reactor Size	**Old Method**	**Water Jetting**	**Old Method**	**Water Jetting**	**Production Time**	**Personnel Costs**
3,000 Gallons	14 Hours (Manual)	4 Hours	14 Hrs. x 3 Workers = 42 Hours	4 Hrs. x 2 Workers = 8 Hours	10 Hrs.	34 Hrs.
6,000 Gallons	28 Hours (Chemical)	5 Hours		5 Hrs. x 2 Workers = 10 Hours	23 Hrs.	+10 Hrs.
20,000 Gallons	72 Hours (Manual)	8 Hours	72 Hrs. x 4 Workers = 288 Hours	8 Hrs. x 2 Workers = 16 Hours	64 Hrs.	272 Hrs.

Safety

Protecting employees from risk is not only common sense… it makes good business sense. Preventing accidents can help control medical costs and reduce downtime. According to OSHA data cited in Modern Bulk Transporter in 2002, nearly half of tank cleaning accidents are caused by thermal burns or chemical contact. Other hazards associated with tank cleaning are poor air quality, extreme temperatures and noise, as well as everyday slips and falls. These risks are facing increasing scrutiny today, resulting in new Permit-Required Confined Spaces (PRCS) standards and other OSHA regulations (see sidebar at right).

What is a confined space?

According to OSHA implemented standard 29 CFR 1910.146:

"A confined space means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means of entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits); and

(3) Is not designed for continuous employee occupancy."

Compliance with all these regulations can be complex and time-consuming. Staying out of tanks altogether makes life easier for managers as well as operating personnel, and automated water jet cleaning makes this possible. Also, since water jetting uses absolutely no chemicals or caustics, no one needs to be exposed to potentially hazardous substances or fumes.

Environmental Responsibility

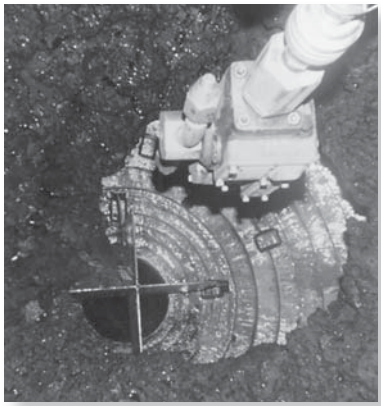
Water jetting also extends these advantages to the workplace at large and even the surrounding community. Since the power of water jetting comes from nothing but high-pressure water, nothing harmful is released into the atmosphere. This also simplifies disposal and reduces associated costs, both direct and indirect (e.g., compliance with fewer regulations, as noted above).

Cost

Because of the savings from reduced downtime and lower expenses for labor and disposal, water jetting's long-term costs are probably the lowest of any tank cleaning method. The initial investment for the 3-D head, lance and high-pressure pump unit can be substantial, but since NLB water jetting can save a plant hundreds of thousands of dollars a year, the payback period is short. Improved safety and product quality (thanks to the thorough cleaning) can also lead to significant long-term cost savings, although they can be harder to quantify.

Versatility

3-D water jetting has consistently demonstrated its effectiveness in removing all sorts of resins and similar products, including ABS, PVC, PS, PU, BR, CR, PVAC, SAN, IR, NBR, and SBR. One NLB customer who was accustomed to spending over 100 hours to clear a 25-foot vessel of 7-inch-thick coke found that he could do it in just 20 hours with water jets. The process is used successfully in large tanks and reactors (e.g. 40,000-gallon) and in the smaller, reusable stainless steel totes often used for shipping chemicals. One chemical company doubled its cleaning output with an automated NLB system, from 55 totes per day to 110 per day.

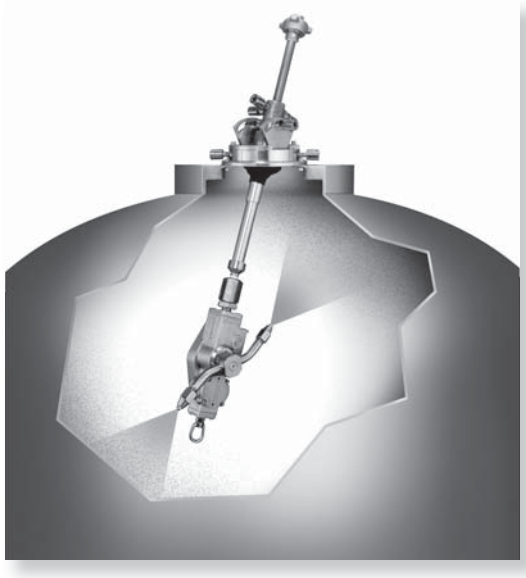


Coke Removal

Matching Water Jets to Your Application

The key to effective water jet cleaning is delivering the necessary water pressure in a three-dimensional (rotating) action that assures complete interior coverage. NLB 3750 3-D heads are available in different pressures, flows and materials to suit specific application needs. The 3750-40 head operates at 4,000 to 13,000 psi and 15-50 gallons per minute (gpm) and the 3750-50 at 4,000 to 13,000 psi and 25-60 gpm. The 3750-80 provides higher flow (25-80 gpm) at 4,000 to 8,000 psi. The highest operating pressure, 20,000 psi, is provided by the 3750-40-20K, with flow from 13 to 40 gpm.

Each head can be ordered in heavy-duty bronze, stainless steel or lightweight aluminum, depending on customer needs. A variety of nozzle arms and extensions adapts them to special circumstances (e.g., large-diameter vessels, narrow entrances), and a protective cage is available to prevent damage in the event of a collision with the tank interior.



3-D head on swivel socket lance

Telescopic Lances

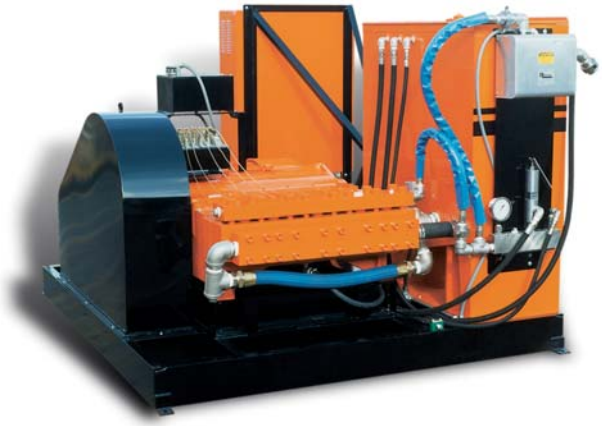
To insert the 3-D head into the tank and move it around, NLB offers a range of lances. A swivel socket lance is generally used in small vessels or horizontal applications, such as stripping columns, blow-down tanks and hopper cars. It mounts to the manway with an adapter to provide three movements: extension and retraction, incline and rotation. Telescopic lances are designed for larger vessels, or for areas where overhead height is limited. Some 14 standard models are available, to fit tanks from 10 feet to nearly 28 feet high, as well as custom-engineered lances.

Where maneuverability is particularly important (around baffles or mixers, for example), telescopic lances can be made of aluminum, with a weight savings of about 80%. NLB offers three lightweight lances. For permanent installations, automated telescopic lances can be designed, with extension and retraction accomplished electrically, hydraulically or pneumatically. These are ideal for between-batch cleaning, eliminating delays for set-up and working before product can dry or build up excessively.

Lightweight Telescopic Lance

High-Pressure Pumps

All tank and tote cleaning systems are custom-designed, and can even include hot water, conveyors, PLC controls, and many other specialized features. NLB application engineers meet customer requirements with a variety of high-pressure pump units, either diesel or electric, mounted on skids or on trailers for portability. Typical water jet pressures for cleaning tanks and reactors range from 8,000 psi to 10,000 psi, but some jobs require higher pressures (up to 20,000 psi) and flows.



Electric pumps, like the NLB 350, are ideal for in-plant use.

The Importance of Dependability

Steve Burtner, vice president of Power Cleaning Specialists, Inc. in Baton Rouge, Louisiana, has considerable tank cleaning experience with water jets and other methods. He suggests that in addition to productivity and cost, reliability should be a prime consideration when choosing equipment.

"We've used other systems, but NLB's are far superior," he says. "They are quicker and more efficient, and require very little maintenance. They are also very reliable. The worst thing you can do is get to a job have equipment not work. The durability of NLB's systems is exceptional."

Conclusion

There is tremendous pressure on companies today to maintain output and quality while holding the line on, or reducing, operating costs. Cleaning tanks and reactors with high-pressure water jets, instead of sending personnel into confined spaces, is a proven way to assure productivity, safety, environmental responsibility, cost, and versatility.