

LEADING WATER JET TECHNOLOGY™



# **REDUCE TANK CLEANING** AND INCREASE PRODUCTIVITY

## REDUCE TANK CLEANING AND INCREASE PRODUCTIVITY



o people who don't work in processing industries, the term "tank cleaning" likely suggests some sort of spraying or scrubbing with detergent. In processing industries, however, cleaning a tank or reactor is a major operation. Here it means thoroughly removing hardened product quickly and safely, without damaging the tank walls or leaving behind anything to contaminate the next product the tank will hold.

This level of cleaning presents a variety of challenges, and no single method will meet every one, in every application. To determine which method is best for a particular application, operations professionals look for one that:

- cleans thoroughly
- minimizes downtime
- maximizes the productivity of personnel
- keeps people out of confined spaces
- complies with all applicable regulations
- offers a reasonable payback period
- is environmentally-friendly

Companies that clean their tanks with high-pressure water jetting have found that it meets all of these criteria for a wide range of products, such as resins (plastics, rubber, etc.), epoxies, and paints. In this white paper, NLB Corp. — a water jet technology leader for over 40 years — will explain how, citing the experiences of several customers.

#### HOW WATER JETS WORK

High-pressure water jets (up to 20,000 psi, or 1,400 bar) are used around the world for product removal and many other applications. Basically, a nozzle (or nozzles) attached to a lance or a specially-designed accessory directs a focused stream at the product to be removed. The resulting force cuts through the product in minutes (sometimes seconds), separating it from the surface to which it was attached and rinsing the surface at the same time. The process thoroughly removes resins, polymers, rubber — even seven-inch-thick coke — and needs no abrasives or solvents of any kind.

For tank cleaning (and various other applications) automated water jetting has significant advantages over manual water jetting as well as cleaning with solvents. Not only is it faster and less labor-intensive, but it enhances employee safety in two key ways: by avoiding exposure to



FIGURE 1

potentially hazardous cleaning agents and eliminating the need for anyone to enter a tank. The latter greatly reduces fall risks (not to mention exposure to uncomfortable temperatures, noise or air quality), saves the expense of safety suits and harnesses, and simplifies compliance with confined space regulations (See Figure 2).

### WHAT IS A CONFINED SPACE?

According to OSHA implemented standard **29 CFR 1910.146**: "A confined space means a space that:

- 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."

FIGURE 2

Automated water jetting is also an ideal solution when a tank's opening is too small to allow a person entry in the first place.

The key to productive tank cleaning is to maximize the coverage of the interior walls by the high-pressure water. This is done by a 3-D head with rotating nozzles, attached to a lance that is inserted through the tank opening. The reaction force of the high-pressure water causes the high-velocity nozzles to spin vertically while the head rotates horizontally, resulting in 360° coverage of the tank's interior. The water jets can even get into hard-to-reach corners (see Figure 3). For large tanks — e.g., 20, 30 or 50 feet high — a telescopic lance is used.





#### PROVEN PRODUCTIVITY

Examples of water jet productivity abound. One NLB customer was tired of spending as many as 100 man hours to remove a seven-inch-layer of coke from the walls of a 25-foot vessel. He switched to high-pressure water jetting and needed just 20 hours to do the job. Similar efficiencies are possible when cleaning totes, the small, reusable vessels often used by chemical producers. One company that was previously able to clean 55 totes a day doubled its output with an automated NLB system, to 110 per day.

Just as important as the hours spent cleaning are the hours of lost production time while tanks are out of service. Figure 4 demonstrates how dramatically 3-D water jets can reduce lost production time. The larger the tank, the more hours saved. One company reduced downtime for a 3,000-gallon tank by 10 hours by switching from manual water jetting to automated water jetting. Another



saved 23 hours on a 6,000-gallon tank vs. the chemical cleaning method previously used. And a company with a 20,000-gallon tank slashed lost production time by nearly 90% – 64 hours – by using 3-D water jet heads.

When the labor hours are factored in (Figure 5), the advantages are even more obvious. Cleaning the 20,000-gallon tank with hand lances required four people to work 72 hours each, or 288 hours in all. But with a 3-D water jet head, just two people were needed for eight hours each: a net savings of 272 hours. Not only did those two people have a much easier time than the four using hand lances, but the latter were reassigned to other tasks to further improve productivity.



\*The 6,000-gallon tank comparison is to chemical cleaning, which requires no man-hours. The 10 man-hours required for water jetting were more than offset by the savings (23 hours) in lost production time. Simply by saving so many hours, automated water jetting can save a plant hundreds of thousands of dollars a year. It's a cost-effective process that typically pays for itself in months, not years.

#### **3-D HEADS**

Like most water jetting tools, 3-D heads are available in a variety of models to meet a variety of needs. Harder materials are cleaned more efficiently with high pressures, while softer materials come off more easily with higher flows. Really tough jobs require both high pressure and high flow, and high horsepower as well. Whatever the operating specifications, heads should be made of a rugged material that will resist corrosion, such as stainless steel. They should also have long-lasting seals that are fairly easy to replace. Some heads, like NLB's, feature carbide nozzle orifices, adjustable rotation speeds and compatibility with a variety of nozzle arms (different sizes and configurations) to meet changing user needs.

Today's 3-D heads pack a lot of cleaning power into a relatively compact body, with adjustable rotational speed and easy-to-replace seals that last hundreds of hours. This makes them suitable for tanks of many shapes and sizes and gives users lots of flexibility. NLB's Torrent<sup>™</sup> 50, for example (Figure 6), is rated at up to 20,000 psi (1,400 bar) at 600 hp, with flow up to 50 gpm, yet can fit through a six-inch tank opening. The larger Torrent 200 has the same pressure rating with flow as high as 200 gpm (757 lpm) at 2,300 hp (1,715 kW).

#### LANCES

Like 3-D heads, the lances that maneuver them should be carefully matched to the application. When cleaning small tanks or horizontal tanks (e.g., blow-down tanks, stripping columns, hopper cars), a swivel socket lance can be mounted to the manway and maneuvered manually.

For large vessels, or in areas where the overhead height is limited, telescopic lance is often used. NLB has 14 standard models that fit tanks ranging in height from 10 feet to nearly 28 feet, and custom-engineers lances for larger tanks. These lances often have hand wheels for extension and retraction, and are brought to the tank on a cart and raised



FIGURE 6



FIGURE 7

into position. In automated operations, a lance (or lances; a big reactor may need several lances and heads) is more likely to be custom-manufactured to the appropriate length. Some are as long as 36 feet. These are permanently attached to the vessel, with an extension/ retraction mechanism (electric, hydraulic or pneumatic) whose operation can be integrated with the plant's mixing and cleaning controls system.

Lances are made of durable, corrosion-resistant materials, often stainless steel. For more maneuverability — around baffles or mixers, for example — aluminum lances offer weight savings of up to 80%. NLB has three lightweight lance models, the largest of which weighs just 80 lbs. but can extend over 20 feet.

"Aluminum lances offer weight savings of up to 80%."

#### **HIGH-PRESSURE PUMP UNITS**

Water jet tank cleaning requires a consistent supply of high-pressure water (typically 4,000 to 20,000 psi for tank cleaning, or 275 to 1,400 bar). This, in turn, requires a rugged, dependable pump unit... ideally, one that's easy to operate and maintain, and minimizes downtime. Most companies who do their own water jet cleaning have elec-



FIGURE 8

Electric pumps, like the NLB 325E, are ideal for in-plant use.

tric-powered pump units connected to the plant's power supply, while contractors hired to clean tanks usually bring along a diesel-powered unit on a trailer. Those who want the flexibility to use water jets for other jobs requiring different pressures and flows may prefer a pump unit that is convertible to a range of pressures. NLB offers over two dozen such models.

"The fact that nothing is used in high-pressure water jetting but the water itself makes it an exceptionally **environmentallyfriendly process**."

#### **ENVIRONMENTAL FACTORS**

The fact that nothing is used in high-pressure water jetting but the water itself makes it an exceptionally environmentally-friendly process. First, of course, water is a clean, natural resource that is readily available. And since no potentially hazardous caustics or abrasives are added, users can recover the water after cleaning, filter out whatever substances it has removed, and use it again.

#### SUMMARY

Over the past four decades or so, automated, highpressure water jetting has proven itself an excellent choice for many tank cleaning applications, and a solution for some of industry's most difficult challenges. User experience has shown that it effectively meets all key criteria for choosing a cleaning method, from thoroughness of cleaning and productivity to safety, investment payback and environmental responsibility. Further, many applications can be handled with standard equipment. To see if high-pressure water jetting may be the solution to your tank cleaning problem, contact NLB today.

#### **DARRELL TERPENNING**

Vice President of Sales darrell.terpenning@nlbusa.com c (248) 877-9348

#### **JOHNNY LAMPERTIUS**

Business Development Manager johnny.lampertius@nlbusa.com c (248) 500-7339



HEADQUARTERS Wixom, MI (248) 624-5555

REGIONAL OFFICES Located across the United States and Europe

#### LEADING WATER JET TECHNOLOGY™ NLBCORP.COM

© Copyright 2017 NLB Corp.