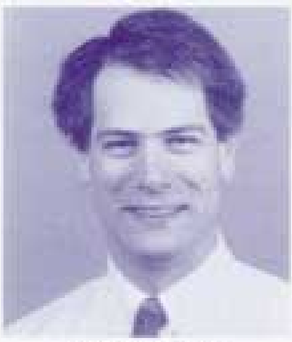
LIGHTNIN
EXTRACTION news

A Newsletter for Solvent Extraction Engineers | February 1996, Vol. 2, No. 1

LIGHTNIN SX Customers Reap Process Improvements, Long-Term Savings



Mike Preston

Senior Application Engineer Mike Preston develops sizing procedures for LIGHTNIN mixers in solvent extraction, minerals processing and chemical processing industries.

In 1995, *LIGHTNIN* installed eight of our new Solvent Extraction systems worldwide. We expect many more new installations in 1996, as well as retrofits of older, established plants. The reason? customers are finding that the *LIGHTNIN* system improves their process immediately, yields significant operational savings, and doesn't require complicated and costly infrastructure designs or improvements.

Here's what you can expect from the *LIGHTNIN* Solvent Extraction System featuring the R320 pumper impellers and A310 or A6000 auxiliary impellers:

Lower capital cost—Increased efficiency means higher performance with less power consumption. This means reduced gear box size, less installed horsepower, and lower wetted material cost (especially in high alloy).

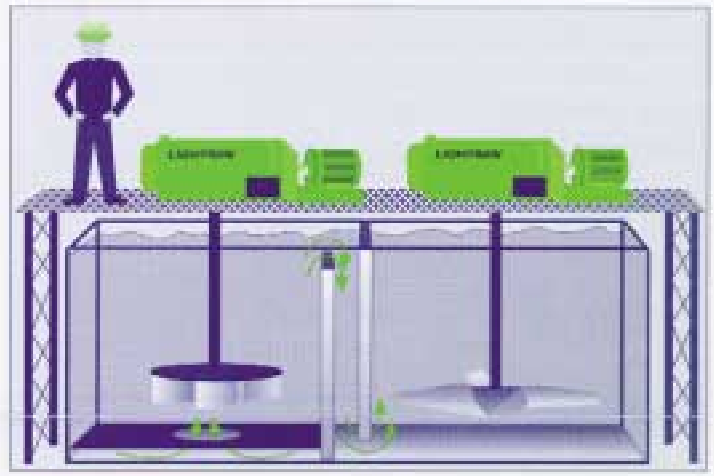
Lower operating cost—Less installed horsepower means lower energy costs. Example: a 10 hp savings for six pump mixers is an annual savings of almost 400,000 kilowatt-hours. At 6 cents/kW hours, the savings is $24,000.

Elimination of air entrainment—Required dispersion is formed at lower energy input without air introduction. This translates into less crud formation and smaller organic losses.

Less organic entrainment—Organic losses are minimized by high-efficiency, low-shear mixing. This saves chemical usage and greatly lowers operational costs.

Proven auxiliary design—Our proprietary software correlates pumper and auxiliary impellers to ensure a perfect operating system that minimizes turbulence, maximizes contacting and enhances phase disengagement.

Confidence in design—*LIGHTNIN*'s R320/A310 combination has proven itself in everything from 6-inch lab scale to 89-inch full-scale at flow rates above 15,000 gpm. This performance is predictable within ±3% and is backed by *LIGHTNIN*'s guarantee (including developed head and flow) for complete confidence in design.



The *LIGHTNIN* Solvent Extraction Team appreciates the opportunity to work with you whether you're designing a new plant or trying to boost productivity in your current one. Give us a call at 716-436-5550 to learn more about the best in process performance and expertise.

Look for LIGHTNIN at...

Society of Mining and Engineering (SME) Show and Conference, March 11-13, Phoenix, AZ, booth 1402. Mike Preston will deliver a paper on the *LIGHTNIN* Solvent Extraction System.

International Solvent Extraction Conference (ISEC) '96, Melbourne, Australia. Tom Post will present a paper on optimizing the design and operation of pumper and auxiliary impellers.

EXPOMIN, May 14-18 in Santiago, Chile, booths 12013 and 12014.

LIGHTNIN Expanding Solvent Extraction —

Already a leader in copper solvent extraction, *LIGHTNIN* is applying its advanced mixing technology to other liquid extraction processes and applications.

As technology improves, this market will surely expand and become more important. The companies that develop advanced technology and introduce it in ways to be advantageous to the industry will lead this new era.

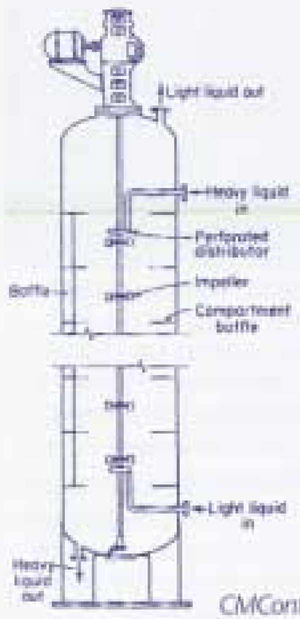
Extraction can be used to produce many elements that are needed in today's world. We are undergoing a study to identify all of the elements or end products that can use our mixing technology with solvent extraction.

What we found was remarkable—30 to 40 percent of the elements found on the Periodic Table of the Elements can be produced with different extraction technology (using different mixing technologies).

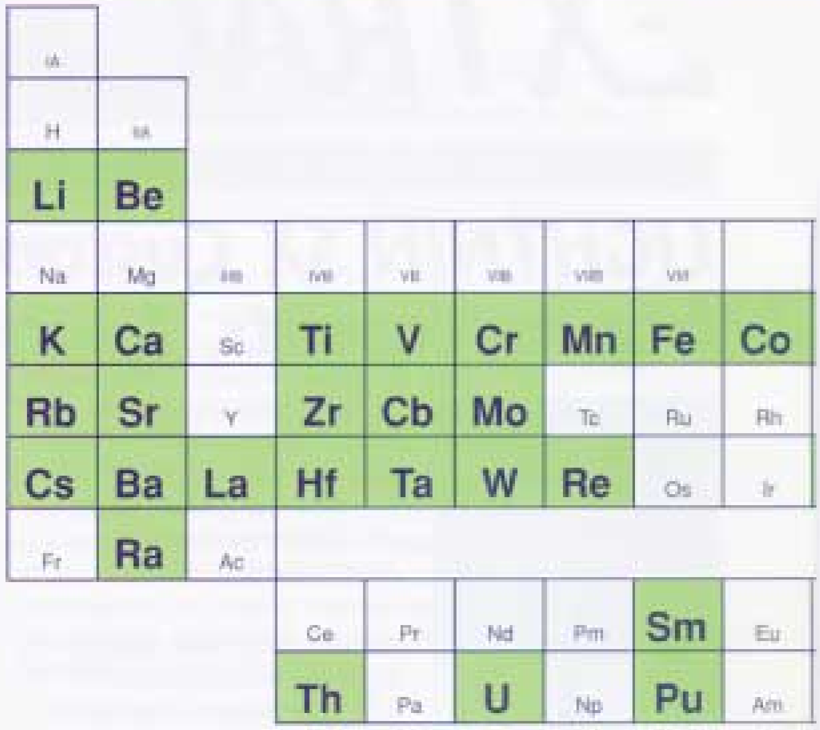
LIGHTNIN has considerable experience in these markets and can determine what mixing technology is best for different processes. We can offer our high-technology impellers to optimize the different designs.

One example of *LIGHTNIN*'s leading position in different extraction processes can be illustrated with our *LIGHTNIN* CMContractor/Oldshue-Rushton extractor that was first used in the 1950s. Thus we have been in the market for over 45 years.

The greatly increasing variety of products and the corresponding need for making difficult separations has resulted in a rapid penetration of liquid extraction into practically every branch of the chemical process industry. *LIGHTNIN* can apply its mixing technology in all of these applications.



CMContractor/Oldshue-Rushton extractor



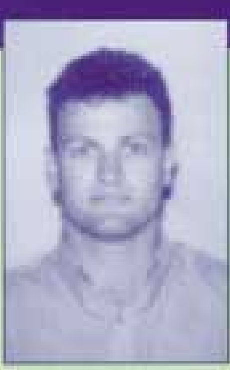
Remember, this is a partial list of applications that is always growing.

Petroleum refining—lubricating oils, naphthas, butadiene, desulfurization, and miscellaneous extractions.

Fat, oil and related processes—propane refining, furfural refining, fat splitting, rosin and tall oil.

By-product coke-oven processes—tar acids and aromatic hydrocarbons

Solvent Extraction Team New



Mark Greaves

Mark Greaves of *LIGHTNIN* Mixers PTY. LTD. recently attended the Copper Hydrometallurgy Forum in Brisbane, Australia. The two-day forum, organized by Alta Metallurgical Services, attracted approximately 120 people. Mark conducted several demonstrations of *LIGHTNIN*'s Solvent Extraction sizing procedures for optimizing the performance of pumper mixers using the *LIGHTNIN* R320 family of impellers.

Mark has been with *LIGHTNIN* since 1990 and is involved in all aspects of mixer process design and specializes in mixer development, sizing and pricing for the Australian solvent extraction market. He has a bachelor's degree in chemical engineering from the University of Newcastle, Australia.

Ken Lally was recently app
Technology. In that role, h
market opportunities and
that will improve solvent e

Ken has been at *LIGHTNIN*
including applications eng
and development manage

He has a bachelor of scien
Clarkson University, an MB
has published more than

Arsenic to Zinc

								INERT GASES
			IIIA	IVA	VA	VIA	VIIA	He
			B	C	N	O	F	Ne
	IB	IIB	Al	Si	P	S	Cl	Ar
Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Pd	Ag	Ca	In	Sn	Sb	Te	I	Xe
Pt	Au	Hg	Ti	Pb	Bi	Po	At	Rn

Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Cm	Bk	Cf	Es	Fm	Md	No	Lr

Pharmaceuticals—vitamins and others

Miscellaneous organic chemicals

Inorganic chemical industry

Metal separations—uranium, spent-fuel reprocessing, thorium, zirconium-hafnium, tantalum-columbium, cobalt-nickel, rare earth metals, beryllium, lithium, tungsten-molybdenum, germanium-arsenic, gallium-gangue metals, venadium, etc.

Treatment of industrial dust.

rs

inted Manager of Market Strategy and will be responsible for identifying mixer reating mixing technology and systems traction systems.

for 17 years in a variety of positions, neer, business unit manager, and research

e design in chemical engineering from A from the University of Rochester, and dozen technical articles.

Ken Lally

Baffle Facts for Pumpers and Auxiliaries

Baffles are flat metal plates attached to the internal wall of a vessel to improve mixing by creating vertical currents and velocity gradients. The presence of baffles prevents swirling and vortexing, resulting in stable power draw, uniform shaft loads and the elimination of air induction. The proper design of tank baffles is important in obtaining satisfactory mixing results.

Following are general rules for baffle design.

Pumper (Primary) Tanks

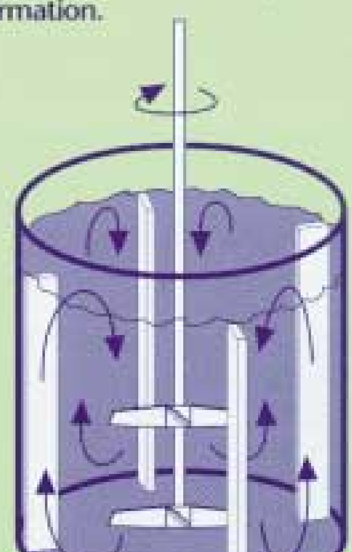
Square pumper tanks require two baffles, 90 degrees from the overflow. Cylindrical pumper tanks should have four baffles, set 90 degrees apart. Baffle width should be 1/12th of the tank side dimension (or diameter, in the case of cylindrical pumper tanks) and can be mounted directly on the vessel bottom or lifted off the bottom, 1/5th of the baffle width. Most important, the baffles should not rise above the liquid level. If they do, air will be introduced, which will cause additional entrainment.

Auxiliary Tanks

Square and cylindrical auxiliary tanks require three baffles. (None is needed on the overflow wall.) The same baffle design and mounting rules as with pumper tanks apply to auxiliary tanks.

For more information

An appropriate mixing environment includes proper tank and baffle designs, and efficient use of applied power. To optimize your system, contact your local LIGHTNIN representative for more information.



Use Modal Analysis To Prevent Unwanted Vibration

At a time when many companies are installing larger mixer systems to increase production capacity and operating efficiencies, unwanted vibrations created by the interaction of the mixer, vessel and supporting structures increase the potential for serious structural and mechanical problems.

LIGHTNIN engineers pioneered the use of modal vibration analysis in critical service applications associated with high-power, large-mixer installations.

Modal analysis is performed to evaluate the source of vibrations in existing mixer system installations. It is also used to predict performance when new mixer systems are being developed to prevent unwanted vibrations.

Traditionally, the stresses and deflections of the vessel, mixer and supporting structures are calculated using static design analysis. However, structural system resonances can amplify the effects of these loads. This can produce stress and deflection levels that surpass intended design limits. In turn, this amplification can lead to mechanical seal and steady bearing failures, coupling wear, and fatigue failures of the mixer shaft or other system components.

To help eliminate these risks, modal analysis focuses on the inherent resonances within the vessel-mixer-support structure system. Some of the natural frequencies of this integrated system can be significantly excited during operation.

Unacceptable vibration can occur when any one of the mixer or vessel wave excitation frequencies approaches or equals one of the natural frequencies of the mixer-vessel-support structure system. Excitation frequencies that require the greatest scrutiny include mixer output shaft RPM, impeller blade passing, baffle passing and motor shaft RPM.

The range of excitation frequencies that can create unwanted vibrations includes motor RPM frequencies at the high end, and vessel wave surface frequencies at the low end. As a result, Modal Analysis focuses on determining the natural frequencies of the system that fall within or near this range.

LIGHTNIN

Printed in U.S.A.

LIGHTNIN
135 Mt. Read Blvd.
Rochester, New York 14603

CERTIFIED TO ISO 9001 QUALITY STANDARDS

ISO 9001 : 1994
QUALITY STANDARD
GRANTED REGISTRATION