



TRI-MIX TURBO-SHEAR by LEE



PROCESS SYSTEMS & EQUIPMENT

Tri-Mix Turbo-Shear® High-Shear Mixing System

The Tri-Mix Turbo-Shear is one of the most versatile, high performance mixing systems available today. It can reduce and control uniform particle size to as small as two microns. It blends, disperses, and emulsifies ingredients in either a liquid/liquid or liquid/solid system. This unit combines the heat exchanging efficiency and mass blending of the traditional Lee double-motion scraped-surface agitation system with the homogenizing action of the Turbo-Shear mixing head. This unique mixing head offers a variety of configurations for versatility in mixing applications.

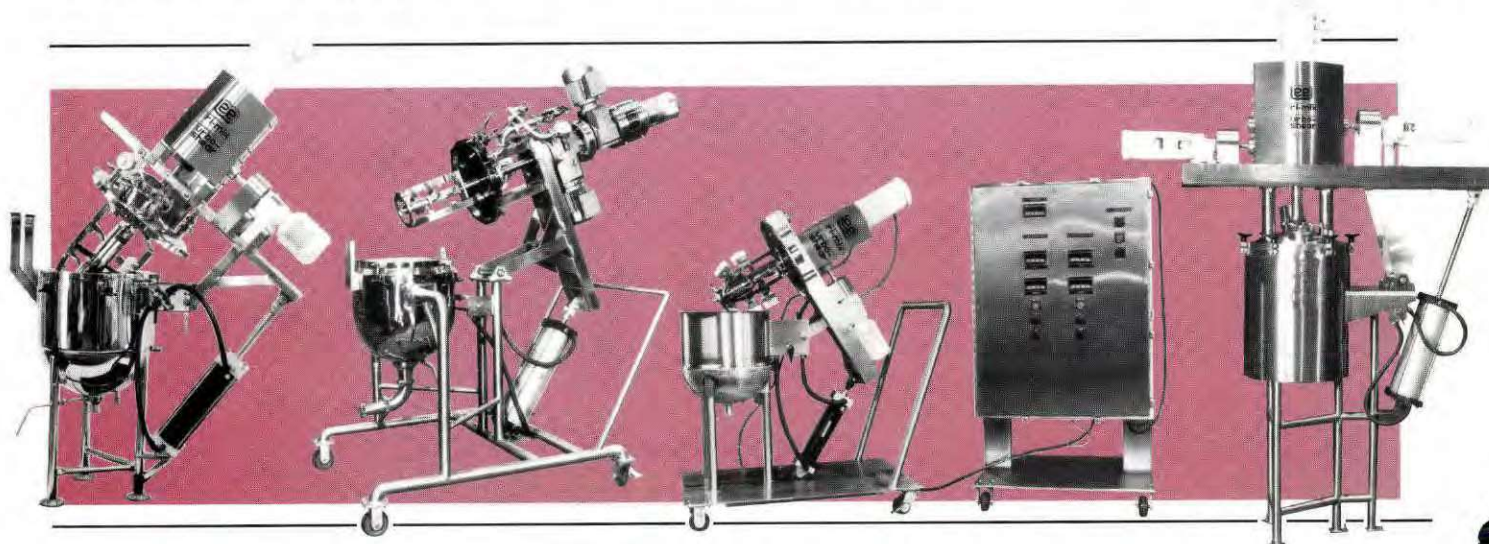
The Turbo-Shear utilizes both mechanical and hydraulic shear to dissolve powders, blend miscible and nonmiscible solutions, prepare lotions and creams, and disperse pigments. A center shaft, which can be run with the primary double-motion agitator or alone, operates at speeds up to 3,450 RPM. The scraped-surface, double-motion agitator cleans the vessel walls during each blending revolution. This sweep agitator operates at speeds up to 50 RPM.

Lee can provide either standard or pharmaceutical grade mechanical seals, as the Tri-Mix Turbo-Shear can also be designed for pressure and vacuum. And, because the high ratio of hydraulic to mechanical shear does not induce great quantities of heat, the Tri-Mix can process your temperature-sensitive products, too. The Lee Tri-Mix Turbo-Shear is available from as small as 10 quart research models to as large as 1,000 gallon production vessels. Custom-designed units are also available for especially difficult applications. A product guarantee, based on free testing of your product in our 25 gallon lab Tri-Mix Turbo-Shear, adds security to your investment.

FEATURES:

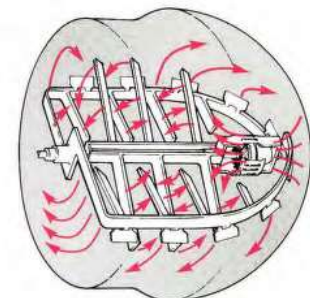
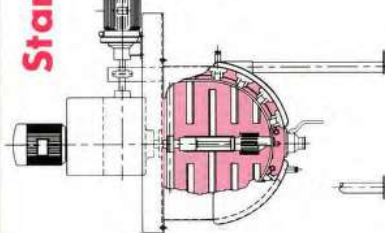
- Product viscosities up to 2,000,000 CPS on primary double-motion
- High ratio of hydraulic to mechanical shear
- Clean, sanitary design
- Particularly efficient for hard-to-wet-out products
- High-velocity axial and radial product flow
- Continuous high or low flow mixing head
- Unique, double-motion agitator offset frame ensures uniform scraping action and continuous product flow
- Custom designs available
- Batch-to-batch uniformity
- Product scale-up and process guarantee

Installation utilizing Tri-Mix Turbo-Shear agitation.



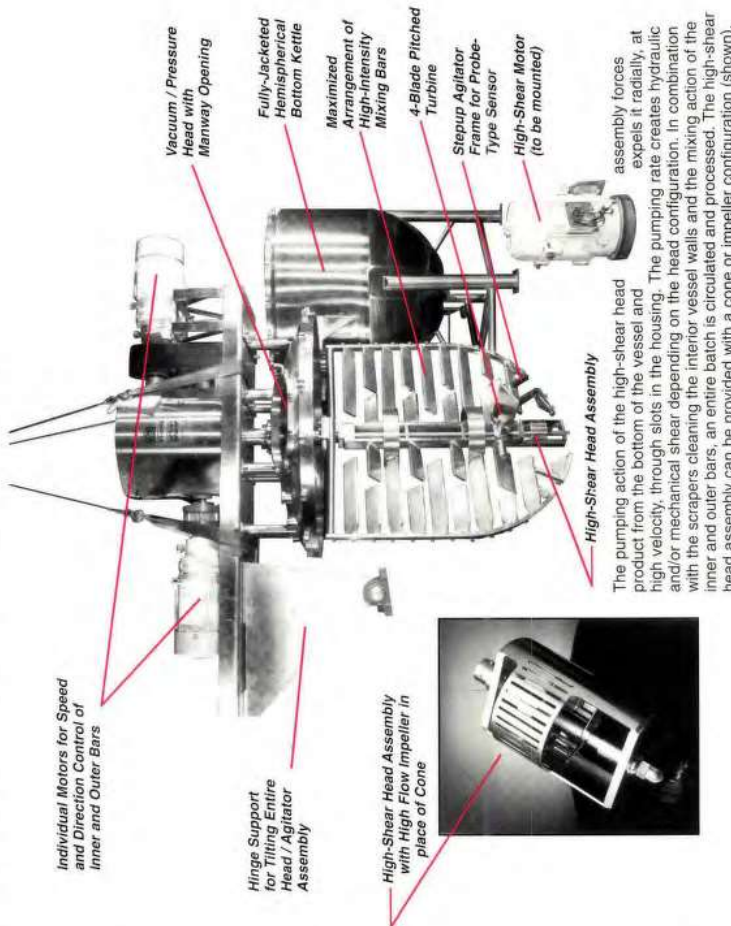
Lee's triple-motion high-shear mixers are available with various options: special finishes, portable platform or tube frames, detachable control panels, full heating/cooling jackets, vacuum/pressure, various drive and motor combinations, and many other custom features.

Standard Style #12 Agitator

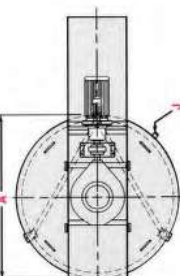
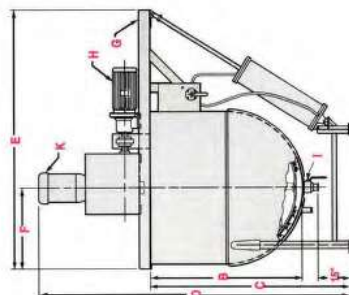


Drawing (left) shows stationary Tri-Mix Turbo-Shear processing vessel with two motors. The 100 RPM motor mounted on the channel powers the inner and outer double-motion, counterrotating scraped surface frame and bars. The motor mounted above the Lee drive assembly provides speeds up to 3,450 RPM for the high-shear head located directly over the bottom outlet of the vessel. Various options can offer flexibility for specific processing applications: triple motors for independent RPM control of mixing components, agitator tilting option for inspection and cleaning, vacuum/pressure capability with several shaft seal designs, heating/cooling jackets with Lee Uniflow coils, portability, a choice of bar or turbine blade configurations along with various high-shear head assembly options.

After testing in our pilot plant and consulting with Lee Applications Engineers, our process scale-up guarantee may require a combination of features to provide a specific result for a processors individual product. This **High-Intensity Tri-Mix Turbo-Shear** (pictured below) is in final stages of assembly and testing. This unit incorporates several optional features that accomplish the efficiency and mixing parameters desired for a specific batch product.



10 Qt. thru 1000 Gallon "D12T" Kettles



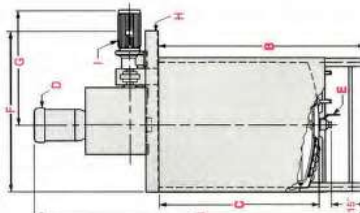
NOTES:

- G WIDE CHANNEL
- H HP 230/460V, 60C, 3PH, TEFC GEAR MOTOR (100 RPM)
- I LEE FLUSH BOTTOM BALL VALVE WITH TRI-CLAMP CONNECTOR
- J STEAM INLET AND CONDENSATE OUTLET
- K HP 230/460V, 60C, 3PH, TEFC, NEMA C-FACE MOUNT MOTOR (3450 RPM)

CAPACITY	25	30	40	50	60	75	80	100	125	150	200	250	300	400	500	600	750	1000
A	23	23	25 1/2	29 1/2	32	32	36	36	38	42	48	52	54	58	62	66	68	72
B	26	28 1/2	30	30 1/2	30 1/2	35	32	35 1/2	40	40	41 1/2	44	47	53 1/2	57 1/2	60 1/2	68 1/2	78
C	45 1/2	48 1/2	49 1/2	49 1/2	50 1/2	54 1/2	52 1/2	56 1/2	60 1/2	61 1/2	64 1/2	67 1/2	73 1/2	77 1/2	82 1/2	86 1/2	96 1/2	100 1/2
D	77 1/2	79 1/2	81 1/2	88 1/2	89 1/2	93 1/2	90 1/2	96 1/2	100 1/2	101 1/2	108 1/2	111 1/2	118	127 1/2	132 1/2	140 1/2	153	153
E	47 1/2	52 1/2	51 1/2	53 1/2	55 1/2	57 1/2	57 1/2	57 1/2	62 1/2	67 1/2	74 1/2	77 1/2	81 1/2	90 1/2	103 1/2	107 1/2	113 1/2	113 1/2
F	12 1/2	12 1/2	13 1/2	15 1/2	17 1/2	17 1/2	19 1/2	19 1/2	20 1/2	22 1/2	25 1/2	27 1/2	28 1/2	30 1/2	32 1/2	34 1/2	35 1/2	37 1/2
G	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
H	1	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
I	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
J	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
K	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
L*	85	92	92	98	98	105	102	106	114	114	118	123	126	135	144	150	162	172

*OVERALL MAXIMUM FILL HEIGHT

10 Qt. thru 1000 Gallon "U12S" Tanks



NOTES:

- D HP 230/460V, 60C, 3PH, TEFC, NEMA C-FACE MOUNT MOTOR (3450 RPM)
- E LEE FLUSH BOTTOM BALL VALVE WITH TRI-CLAMP END CONNECTOR
- H WIDE CHANNEL
- I HP 230/460V, 60C, 3PH, TEFC GEAR MOTOR

CAPACITY	25	50	75	100	125	150	200	250	300	400	500	600	700	800	1000
A	23	26	30	34	36	38	42	46	48	54	58	64	68	76 1/2	1000
B	42 1/2	51 1/2	53 1/2	55 1/2	58 1/2	60 1/2	63 1/2	66 1/2	71 1/2	82 1/2	84 1/2	84 1/2	84 1/2	85 1/2	85 1/2
C	22 1/2	31	33 1/2	35	38	40	43	45 1/2	51	62	62	62	62	62	62
D	1 1/2	5	5	7 1/2	7 1/2	7 1/2	7 1/2	15	15	15	25	25	25	25	40
E	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	3
F	39	43	45	47	48 1/2	51 1/2	53 1/2	60 1/2	61 1/2	64 1/2	67 1/2	73 1/2	75 1/2	76 1/2	82 1/2
G	33 1/2	35 1/2	36 1/2	38 1/2	38 1/2	38 1/2	38 1/2	45 1/2	45 1/2	46 1/2	46 1/2	52 1/2	52 1/2	52 1/2	53
H	12	17	17	17	17	17	17	21	21	21	21	21	21	21	21
I	1	1	1	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	10
J	74 1/2	89 1/2	92 1/2	95 1/2	96 1/2	100 1/2	103 1/2	110 1/2	116	127	132 1/2	134 1/2	134 1/2	134 1/2	138

NOTE: All dimensions are for general reference only. Consult engineering drawings for exact dimensional data.

Particle Size Reduction

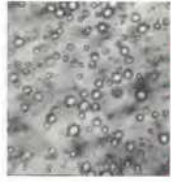
Recently, Lee Industries conducted a particle size reduction test. A 25 gallon style 'D12T' Lee pressure kettle with Tri-Mix Turbo-Shear agitator was used. Initially, the preparation by approximate weights consisted of: epoxy resin (25%), emulsified in water (29.54%) with cellulosic thickener (20%), and surfactant (.30%). After five minutes of mixing with the double-motion scraped-surface agitator at 30 RPM, the resultant particle size was 55 microns. The double-motion agitator was run for an additional 55 minutes. Particles were reduced



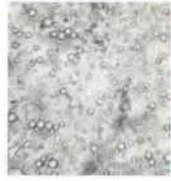
Particle size - 55 microns.



Particle size - 30 microns.



Particle size - 5 to 7 microns.



Particle size - 2 microns.

to 30 microns. The double-motion agitator was shut off, and the 3,600 RPM Turbo-Shear with a standard head configuration was utilized. Samples examined after an additional 25 to 40 minutes of high-shear agitation yielded particles of 5 to 7 microns. Up to this point the product had been agitated one hour with the double-motion agitator and one hour with the Turbo-Shear agitator. Cellulosic thickener (1.04%), flint (20.48%), and pyrophyllite (25.43%) were then added. The double-motion and Turbo-Shear agitators were run simultaneously for one hour. Final particle size was 2 microns. Final product viscosity was 40,000 CPS.

Batch Processing Vessels from LEE processing solutions from Lee

Lee Industries, Inc. Process Systems and Equipment Division designs and manufactures the highest quality stainless steel tanks, kettles, reactors, blenders, and specialty mixing vessels for the cosmetic, food, specialty chemical, pharmaceutical, and bio-tech industries.

OUR CAPABILITIES INCLUDE:

- Fastest guaranteed lead times
- Prevalidation documentation
- In-house electropolishing
- Certified in-house sprayball testing
- Fully equipped Pilot Plant Test Facility
- ASME code certified field service crews
- Engineering assistance/unsurpassed customer service
- Over 70 years of quality craftsmanship

Our Applications and Design Engineering Departments are available to assist you in choosing and custom designing equipment to meet your specific needs.



Jacketed Vacuum/Pressure Vessels

OUR COMPANY HISTORY

During its 70+ year history of continuous manufacturing operations, Lee Industries, Inc. has grown from a fabricator of metal parts, to a designer/manufacture of complete sanitary processing systems. Lee Industries started in business in 1925, producing the first nickel kettles, a manufacturing innovation at the time. Lee equipment is in service throughout the world in major pharmaceutical, cosmetic, food and chemical industries. In 1935, Lee introduced the first offset centerline scraper agitators and in 1938 the first stainless steel kettle for the food processing industry. Throughout its

history, Lee has always demonstrated innovative design and engineering expertise.

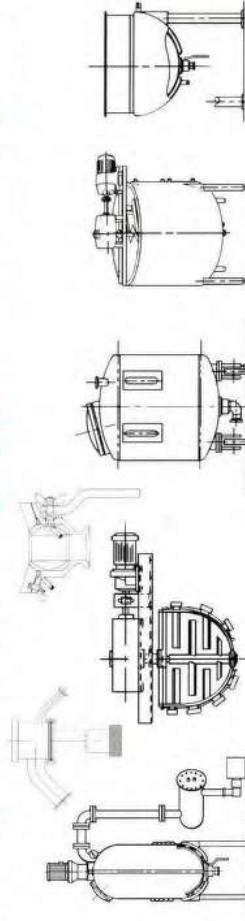
This, combined with quality craftsmanship and unsurpassed customer service, has made Lee a leader in the sanitary processing equipment field.

In 1976, to provide more personalized customer service, Process Systems and Equipment was formed as a division of Lee Industries, Inc.

Process Systems and Equipment's experienced Applications Engineers will be happy to help you when your needs demand the finest in stainless steel processing equipment. To discuss your particular needs, or for any special application information, please contact Process Systems and Equipment at the address or telephone number given on this brochure.

LEE . . .

Quality Crafted Processing Equipment and Sanitary Valves



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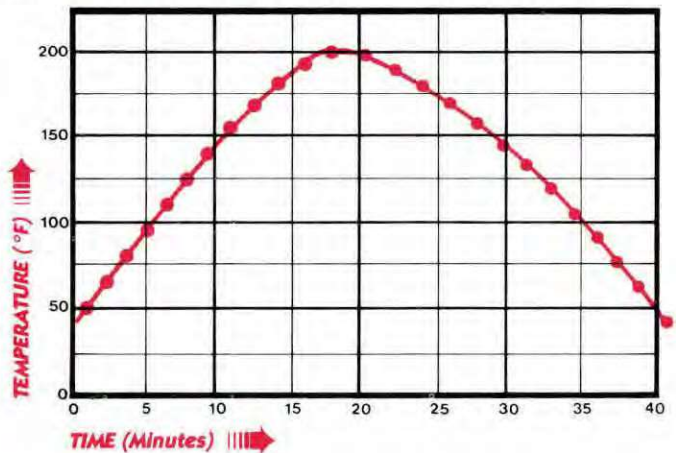
ELIMINATE HEAT EXCHANGERS

1,000 GALLONS COOLED FROM 200°F to 45°F in 25 MINUTES !

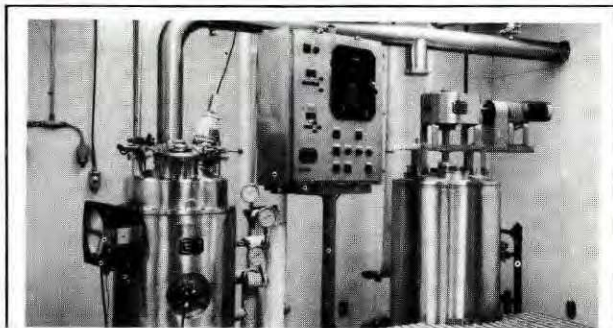
HEATING/COOLING CYCLE

The graph (to the right) illustrates the effective heat transfer capability of a scraped surface, Uniflow jacketed vessel and the rapid cooling rate accomplished by vacuum cooling. This heating/cooling cycle is typical for many cream or tomato base sauces. The particular application as shown here processed 1,000 gallons of red sauce with vegetables.

Maximized heat transfer area, a double motion scraped surface agitator, and 100 PSI steam account for the rapid heating of the product from 45°F to 200°F. The product was then cooled to 45°F by means of a three-stage eductor system. Additional water was added during the heating phase to replace the vapor loss during cooling. If desired, lower temperatures can be obtained. Product taste, color and consistency were found to be superior to conventional heating/cooling methods.



TEST YOUR PRODUCT IN OUR TEST LAB



LEE Heating/Cooling Vacuum Test Facility

CASE STUDY

In this unique application of a LEE 50 gallon 'U9MS' tank with pressure and vacuum capabilities, a special pinto bean recipe was processed for product evaluation by the customer.

Using continuous double motion agitation (25 RPM), a batch recipe of beans (100 lbs.), oil, spices and 45 gallons of water (300 lbs. for processing and 75 lbs. for evaporation) was brought to a boil, pressurized and cooked for 45 minutes at 245°F (12 PSIG). After this cooking cycle, the pressure was released and sauce added to the recipe.

The system was then placed under a vacuum using a three-stage eductor that gradually lowered the temperature of the batch to 55°F in 25 minutes.

The evaluation of the resultant product batch revealed a consistently thick, pasty base with only a small percentage of whole beans that proved to be thoroughly cooked as were the

bean pieces that made up the majority of the final batch. Further, a very favorable maintenance of flavor and spice integrity was retained through the processing cycles.

The consistency of the product is controlled by varied cooking times and/or agitation intensity. This process can be scaled-up to 1,000 gallon batches with the same cooking and cooling times.

- Cook, cool and mix - in the same vessel, up to 3000 gal. (Batch cooling in less than 30 min.!)
- Exceeds USDA cooling requirements.
- Maintains particle identification.
- Gives superior quality control with low maintenance.
- Has great versatility while increasing productivity and efficiency.
- Uses Uniflow coil jacket for cooking (most efficient on market) with double-motion agitation for gentle/heavy-duty mixing needs.
- Decreased number of positive displacement pumps with shorter process piping runs.
- Maximized product yields with closed sanitary system with sterilization, also low maintenance which means cost savings on direct labor.
- Greater flexibility and control with reduced freezer energy consumption.
- No burning due to line failures.
- No recirculation needed.
- No product integrity lost.

For more information call or write:

PROCESS SYSTEMS & EQUIPMENT



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