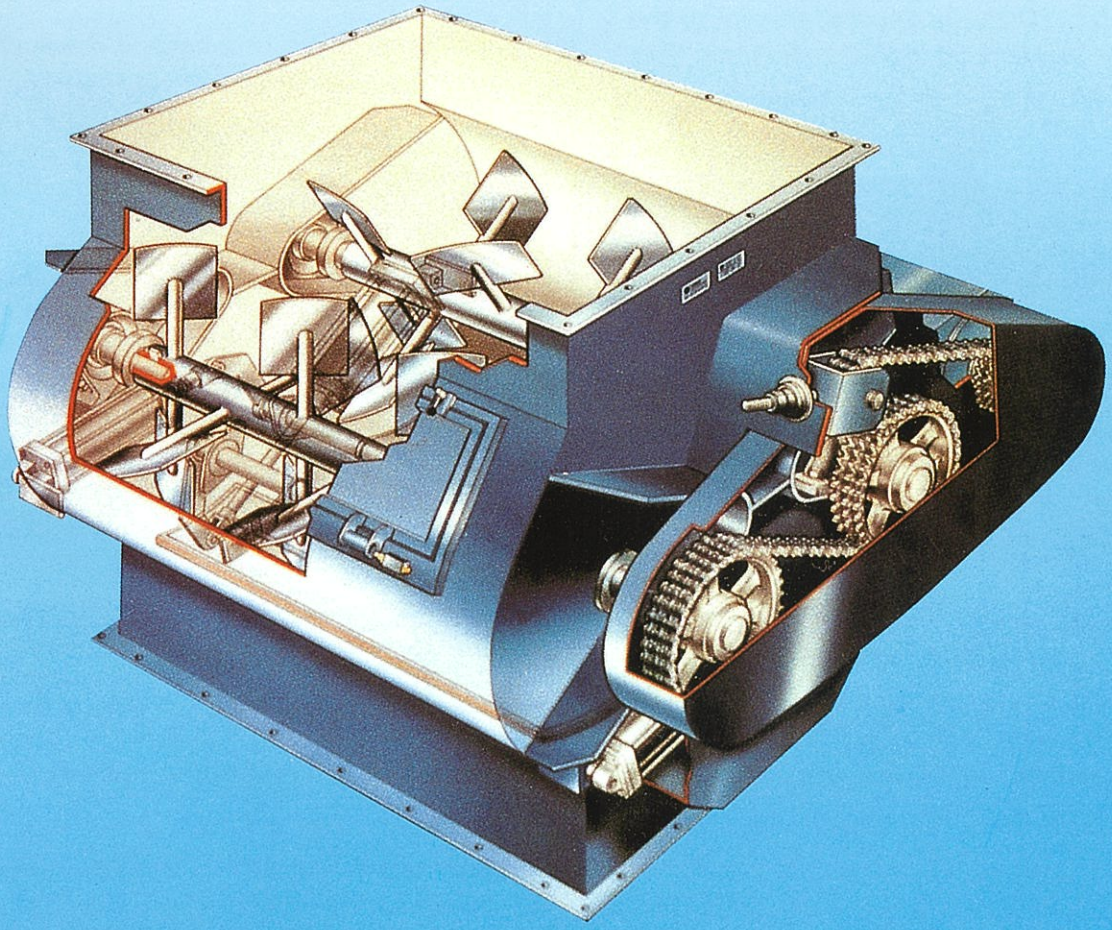
STAR-FORBERG MIXERS

«THE FLUIDIZED ZONE MIXING SYSTEM»

The mixing system giving quality mixes regardless of particle size and density



We have solved the problems, with short mixing time and low speed.

QUALITY MIXES

We have solved the problems of:
- segregation during mixing.
- addition of minor ingredients.
- addition of liquids.
- accurate mixing.
- heat generation in the batch.

Due to short mixing time and low speed, we achieve:
- gentle mixing action.
- low power consumption.
- high capacity per hour.

The Star-Forberg Mixers were developed to offer high quality mixes. It takes only from 5-15 seconds to mix dry ingredients. Liquid additions are also fast and easy to enter into the mixer.
Although the machines perform efficiently at the rated capacity, the individual performances may vary according to the fill of the ingredients. Most applications will mix in 15 seconds from a range of ±20-30% of batch capacity.
*Normal fill (100%) is approximately to the top of the horizontal paddle shafts.

TYPICAL USES

FOODS
Cereal mixes, vitamin coating, mixing of frozen vegetables, mixed nuts, glazings, flour mixes, cake mixes, snack foods, drink powders, meat- and fat mixes, coffee mixes, spices and animal feed.

CHEMICALS
Fertilizers, pesticides and herbicides, treating grains with fungicide, detergents, bleaches, treating activated charcoal, colour pigments, pharmaceutical- and cosmetic products.

METALS
Zinc dust with lime, metal powders.

ABRASIVES
Carborundum, drilling-mud, crystal glass-mixes.

PEAT-PRODUCTS
Growing media with perlite and fertilizers.

PRINCIPLE OF OPERATION

The Star-Forberg Mixers were originally designed to solve a critical mixing problem where minor ingredients had to be evenly dispersed into a major ingredient. The major ingredient varied in particle structure, and weight from moisture. The minors consisted of very light large particles, and also very fine heavy metallic powders. Dispersions were as low as 1.4 parts per 10 million by volume, i.e. 0.14 parts per million; and the weight ration was 70 to 1. The product had to be produced in high volume.

1. Distributing a minor ingredients requires a controlled, organized and randomized transport system. If you can transport each particle into direct relationship with all the others, you have a homogenous mix.

2. The mixer must overcome the natural forces that make particles want to come apart. In this case, these forces were particle size differential, and particle weight differential.

3. Efficiency could be increased drastically by elimination of gravity in the mixing zone.

4 Segregation on discharge had to be reduced to a minimum.

There are several technical papers published on the natural forces causing particles to roll apart. From these papers and our own tests we found the following:

Very fine particles, under 50 micron, tend to separate because of weight of the particle. Over 50 micron, the particle size differential is the largest cause of segregation. This can be measured at a diameter ratio as low as 1.03. At a ratio of 1.2, segregation is substantial.

Because particle sizes are impossible to control within these ratios, mixers vary in performance from batch to batch. To get uniformity, we believe you need the ability to mix faster than the natural forces can react. In addition to elimination of gravity, this needs tremendous particle movement.

The variance between batches caused by variance in particle size is reduced to just a few seconds. We produce a highly homogenous mix each batch, and by using a time over 15 seconds we can repeat our performance from batch to batch. It is this performance that makes the mixer ideal for automation.

Segregation on discharge is greatly reduced by using two bombay doors to slug-move the material, so it does not roll apart. Highly segregating products can be slugged through one door. Typical unload time is 5 to 7 seconds.

LIQUID ADDITIONS

Liquid additions are fast and a wide range of viscosities can be applied. We use two basic techniques that take advantage of wiping action from the tremendous particle movement, and/or the organized transport system.

For materuals where the liquid stays on the surface for a few seconds, our wiping action will disperse the liquid very quickly. For example, 8% molasses can be put on pellets in 15 to 30 seconds, and cycle the machine on one minute.

For absorbent materials, the organized transport brings all the particles past a point every few seconds, and we spray liquid at a slower rate. If particles or liquid tend to stick to the machine, we have a «patent applied for» apparatus that distorts flow of materials returning to the bottom of the mixer so the liquid can be applied directly to the material without exposing the machine mechanism. For example, 15% molasses can be added to mash in 45 seconds.

DEMONSTRATIONS

In order to show the efficiency of the Star-Forberg Mixer, samples were taken from different places in a 20 litre mixer. They were analyzed (see fig. 1 and 2),anc the data were put on a graphical curve (see fig. 4). The ingredients used in this demonstration were limestone and synthetic resin (see fig. 3).

During another demonstration (fig. 5-8), the ingredients consisted of salt and charcoal powder.

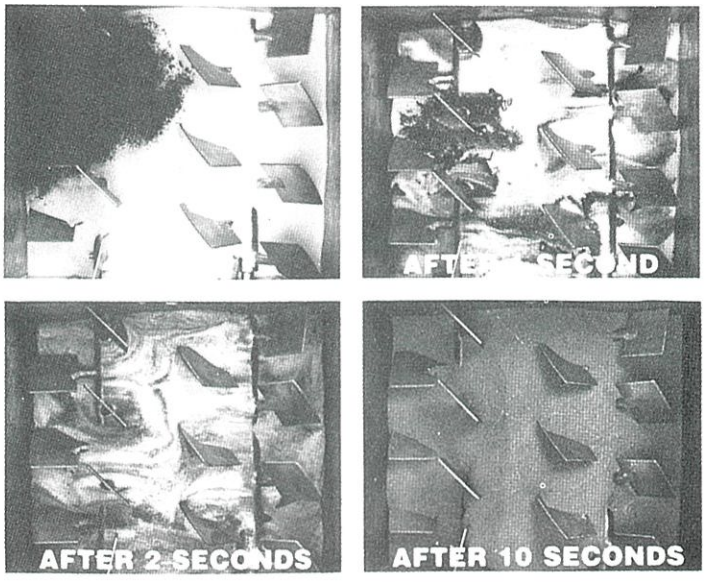


Fig. 5-8

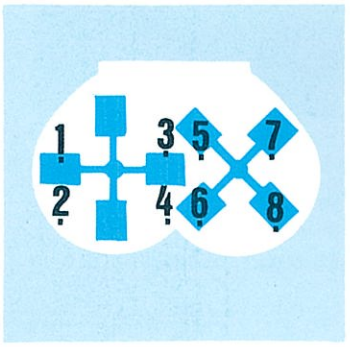


Fig. 1 An end view shows where the analysis-tests have been taken out.

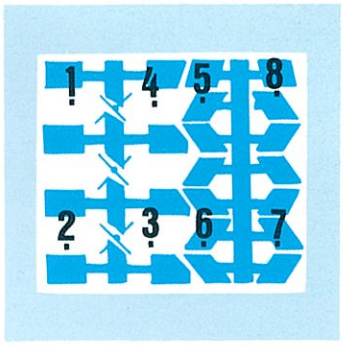


Fig. 2 A horizontal view shows where the analysis-tests have been taken out.

SAMPLE	LIMESTONE	SYNTHETIC RESIN
WEIGHT	20 KG	2 KG
PARTICLE SIZE	10—50	250—1000
DENSITY	1,4	0,8

Fig. 3 Specifications of test materials.

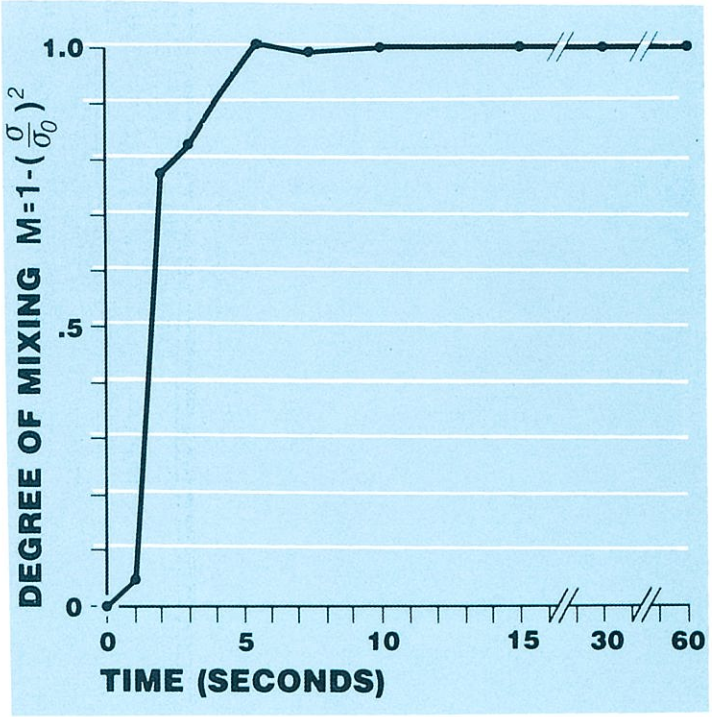
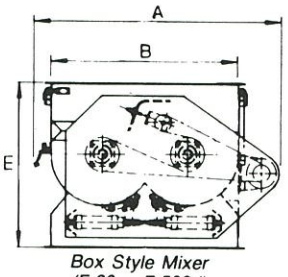
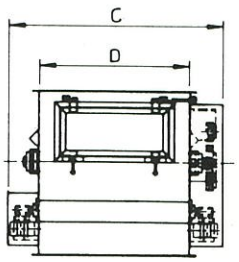


Fig. 4 A typical mixing-curve based on tests.

DIMENSIONS

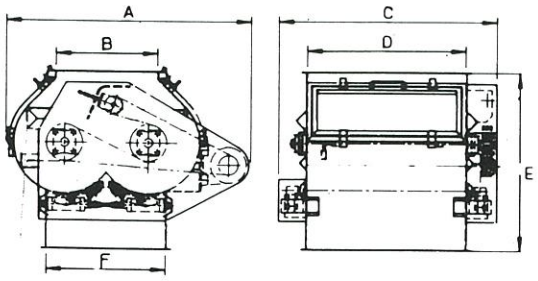
The following information has been included to assist you in planning. The information provided is the most accurate to date. However, we reserve the right to improve, change or correct published information without prior notice.



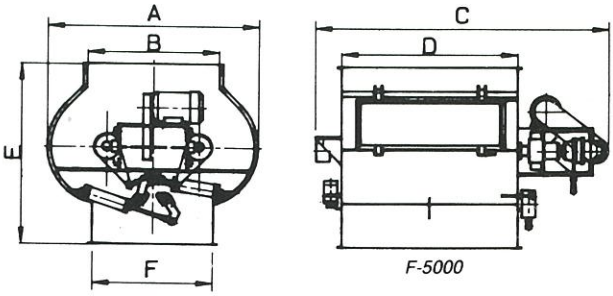


Box Style Mixer
(F-20 – F-500 l)

STANDARD MIXERS



F-750 – F-3600 L



F-5000

The weight of the machines is subject to large variantions pending on the choice of material and equipment. The approx weight of each individual machine can be submitted as soon as the specification of the unit to suit the customers particular application is known.

Model	Batch Cap. *litres (cu. ft.)	STD KW (HP)	Dimensions - mm (in) A	B	C	D	E	F
F-6	6 (0.21)	0.37 (0.5)	500 (19.7)	370 (14.6)	710 (28.0)	195 (7.7)	440 (17.3)	
F-20	20 (0.70)	0.75 (1.0)	660 (26)	470 (18.5)	900 (35.5)	400 (15.75)	485 (19.9)	400 (15.75)
F-60	60 (2.1)	2.2 (3)	910 (35.4)	680 (26.8)	930 (33.5)	570 (22.4)	610 (24)	
F-120	120 (4.2)	3.0 (4)	1155 (48.4)	840 (36.6)	1140 (47.6)	720 (28.3)	930 (36.6)	
F-200	200 (7.1)	4 (5)	1310 (57)	1000 (42.8)	1300 (61.8)	850 (37)	950 (37.4)	
F-350	350 (12.4)	5.5 (7.5)	1630 (63)	1250 (52.8)	1490 (61.2)	1000 (42.9)	1100 (43.3)	
F-500	500 (17.7)	7.5 (10)	1720 (67.7)	1360 (57)	1650 (70.9)	1160 (49.2)	1180 (46.5)	
F-750	750 (26.5)	11 (15)	2010 (80.7)	850 (33.5)	1885 (87)	1320 (52)	1480 (58.3)	1000 (39.4)
F-1000	1000 (35.3)	15 (20)	2170 (89.2)	900 (35.4)	2060 (93.3)	1450 (57)	1560 (59)	1110 (44.1)
F-1500	1500 (53)	22 (30)	2445 (97)	1060 (41.7)	2350 (99.2)	1675 (65.9)	1725 (67.9)	1150 (45.3)
F-2000	2000 (70.6)	30 (40)		1180 (46.5)		1870 (73.6)	2040 (80.3)	1440 (56.7)
F-2500	2500 (88.3)	30 (40)	3020 (118.9)	1260 (49.6)	2780 (109.5)	1980 (78)	2180 (85.8)	1540 (60.6)
F-3600	3600 (127.2)	37 (50)		1750 (68.9)		2320 (108.7)	2400 (86.6)	1600 (63.8)
F-5000	5000 (176.6)	55 (74)	3132 (123.3)	2000 (78.7)	4670 (183.8)	2500 (98.4)	2400 (94.5)	2000 (78.7)

*Normal batch capacity, 100% filling, is approximately to the top of the horizontal paddle shafts.

The mixer is patented worldwide and is manufactured by Star Union Engineering Pte Ltd under licence of Forberg International Ltd A/S., Norway.

NISMIX MACHINERY & DISTRIBUTION
(A Division of Star Union Engineering Pte Ltd)
10 Third Lok Yang Road Singapore 628005. Tel : (65) 6262 2213 Fax : (65) 6262 2210
Email : nismix@singnet.com.sg Website : www.nismix.com