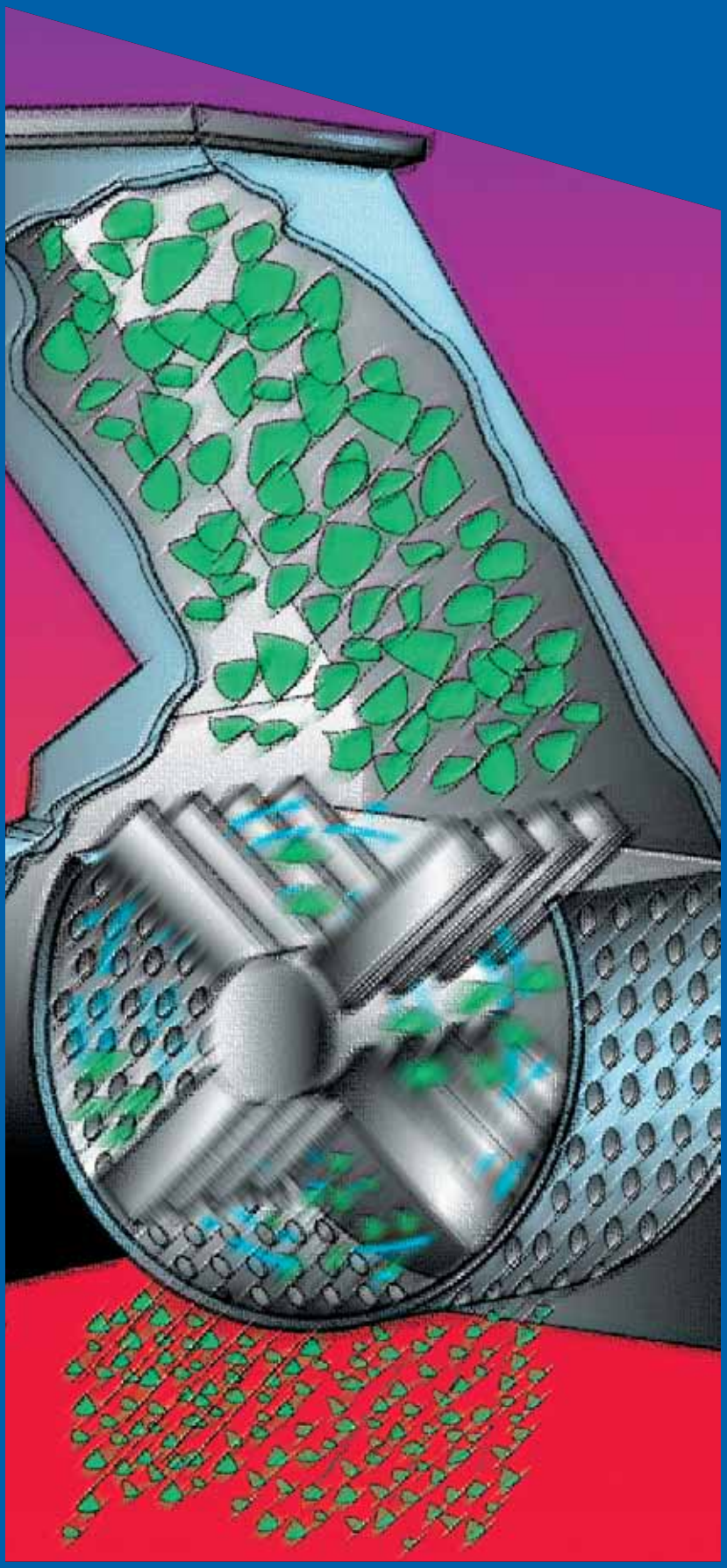
Size Reduction Systems



FITZ®MILL

Controlled particle size reduction.

Predictable results.

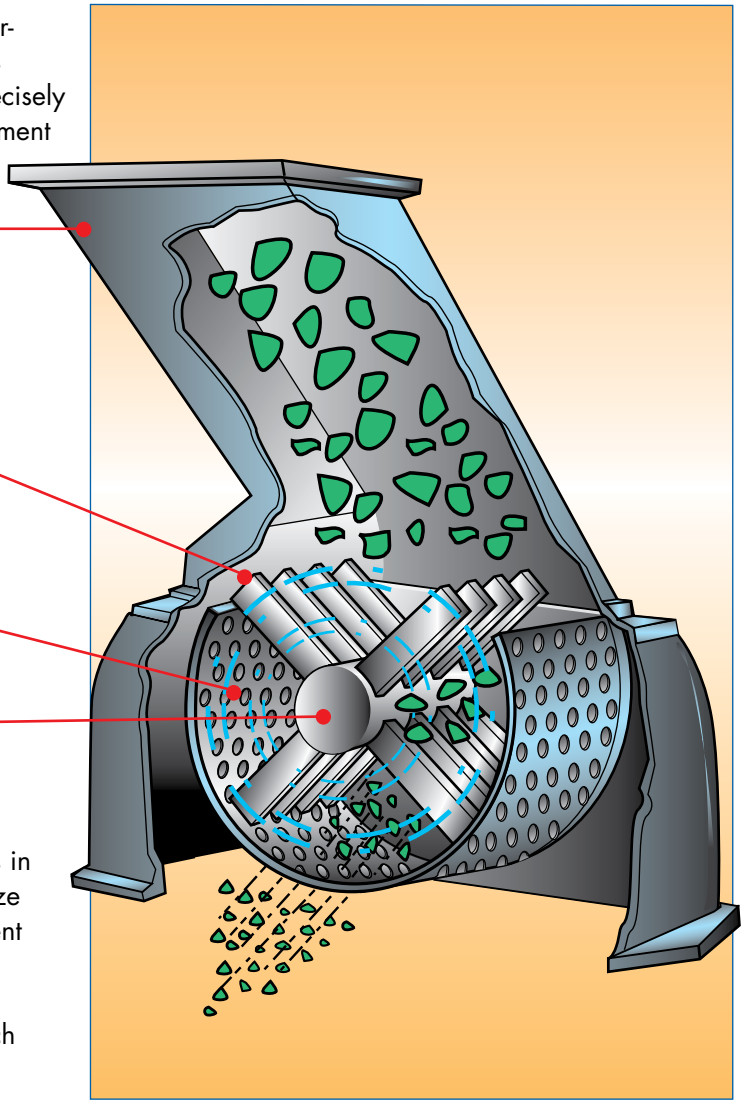
The Fitzpatrick Company

The Process

com·mi·nute (kŏm ‘ə-nōōt’) *tr. v.*

Controlled size reduction with predictable and repeatable results.

Comminution has evolved into more than hammer-milling or grinding. The Fitzpatrick Company has perfected FitzMill® comminution equipment to precisely control the particle size reduction process. Equipment variables that affect process results include:



THE FEED THROAT
Introduces material on a tangential path to the comminuting chamber.

BLADE PROFILE
Helps determine degree of reduction based on material being processed

SCREEN TYPE
Helps regulate particle output within a specified size range

ROTOR SPEED
Works with screen to regulate particle output within the size range

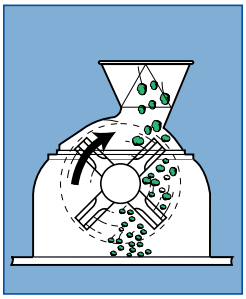
THE BENEFITS OF CONTROLLED PARTICLE REDUCTION
Particle size affects any number of characteristics in the manufacturing process. Controlled particle size helps assure that your production will be consistent and repeatable with respect to:

- COLOR - uniform particles assure batch-to-batch color consistency
- TASTE - allows precise portion control for consistent taste
- FLOWABILITY - critical to packaging, tableting, weighing
- UNIFORMITY - consistent bulk density
- DENSITY - helps control shipping costs and minimize dust
- RECONSTITUTION - assures the desired dissolution rate
- CHEMICAL REACTION - vital for uniform, controlled chemical change

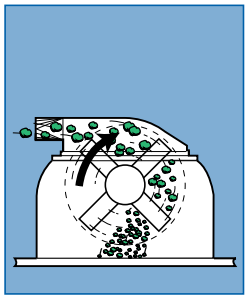
THE FEED THROAT

(SEE PAGE 10)

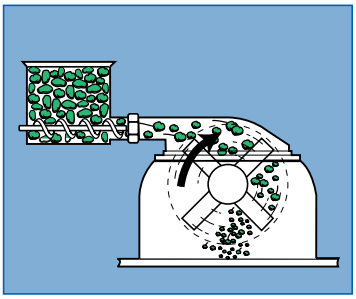
Controllable comminution requires that product be introduced into the processing chamber on a tangential path relative to the machine's milling blades. FitzMill feed throats provide exacting control over feed angle, assuring consistent, predictable results. Fitzpatrick offers a wide range of standard and custom throats. If your process requires heat transfer or introduction of inert gas, a special throat can be provided.



Forward, vertical inlet - best for fragile material



Horizontal inlet - best for fine grinds

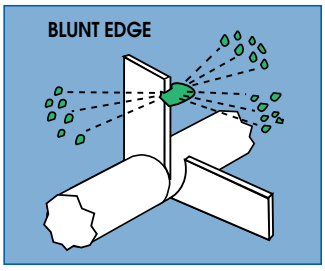


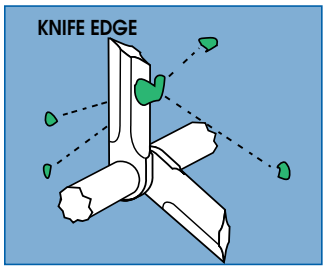
Throat with automatic feed assures uniform feed rate

ROTOR/BLADE ASSEMBLY

(SEE PAGE 9)

At the heart of the each FitzMill® comminutor is a rotor and blade assembly. Blades may be fixed or swinging, and can be either knife-edged for gentle granulation or impact-edged for more aggressive reduction. Blades with one edge type on either side are also available for versatility. A variety of blade profiles assures the best match for your product requirements.





SCREEN TYPE AND ROTOR SPEED

(SEE PAGE 8)

For every combination of rotor speed and screen, particles in a certain size range are permitted to pass through the FitzMill's screen and exit the machine. Higher rotor speeds flatten the approach angle of a particle relative to a screen's surface, effectively reducing the screen's hole size (see Figure A). A circular hole, for example, appears elliptical, thereby allowing only smaller particles to pass through. At slower speeds, the approach angle increases, allowing larger particles to pass through. As screen gauge increases, opening size must also increase to maintain desired particle size (see Figure B). Variable rotor speed and screen interchangeability make it easy for a single FitzMill to produce a variety of results.

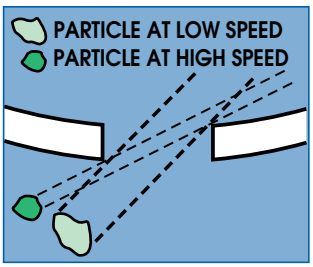


Fig. A

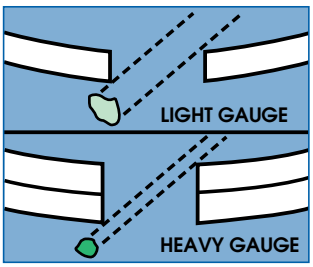
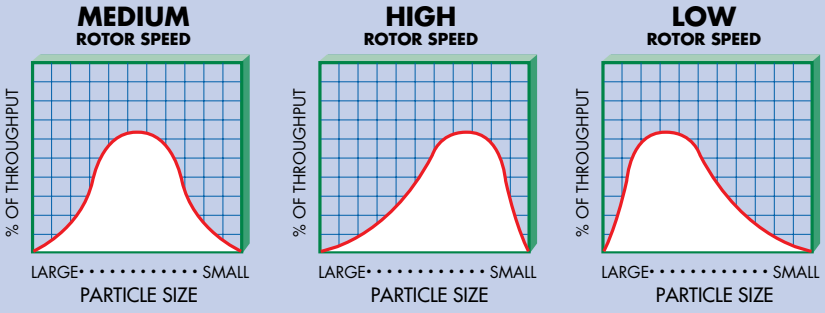


Fig. B

HOW ROTOR SPEED AFFECTS PARTICLE SIZE



The FitzMill®

QUALITY BEGINS WITH THE FITZMILL CHAMBER

At the heart of every FitzMill is the comminuting chamber. Fabricated from stainless steel or special alloys, it houses the rotor, blades and screen. FitzMills are engineered to make the chamber accessible for easy cleaning, inspection and maintenance.

REVERSIBLE ROTOR ENHANCES VERSATILITY AND BLADE LIFE

You can quickly reverse the rotor on many FitzMills, thereby reversing the blade edges to accommodate a different process (i.e., switch from the knife to the impact edge). Where both edges are identical, reversibility can effectively double blade life.

EASY TO CLEAN AND MAINTAIN

Save time and expense. A FitzMill disassembles quickly for fast, easy cleaning. Minimal routine maintenance is all that's needed for years of trouble-free service.

SAFETY FEATURES PROTECT PERSONNEL

The entire machine can be shielded for noise attenuation. Moving parts, such as flywheels and belts, are fully-enclosed in guards. A safety interlock prevents the machine from being activated when rotor and blades are exposed. Feed and discharge openings feature protective grid bars that discourage milling chamber access while the machine is operating. Where grid bars in the feed opening are not practical, a special reverse-S (RS) design feed throat can be provided. The reverse-S can prevent access to the rotor blades without obstruction to product entry.

Safety Grid Bars at Inlet

RS Design Feed Throat

MOTORS AND CONTROLS FOR EVERY APPLICATION

Drive motors are available for virtually every worldwide electrical standard, for variable or single speed operation, and with special service and temperature ratings including explosion-proof, washdown and TEFC. Convenient, customized controls can be provided either machine-mounted, remotely-mounted, or in a mobile enclosure.

FitzMill® Comminutors

For Small, Medium or Large Scale Production

TYPICAL APPLICATIONS

- Coarse grinding and chopping of dry material
- Size reduction of wet material
- De-lumping of agglomerated material, wet and dry
- Pulverizing
- Solid/liquid blending
- Granulating compacted material
- Processing slurries and liquids
- Processing and conditioning wet and dry materials
- Pureeing and emulsifying

AIR PERMEABLE DUST RETAINER

Using a dust retainer to connect the mill discharge to the product container will contain the material being processed and vent the process air created by the rotor. Dust retainers are a common spare part which can be provided for any drum size.

THERE'S A FITZMILL FOR YOUR APPLICATION AND ALL THE HELP YOU'LL NEED TO SPECIFY IT

Achieving your particle size requirements begins with application testing in one of Fitzpatrick's laboratory facilities. Every effort will be made to duplicate your exact production conditions to assure reliable test results. Test data will be used by your Fitzpatrick sales engineer to determine the best FitzMill configuration for your processing needs.

S-DAS06
This manually-fed, belt-driven Model D features a standard throat, is available with reversible rotor, and can be furnished with a selection of blades and screens to meet any application need.

THE FITZMILLS SHOWN ON THESE PAGES REPRESENT ONLY A FEW MODELS OUT OF HUNDREDS OF CONFIGURATION POSSIBILITIES.

VFS-DAS06

VFS-FAS020

The feed system on a Variable Feed Screw (VFS) FitzMill Comminutor is constructed of all stainless steel with disassembly and cleaning in mind. The VFS System provides greater efficiency when grinding to finer particle sizes.

This **SPV-FAS020** incorporates a shroud for sound attenuation. The panels are constructed of stainless steel outer shells with lightweight, sound attenuating pads made of F.D.A.-approved materials. The shroud is made with removable panels for easy cleaning and maintenance.

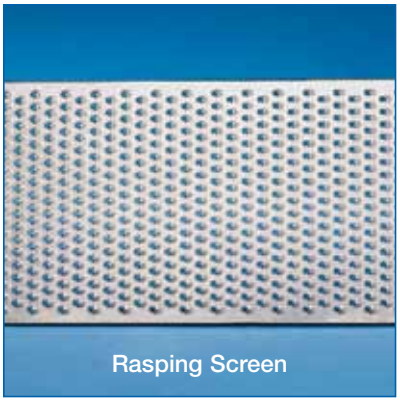
SPV-FAS020

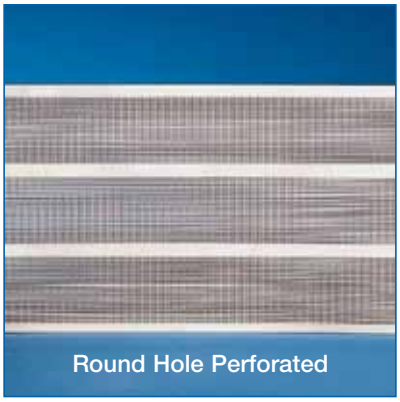
SPV-HAS030

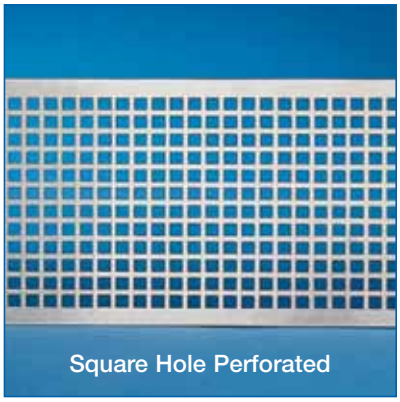
SPV-DKAS012

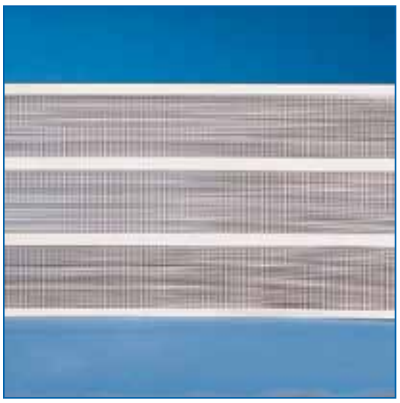
FitzMill Comminutors supplied with SPV, open type, feed throats are designed to accommodate special installation requirements.

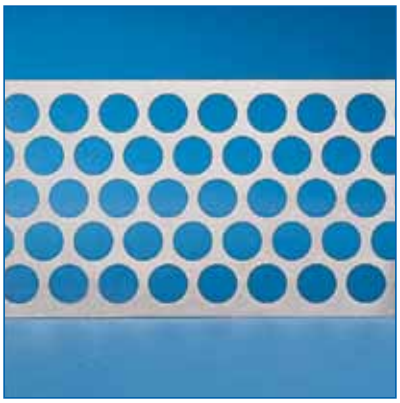
FitzMill® Screens

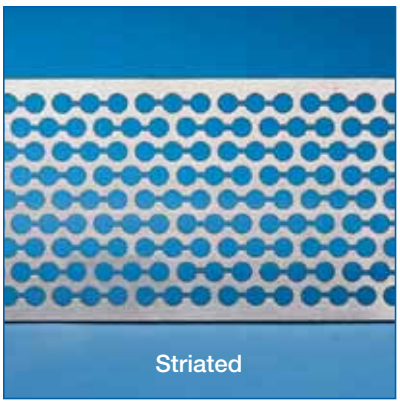

Rasping Screen


Round Hole Perforated


Square Hole Perforated






Striated

A complete selection of screen types and sizes is available to produce the particle sizes you require. Screen openings generally vary from 0.30mm (.012") to 38mm (1.5") with round or square perforations, diagonal or straight slots, or with a rasping surface. Special fabrication techniques assure long service life. Screen construction is often customized to meet specific customer requirements. Your Fitzpatrick sales engineer can help you make the right selection.

FitzMill® Blades And Rotor Assemblies

OVERVIEW

Proper blade style selection is important to assure the desired particle size. When pureeing or pulverizing, impact edges are preferred. When sizing, chopping or granulating, knife edges are usually best. Reversible blades, featuring a knife and blunt edge, are available for application versatility.

Fixed or removable tip blade assemblies are offered. Fixed blades feature one-piece construction and simply slide onto a spline to create a complete rotor assembly. Removable tip blades feature a shank that slides onto the rotor. A blade tip is then bolted to the shank. Using either system, blades are positioned on the spline to create the most efficient cutting or impacting pattern.

575

790 Double Coverage

225

625

BLADES FOR ABRASIVE PRODUCTS

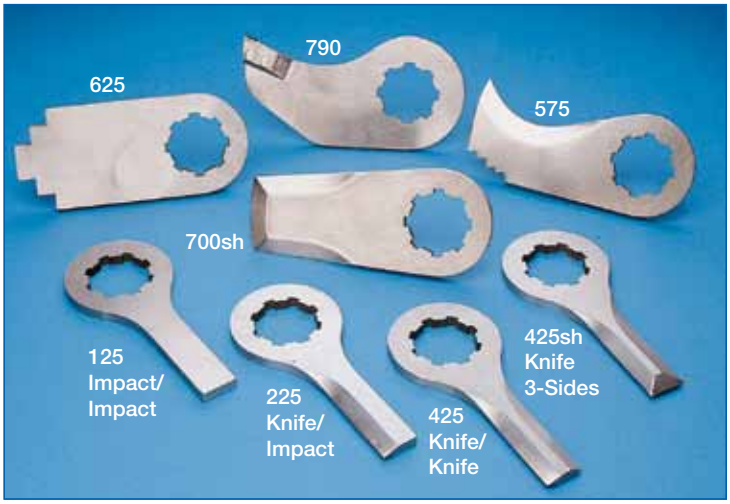
Wear-resistant inserts and coatings can be applied to many blade styles to extend their life in abrasive applications. Fitzpatrick's removable tip blades enable replacement of worn tips without disassembling the rotor.

BLADES FOR USDA

Special gasketing can be provided between blades to meet USDA guidelines.

BAR ROTOR

A bar rotor can be supplied when the most gentle form of reduction or de-lumping is required.



Carbide Inserts

Removable tip blades for abrasive products

Feed Throats

Selecting the proper feed throat for your FitzMill comminutor will partially determine the blade force and action imposed upon feed material, thereby affecting particle size.

Inlet location on the feed throat affects particle size distribution. A horizontally situated inlet exposes product to more break-up surface area, producing a finer grind. The addition of breaker bars on inner surfaces of a feed throat produce yet finer grinds. A forward, vertical inlet minimizes break-up and immediately exposes more material to the screen yielding larger-sized particles.

A wide range of interchangeable feed throats is available to optimize your FitzMill's versatility.

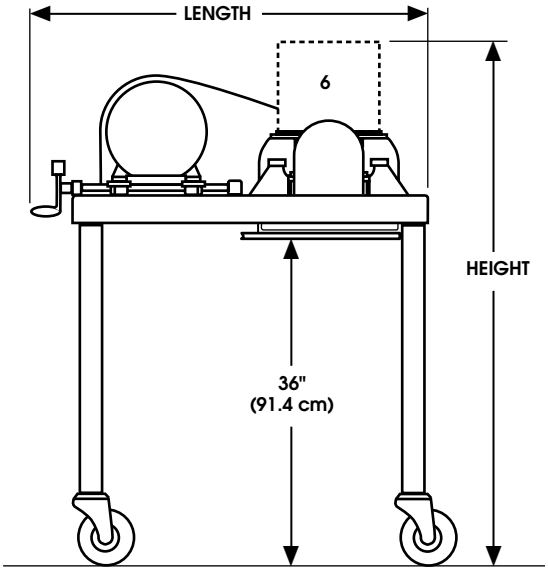
Liquid Inlet

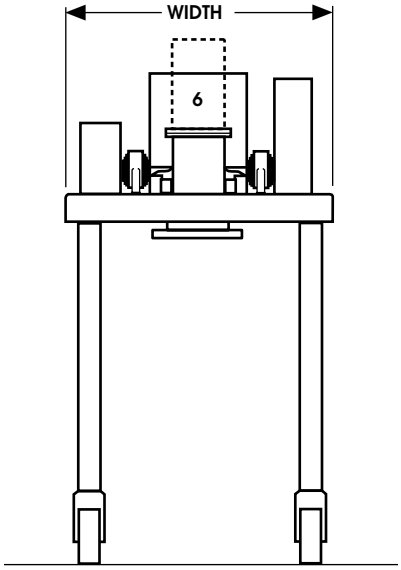
Breaker Plate In Feed Throat

VARIABLE FEED SCREW (VFS) SYSTEM

Overfeeding can cause unpredictable results; starving can produce a wider-than-desired range of particle sizes. The FitzMill can be built with a variable feed screw (VFS) option to assure precisely controlled feed rate. A VFS helps minimize waste, eliminates operator variables, and achieves particle uniformity.
It is also preferred when finer grinding is required.

Machine Specifications

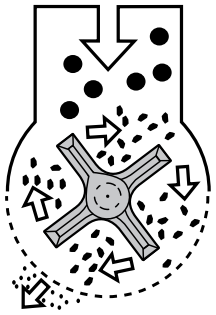




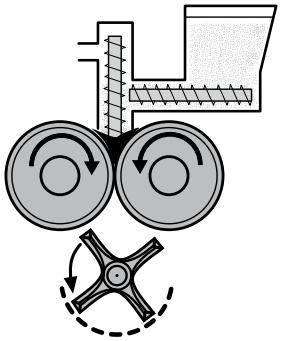
	CHAMBER				ROTOR	MACHINE LIMITS		APPROX. DIMENSIONS[5]		
MODEL	CAPACITY FACTOR[1]	NOMINAL WIDTH	SCREEN AREA	ROTOR DIAMETER[2]	NUMBER OF BLADES	MAXIMUM RPM[3]	MAXIMUM HORSE POWER[4]	LENGTH	WIDTH	HEIGHT[6]
L1A	.07	1 in	8.5 in²	5.4 in	8	9,000	.5	18.5 in	15.4 in	20 in
		2.54 cm	55 cm²	13.7 cm				46 cm	40 cm	50 cm
Homoloid (J/JT)	0.4	2.5 in	43 in²	6.625 in	12	7,200	10.0	38 in	30 in	52 in
		6.3 cm	277 cm²	16.8 cm				.96 cm	.76 cm	1.32 cm
M5A	0.7	4.5 in	76 in²	8.0 in	16	6,100	3.0	32 in	26 in	55 in
		11.4 cm	490 cm²	20.32 cm				.81 cm	.66 cm	1.39 cm
D6A	1.0	6 in	109 in²	10.5 in	16	7,200	5.0	35 in	31 in	63 in
		15.24 cm	703 cm²	26.67 cm				.89 cm	.78 cm	1.60 cm
DAS06	1.0	6 in	109 in²	10.5 in	16	7,200 (DK) 9,000	15	42 in	30 in	66 in
		15.24 cm	703 cm²	26.67 cm				1.07 cm	.76 cm	1.68 cm
DKAS012	2.36	12 in	257 in²	10.5 in	32	6,000	30	48 in	32 in	66 in
		30.48 cm	1658 cm²	26.67 cm				1.22 cm	.81 cm	1.68 cm
FAS08	1.83	8 in	199 in²	14.375 in	16	6,800	40	60 in	36 in	72 in
		20.32 cm	1284 cm²	36.51 cm				1.52 cm	.91 cm	1.83 cm
FAS012	2.83	12 in	309 in²	14.375 in	24	6,000	75	60 in	36 in	72 in
		30.48 cm	1994 cm²	36.51 cm				1.52 cm	.91 cm	1.83 cm
FAS020	4.85	20 in	529 in²	14.375 in	48	3,000	75	60 in	44 in	72 in
		50.80 cm	3412 cm²	36.51 cm				1.52 cm	1.12 cm	1.83 cm
FHAS020	4.85	20 in	529 in²	14.375 in	48	3,600	75	60 in	44 in	72 in
		50.80 cm	3412 cm²	36.51 cm				1.52 cm	1.12 cm	1.83 cm
HAS030	9.05	30 in	986 in²	17.25 in	80	2,400	150	68 in	60 in	75 in
		76.20 cm	6361 cm²	43.82 cm				1.73 cm	1.52 cm	1.90 cm

1. Throughput relative to Model D-6 at same Tip Speed
2. $RPM_2 \cong RPM_1$ (Diameter 1/Diameter 2)
3. With type 125, 225 or 425 blades
4. With V-belt drive at maximum R.P.M.
5. With typical throat and 36" (91.4 cm) between chamber discharge and floor
6. Consult with your Fitzpatrick Sales Engineer for proper throat selection

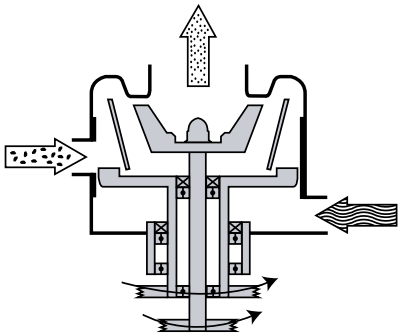
FITZPATRICK®



FitzMill® Comminutor
for precision particle size reduction



Chilsonator® Roll Compactor
for turning powder into granules



Fitz cM™ Classifier Mill
for fine grinding

SINCE 1930 WITH OVER 30,000 MACHINES SOLD WORLDWIDE

With the introduction of the FitzMill® Comminutor in the 1930's, Fitzpatrick has pioneered particle size reduction technology for a wide variety of industries. With a focus on providing process flexibility and repeatability, cleanable and sanitary designs, and robust equipment that is easy to use, the FitzMill® Comminutor is a trusted part of many processing installations worldwide.

The Chilsonator® Dry Granulation System was developed in the late 1950's as Fitzpatrick developed expertise in particle forming technology. Fitzpatrick has been constantly improving this dry agglomeration technology, improving both existing processes as well as opening up new and difficult applications to the many cost and processing benefits of dry agglomeration.

In 2006 Fitzpatrick introduced the Fitz cM™ classifier mill to further expand and enhance their particle size reduction capabilities. The Fitz cM™ classifier mill can achieve fine particle sizes, with integral classifying capability, to enhance the particle size reduction process.

Pharmaceutical, chemical, food, plastics and other industries utilize a wide range of Fitzpatrick machines. Specialized, as well as custom equipment and systems, are also developed for specific applications based on the ever-changing needs of process equipment users. Each unit is built to stringent quality standards to operate under the most demanding manufacturing conditions. Over the years, Fitzpatrick's tradition of innovation continues to support their processing expertise.

In 2011, Fitzpatrick joined a group of IDEX companies that focus on material processing technologies, and includes Quadro Engineering and Microfluidics. Quadro specializes in technologies for dry, wet and fine milling, fluid mixing, powder dispersion, emulsification, material conveying and handling. Microfluidics specializes in technologies for Nano-enabled Applications such as size reduction, cell disruption and "bottom-up" Nano particle creation.

This IDEX group maintains Centers of Excellence test and support facilities located around the world, to provide process development assistance as well as ongoing support over the life cycle of the equipment. At Fitzpatrick our goal is to be your trusted provider of creative process solutions.

FITZ-MILL

THE FITZPATRICK COMPANY

FITZ-MILL

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