



## **Conical Mills (Under-Driven)**

Sanitary size reduction milling machines for dry and wet processes in the pharmaceutical, food and related industries. Suitable for laboratory, pilot and full-scale production applications.



# Product Overview

**Conical mills are designed for milling processes in the pharmaceutical, food, chemical and related industries. The conical mill offers numerous benefits over alternative milling methods including higher throughput, tighter particle size distribution, easier cleaning/maintenance and less noise, heat and dust. They are suitable for a wide range of applications and offer full process scalability from laboratory to pilot to production.**

The Uni-Mill U-series (M05-U, M10-U, M20-U, M30-U) utilises the current industry standard under-driven conical mill design, featuring a gearbox-driven impeller, rotating inside a screen. This principle achieves comminution by compression or shearing of the particles between the impeller and surface of the screen.

The Uni-Mill under-driven models are designed with an optimal, spacer-less gap (to avoid metal-to-metal contact); this offers a major benefit compared with over-driven conical mills where the distance between the screen and impeller has to be set manually using spacers. This makes tooling changes on under-driven mills faster and easier, guaranteeing the closest possible gap every time. Other benefits include a more compact design, improved sanitary construction and in-line inlet and outlet offering higher throughput.

Hanningfield mills offer excellent flexibility and are available with a wide-range of screen and impeller tooling, helping to achieve the various required final particle sizes and throughputs. Conical mills are typically suitable for size reduction down to approximately 150 microns (80 mesh) with minimal heat generation and are suitable for both dry and wet milling applications.

As standard, all contact parts are manufactured from 316L stainless steel, with FDA compliant seals, gaskets etc. Non-contact parts such as frames, motor covers and control panels are manufactured from 304 stainless steel. All standard materials of construction and surface finishes can be upgraded or downgraded upon request.

The Hanningfield Uni-Mill is highly customisable and can be supplied mounted to mobile frame, swing-arm, height-adjustable hoist or freestanding. The inlet and outlet can be configured with options such as hand feed chute, valves, tri-clovers, BFM, vacuum adaptors or any bespoke design required for process integration.

The design can be further modified with features such as detachable mill-head, temperature monitoring, CIP, WIP, pre-breakers, nitrogen purging and ATEX execution where applicable. All equipment can be supplied with full validation documentation (FS/DS, FAT, SAT, IQ/OQ) and 3.1 mill certificates.

## Features:

- Stainless steel construction (with 316L contact parts)
- All seals FDA compliant (silicone, PTFE etc.)
- No metal-to-metal contact
- Easy-clean, GMP design (with optional features such as detachable millhead for autoclave or CIP/WIP)
- ATEX / Explosion Proof versions available

## Benefits:

- High throughput for maximum productivity
- Achieve various particle sizes on one machine, simply by changing screen and / or impeller
- Easy to operate
- Low heat, dust and noise generation for improved working environment
- Process scalability from lab to pilot to production

# Models

## Uni-Mill M05-U

The Uni-Mill M05-U is designed for laboratory and small scale applications. The unit features an 83mm diameter screen (3.25") with an 8" feed chute and 6" outlet. Achieve throughputs up to ~200kgs/hr (425 lbs/hr).



## Uni-Mill M10-U

The Uni-Mill M10-U is designed for pilot or low capacity applications. The unit features a 127mm diameter screen (5") with a 10" feed chute and 8" outlet. Achieve throughputs up to ~400kgs/hr (850 lbs/hr).



## Uni-Mill M20-U

The Uni-Mill M20-U is designed for a wide scope of production applications. The unit features a 203mm diameter screen (8") with a 12" feed chute and 12" outlet. Achieve throughputs up to ~2000kgs/hr (4250 lbs/hr).



## Uni-Mill M30-U

The Uni-Mill M30-U is designed for high capacity production applications. The unit features a 306mm diameter screen (12") with a 12" feed chute and 500mm v-clamp connection on the outlet. Achieve throughputs up to ~4000kgs/hr (8800 lbs/hr).



# Data Table

Criteria	Unit	M05-U	M10-U	M20-U	M30-U
Max. Throughput *	kgs/hr	200	400	2000	4000
	lbs/hr	425	850	4250	8800
Screen Diameter	mm	83	127	203	306
	in	3.25	5	8	12
Standard Motor	kW	0.375	1.5	4.0	7.5
	HP	0.5	2	5	10
Standard Speed	RPM	3600	2440	1480	960
Lowest Achievable Particle Size	Approx. 150 microns (80 mesh)				
Typical Noise Level	<78dB (under factory test conditions)				
Contact Parts	AISI 316L stainless steel (1.4404)				
Non-Contact Parts	AISI 304 stainless steel (1.4301)				
Country of Design & Manufacture	United Kingdom				

\*Capacities can vary according to application specifics (e.g. feed particle size, target particle size, material hardness).

# Tooling



## Screens

Screens are available with a wide range of hole sizes, and the following hole shapes: Round, Square, Slotted, Grater, and Conidur hole.



## Impellers

Impellers are available with the following arm profiles: round-bar, square-bar, bevel-bar, and reverse bevel bar. We can also engineer custom impeller shapes upon request.



## Spare and Care Kit

The Hanningfield Uni-Mill range can be supplied with a 'Spare and Care Kit' covering all your planned (and unplanned) maintenance requirements.

# Typical Applications



## Milling into Drum

The conical mill can be hand-fed allowing immediate discharge into the drum below (various methods of dust containment are available).



## IBC to IBC Milling

By positioning a bin above the mill, and another bin below the mill, product is released from the top IBC, milled, and then passes directly into the bottom IBC.



## Isolator Milling

The Uni-Mill is suitable for isolator integration using our 'through-the-wall' design. This mounts the milling head inside the isolator, whilst keeping motor and controls external.



## Table Top Laboratory Scale Milling

The Uni-Mill M05-U is suitable for table-top use, such as those performed in R&D or lab scale applications. Product can be milled into bags, drums etc (containment available).



## Wet Milling (Post-Granulation)

Milling after granulation increases the surface area of the material. This enables a faster, more consistent drying process downstream.



## In-Line Vacuum Transfer Milling

The Uni-Mill can be integrated with vacuum transfer systems for the automated loading or unloading of process machinery, with in-line conical milling (example application: unloading a fluid bed dryer).

# Specialist Features



## High Containment

The Uni-Mill can be designed as a closed system, through the incorporation of split butterfly valves, a closed loop system, or glove box milling. This protects the operator from exposure to harmful or toxic compounds. It can also be beneficial in applications where product integrity itself is critical, preventing contamination by operator or environment.



## Wet-In-Place (WIP) / Clean-In-Place (CIP)

Sprayballs can be used to speed up the cleaning process and help guarantee operator safety. Wet-in-place can be used for an initial clean and eliminating airborne dust during disassembly (offline final clean still required). Whereas, clean-in-place can be used for an in-line validated clean of all internals, enabling immediate batch changeover after drying.



## N2 Inertion

Nitrogen can be used as a safety measure when handling explosive powders. N2 is injected into the mill housing to displace oxygen, creating an inert atmosphere and eliminating the risk of an explosion. The N2 blanket can also be used to maintain material integrity (e.g. when product cannot be exposed to oxygen).



## Cryogenic Milling

Liquid nitrogen can be used to overcome issues associated with temperature sensitive applications. LN2 can be used to maintain a controlled low temperature inside the milling chamber up to (-195°C / -320°F). LN2 can also be used to flash-freeze materials before milling. This process is particularly beneficial to embrittle materials such as polymers which have a degree of elasticity.



## ATEX / Explosion Proof

Our machines can be supplied for use in the most stringent hazardous environments, with certifications for dust zones (up to ATEX 1D / Zone 20) and gas / vapours (up to ATEX 1G / Zone 0). As part of our Quality Assurance Notification, Hanningfield is audited against the standards for Equipment or Protective Systems or Components Intended for use in Potentially Explosive Atmospheres.



# hanningfield



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