



## **Conical Screen Mills**



### **Uni-Mill Series**

{xtypo\_info}The **Uni-Mill** conical screen mill draws upon Hanningfield's wealth of experience in size reduction for the process industries.{/xtypo\_info}Conical screen or 'cone-milling'

is ideal for achieving a fine, uniform particle size. By combining high throughput and high efficiency, the low energy

### Uni-Mill

is perfect for the pharmaceutical, food, chemical and consumer goods industries.

The **Uni-Mill** is designed and manufactured by **Hanningfield Process Systems** at their UK Headquarters.

{faq inline/tabs}		Profile
The	<b>Uni-Mill</b>	is suited to dry, wet or fine milling in the pharmaceutical industry. The Uni-Mill conical screen mill balances performance with simplicity.
{xtypo_quote}The	<b>Uni-Mill</b>	
Method of Operation		



Unprocessed material is **Uni-Mill** into the product by hand or [vacuum transfer](#). The material

The material is instantly reduced in size as it passes through the holes in the screen.

By changing a combination of screen, impeller shape and speed, the finished milled particle size can be

Most important for hygienic requirements, such as those in pharmaceutical and food production, there is

### Features

- Stainless steel construction
- Low maintenance, easy-clean design
- No metal-to-metal contact
- Can be integrated with vacuum transfer for high-throughput in-line milling
- Fail-safe design
- ATEX Versions available

### Benefits

- High throughput for maximum productivity
- Adaptable to various products for cost-effectiveness
- Easy to operate
- Low heat, dust and noise generation for improved working environment

### Specifications

- **Throughput:** 0-7,200 kgs/hr (0-16,000 lbs/hr)
- **Noise:** <85dB
- **Minimum Particle Size Applicable:** Approximately 150 microns
- **Explosion Protection:** ATEX or Non-ATEX version available

**Material of Construction:** Stainless steel (304 or 316)

### Typical Applications

## Pharmaceutical

Dry milling for tablet manufacturing  
Wet milling for tablet manufacturing  
Deagglomeration of raw materials  
Reclaiming powder from tablets and capsules

## Food

Dry milling for food manufacturing  
Wet milling for food manufacturing  
Deagglomeration of raw materials  
Reclaiming food to transform it to smaller pieces/powder

## Chemical

Dry milling of chemical materials  
Wet milling of chemical materials  
Deagglomeration of raw materials

### Consumer Goods

Dry milling for consumer goods manufacturing

Wet milling for consumer goods manufacturing

Deagglomeration of raw materials

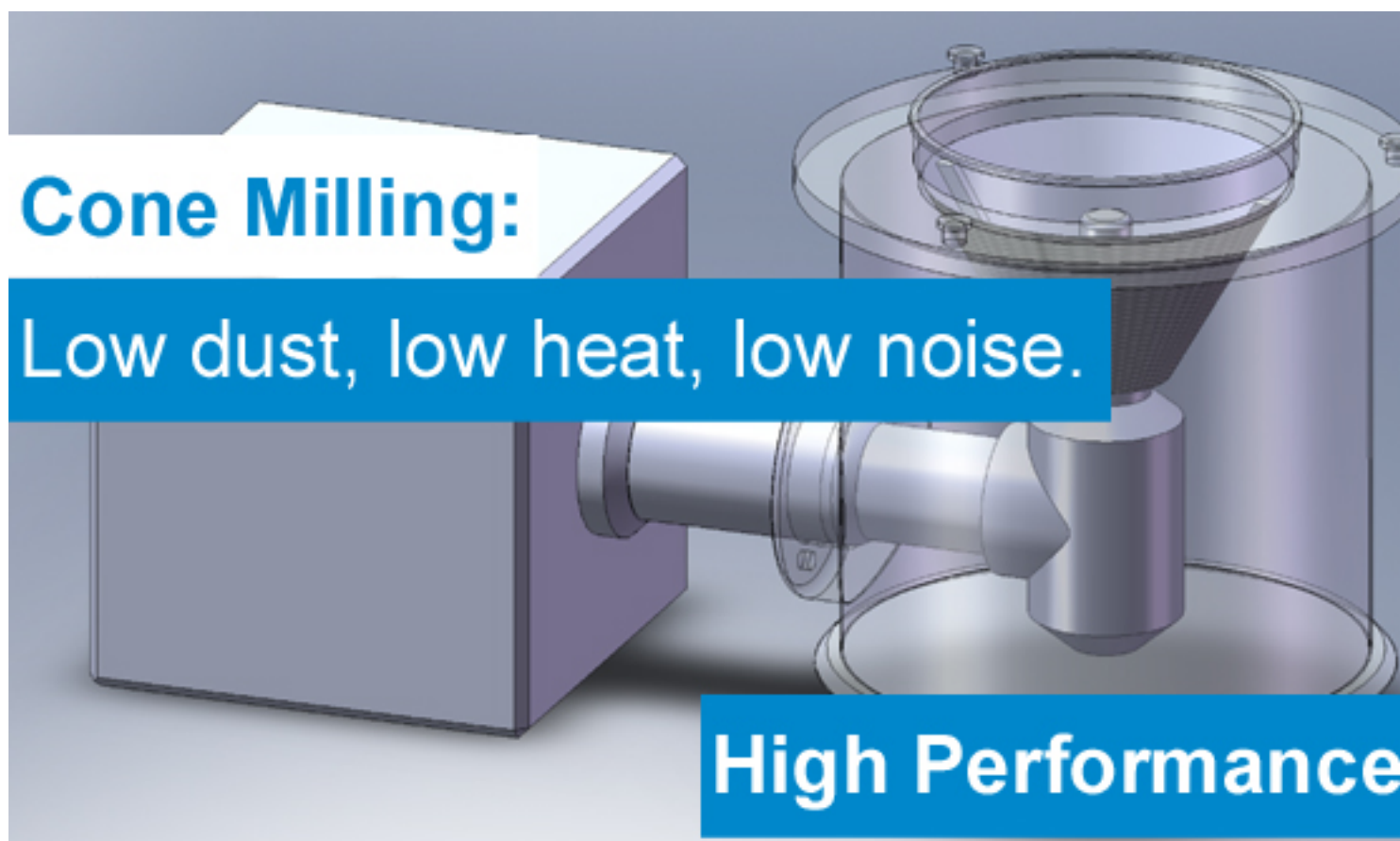
Reclaiming of heat sensitive products to transform into a powder

Gallery

{gallery}unimill{/gallery}

{/faq}

{jkefel title=[What is Cone Milling?] kefelui=[sliders]}



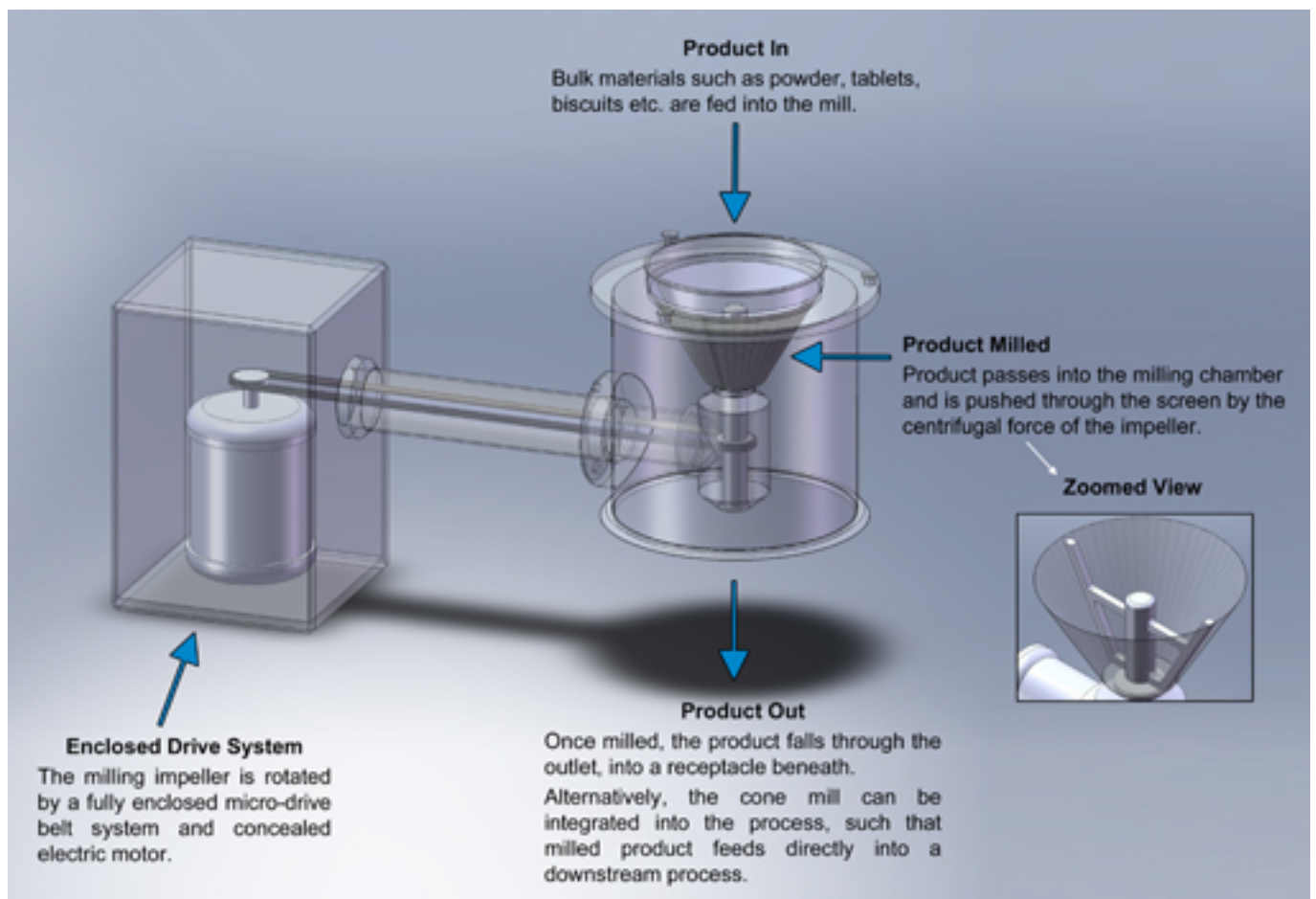
Conical Screen Milling, or simply 'Cone Milling', is widely recognised as one of the most efficient and beneficial methods for size reduction in the powder processing industries. Benefits

of this method include a reduction in process times, cleaning, noise and dust levels, thus making this a highly desirable solution for size reduction of materials.

The Hanningfield '**Uni-Mill**' conical screen mill draws upon our years of knowledge and expertise in size reduction for the process industries. The '**Uni-Mill**' can achieve a throughput of up to **7,200 kgs/hr** making it a high productivity, low energy solution for the pharmaceutical, food, chemical and consumer goods industries.

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{jkefel title=[How Does it Work?]}



Material is fed into the cone mill via the in-feed chute, using hand-feed, gravity-feed or vacuum-feed. The material passes into the milling chamber, where the centrifugal force of the rotating impeller pushes material through the apertures of the screen (this process ensures that material will not pass through the screen until the particle is the desired size).

Once the material has passed through the screen, the finished product falls from the bottom of the mill to a receptacle beneath. Alternatively this can be integrated with various systems (such as [Vacuum Transfer](#) ), such that milled product automatically passes to a downstream process.

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{jkefel title=['Low Dust, Low Heat, Low Noise' – Why is this important?]}

**Low Dust:** Minimal dust generation is important as excess powder escaping to the atmosphere can be harmful for operators and potentially hazardous to the operating environment. The ‘

### **Uni-Mill**

’ cone mill produces comparatively little dust compared with many alternative milling processes. Moreover, the

### **Uni-Mill**

can be integrated with various other pieces of equipment to create a totally-contained, dust-free milling process.

**Low Heat:** Ideally, a machine is used to process a material, not to change its core characteristics. The low heat generated by the Hanningfield ‘ **Uni-Mill** ’ means that the milled product is not altered by the temperature created during grinding. Moreover, many hygroscopic products do not fare well under high temperature conditions. By keeping the temperature optimised, the mill does not negatively affect the product.

**Low Noise:** Minimising noise is desirable to help comply with Health and Safety requirements for maintaining a safe working process environment.

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{jkefel title=[What are the Typical Applications?]}

Typically cone mills are used for the size reduction and deagglomeration of powders, granules, tablets, foodstuffs etc across a wide variety of industries. A cone mill is generally used for reducing material to a particle size as low as 180µm (80 mesh).

Below are some common example applications:

**Pharmaceutical:** Milling powder, reclaiming tablets, sizing wet granulated particles before drying, sizing dry granulated particles before tableting and more.

**Food:** Milling powder and spices etc., milling foodstuffs, deagglomerating dried fruits or other clumped material, reclaiming biscuits, reclaiming granola bars, reclaiming cereal and more.

**Chemical:** Milling powder, de-lumping raw material, wet granulation, reclaiming off-specification product.

**Cosmetic:** Milling powder, reclaiming off-specification product, de-lumping raw material.

**Other:** A cone mill can be used for size reduction of many different types of material, and for many different purposes. For more information and to discuss your specific requirements with our technical team, please contact us.

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{{kefel title=[Achieving a Dust-Free Milling Process]}}

Modern processes often use high potency APIs and other ingredients, which are potentially dangerous if mishandled - this is a particular concern during milling, a process which is notorious for generating dust. Hence, in order to protect both the operator and the process environment, it is important to consider various methods which could be used to help minimise this problem.

There are a number of ways to contain dust during cone milling, this article shall focus primarily on three methods; in-line vacuum transfer, container-to-container milling and milling inside an isolator. All three techniques offer an efficient and effective way to achieve dust-free milling.

### **In-line Vacuum Transfer**

Feeding and discharging from a cone mill using a vacuum is a particularly effective method for achieving dust-free milling. This process not only contains the dust, but also automates the process and minimises waste - helping customers make efficiency savings.

Using an in-line vacuum transfer system (such as the [Hanningfield Uni-Vac](#) ), material is automatically fed into the inlet chute, and is also automatically drawn from the outlet of the mill. This process ensures that from pick-up to discharge, the system is fully enclosed, preventing the escape of dust.

### **Container-to-Container Milling**

This solution uses the principle of gravity to feed product through the mill. 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.

This creates a totally contained, in-line solution for milling. Not only does this contain the



product during the milling phase, but this is also a simple and effective method for transferring product from bin-to-bin, and cone milling the product en-route.

### Isolator Milling

One suggested method for the containment of such fine powder during milling, is the use of an isolator or 'glove-box' to ensure all excess material remains contained, ensuring the fine dust particles are not exposed to either atmosphere or operator.

Cone mill integration within the isolator is performed by means of through the wall fixing flange. This fixing flange and particular configuration of the cone mill allow for a physical division of the cone mill head by the technical area that is left outside the isolator. Thanks to this special configuration all cone mill cleaning operations are performed within the isolator by means of gloves or half-suit, reducing any risk of exposure for the operator and avoiding any transport to cleaning room.

Another benefit of isolator milling is for achieving a zoned area such as ATEX. The isolator itself creates an ATEX environment for milling, ensuring the entire process environment (including motors and controls) do not need to be changed to comply with the necessary requirements. Learn more about milling in an isolator below.

### Conclusions:

In a modern process, containing dust is extremely important. This can be easily achieved during the cone milling stage, simply by employing one of the methods listed above. Each solution will be more or less suited to any particular application.

For more information on how to contain dust during processing, please just contact us.

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{{kefel title=[Milling & Conveying]}}

The following video shows the simultaneous application of Hanningfield 'Uni-Mill' and 'Uni-Vac' machines in milling material and transferring the output powder from point A to point B in a fast and efficient way:

{{flv}}millingandconveying |600|450|{{/flv}}

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{{kefel title=[Contained Milling: Utilising a Cone Mill inside an Isolator]}}

A Technical Article by James Ellis (Hanningfield) and Stefano Butti (F.P.S. Food and Pharma Systems S.r.l.)

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### Contained Milling: Utilising a Cone Mill inside an Isolator

#### Abstract

Cone milling is one of the most prevalent methods of size reduction in the process industries. Due to the ever-increasing potency of process material (APIs etc) containment becomes an

essential element of modern day processing considerations.

One suggested method for the containment of such fine powder during milling, is the use of an isolator to ensure all excess material remains contained, ensuring the fine dust particles are not exposed to either atmosphere or operator. Understanding when to use an isolator, and how to use it, can be essential to ensuring the milling process meets required and advised processing guidelines.

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## 1. Introduction

The increasing popularity and potency of new pharmaceutical API's, HAPI's and sterile products makes the need for tailor-made containment a priority. This is necessary to continuously meet the required safety standards and to ensure an appropriate level of advanced technology is in place to support research activities, product developments and final production phases.



*'The increasing potency of API's has made containment during milling a hot topic.'*

This concern is particularly relevant in relation to mechanical milling methods, such as cone milling. Milling is a process which can generate fine dust particles - this is a problem which needs to be deeply analysed and investigated to ensure proper levels of containment,

ergonomy and process accuracy are maintained. For this reason, choosing to integrate a mill with an isolator is a matter of acute technical importance.

Cone milling is one of the most common methods of milling in the pharmaceutical and allied industries. Although cone mills often produce less dust than alternative forms of milling, there is still some level of dust generation. An excellent solution for containing this is to use an isolator for keeping the mill, and therefore an excess dust, enclosed within the booth.

However, in order to properly evaluate when to use a containment booth, we must first gain an in-depth understanding of both cone milling and isolation chambers.123456

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## 2. Cone Milling - Dust Generating Process

Cone milling is an extremely effective machine for size reduction. Material is fed into the cone mill through an in-feed chute. This can either be charged into the mill using a vacuum or gravity feed. The material passes to a rotating impeller which forces the material through the holes in the screen (without metal-to-metal contact). Once the material has passed through the screen, the finished product falls from the bottom of the mill to a receptacle beneath.

However, one common problem in cone milling, similar to all other forms of size reduction, is the generation of dust. The dust is formed during the grinding stage of milling, and can become air-borne if mishandled.

To protect both the operator and the process environment, it is often advisable to consider methods for keeping this dust contained. This is particularly pertinent to many modern processes, which use increasingly potent API's or other potentially harmful substances. Often, the best solution is to completely contain the mill by means of housing it.

This can be achieved inside a transparent isolator, which completely contains the product (and any excess generated dust). The flexibility of a cone mill makes this easy to achieve, as tooling

changes are simple to undertake, even when using isolator gloves. Hence the isolator continues to offer process flexibility to allow for screen/impeller changes and dismantling for cleaning.

Another important consideration is ATEX. By housing the mill inside an isolator, one can achieve ATEX requirements inside the isolator, even if the process room itself does not conform to ATEX. Hence, an isolator offers a simple method for achieving an ATEX process, without needing to adapt the entire process environment.

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### **3. Integrating Containment Methods**

Cone mill integration within the isolator is performed by means of through the wall fixing flange. This fixing flange and particular configuration of the cone mill allow for a physical division of the cone mill head by the technical area that is left outside the isolator. Thanks to this special configuration all cone mill cleaning operation are performed within the isolator by means of gloves or half-suit, reducing any risk of exposure for the operator and avoiding any transport to cleaning room.

For this reason, ergonomics within the isolator is one of the most important features, which should always be properly checked in a preliminary study at the design stage. Often, the best way to achieve the optimal design is a combination of technical drawings and prototypes. A prototype can be used for the simulation of all operations to be performed within the isolator (charging into mill, milling, discharging, weighting, cleaning and maintenance).

## Conical Screen Mills

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[Conical Screen Mills \(Uni-Mill Series\)](#)

[EPA Guidelines for Uni-Mill](#) [xtypc\_download]

