



# Why The Mini Pellet Mill?

Thank you for taking the time to read this document. What this guide is about is highlighting the differences between most other small pellet mills and the Mini Pellet Mill that you can see to the right. One of the most notable differences is that the Mini Pellet Mill is made in the UK to a higher quality standard than most other small pellet mills, with most made in China. However, the Mini Pellet Mill is not only superior in the quality of its parts and its construction, but also in its design and features. The Mini Pellet Mill has features seen on no other small pellet mills, which are only normally seen on large-scale professional pellet mills.



## What Unique Features Does The Mini Pellet Mill Have?

The Mini Pellet Mill has a series of features not seen on other small pellet mills:

**Raw Material Hoper With Auger Feed**

**Variable Speed Auger**

**Water and Vegetable Oil Drip Feeds**

**Conditioning Chamber**

**Variable Speed On the Conditioner and Die**

**Ring Die Design**

**Designed To Run From A Domestic Power Supply**

But what do these features mean, and why are they necessary?

That is the question that this guide will answer. First we must start by looking at the other small pellet mills currently on sale.

## The Majority Of Small Pellet Mills On The Market

Below are just a few example images of the majority of small pellet mills currently on sale. These small pellet mills all have similarities including:

**Mass Produced In China**

**Flat Die Pellet Mill Design**

**Designed For Animal Feed, Not Wood Pellets**

Animal feed is produced from low-density materials that are very easy to compress in the pellet mill, however the same cannot be said for pressing fibrous materials like biomass and wood. These small flat die pellet mills were designed to compress low-density materials only, and this can be seen through the following features.

**Incorrect Gearing From the Motor To The Pellet Die**

**Insufficient Power Due To Incorrect Gearing**

**Pellet Die Holes Are Not Sufficiently Prepared**

**Pellet Die Hole Tapers Are Not Designed For Wood**

**Insufficient Compression Due To Pellet Die Depth**

**No Control Over Raw Material Feed Rate**

This analysis is made from the personal experience of owning and operating several small flat die pellet mills when we first started to produce pellets here at PelHeat.

We originally planned to re-engineer the pellet mills to a higher standard to be able to compress biomass and wood pellets. However the more we learnt from the process the more we realized that the issues are core to the design of the pellet mills. In short while it is not impossible to produce pellets with these pellet mills, to consistently produce quality wood pellets/biomass pellets is very difficult and very time consuming.



## What Are The Issues With Flat Die Pellet Mill Design?

The most significant issue with the flat die pellet mill design is roller slip. Roller slip causes increased wear of the roller and die. Also the increased friction means the pellet mill consumes more power. Again producing wood and biomass pellets requires more power than animal feed, and the issue of roller slip further increases power requirements. Below I will attempt to explain what roller slip/skip is.

### What Is Roller Slip?

The rollers within the pellet mill slip or skip due to the difference in the speed of the inner and outer edge of the pellet die. If you look at the image below and the blue and red dots on the surface of the pellet die you will agree that the blue dot will be turning at a slower speed than the red dot on the outer edge of the pellet die.

Now look at the rollers, the blue and red dots will touch the blue and red dots on the surface of the pellet die during operation. However the inner and outer edge of the rollers are the same circumference. This means that during operation to match the speed of the blue dot and the red dots on the die the inner edge of the roller wants to go a slower speed



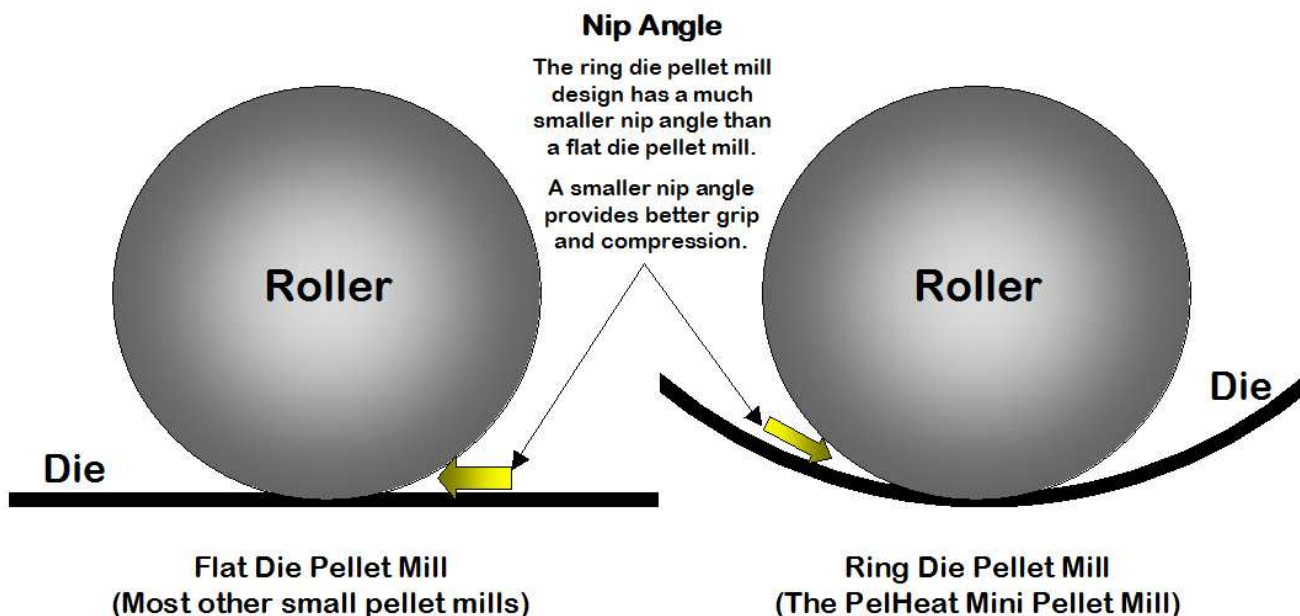
than the outer edge. As the inner and outer edge of the roller are the same circumference, that is obviously impossible. Therefore the only outcome is that the roller has to slip/skip or the rollers cannot turn at all. The only flat die pellet mills not to experience this issue are ones with tapered rollers, however using tapered rollers also creates a series of issues due to the immense forces placed on the pellet mill.

### The Mini Pellet Mill Does Not Suffer From Roller Slip/Skip

As the Mini Pellet Mill is based on the ring die pellet mill design it does not suffer from roller slip/skip, as the inner and outer edges of the rollers and die are covering the same speed. This means the Mini Pellet Mill has less friction and therefore requires less energy to compress wood and biomass pellets into quality pellets.

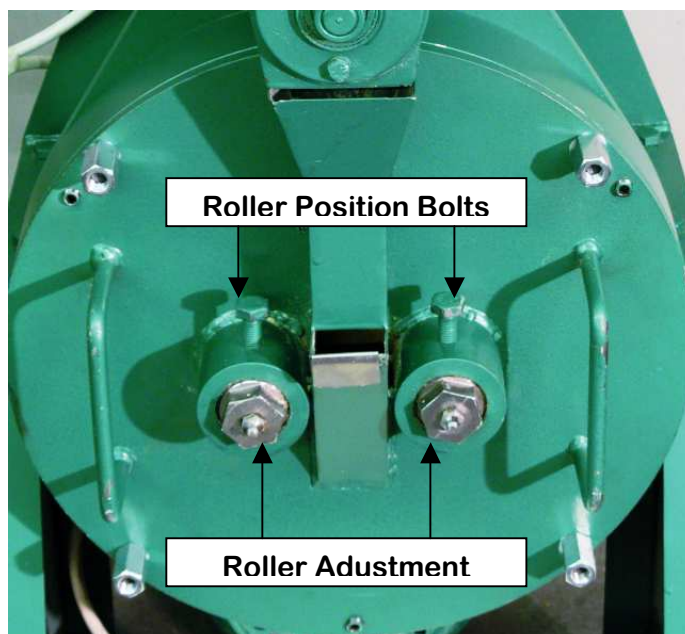
## Reducing The Nip Angle For Better Compression

The point between the roller and pellet die where compression takes place is referred to as the Nip Point. As you can see from the diagram below the Mini Pellet Mill has a reduced nip angle compared to the small flat die pellet mills.



## The Need For Roller Gap Adjustment

What many people are not aware of is that the roller and die in a pellet mill should never actually touch. There should always be a 1mm gap between the roller and die. The gap is important to maintain the life of the rollers and die and also for pellet quality. Trials have proven that pellet fines (dust) are reduced by up to 30% by having a 1mm gap. This is because in the carpet of material that lies in this gap is where initial material heat penetration and compression takes place. A pellet mill with a set gap of 1mm can produce better quality pellets with increased density. This is crucial for the pellets to burn efficiently. The small flat die pellet mills have no ability to control this gap. The rollers are simply clamped to the surface of the die. However as you can see to the right the Mini Pellet Mill can set the rollers precisely into position.



## Feeding Raw Material Into The Pellet Mill

How the pellet mill is fed is another often overlooked part of the process. If you go onto YouTube and watch videos of the small flat die pellet mills what you will notice on most of the videos is how delicately the user is adding raw material into pellet mill, why not just fill up the cone hopper?

Well the simple reason why is because material feed rate into the pellet mill is very important, it effects pellet quality, the load on the pellet mill and can cause the die to block. Even if you fill up the cone and the pellet mill operates, soon you will get issues with material blockages and have to stop.



## Material Control and Automation

The Mini Pellet Mill has a built in raw material hopper with auger feed. The auger motor is infinitely variable to give you complete control of the process.

Therefore the pellet die is constantly feed the right amount of raw material reducing blockages and pellet mill energy consumption. The size of the hopper can also be extended to hold hours of raw material.

## Your Time Is Valuable

The small flat die pellet mills require constant attention, however the Mini Pellet Mill requires only a small amount of your time in comparison to make sure the hopper is full. On the Mini Pellet Mill the auger feeds a conditioner, not the pellet die directly. The small flat die pellet mills have no conditioner at all.

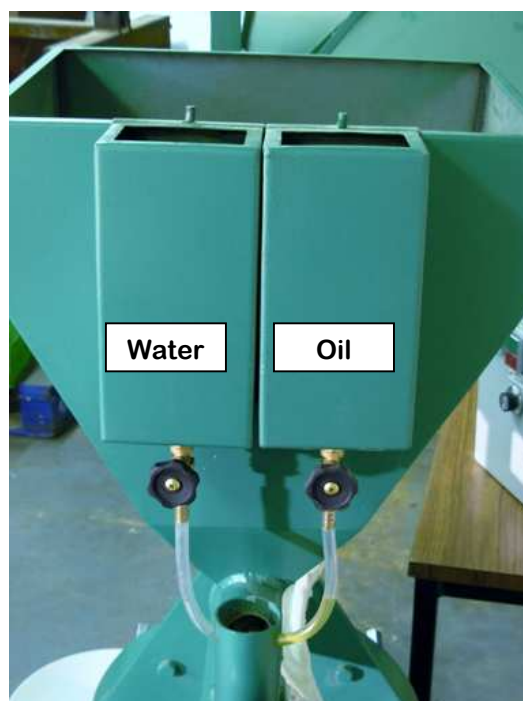


## Preparing The Raw Material For The Pellet Mill

It's important to clarify that every raw material, and each batch of material can perform differently in the pellet mill. To consistently produce quality pellets with a good density you need to feed the pellet mill at a constant rate, with a consistently prepared raw material. The small flat die pellet mills come with no way to prepare the raw material at all. Therefore you have to prepare all the materials beforehand. This is not only difficult, its also very time consuming. Therefore the small flat die pellet mills consume up even more of your time preparing the raw material, not to mention the fact while the pellet mill is in operation you have to constantly feed the pellet mill.

## The Mini Pellet Mill Prepares The Material For You

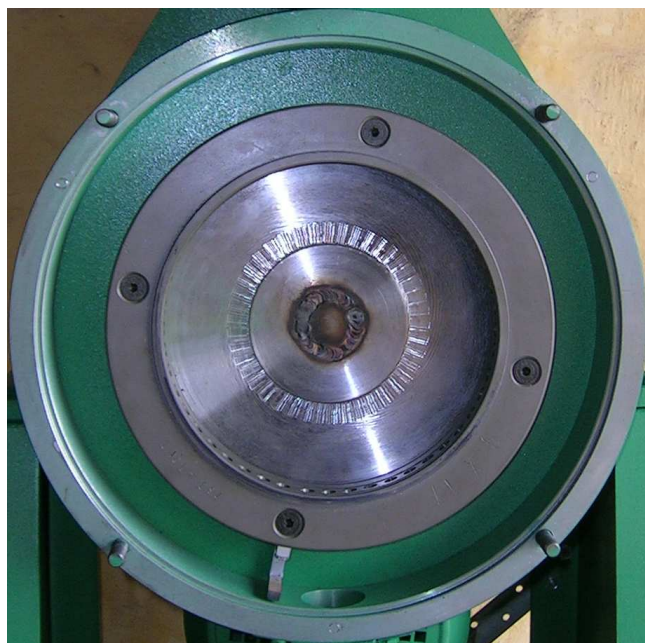
On the back of the material hopper there are two tanks, one for holding water the other for holding vegetable oil, however other liquids could also be used. Each tank has a drip feed valve, which can precisely meter water and/or oil into the conditioning chamber where raw material from the hopper is also been metered. The reason for this is as stated previously is each material/batch is different. Water and oil can be used to increase or reduced the pressure within the die to control pellet compression and therefore pellet density. Without this ability it would be a case of trying a raw material, judging pellet quality, then trying to prepare the batch again and again until you reached the right consistency. With the Mini Pellet Mill you can constantly adjust the materials characteristics helping you achieve the best pellet quality and saving you huge amounts of time. The material is metered from the hopper, water/oil is then mixed in the conditioning chamber to provide a consistent raw material bend that is slowly metered into the pellet mill. No other small pellet mill provides this level of control over the pellet production process.



## The Quality Of The Pellet Die Is Crucial

Another significant issue with the small flat die pellet mills is the low quality of the die. The die is where compression takes place, therefore if the force that the rollers and material place on the die is less than the resistance of the material passing through the die, this will lead to a blockage. This is one of the reasons why many people struggle to make wood pellets with the small flat die pellet mills, the holes in the die are simply too rough. Improving the finish on the holes is not easy, as the die has gone through a hardening process after drilling, and the imperfections are also hardened. Again the small flat die pellet mills were designed to process low density/oily materials for animal feed, which will easily pass through these dies. This however is not the case for fibrous materials like biomass and wood in particular.

The die on the Mini Pellet Mill is manufactured from higher-grade steel, and the holes are drilled and polished to produce a smooth finish to produce wood pellets and other biomass pellets. The Mini Pellet Mill die is also much deeper than most of the dies used on small flat die pellet mills. Extra depth on the die increases the compression of the raw material further improving pellet density. Only pellets with a high density burn efficiently in a pellet stove or boiler.



## The Productivity Of Small Pellet Mills

When it comes to productivity figures quoted by most pellet mill re-sellers, they are vastly over stated. The reasons for this were stated earlier in the guide, the small flat die pellet mills were designed to process low-density animal feed pellets. The pellet mills will produce a significantly higher productivity figure for these materials. Therefore the re-sellers quote these same figures as provided by the manufacturers in China, however this figure is far higher than the actual productivity for wood and biomass pellets. The Mini Pellet Mill may have a lower productivity than that stated for other small pellet mills. However the difference is that the figures are accurate, and the Mini Pellet Mill will produce pellets without the need for constant supervision.

# The Mini Pellet Mill

Hopefully this guide has explained to you effectively the differences between the Mini Pellet Mill and other small pellet mills. Below is a summary of the points:

## Made In Great Britain

The Mini Pellet Mill is made to a much higher standard than most small pellet mills, using higher-grade steels and will have a much longer operating life.

## Ring Die Not Flat Die Design

Improved pellet compression with improved life of consumable parts and reduced energy consumption.

## Controlled Material Feed

Automated feed from the raw material hopper to maintain pellet quality and reduce unnecessary pellet mill load.

## Controlled Material Conditioning

Preparing the raw material to feed the pellet mill with a consistent material.



## The Mini Pellet Mill Requires Less Of Your Time Than Any Other Pellet Mill

With all other small pellet mills to consistently produce quality pellets you have to spend time before using the pellet mill to prepare the material, and constantly feed the pellet mill during operation. The Mini Pellet Mill prepares the raw material for you and feeds the raw material into pellet mill as well. Therefore it has the lowest operating costs of any small pellet mill due to the little time it requires to operate.

If you would like a quotation on the Mini Pellet Mill please email [contact@pelheat.com](mailto:contact@pelheat.com)

If you have not already seen the video of the Mini Pellet Mill, please click below.