Baker Perkins

Increasing Wirecut Productivity: The Importance of Correct Machine Set-up and Die Design

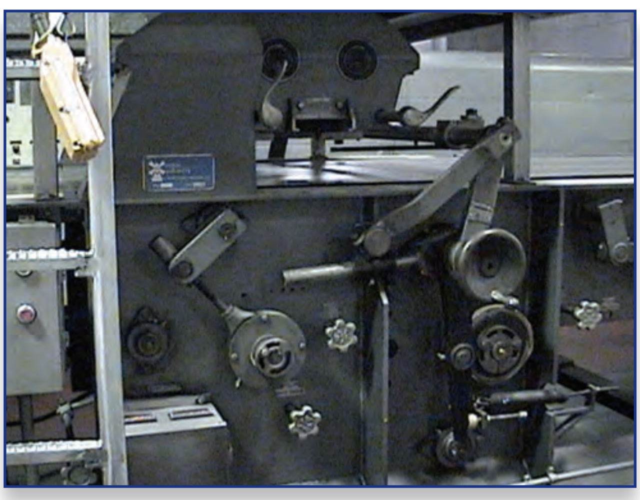
Introduction

Wirecut cookies, and the processes used to make them, are as old as the industry itself, but how well understood are they? The apparent simplicity of a wirecut machine belies a series of complex process and engineering interactions, each of which has to be correctly configured if good weight control, product quality and line efficiency are to be achieved.

While it is true that the design of the filler block and die have a significant impact on weight control, other factors such as wire straightness, tension and location are also important. Filler blocks and dies are product-specific but so too are product formulation and wire settings such as up-shoot, stroke length and drop. The importance of these increases with the speed of the machine. This paper examines the fundamentals of the wire-cutting process, from the feed rolls to the oven band, with particular emphasis on the importance of good die design.

History

The wirecut was invented to create puck-shaped cookies in an efficient manner. These cookie formers evolved over time as manufacturers pursued ways to increase the productivity at their plants and keep costs down.



Werner Lehara Wirecut

As wirecut speeds increased so did oven lengths, followed by wider wirecuts, sometimes feeding at 30 degrees to the oven band for additional throughput. The wirecut was no longer the bottleneck in the process and manufacturers began looking for other ways to increase productivity.

The first step was to improve weight control. The introduction of the filler block, coupled with proper fitting to the feed rolls and hopper, reduced the variation in piece weights and sizes to produce a more consistent and repeatable product. Meanwhile, consumers' tastes have expanded thus creating markets for many different types of cookies while, at the same time, manufacturers' requirements for wirecuts that are more hygienic and easier-to-clean have increased. These various developments have spurred the current generation of wirecuts that are suited for faster changeovers and easier cleaning while continuing to meet speed and weight control expectations. The latest trend that is influencing wirecut design is the need for allergen and microbial cleaning.

Baker Perkins TruClean Wirecut

Wirecuts have evolved over many generations. It is hard to guess what the next evolution will be for this important machine. One thing is for sure, they will continue to operate at high rates of cuts per minute, provide precise weight control for each cookie, provide easier changeover for new products and enable cookie producers to clean them quickly and to a very high standard.

Types of Dough

The wirecut, unlike the rotary moulder or the rotary cutter, can handle a wide range of dough types and consistencies including vanilla wafers, fig bars, two-dough cookies, health bars, frozen dough cookies and fat- or sugar-free cookies to name but a few.

Wirecut Cookies

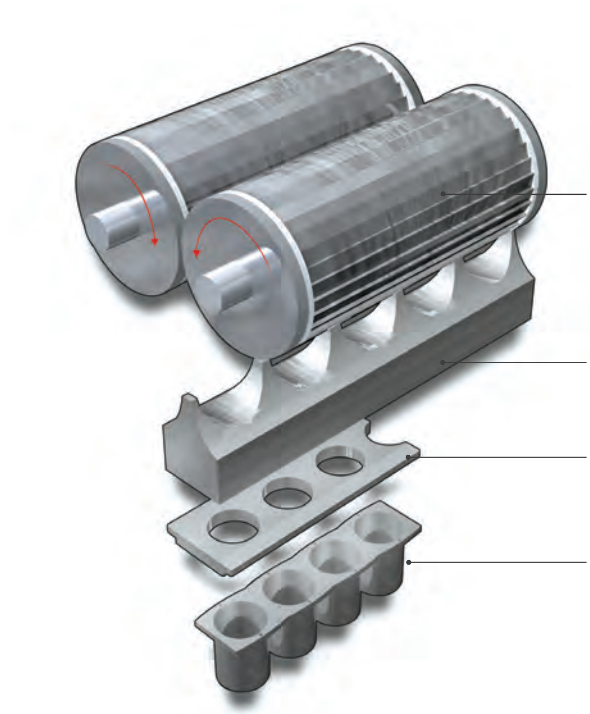
Vanilla wafer dough can be very runny and requires a special set-up to eliminate leakage, whereas a health bar requires more torque to push the dough through the filler block and dies. Frozen dough products provide a unique challenge as the dough tends to be very sticky and have unusually large inclusions. This requires that the gap between the feed rolls is increased and there is more flexibility with the wirecut mechanism to allow control of the up-shoot, drop and stroke. Understanding the steps to properly set up your wirecut will help produce the desired product at the speeds needed while still meeting weight control expectations.

Inclusions

Inclusions are any variant added to the dough such as nuts, chocolate and fruit . Each one provides a unique challenge to feed through the wirecut: nuts and chocolate come in many different sizes and shapes, requiring the gap between the feed rolls to be matched accordingly while fruit, such as raisins and cranberries, do not cut easily and may catch on the wire or knife. It is possible to set up the wirecut mechanism to cut them cleanly and it is important to do so. Sometimes cooling the fruit will make it easier to cut. In short, the set-up of the wirecut mechanism, coupled with properly designed dies, filler blocks and the right wirecut head, will help produce a consistent product.

Wirecut Options

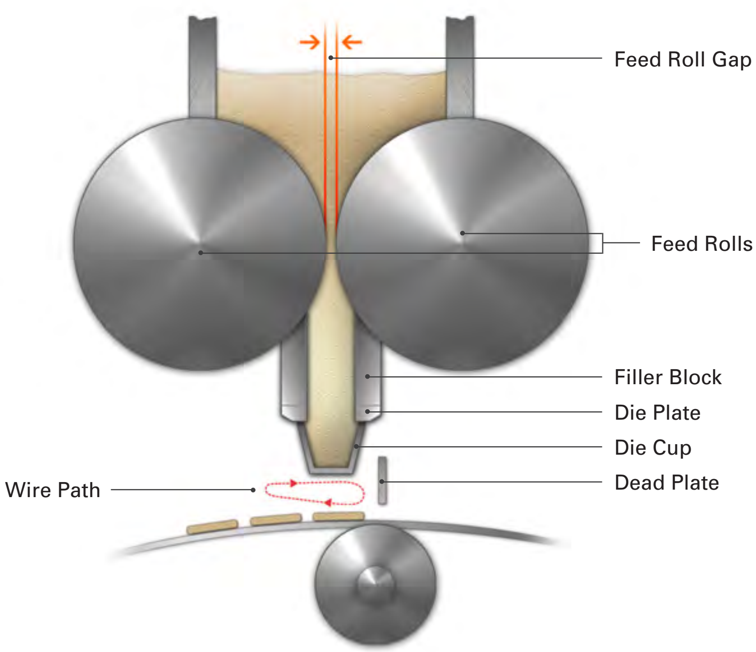
Wirecuts come in different sizes and shapes. There are a number of variables that must be considered when selecting or setting up a wirecut for one or more of the many different recipes available to cookie producers.



Wirecut - Key Components

1) Feed Roll Size – The size of the feed roll will have an impact on how much dough can be pushed through the wirecut. Larger rolls have more surface area that help with the higher torque required when handling higher volumes and/or stiffer dough. Wirecuts have been known to feed well over 16,000 lbs/hr if properly sized and fitted to the application. Larger rolls will deflect less under the heavy loads imposed by stiff dough, which is important in maintaining weight control.

2) Feed Roll Gap – This is the distance between the feed rolls and is chosen to suit the dough type and size of inclusions. A wider gap is required to handle large inclusions without damaging them, or to accommodate high outputs, while a narrower gap would be used with very soft dough. A very large gap with a divider plate will enable a wirecut to run two-dough formulas such as fig bars. This option requires a divider plate, independently driven feed rolls and a special hopper and filler block.



Wirecut Process

3) Throughput (lbs/hr) – Throughput is the amount of dough that can be pushed through the wirecut. It is dependent on the size of the feed rolls, width of the machine, rotational speed of feed rolls and the feed roll gap. The filler block and die design can also have a huge impact. This will be discussed in more detail later in the paper.

4) Cleaning Requirements – There is an increasingly strong requirement to clean these machines to rid them of allergens and microbes as well as debris. Sanitation is becoming one of the most important considerations when choosing a wirecut: can all the components be adequately cleaned? Are inaccessible parts easy to remove for cleaning off the machine? Could any potential contamination areas be eliminated by redesigning components or specifying different materials? E.g. one-piece filler block in wear-resistant food-grade polymer that eliminates the need for inserts.

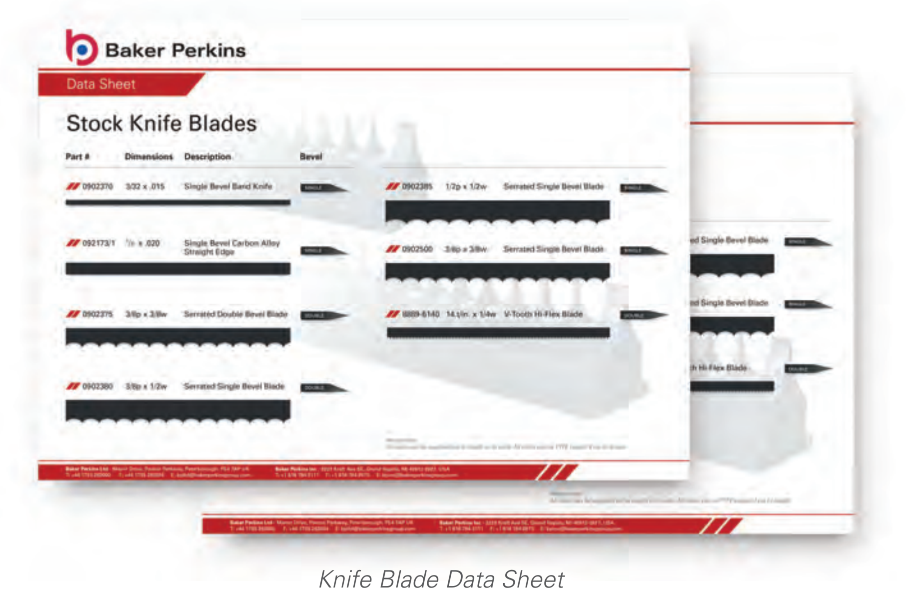
5) Baked or Frozen – Is your wirecut feeding an oven or a freezer? Oven baked cookies require spacing sufficient to eliminate doubles and maximize throughput while keeping scrap down whereas frozen dough pieces are normally packed in tight to get as much through as possible on the conveyor. The main consideration for frozen dough piece production is the quantity of dough that can be pushed through the feed rolls.

6) Cuts per Minute (cpm) – How fast does a wirecut need to operate? There are typically three ranges to consider; slow (0 to 90 cpm), medium (90 to 150 cpm) and fast (150 to 300 cpm). The range dictates the type of knife used, cam profiles on the drop and stroke, as well as many other variables that affect wirecut design.

7) Very Soft/Runny Dough – This type of dough can leak so it is important to have a properly fitted filler block and die. The dough flows nicely and does not take much torque to feed it properly. The most common dough of this type is vanilla wafer.

8) Stiff Dough – This dough has a high torque requirement and requires a heavy duty wirecut head, as well as filler block and die. The most common product that fits this category is health bars.

9) Wire or Knife – Wires do not cut, they actually push their way through the dough. Knives have a sharp edge and will shear through, or cut, the dough. Knives come in a variety of shapes and sizes.



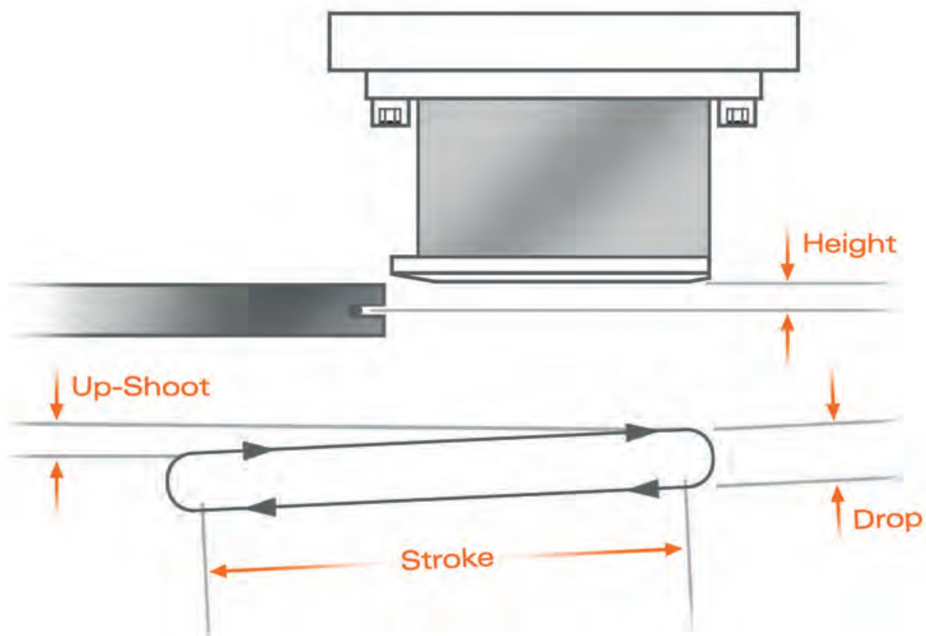
Knife Blade Data Sheet

Smaller diameter wires have less surface area and may part the product more easily. However, they also have a tendency to break more easily. Knives take more effort to break but may give a different look to the end product. To prevent the product sticking to the knife they may be supplied with a non-stick food-grade coating.

10) Cutting with or against the flow – The flow is the direction of travel of the oven band or belt conveyor. Cutting with the flow is when the knife or wire is cutting in the same direction of travel as the band. This is the most common method, especially for sticky dough, large pieces or very high speeds, as the mechanism is behind the product and cannot interfere with it. Cutting against the flow is beneficial if a back stop to catch the product is used as it gives very good alignment. It is particularly useful on angled overhead wirecuts, which are used when space is at a premium.

Wirecut Mechanism Set-Up

When setting up a wirecut mechanism, there are several important variables to consider. We will define and discuss each of these.



Wire Path Variables

1) Wire Height – This is the position of the wire or knife in relation to the bottom of the die cup. The height can be positive or negative. Positive is where the knife or wire is touching, or interfering, with the cup while a negative position is below the cup and does not touch it. Normally, a positive height is preferred as this creates a cutting or shearing action with the wire. In most cases, the height is set and never adjusted. When sticky dough or formula with fruit inclusions is run, a very positive height may be required in order to create a "snap." Most wirecut mechanisms don't allow this adjustment on the fly or during operation, but there are a few that have that option. If an increase in wire breakage is seen it would be wise to check to see how the operators are using this variable.

2) Wire Stroke – This is the length the wire travels and runs parallel to the bottom of the cup. Most wirecuts have a stroke adjustment that allows the travel to be adjusted to match the outlet of the die cup. Stroke is normally driven by the eccentric of the wirecut mechanism. In many cases the stroke should just pass the outlet of the die cup and then return to its home position. Minimizing the stroke will reduce vibration or wear in the system.

3) Wire Drop – This is the distance the wire falls away from the bottom of the cup and is driven by the cam in the wirecut mechanism. The distance needs to be larger than the height of the cookie in order to return back to home without interfering with the product. Different cam profiles may be used for different production conditions.

4) Up-shoot – Initial set-up has the wire running parallel to the bottom of the die cup. As a final set-up, we recommend having the wire running uphill i.e. slightly below the back of the cup, just touching at the center and then interfering with the die cup at the end of the stroke. Up-shoot creates a shearing or cutting action and a “snap”. The latter is generated when the wire passes the end of the die cup with a large up-shoot, or a positive height location. This creates a strong shearing action that helps separate the dough piece from the die cup outlet. The snap in conjunction with the timing of the cam as well as the speed of the wire is beneficial in cutting difficult formulas such as fat-free oatmeal raisin cookies or even some of the high protein health bars.

5) Cam Profiles – The vertical wire path is determined by a cam profile moving the wire via a set of linkages. In most cases the cam profile comes in two options; fast or slow speed.

Wire Path Cams

Most cam profiles go through a four-step cycle: dwell (usually cutting section); fall (drops away from the die cup); dwell (returns to home); and rise (returns to the beginning of the die cup). The fast-speed cam is normally symmetrical (zero acceleration or constant velocity, which means that the rise and fall are the same and nearly match the dwell) with an offset that creates the clearance to allow the cookie to drop to the belt without catching on the wire as it returns home. This cam design minimizes vibration and pounding in the system and thus enables the machine to operate at faster speeds.

The slow speed cam normally has a fast drop. Simply stated, the cam accelerates instantaneously at the fall section. This can be useful for products where a “snap” in the wire is required, but the instant acceleration creates an impact in the machine that leads to vibration and limits maximum speed. The vibration is proportional to the drop so a shorter drop (used on thinner products) enables the wirecut mechanism to run at higher speeds. Some of the newer wirecuts offer a cam drop adjustment on the fly to enable the optimum balance to be struck between drop and vibration. On several of the older wirecuts there is a bump stop which is a simple but effective way to introduce a sharp impact or different profile.

6) Timing – This is how the drop (cam) and stroke (eccentric) are synchronized. As noted earlier, the cam controls the fall and rise of the wire path while the stroke drives the wire forwards and backwards for the cut and return. The timing of the wirecut mechanism is all based on the cam. The cam dictates when the wire drops from the die cup. Normal wirecut set-up has the wire dropping as it clears the outlet of the die cup, but set-ups where it is better for it to drop just before or just after that point are not uncommon. Timing is product specific.

Other Wirecut Set-up

Next are several other variables that are part of the wirecut mechanism. These variables, correctly set, will assist in cutting cookies.

1) Wire Tension – This is an often overlooked item. How much tension is required to cut specific products? A taut wire or knife minimizes wire breakage and also gives a more consistent cut across the face of the die. Recently we have introduced a wireframe that enables the operator to measure the tension of the wire for a repeatable set-up from product to product and even shift to shift.

2) Oscillating Knife – An oscillating knife can help cut tough products by introducing a sawing action or a vibration. An oscillating knife is driven by a motor with an eccentric drive that causes the wire or knife to work back and forth in the wireframe. The length of oscillation is dependent on the offset. The larger and faster the oscillation, the higher the likelihood that an unhealthy vibration will be introduced. This type of vibration will increase bearing wear and wire breakage. As noted earlier, an oscillating knife works only within a specific cpm range. At higher speeds only a couple of oscillations are carried out during the cutting and no there is no major benefit. The greatest benefit is seen in the 0 to 60 cpm range; there is a marginal benefit in the 60 to 120 cpm range and for 120 cpm and greater, there is no benefit.

3) CPM: Slow vs. Fast (Intermittent) – On older machines producing very large cookies, a clutch was used to create a fast cut in order to keep the cookie cylindrical. The wire would accelerate through the entire cutting cycle and then park in the home position until it was time to cut again. The gearmotor and clutch have now been replaced by servomotors.

4) Belt or Band Raise – The belt or band raise comes in two versions, static and dynamic. A static band raise can be manually adjusted up and down as well as forward and backwards. The purpose is to position the band to catch the cookie as it is cut and keep all the cookies in perfect alignment. A dynamic function lifts and lowers the band in sync with the wirecut mechanism. This helps in placing the cookie on the belt/band and maintaining alignment. For sticky dough, it helps to pull the cookie off the knife. Experienced operators are able to use the band raise to increase the diameter of the cookie by squeezing the dough as it is extruded through the die. Just as with the oscillating knife, the dynamic band raise is only effective at low to medium speeds. Dynamic band raises can be driven via a cam or eccentric. The eccentric is faster but a cam can introduce quicker drop, which might be beneficial for some difficult products.

Temperature

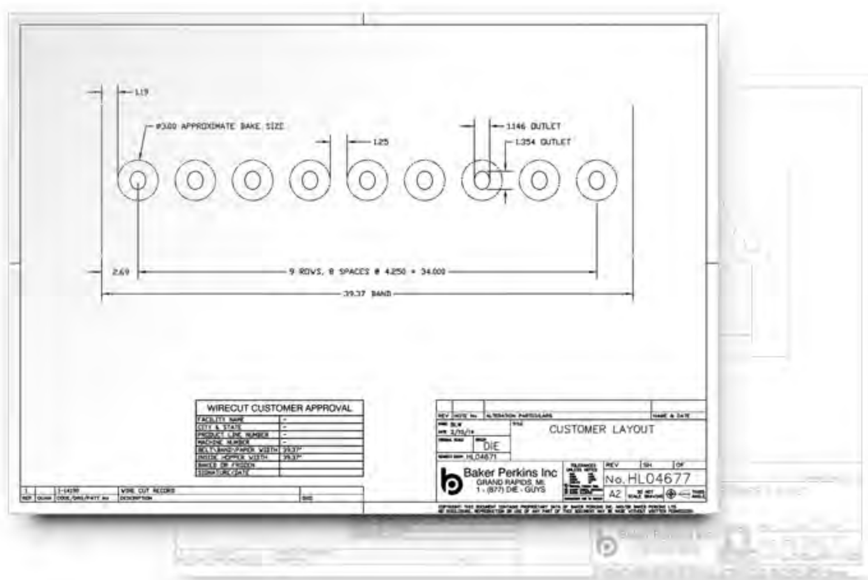
Dough temperature plays a huge part in running cookies through a wirecut. If it is too warm, chocolate chips will melt and smear. If it is too cold, inclusions are difficult to cut. Temperature also controls how the cookie will flow as it is baked. Sometimes only a few degrees will make a difference to producing, or not, the desired product.

1) Water Cored Feed Rolls and Hopper – Mixing and feeding introduces heat into the process. In order to control the temperature of the dough, wirecuts may have a jacketed hopper and cored feed rolls. Increasing or decreasing the temperature may help the dough flow through the wirecut.

2) Effects on Inclusions (raisins, nuts, chocolate, etc.) – As mentioned earlier, warming up the chocolate will make it easier to use, but if it is too warm, it will start to smear. As for fruit such as raisins, chilling them will make them easier to cut and help keep them from catching on the wire.

Set of Production Components (Design Information)

1) Layout Drawing – The first step to determine the proper wirecut die is to create a layout drawing.



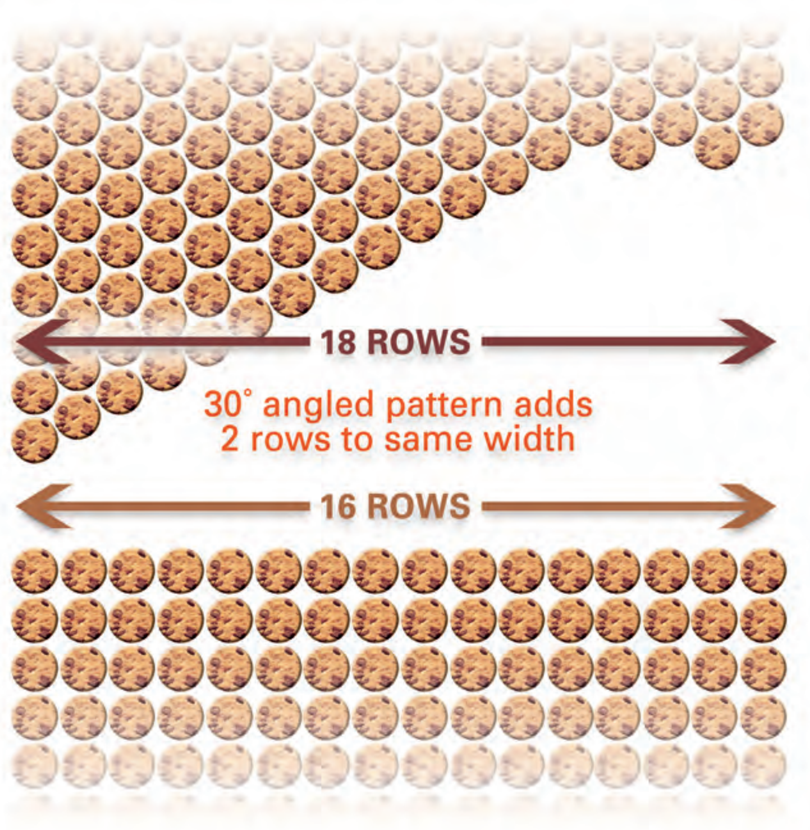
Layout Drawing

A layout drawing shows both the unbaked and baked sizes on an oven band. It also has machine and any other relevant information. The layout helps facilitate the transfer and agreement of information. This helps insure that the expected tooling fits the correct machine and product is placed correctly on to the oven band.

2) Frozen Dough Layout – This is a cookie type product that goes through a freezer instead of an oven. After it is frozen, it is packed in cartons and then shipped to a customer for baking on site. Because there is no expansion after the wirecut process, more and/or bigger cookies can be produced from the same machine.

3) Baked or Oven Layout – Standard practice is to allow 1″ between the outside of the row and the edge of the oven band, while the product is laid out to handle expansion during the baking process. Spacing is critical. If they are too close doubles are created that cause packaging problems and scrap. If there is too much space, efficiency is reduced.

4) Angled wirecut – An easy way to increase capacity by up to 20% is to feed the oven band at 30 degrees.



Nested Vs Straight Rows

This can be accomplished by either an overhead angled wirecut or a standard wirecut with an internal belt conveyor set at an angle to the oven band. In both cases the cookies are placed on the oven band in a nested fashion i.e. overlapping rows and lanes. This pattern maximizes utilization of the oven band.

Angled Overhead Wirecut

5) Band vs. Conveyor – Some recipes are too sticky to feed onto a conveyor belt and in these instances it is more beneficial to cut directly onto the oven band. As for conveyors, they are best employed if there is a need to transfer a product over a distance.

6) Side Wall to Center of Cup (0.6 Rule) – Something we have learned over time is that the side walls of the hopper can create a drag, causing the outside rows to weigh less than inside rows. We developed the 0.6 rule, which is the distance from the center of the outside row to the edge of the hopper, based on cookie pitch. The pitch is the distance between the outlets on the die. This distance minimizes the impact the hopper has on feeding the outside rows.

7) Straight Side Hopper vs. Angle – Straight hopper walls help feed the dough and minimize bridging. Bridging is where the dough locks up and will not feed through the feed rolls, which can occur with angled hopper walls. Some doughs and formulas have a greater tendency to bridge than others.

8) Round vs. Oval – Some products will not come out round during the cutting process of the wirecut. Depending on the texture of the formula and the speed of the knife, an oval outlet may be required to produce a round cookie.

Dies

A die is used to form the shape of the cookie.

Die Cups

Outlets match up with the filler block and it interfaces with the wireframe to cut the product. The die cup is designed with a taper to create back pressure in order to pack the dough correctly. The angle of the die cup may change depending on the type of dough being formed. If the dough is too loose, a larger angle in the die cup will improve the density. A standard die consists of a mild steel low-friction food-grade coated die plate with stainless steel wear-resistant food-grade polymer inserted die cups. The inserts are used to help the dough flow through the cups and provide consistent weights. As noted earlier, hygienic designs are becoming more important and inserts fitted into the stainless steel cups create spots that have to be cleaned. Options to eliminate these spots are solid stainless steel die cups or blue polymer die cups.

Dies designed for frozen dough applications require that the cookies be placed tightly together. Sometimes a snowman-style outlet (joined or “wedded” – see “A” in picture for example) will increase the throughput. Up to three outlets may be cut at the same time, depending on the size as it is important that the distance is not too big for the wireframe fingers to support the wire. As for baked products, the number of outlets depends on the expansion of the cookie in the oven. The purpose is to get them as close as possible while avoiding the possibility of doubles.

There are several other variables that dies can provide. Square cookies are a challenge as dough will naturally tend towards a circle as it bakes. Cups for square cookies normally require concave walls. Bump stops are a part of the die and used mostly with applications that require cutting against the flow. They work well as long as the dough is not too sticky. Double row dies are a great way to increase the throughput of a wirecut. The wire/blade cuts two rows as the same time. These dies require the mechanism to be set up properly so it can handle cutting both rows cleanly to produce a good pattern.

Some products require a plug in the die cup to increase the back pressure. With loose dough these plugs, as well as a steep angle on the die cup, will usually compact the dough sufficiently for the wire to cut it cleanly.

Finally, restrictor screws are a last resort and are usually added to the die cup to help control the flow of the dough going through it. Usually there is something else wrong with set-up if this is required. The dough feed system may not be feeding the dough consistently. Sometimes the filler block or feed rolls are worn and not pushing the dough evenly through the die. Die cups can wear, causing irregular weights from outlet to outlet. Introducing these screws adds another variable that is hard to control.

Filler Block

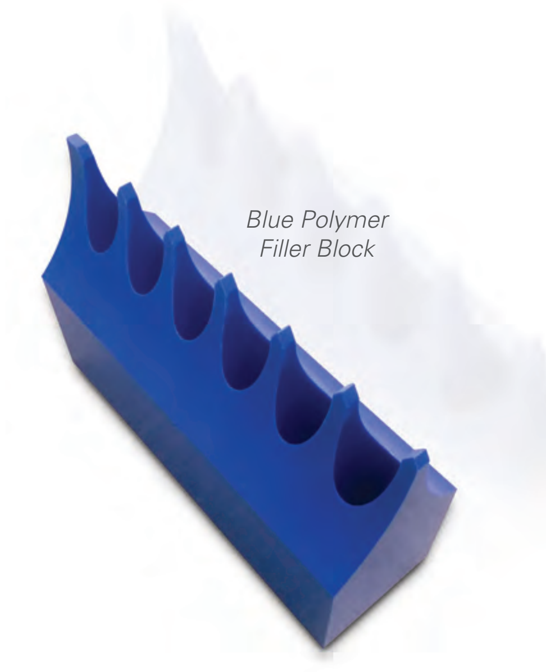
On older machines, a scraper bar was used to contain the dough in the space between the feed rolls and the die plate but these have now been replaced by filler blocks. The filler block contains a series of channels that exactly match the outlets in the die plate and guide the dough from the nip of the feed rolls into the die in a controlled manner. The advantage this offers over the old system is that the dough begins its journey to the die at the point where the pressure is at its most even and every stream of dough is subjected to exactly the same conditions as it travels to the die. Therefore weight control is even across the band.

Filler Block

Filler Block Removal

A standard filler block is hard-coat anodized aluminum with wear resistant food grade polymer inserts. It is made with a special aluminum in order to hold its tolerance and properly hardened during the anodizing process. Inserts are added to help the dough flow smoothly into the die outlets. As mentioned earlier, inserts require time to take apart for cleaning.

Stainless steel and blue polymer filler blocks are other material choices. Stainless steel filler blocks are three times the weight of aluminum and cost 2-3 times more depending on the shape and number of outlets. Blue polymer filler blocks are approximately 80% of the cost of the aluminum option as well as 80% of the weight. This type of polymer has a very low coefficient of friction.



This polymer is better suited to handle the new caustic cleaning agents that are being introduced. It will not flake like anodized aluminum when it meets an acidic dough or cleaning agent. The downsides are that it is not as hard as aluminum or stainless steel and it is less dense than water so will not be picked up by X-rays. The choice of material is dependent on the manufacturer's requirements.

A properly fitted filler block is important in order to obtain optimal weight control from lane to lane and piece to piece. It must be parallel to the feed rolls and the die. If not, weights will show an increase from one side to the other, indicating that the filler block is not seated high enough. This allows more dough through and thus makes the cookies heavier.

Most bores are straight and in-line and match up with the die cup inlets. Typically bores are circular although sometimes square to match up with the die cup. In extreme cases we have manufactured these bores with a taper. Usually this is for a dough that needs some help to feed through the filler block and into the die cup. In summary, filler blocks are a key component in controlling the flow of dough. Properly fitted to the machine and die, they play a significant role in meeting the desired weight accuracy and dimensional tolerances.

Wireframe (or Harp)

A wireframe is designed to hold the wire or knife in position and against the die cup. These components are often overlooked but play a key part in cutting the dough cleanly, creating a good pattern, and obtaining good piece weight from row to row and lane to lane. A standard wireframe is mild steel low-friction food-grade coated and straightened to hold the wire in position across the face of the die cups.


Wireframe

The characteristics that are most overlooked on these components are straightness and wear. Over time, if abused, the wireframe's fingers will bend and twist, usually caused by improper handling. They can also come out of straightness when the wirecut mechanism is not set up correctly. Wear is another concern. Normally the finger-tips will start to tear at the back of the slot where the wire is held in position. This tear is caused by too much wire height or wear. Sometimes the oscillating knife will start to cut the groove downward.

Wireframes must be checked periodically to insure they are holding the wire or knife in the desired position.

In order to meet modern hygiene requirements, stainless steel wireframes have been developed. These are fitted with hardened carbide inserts that minimize the wear of the wire grooves and are easily replaced when they wear out.

Wireframes can be repaired, which usually involves replacing bent fingers, recoating and straightening. Earlier we discussed being able to repeat the tension of the wire. Self-tensioning wireframes have been designed so torque wrenches can be used to tighten the wire consistently. The other benefit of this new design is that it allows the removal of the wire holders, making it easier to clean the machine.

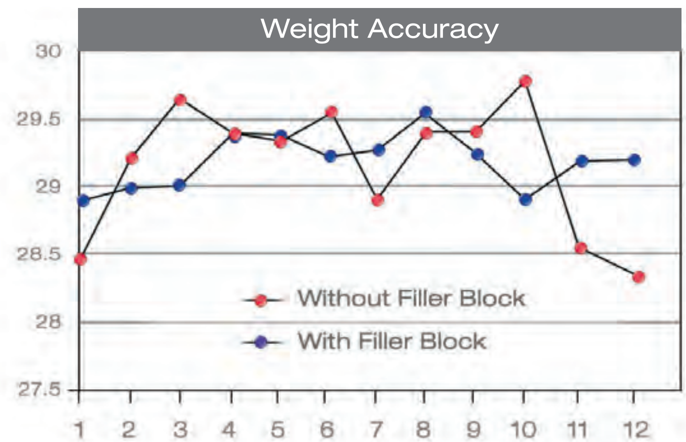
Other new wireframe developments include "tool steel" construction which creates a stiffer wireframe finger and helps prevent the fingers bending. There are also stud-mounted wireframes which help the end user change the wireframes more quickly. Wireframes that are set up properly can cut two or more die cups depending on the distance.

On a final note, wireframes are designed to handle either a knife or a wire. It is important to note that there are two notches in the wirecut mechanism arms. The front notch is used to hold the knife while the back notch is used for the wire. The purpose of the notches is to hold the knife or wire in the back of the slot in the wireframe fingers. This helps support the knife or wire in position which will help cut the cookie correctly. There has been more than one occasion where the wrong notch was used. This creates a "banjoing" effect on the wire, usually causing it to break.

Trouble Shooting

The following are some common problems that wirecut operators encounter, along with possible solutions.

1) Light Outside Rows – The most likely cause is hopper drag, although poor dough feed is another possibility. The best solution is to increase the dough flow through the outside rows. This can be done at the filler block by opening up the nip. Other options are to use larger die cup outlets.



2) Light Inside Rows – This is a difficult one. It is not common and usually caused by the dough flowing faster on the outside rows. One theory is that the hopper actually creates a smoother surface for better dough feed. A solution is to change the outlet of the die cups on the outside rows. Another option is to add restrictor screws to the outside die cups.

3) Uphill or Slanted Weight Patterns – This is caused by the filler block not being seated properly. Usually one side of the filler block is low, caused by burrs on the filler block, compacted dough, operator error and/or mechanical wear. The best solution is to clean out the head properly and reset the filler block so it is parallel to the feed rolls and thus the die.

4) Doubles or Triples – These are most likely caused by wear on the wireframe or wirecut mechanism, poor set-up or bearing failure. First check is to make sure the wireframe is straight and that the fingers are not worn. Also, check the wirecut mechanism for wear, including bearing failure. After the machine passes inspection, revisit the set-up. Tougher dough requires special set-up such as fast cut, fast drop cam, smaller wire, etc…

5) Oblong Cookie Shapes (The cookie dough is changing shape during the cut process) - This can be rectified by altering the die cup outlet to compensate for the shape. Another option is to try cutting the product faster or slower. Other choices are changing the temperature, mix time or water content.

6) Wirecut Head Leakage – This occurs with loose and runny dough, which requires the head and feed rolls to fit properly with the filler block. The most likely cause is wear to these components so if leakage persists, it is time to replace them.

7) Variable or Random Cookie Weights across the Oven Band – Fortunately this doesn't occur very often. It is caused by the head being pulled down too hard, or not hard enough. Check the pressure of the head to make sure it is firm and not causing movement in the key components. Another item to inspect is the mixing and temperature of the dough. The dough may not be uniform with varying densities throughout the batch.

8) Hopper Bridging – Stiffer dough may bridge in the hopper and thus not feed through the filler block and die. Possible solutions are to coat the hopper with a low friction food grade coating, change the hopper to straight side walls, kibble the product, or meter it into the hopper. An important consideration is to keep the hopper walls inside the center line of the feed rolls. This helps pull the dough through the tooling.

9) Fruit Sticking to Knife – This is caused by the fruit not cutting cleanly. You can try to create a shearing action by increasing the wire height. Other options are to work on the timing of a dynamic band raise and wirecut mechanism. The best is to cool the fruit making it stiff and thus easier to cut.

10) Wire Breakage – Anyone who owns a wirecut knows about wire breakage. This is caused by many different things. The wireframe may be worn out (e.g. tear-dropping or bent fingers). Another cause is a bad bearing in the wirecut mechanism. Excessive vibration by the oscillating knife will also break wires. Some simple items to check out are too much wire height or too hard a drop. Check out the wireframe and wirecut mechanism for wear. If that checks out, then work on the set-up. Using a larger diameter wire or knife may be beneficial.

11) Excessive Vibration – This is caused by either a bad bearing in the wirecut mechanism or the oscillating knife not being properly set up. Take a look at both of these items and repair and adjust as required.

Summary

Wirecuts are one of the most flexible machines to form cookies, as well as many other types of products.

Wirecut & Oven

In order to maximize the efficiency of wirecuts, it is important to focus on proper machine set-up as well as the production tooling. Variables such as wire height, wire stroke, wire drop, and up-shoot play as much a role in producing cookies as properly designed filler blocks, dies and wireframes.

The following is a list of items to remember when running a wirecut for optimal efficiency.

1) Layout drawings are used to communicate the cookie pattern, outlet size, baked size, machine information, etc. They must be confirmed by the customer to insure the proper wirecut tooling is provided.

2) Wireframes are the most overlooked item. The fingers bend over time and the slot starts to tear-drop. These make it difficult to get a clean cut and thus a good pattern.

3) One-piece polymer filler blocks, stainless steel dies (plates and cups) and stainless steel wireframes have been introduced to help with current cleaning requirements.

4) Filler blocks are the most important components for weight control. They must fit properly with the die and feed rolls. Worn out filler blocks should be replaced.

5) Mixing, temperature and water all play a part in the process of producing a good cookie. Once all the variables of the wirecut and dies have been exhausted, look at these variables.

6) Wirecuts are very flexible machines. They are capable of running two-dough products, fig bars, health bars, cookies, breakfast bars and two-dimensional shapes, to name but a few. They also can handle a wider range of formulas than most other cookie machines.

7) Wirecut mechanism set-up is about the wire height, wire stroke and wire drop. Other items are timing, cam profile, up-shoot and wire tension. Cutting tough dough requires that each of these items be set up correctly and consistently.

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