



Fruit processing machines

smart machines

# HOW TO EXTEND SHELF LIFE



Adults and youth (ages 13 and older) need an average of 2,000 calories a day, and children (ages 4 to 12) need an average of 1,500 calories a day. However, individual needs vary.

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# 'LONGER SHELF LIFE PAYS BACK ON YOUR INVESTMENT'

Extending shelf life is important in all layers of the supply chain. And at the end for the consumers too. Longer shelf life not only keeps shoppers happy, but also pays dividends for processors and retailers. Product expirations cause significant shrink at the retail level, representing lost sales potential.

But how do you extend the shelf life of your product? First of all; handle the product with care. Fruit is tender and needs to be harvested and processed without bruising it.

At ZTI we always have the shelf life on top of mind in our engineering process. How can you peel, cut or slice the fruit without damaging it? That's is our main question to start with. Furthermore, yield and ROI are just as important.

We are happy to tell you more about it in this white paper. Enjoy and don't hesitate to contact me for more info.



**HANS KEIJZER**

CEO



## WHERE DOES EXTENDING SHELF LIFE BEGIN?

Convenience food is more in demand than ever! So more and more processors invest in their plant to produce more fresh products. For retailers, restaurants, hotels and catering companies, airline companies and hospitals.

Longer shelf life of freshly cut fruit is high on the wish list for all involved in the chain.

When you think of extending the shelf life as a processor, you probably think of packaging. Or sealing the fruit with some kind of natural sealing product. You can freeze it shortly or you can put nitrogen into the container. There are many ways to keep the product longer fresh.

But the most important way to keep your product longer fresh is often not the first option you think about. Namely; to prevent it from bruising.

Handle with care while harvesting, transporting and processing.

So you already start with extending the shelf life at the grower. Harvesting and collecting the fruit should be done gently. No rolling or falling about, but putting it gently into a container.

When the fruit arrives at the processor, the shelf life extending continues. The fruit is preferably manually placed into a machine. That way it's orientated exactly in the best position for processing it in the right way. Also important: don't process whilst carrying the fruit on the pulp itself. And don't put too much pressure on the fruit. Cut with sharp and moving knives. Prevent extrusion for most products. Just prevent it from going to get crushed and damaged, resulting in brown or soft spots and unnecessary juice loss. Carrying on the stone or on the growing point is the best way to transport a piece of fruit when processing in a machine.



**Purchasing a machine is a long term investment. Inquire about the yield and ROI and see if it's the right match for your demand.**



## THE PROCESSING OF FRUIT REQUIRES SPECIAL TREATMENT

Fruit is fragile. The processing of fruit therefore requires a number of inventive peeling and cutting methods. When processing fruit, you want a machine to handle the fruit carefully. You look for applications to damage it as little as possible. So you pick it up carefully, put little to no pressure on the pulp and you carefully slide it onto a conveyor belt after processing. This greatly improves the shelf life of your product.

When engineering a machine you first examine the fruit very carefully. You look at the growing point, how the stone is positioned, what varieties there are, how hard or thick a peel can be, and much more. You also look at how that piece of fruit could best be hand peeled. Those are the most important principles before you start with the first design of your machine. Because only when you've determined the fruit, know it inside and out, you can process it the best way without damaging it.

# DESIGNING PROCESS: HOW THE DESTEMMER CAME TO LIFE

A fruit processor had ten people lined up, standing by crates, manually turning grapes from the bunches. A labour-intensive job. In addition, the repetitive twisting movement, which must be made from the wrist, could increase the risk of RSI. An automated solution was necessary. But not easy.

An important condition was that the grapes had to be turned from the stem, not pulled. When you pull the grape off, it damages the skin at the growing point of the grape. This immediately shortens the shelf life of the product. In addition, turning must be done with care, the fruit must not be bruised or crushed. Finally, the machine should be creating a decrease in the costs. A payback period of between one and one and a half years was desired.

## Trial and error

We sat down at the drawing board with these principles. A few test setups were built from the first sketches. Including a bed with rotating silicone toadstools over which a truss could be towed. The grapes could be transported to the belt below in between the mushrooms. This worked, but just not good enough.

## Look how it's done manually

The customer showed us how to quickly destem a bunch of grapes. He made a kind of hand-rubbing motion around a bunch. Much of the grapes came loose with this motion!



Machiel Honig  
CEO and engineer at ZTI

Test set-up two therefore became a new concept. We mounted inflated inner bicycle tubes on a rotating plate. That way we could imitate a rotating, hand-rubbing, movement

A combination of test setups lead to the desired result. The current Destemmer was created by combining both test setups (the silicone mats and the rotating movement). A symmetrical system, made with two moving silicone pads arranged in a v-shape. The V-shape ensures that the grapes and stems can roll from the bottom of the machine onto a belt.

### **Return on investment**

One Destemmer with three people on the line (for advancing the machine and reading the belt) has the same capacity as 10 people who manually turn the grapes.

### **Shelf life**

Shelf life was one of the important starting points before we went to the drawing board to design this machine. The rotating movement of the grapes, to prevent the peel from tearing, and the soft silicone patches are keeping the grapes from being damaged. Also the careful movement off the grapes onto the conveyor belts ensure that the grapes are as attractive as they were on the bunch.





Rotating knives are making nice sharp edges on your fruit cubes



Video: Fruitcutter e-line. De fruit is placed into trays to prevent it from moving around. Nice even pieces and no pressed or lost pieces of fruit in the machine.

## ALL ABOUT THE KNIVES

Designing a fruit processing machine with extending shelf life in mind also requires expertise in knives. Shape, sharpness, movement, thin peelers and much more aspects make a machine work at its best.

### Movement

When the knife makes a sawing motion through the pulp of the fruit it prevents a lot of juice loss. And the pressure on the fruit is also reduced to a minimum.

### Made for the job

A good machine has its own specially designed knives.

For destoning a knife can be bow shaped, for peeling its best to use a thin peeler to improve your yield, for cutting a moving knife is best. Some machines even have cylinder shaped knives or circular shaped. Like in the fruitcutter above.

Knives can be made at ZTI in house. That is making sure that we always have the right knife for the right job.

Extend your shelf life with the best knives you can find



# EXTENDING SHELF LIFE CAN BE FOUND IN SMART SOLUTIONS

## Sharp and moving knives

Make use of oscillating knives and peelers. This prevents unnecessary juice loss and bruising of the fruit.

## Transport

Another important element is the way in which the fruit is introduced and transported through the cutting or peeling process. For example on the stone or only on the growing points.

## Manually is done best?

Start with “best practice by hand”. For example, grapes are manually picked by gently turning them from the stem. This prevents damage to the fruit and allows the growing point to stay intact.



**Manually is not always best. A smart machine wins on time, space, money and shelf life**

## Loading and unloading

How is the fruit loaded into the machine? Does it fall from a bunker or is it carefully placed by hand? Look what's the best way for your specific type of fruit.

## No pressure!

The knife in the machine shouldn't apply any pressure on the product. Ultimately the knife makes a sawing or oscillating movement to prevent damage and juice loss.

## Do not extrude

Extrusion means pushing the fruit through a knife or a mold. Usually, this means also pressure on the fruit. It is better to make a cutting movement.

## A cup of fruit

When the fruit is placed into a cup into the machine, it cannot move around whilst processed. That way it doesn't get pushed aside or get stuck somewhere you don't want it to get stuck.

# OUR MACHINE SOLUTIONS FOR MORE YIELD, GOOD ROI AND LONGER SHELF LIFE



Fruitcutter  
e-line



Mango Peeler-de-  
Cheeker 20



Fruitcutter



Mango Peeler-de-  
Cheeker 40



Pineapple Peeler



Mango Peeler



Watermelon Dicer



Citrus Kiwi Peeler

- Thin peeling knives that follow the contours of the fruit
- Easily adjustable peeling thickness
- Fitting trays for equal cubes
- Shaped knives for destoning
- Variable cutting cylinders
- Moving sharp knives for longer shelf life



Check our [website](#)  
for an overview of all  
our machines!



Thank you for reading this whitepaper. I hope it was a good and useful read for you. If you have any questions, or need an overview of all our machines, please contact me by the link below.

