Plastic recycling in less developed countries

The big mean part is: *no budget*

When people think of recycling or circularity, it is often about 'the West'. Western Europe, North America, that's where these topics are most developed. But the world is much bigger, and much of the plastic is used in areas where recycling is in its infancy. Someone who is trying to offer a helping hand there is Rik Voerman of Triple Benefit. He helps interested parties in less developed Countries to find cheap, simple production lines to recycle plastic.

Rik Voerman, "My passion is to buy machines and moulds as cheaply as possible ."

Voerman has a number of production concepts with which he can tackle a large part of the questions. It's often about intruding. continuous extruding, cold pressing, mouldless sheet cutting or rotational moulding. I have some very nice solutions for that - which are very easy to repeat, by the way. This is happening more and more. But my passion is to buy machines and make moulds as cheaply as possible. Often 10 to 20 times cheaper than usual in the sector. I have several clever tricks for this, which I also like to apply in other projects. And of course, none of these lines produce waste: we can recycle that right away...!"

According to Voerman, there is a common denominator in such local initiatives, and that is: it must be as good a buy as possible. "There is no budget, also because virgin plastic is so cheap. In the West, governments give money so that a central approach is possible, but not in those countries. So if you want something, you can only do it bottom-up and decentralized. And then you have to hope that it will grow autonomously.

'as cheap as possible' consists of two key figures:

1. The investment should be as low as possible (CapEx).
2. And the production cost per kilo as well (OpEx).

Specific projects

"Furthermore, of course you want to add as much value as possible to a useful product, but that follows after that. First, the OpEx must come out below a quarter per kilo of at a low investment. I often stick to a specific investment formula, and that is the investment per kilo per hour. That means: if you process 100 kilos of plastic per hour, you want to remain under 50.000 euros. For example, if you earn 50 cents per kilo, you will have earned back your investment after 1000 production hours.

How did Voerman come up with all the production lines?

That has grown organically. He is usually approached by enthusiastic people who see a problem and look for a source of money and the technical knowledge to solve it. For example, a local plastic stream in the banana industry; someone who wants to make an island circular; or a group of people who have fished a mountain of litter out of the sea and want to turn it into something useful. So: local sources, often specific to that place. And often specific plastics or a specific quality".

One-stop shop

Then they need to know what they want to make of it. Voerman also helps with this; "In order for the project to be feasible, I take care of the entire process, I am a one-stop shop. From discussing the business plan, to selecting suppliers, making moulds and organising them. In addition, commissioning, execution; and of course on-site training - which can also be done remotely."

Such a process can easily take up to a year, but when that is finished, the machines will remain there permanently. "Most of my projects are still running continuously. I help them get going and then they go their own way, some even show organic growth. That's great, of course. But it doesn't always happen by itself. It is certainly not always paid work, think of the preliminary stages, but the result does contribute to a cleaner world.'

".. Out of control hobby"

Voerman is actually a project manager in the plastics and rubber industry who has specialized in production optimization for the past 25 years. Over time, he has increasingly focused on small recycling plants. "It's a hobby that got out of hand," says Voerman, who has successfully delivered 10 to 20 such projects over the past five years.

triplebenefit.nl

Maartje Henkel

Different production concepts for plastic waste with a minimum purchase price

Concept 1: Continuous extrusion

"When bananas are harvested, a lot of agricultural film is released. A major banana importer took me to Peru in 2018. There we calculated business cases with various cooperatives and made plans to convert the plastics into cornerboards for their pallets. A year later, the first factory was put into operation and several factories followed in Peru and then in other countries. It has led to a huge reduction in plastic pollution in the environment. We are now at an advanced stage to replace these plastics with biodegradable plastics in order to further reduce the environmental impact of residual pollution.

Continuous extrusion lines for bunch bag recycling in Peru.

In the banana fields, with a bunch bag in the background.

Pressing products with the portable extruder in Senegal.

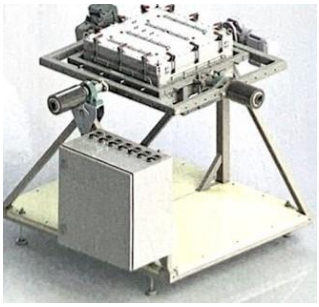
Handing over the portable extruder in Senegal.

Concept 2: Cold pressing

"With "cold pressing" we mean pressing hot melt into a cooled mold. The problem with heating and melting plastics is poor thermal conductivity. Industrial smelting solutions are typically based on extrusion principles. Initially, a mini-extruder was developed that is portable, can be connected to the normal grid and is suitable for contaminated and mixed plastics. In Senegal, we tested the concept in collaboration with Waste with entrepreneurs in the field. After that, many bought the extruder with personalized moulds, especially for demonstration purposes in Countries such as Vietnam, Uganda, Bonaire, Mali, Indonesia, Kenya and Mozambique. On a larger scale, the concept can be combined well with a normal extruder and a good press.

With specially developed techniques to keep mould costs to a minimum on an industrial scale, the investment costs can be kept low.

The portable extruder



Setup of the rotational moulding machine for hollow products.

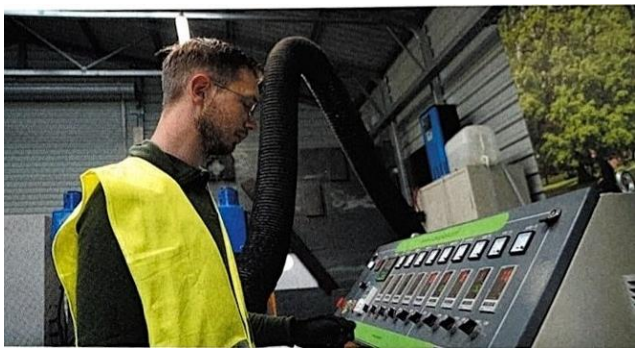
Concept 3: Rotational moulding

"If larger products are made with a small material flow, rotational moulding can be an interesting solution. A machine for rotational moulding has now been developed and put into operation in an industrial environment. At the moment, we are still working on smart mould solutions that make the purchase of both mould and machine even lower. It is expected that this will be put into use in a local recycling project in 2024."

Concept 4: Intrusion

With "intrusion", the built-up pressure in an extruder is used to push the melt into a mould. Products are often long shaped, such as poles, posts and planks. These products can then be used to assemble for example garden, street, marine, school furniture or even entire houses are made. The first concept was developed for Save Plastics and has now been further developed with even smarter cheap and efficient solutions and is used in several projects, including in India, Antigua and Indonesia. The purpose of this is to close the cycle of household waste plastic locally."

The photo shows Bram Peters at his setup of Save Plastics.



Intrusion machine at Save Plastics.

CNC router with the seat designed by Searious Business on Saint Lucia.

Production team of the workshop in Saint Lucia.

Concept 5: Mouldless sheet cutting

"It's even better, of course, when moulds wouldn't be needed. There are designs of an infinite number of products that can be made from sheet material by CNC (computer-controlled processing). In order to close the cycle locally, the idea was developed with this in mind to make flat plates without product-specific mould.

These plates are then machined computer-controlled. This also makes the production process very flexible; you can change products at any time during production. The chair in the accompanying photo was developed by Searious Business for this project in Saint Lucia."