

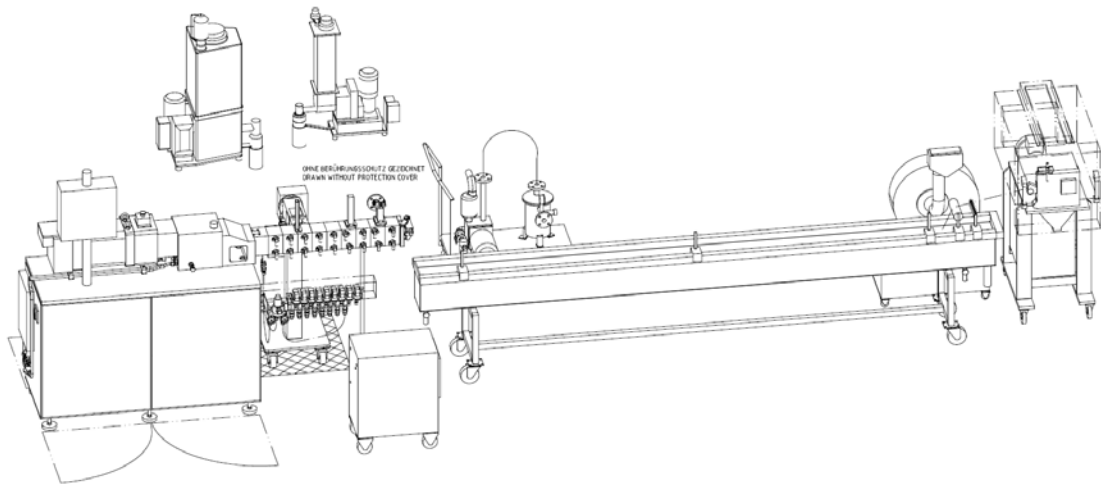
## EXTRUSION - COMPOUNDING

### Nanocomposites Research and "Taylor-made engineering thermoplastics "



Today, engineering plastics are essential in many sectors, from vehicle and machinery manufacturing, energy technology and appliances, sporting goods, leisure, and so on. Because of their high mechanical strength, stiffness, heat proof, and their high qualities of insulation.

The Mega Compounder ZSK26 from Coperion available on Aitiip, is the optimal solution for all types of production of engineering plastics, from simple coloring and basic polymers mixing to the incorporation of organic and inorganic fillers and reinforcements.



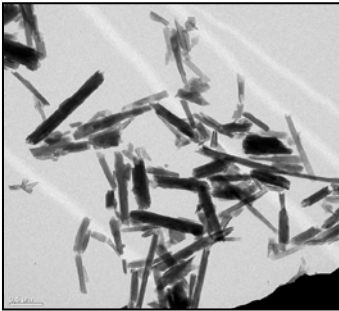
Aitiip technology center, as well as the production of new products, offers its clients advice on the formulation of composites and nanocomposites, depending on the needs and technical requirements of products that are intended.

- **Nanocomposites production**
- **Reinforced composite production**
- **Masterbatch production**

## Nanocomposites Production

The term nanomaterials includes all materials developed with at least one dimension in the nanoscale (below 100 nm) appearing new properties that allow the development of materials and devices with completely new or improved features.

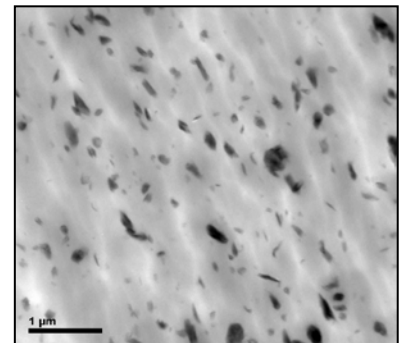
Nanotechnology, and specifically the area of nanomaterials, it is therefore horizontal, with influence in almost every socio-economic sector, from Health to Energy through Textile, Communication and Information Technology, Security, Transportation, etc. and has a huge economic potential.



Nanotubos de Halloysita

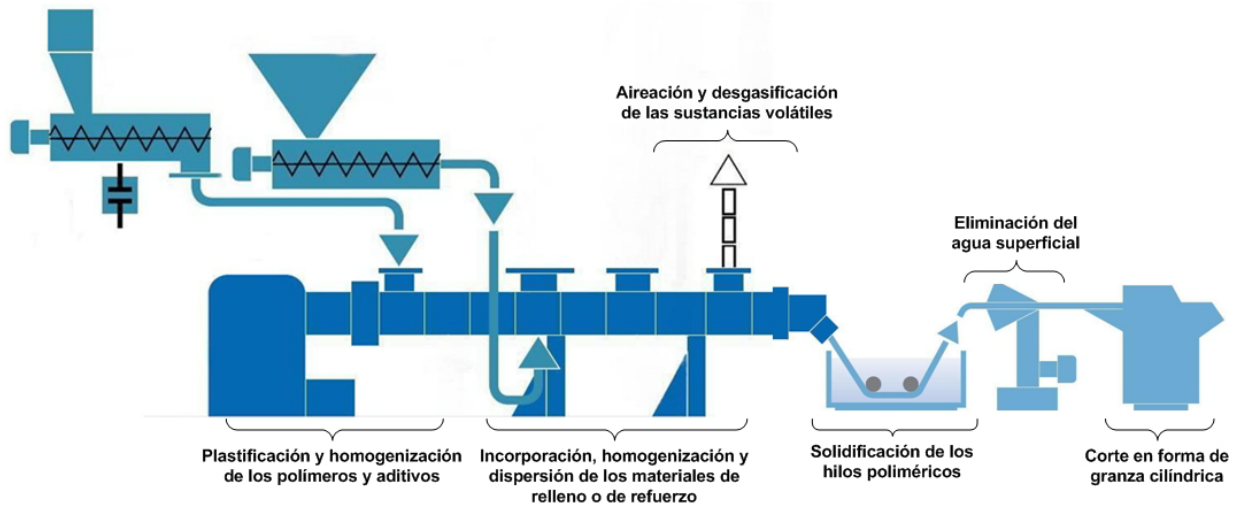
In 2009, aitiip made a strong commitment to innovation and began working with polymer matrix nanocomposites to improve the properties of materials we normally work for our clients. With the knowledge and results, we now offer the service of producing nanocomposites that allow materials to provide common, new or improved properties.

The production process is similar to reinforced composites, introducing through the main hopper the polymer which will act as the matrix, and by the side feeder, nanomaterials (nanoclays, nanotubes, metal nanoparticles, etc.).



Materbatch PA+NTH

## Reinforced Composites Production



The addition of **raw materials** can be performed by two different pathways, depending on their nature and purpose. The first is through the main hopper, where is generally introduced the polymer or polymers, that is going to form the melt. Once this mass is plastic, you can enter various additives (see table below) by the side feeder, being incorporated into the dough and melted for homogenization.

### MAIN HOPPER

#### Basic Polymers

PE, PP, PS, ABS, POM, PBT, PET, PA, etc.

#### Additives and pigments

0.5-60%

#### Polymer Blend

PP+Elastomer  
PC+PBT  
PC+ABS  
PPE+PES

### SIDE FEEDER

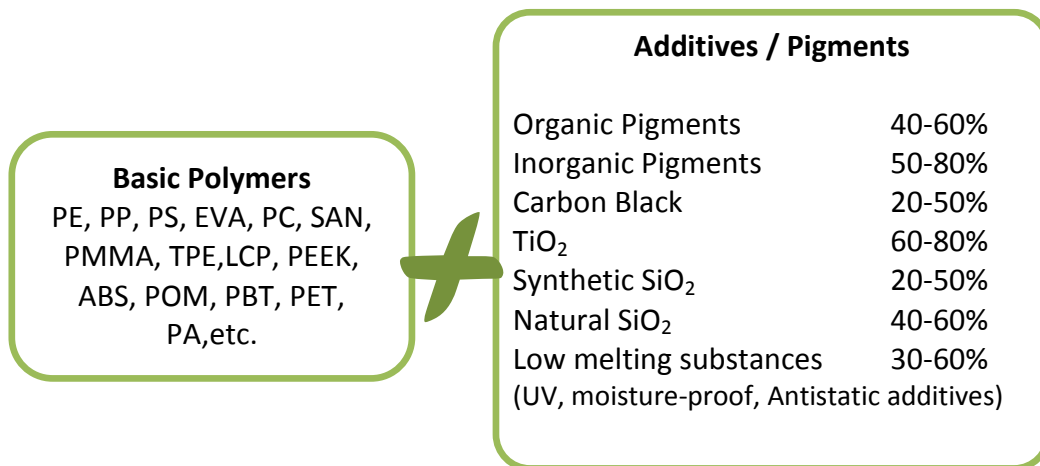
#### Filling materials and additives

#### Fibers and Microfibers

Talc	max. 75%
CaCO <sub>3</sub> , BaSO <sub>4</sub> , Wollastonita	max. 80%
Hollow Glass Balls	max. 50%
Fireproof material	max. 60%
Sb <sub>2</sub> O <sub>3</sub>	max. 90%
SiO <sub>2</sub>	max. 50%
Metal connections	max. 95%
Saw dust	max. 70%

## Masterbatch Production

In the plastics industry, concentrated pigments or additives within a polymer matrix are called masterbatch (MB), and generally in the form of pellets. They are used for the incorporation, dust-free, true to the formulation and simple, of pigments and additives to polymers and composites.



The masterbatch process is a production task, very demanding, since generally incorporate large amounts of pigments and additives to a polymer base. To do this, are particularly appropriate co-rotating twin screw extruders as the MEGAcopounder ZSK 26 available in Aitiip.

The process to follow is the dosage separately: During the separately dosing process the polymer is dosed at the entrance of the twin-screw extruder. After melting the polymer the additives are dosed into the extruder through the side feeder system.