
LEAD FREE CABLES SEPARATION

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THE FEASIBILITY STUDY

- The overall objective of the proposed project was the study of technologies that can be applied to detect the lead (Pb) presence in PVC products as a whole recycled plastic material.
- From this study, a series of information has been obtained that indicates the feasibility for the future development of an online machine that includes the following characteristics:
 - detection of Pb traces in PVC products as granulates (size <10mm)
 - reliability and industrial production capacity
 - ease of use by moderately trained operators
 - compliant with current regulations for operators' safety

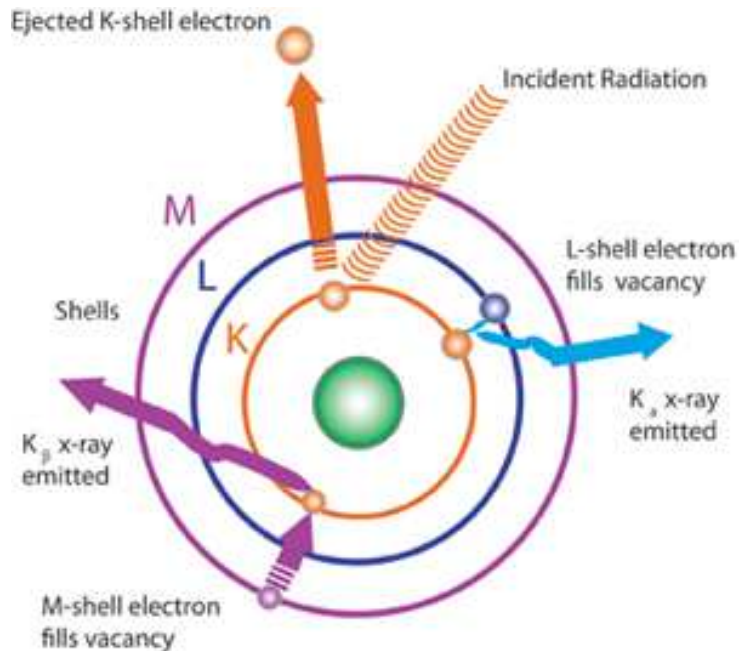


THE TECHNIQUE

- During the study, we performed tests to verify the feasibility of the use of XRF (X-Ray Fluorescence) technology in industrial production to detect the presence of lead (Pb) in PVC samples
- We considered also other technologies that could be exploitable than XRF
- The Project links partners ranging from producers, large-scale European consortiums and Industry to explore technologies for the future, taking an ambitious step beyond the current state-of-the-art
- The Project combines cutting-edge technologies for a wide range of industrial applications.



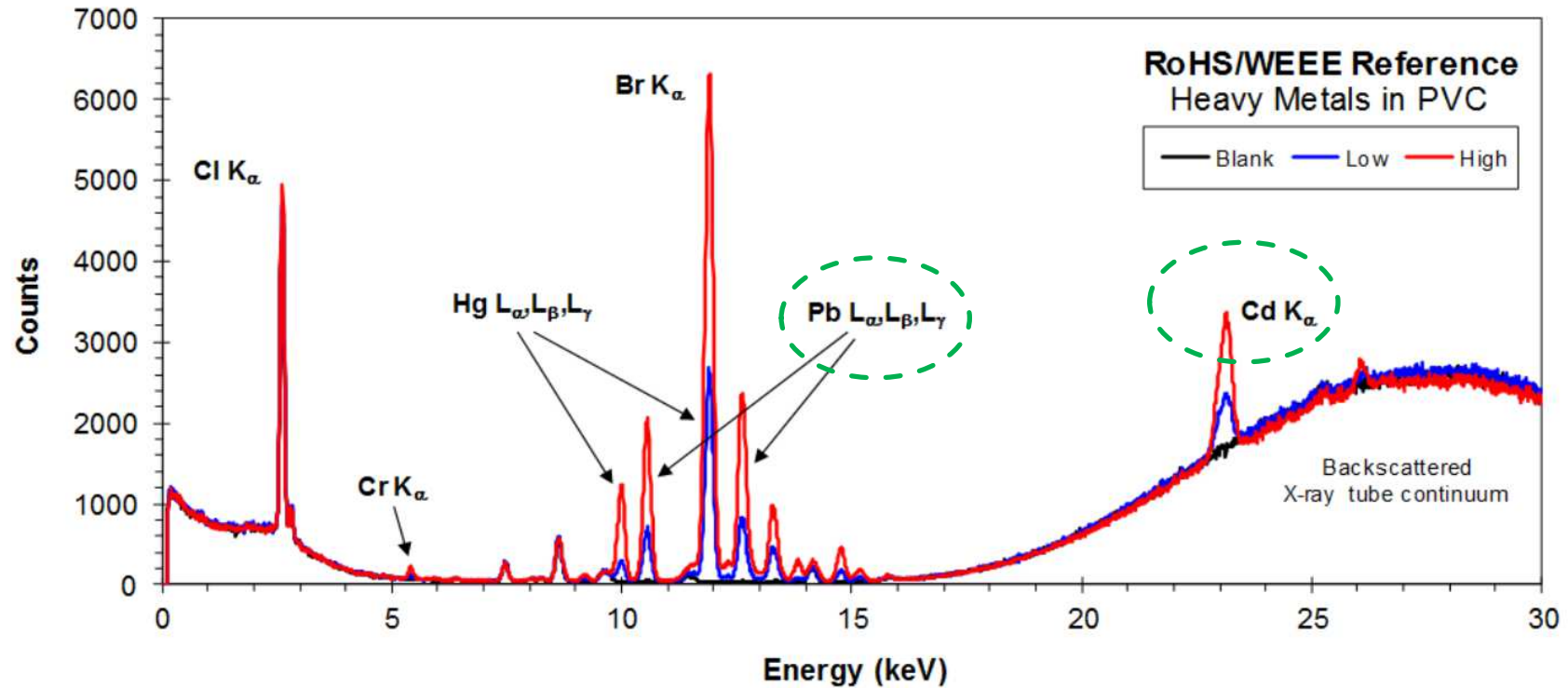
THE X-RAY FLUORESCENCE PROCESS



- Fluorescent X-rays are produced by exposing a sample to an X-ray source that has an excitation energy similar to, but greater than, the binding energy of the inner-shell electrons of the elements in the sample.
- Some of the source X-rays will be scattered, but a portion will be absorbed by the elements in the sample.
- Because of their higher energy level, they will cause ejection of the inner-shell electrons. The electron vacancies that result will be filled by electrons cascading in from outer electron shells;
- however, since electrons in outer shells have higher energy states than the inner-shell electrons they are replacing, the outer shell electrons must give off energy as they cascade down.
- The energy is given off in the form of X-rays, and the phenomenon is referred to as X-ray fluorescence.



Spectra measured from PVC samples



Example of the spectra measured from PVC samples: blank, low levels of the RoHS elements and a standard with high levels of the RoHS elements [source: Amptek Inc]



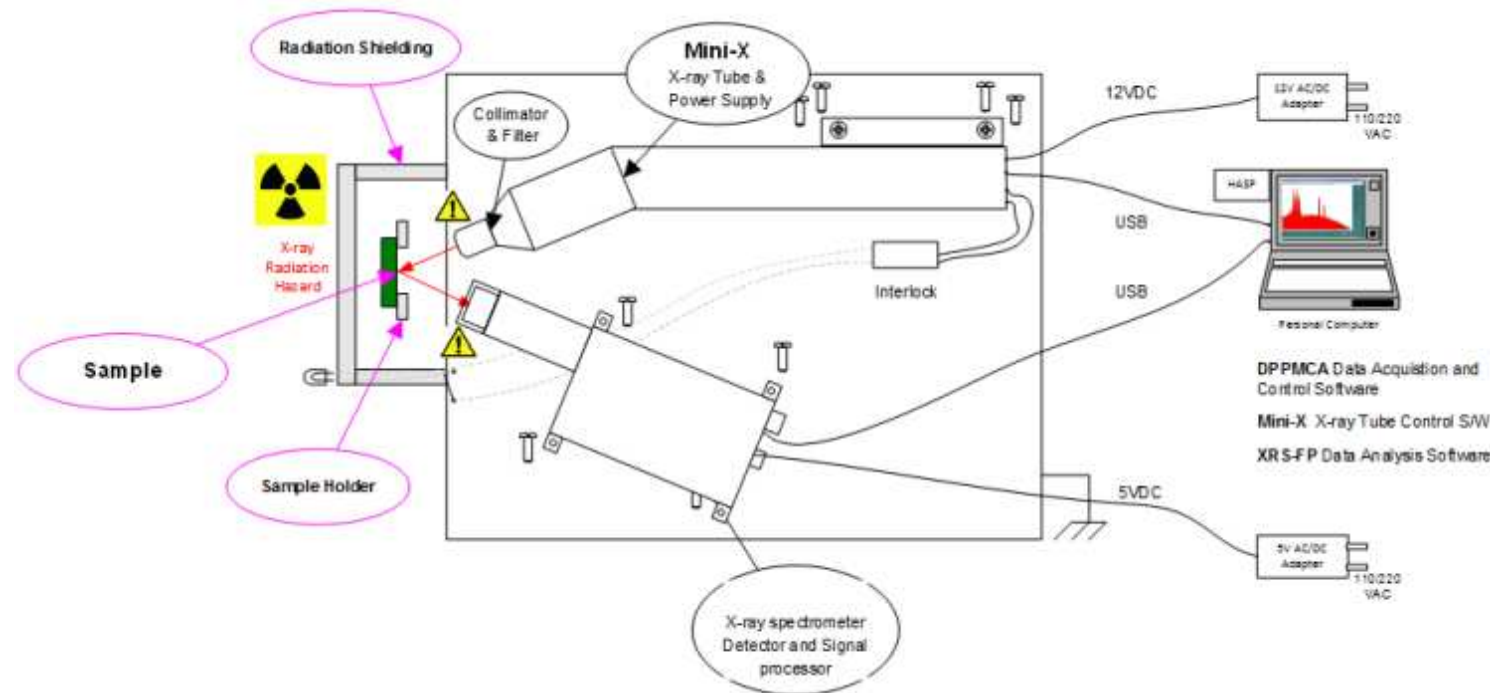
THE SETUP

The samples, provided by the partners with:

- ✓ presence of Pb
- ✓ absence of contaminant

were tested using an X-ray facility composed of:

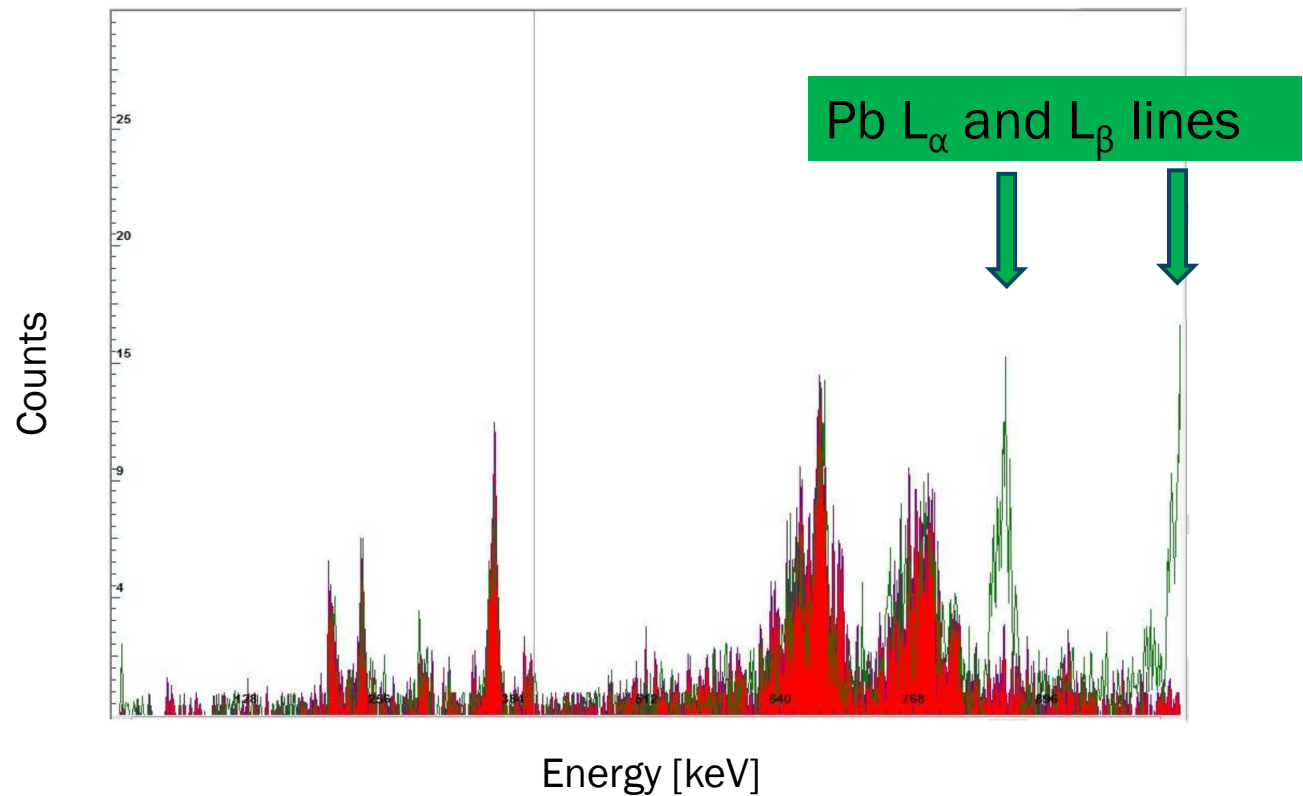
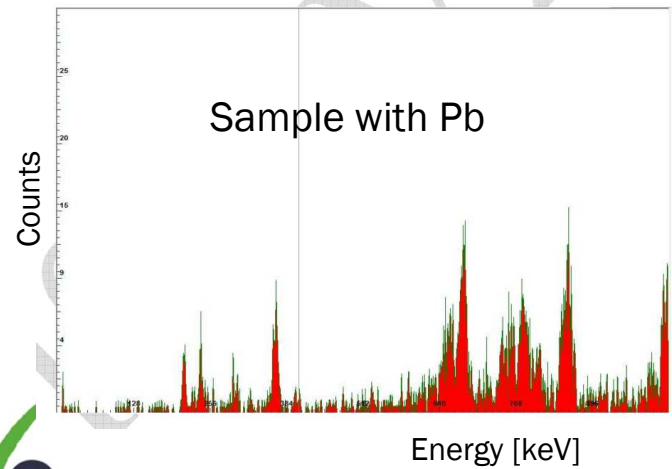
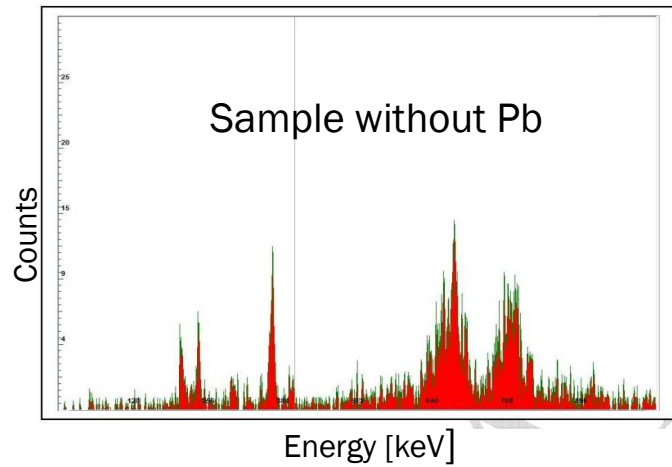
- Shielded X-ray box;
- X-ray microfocus source for the excitation of the X fluorescence of the components of samples;
- X spectrometer consisting of detector and signal processing electronics.





THE FIRST RESULTS

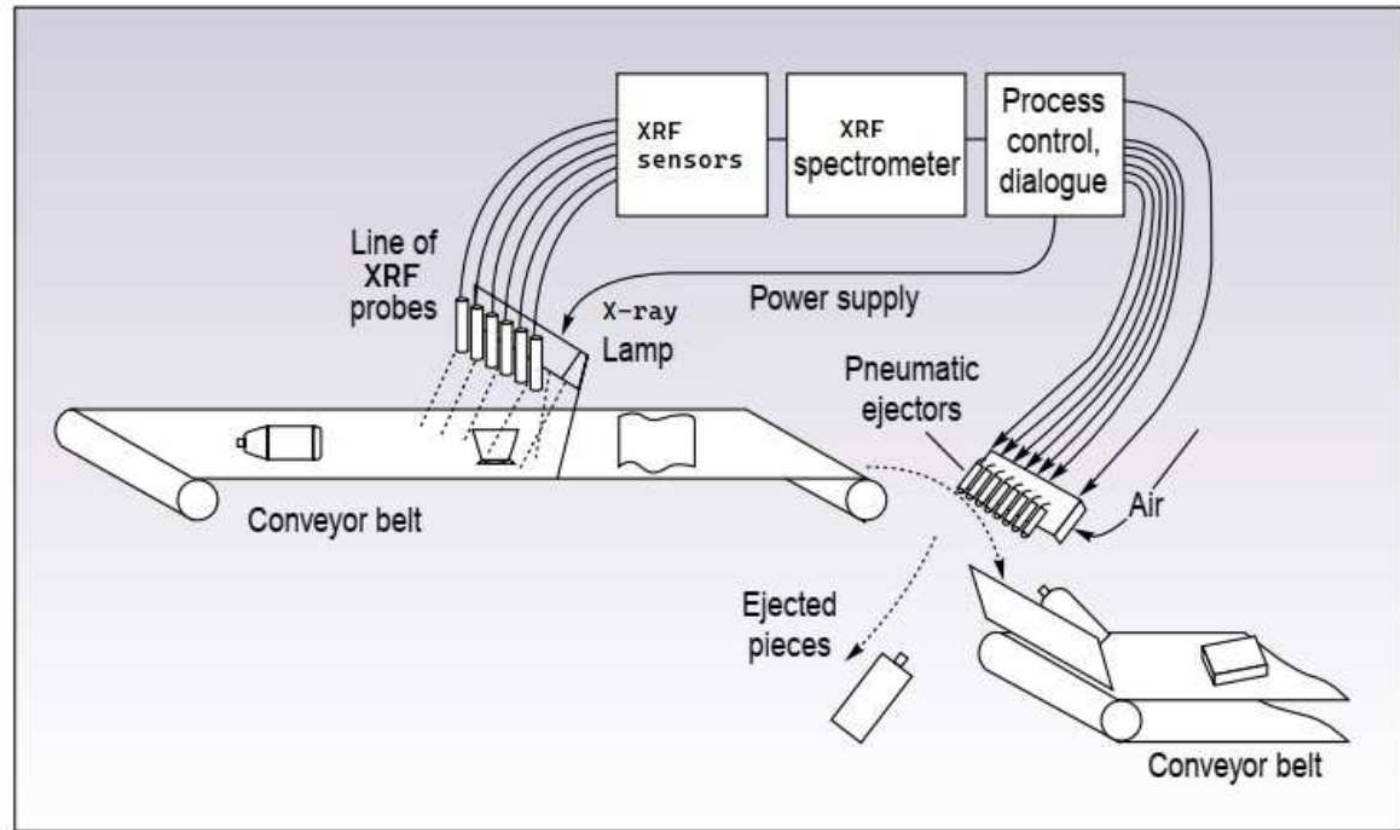
Comparison of the X-fluorescence spectra of PVC with and without lead





Final Goal

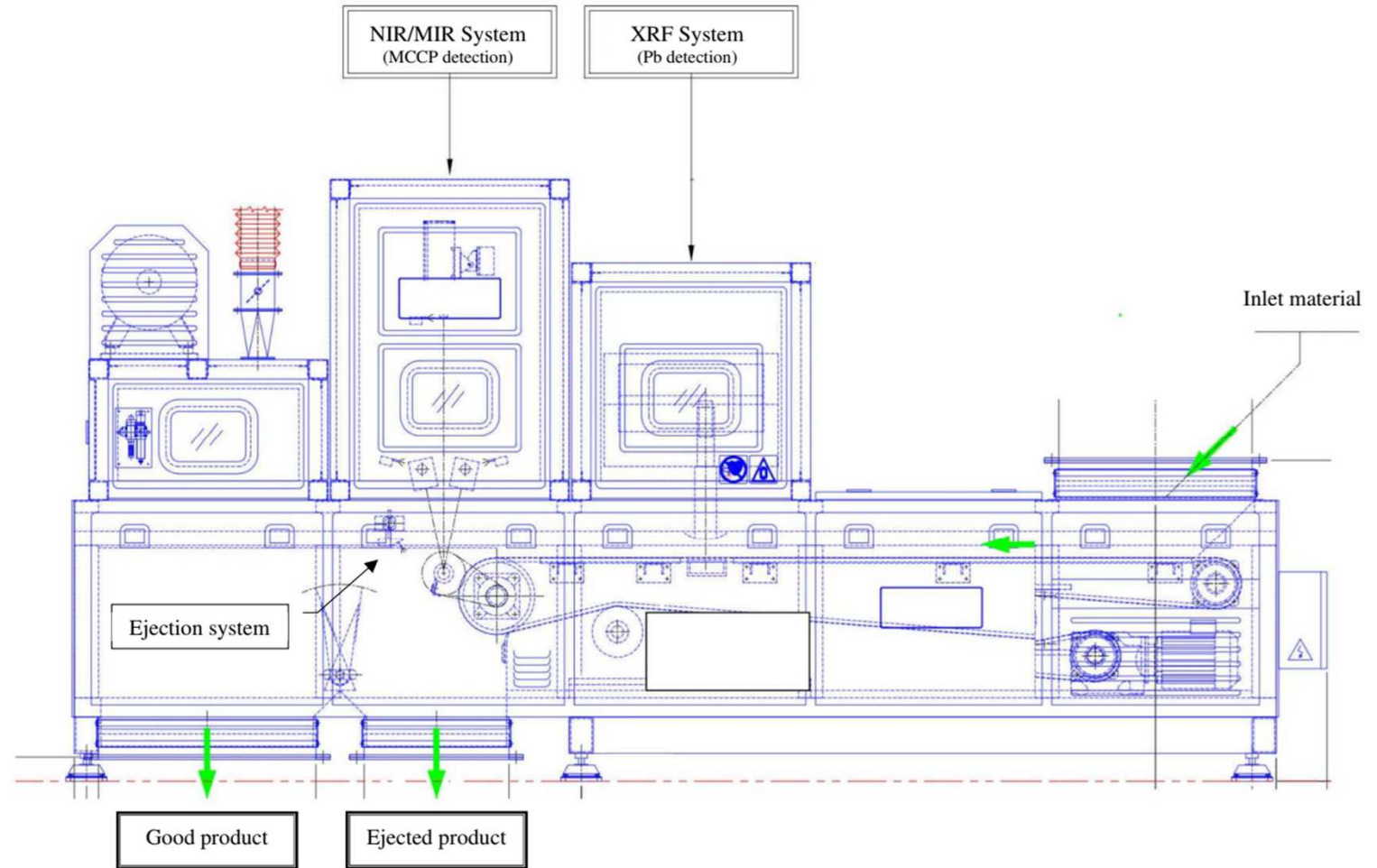
- ✓ Throughput: >1 ton/h
- ✓ Product sizes: 4-10mm



Schematic diagram of pilot plant



Schematic diagram of a production machine with double technology





Thank you



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