

## Case Study    Sorting

# Automatic Packaging with Specific Position and Order

*With the vision systems, we were able to speed up the entire sorting and packaging process, increase precision, and save costs in the long term.*

*– VP, Quality Control*



### The customer.

A leading manufacturer of ceramic teeth.

### The challenge.

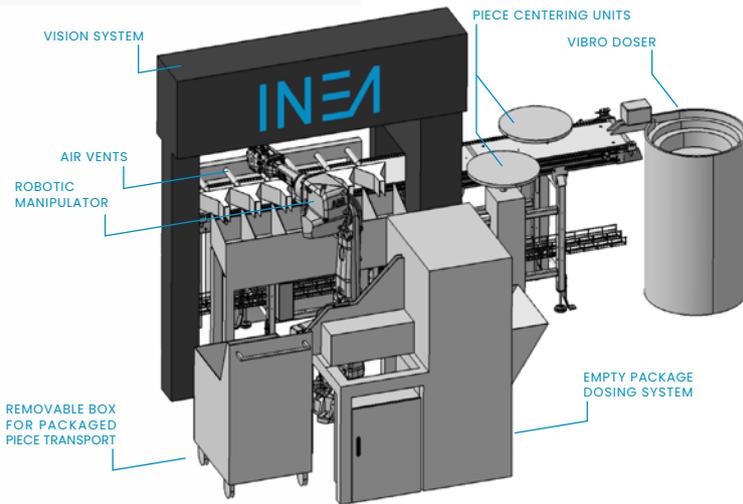
For the customer, the biggest challenge is the automatic packaging of specific teeth into packages of six pieces. Each package must follow two rules:

- All teeth must be aligned in a way that all frontal surfaces of the teeth are faced in the same direction;
- Every package must consist of two central incisors (left and right), two lateral incisors (left and right), and two canines (left and right) in an orthodontic order.

The pieces are usually made in a tool of 18 nests (3 sets at once), which ejects them after each cycle into a special crate, which is transported to the sorting room where labourers sort pieces and fold them into final packages.

The solution.

The sorting and packaging system has two phases. The first phase performs sorting of six different pieces using a dosing system, which assures that the proper number of teeth is put onto the conveyor. The conveyor moves all pieces in front of the vision system, which classifies pieces based on taken pictures and a deep learning neural network algorithm. Each piece is put into the proper crate, which contains only pieces of one type.



The second phase is used to perform proper packaging of the teeth. The pieces are one by one dosed onto six different special tables (one table for each type), where another vision system determines the position and orientation of the piece using pattern recognition and sends data to the robot. Afterward, it properly takes each part and puts it in a specified position in the package. When the package is filled, another robot is used for stacking small packages into a bigger one, which is ready for transport to customers.

In both vision systems, we have also embedded quality control for detecting various deformations or irregularities on a tooth in order to assure the best quality of products for customers.

The results.



**50%**

**fewer scrap parts**  
or mispackaged sets



**2**

**peoples' worth**  
of cost reduction