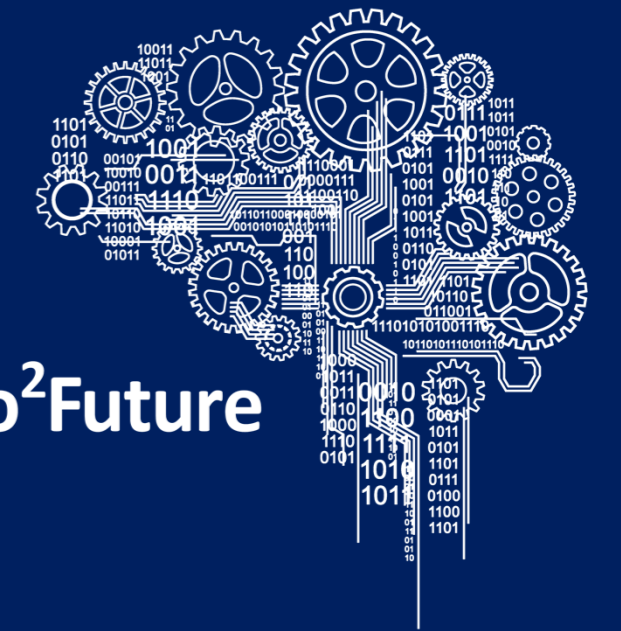


# QUALITY ASSESSMENT OF PELLETISED MATERIALS

## In-line Quality Assessment of Pelletised Materials based on Fourier Descriptors



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### MOTIVATION & GOALS

In the production of pelletised plastics, the **quality** of the resulting pellets is highly dependent on various **machine parameters**. Amongst others these are the **temperature** of the molten prime material and the **cooling** water, the **sharpness** of the cutters, and the **pressure** of the molten prime material.

The resulting reduced **production quality** is reflected by a change in colour or transparency and a change in the shape of the pellets.

Our goal was to **introduce parameters** to assess the pellets' shape in order to **determine the pellets' quality** and in a further step to control the production process in combination with other machine parameters to decrease the share of low quality output.

#### Project FactBox

Project Name AI Gran 2  
Project ID MFP 4.2.1-1  
Duration 36 Months

Area 4.2  
Cognitive Production Systems

Project Lead  
Dr. Wolfgang Roland

### APPROACH

For the analysis we used a B&R Vison System Camera to take images of samples from the pellet **output stream** of the machine. **Changes** in colour can easily be detected by evaluating the mean grey-value.

For the analysis of the shape we used the so called **Fourier Descriptors** of each detected pellet's contour. We used the distribution of the relative magnitude of the Fourier Descriptors to assess general form and smoothness of the pellets' contour.

### OUTCOME

Depending on the intended shape of the pellet we used the sum of the **relative magnitudes** of a certain selection of lower order **Fourier Descriptors** to obtain a parameter for the smoothness. With this parameter a categorisation in high and low quality pellets was possible with similar results as was obtained by a categorization "by hand". This is shown in the image on the right with a threshold of approximately 0.79.

With the data of the **Fourier Descriptors**, other parameters obtained by the **image processing algorithms**, and the machine data the control of the **production quality** is the goal in the next step of the project, which will be conducted in collaboration with the Institute of Automatic Control and Control Systems Technology.

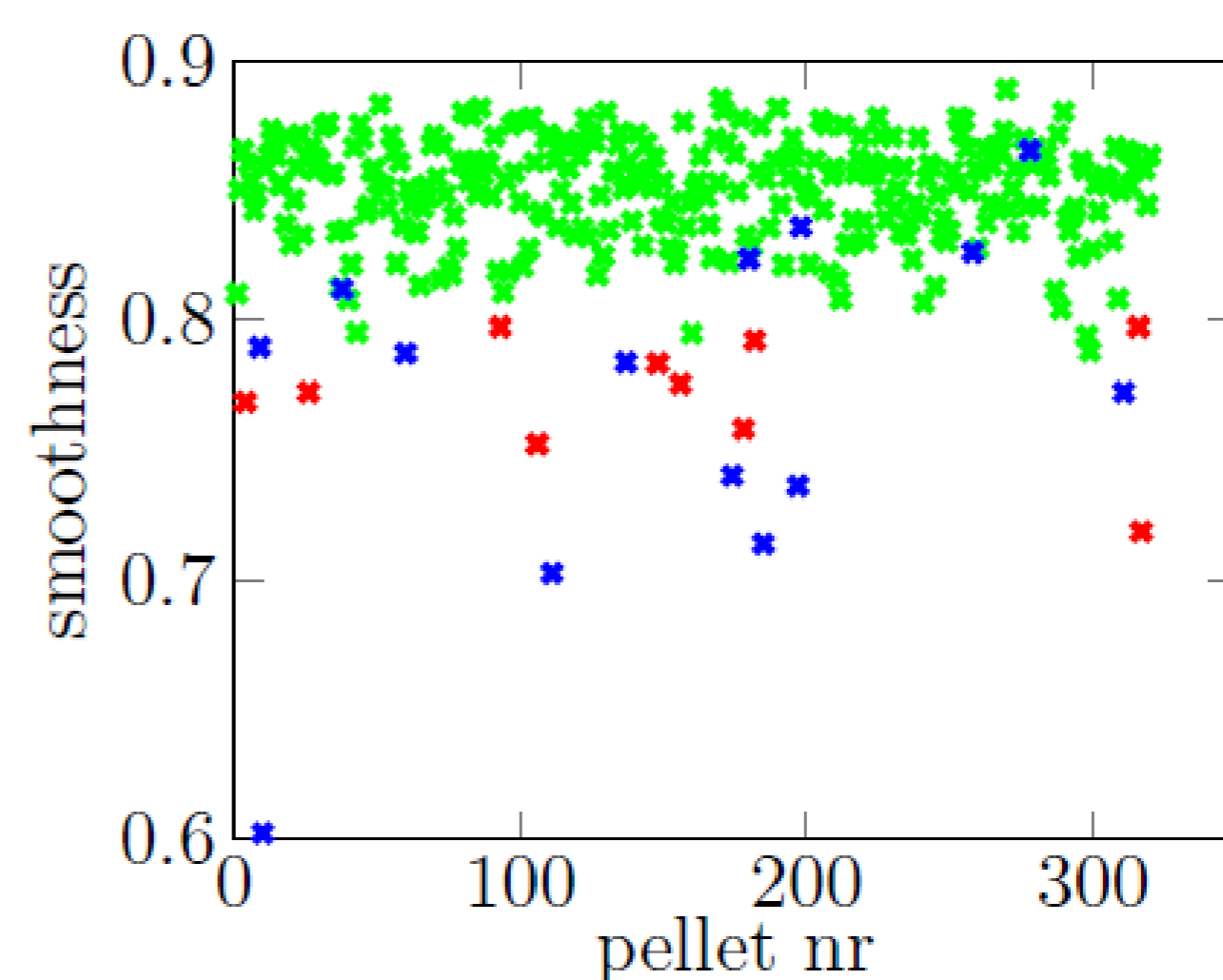
### CONTRIBUTION

#### Scientific contribution

With this project the use of Fourier Descriptors as general shape descriptors was investigated. The result being that they can be applied to get a general description of the quality of an object's shape as well as an estimate of the specific shape (round, triangular, etc.).

#### Economic contribution

The preliminary results of this project showed, that it is possible to assess the pellets quality in a potentially cheap way. The subsequent control of the machine parameters may lead to a reduction of defective produced pellets and hence the connected costs.



Left: Smoothness values (first order Fourier Descriptor) for 30 test images of spherical pellets (image on the right). The colours are based on a categorisation „by hand“ in high quality (green), low quality (red) and multiple (blue).

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