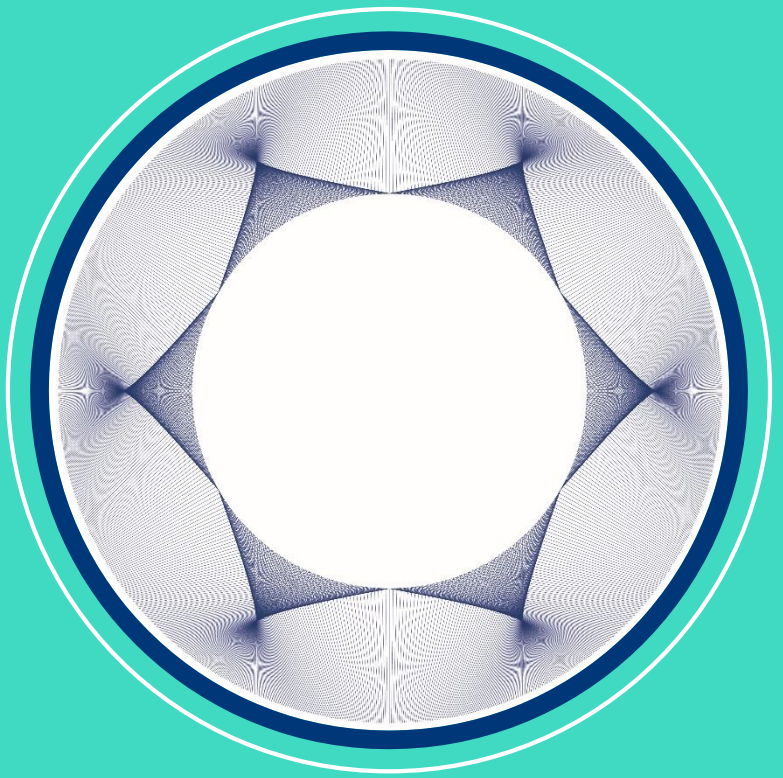
MAFAC

Parts Cleaning. Systems and Solutions.

MAFAC Vector Kinematics



Vector kinematics

Objectives

- Further development of the previous kinematics in the MAFAC cleaning chamber.

Functional description

- A relative rocking movement of the nozzle arm, attached to the rotating nozzle tube, achieves a considerably more effective impact on the batch to be cleaned.

Benefits

- More effective impact on all components
- Faster cleaning of the components
- Faster drying of the components
- Reduction of the particle quantity on the components while cycle time remains constant
- Better impact on recesses in the components

Performance features

- The process can be optionally integrated in the current version of the MAFAC JAVA and MAFAC PALMA machine types, without additional adjustments like e.g. larger chamber, larger frame or larger holding tanks.

Environmental aspect

- Energy savings due to shorter cleaning and drying times

Vector kinematics

Previous state of the art, stationary spray tube

- Rigid spray tube, which always sprays into the centre of the cleaning chamber
- Irregularly distributed impact on the cleaning batch; good in the centre, less than optimal in the peripheral areas
- Spray shadow with sensitive components in many areas which cannot be impacted directly

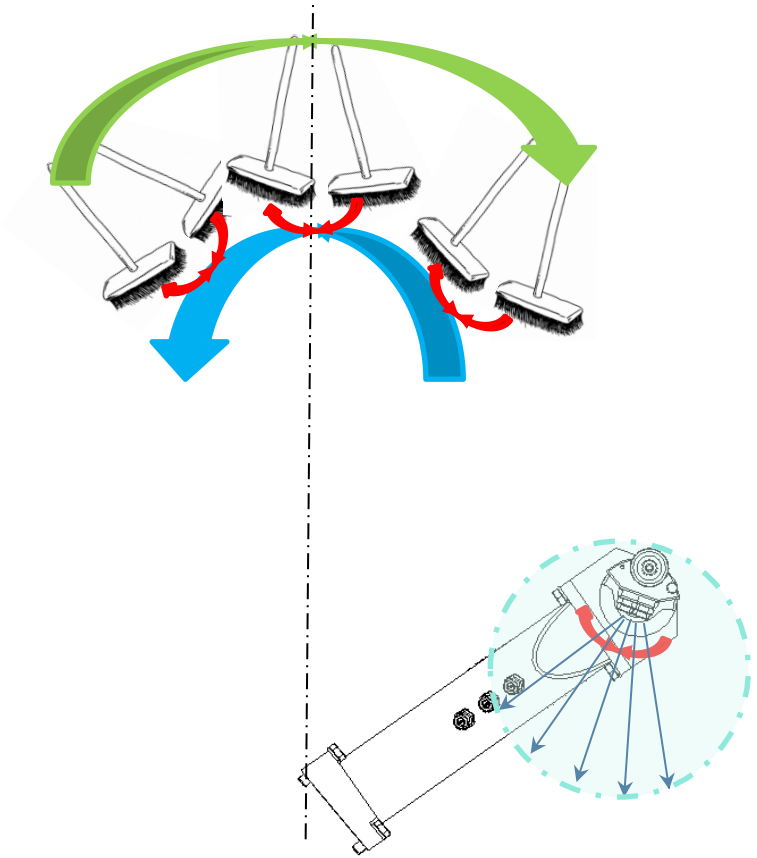
MAFAC vector kinematics

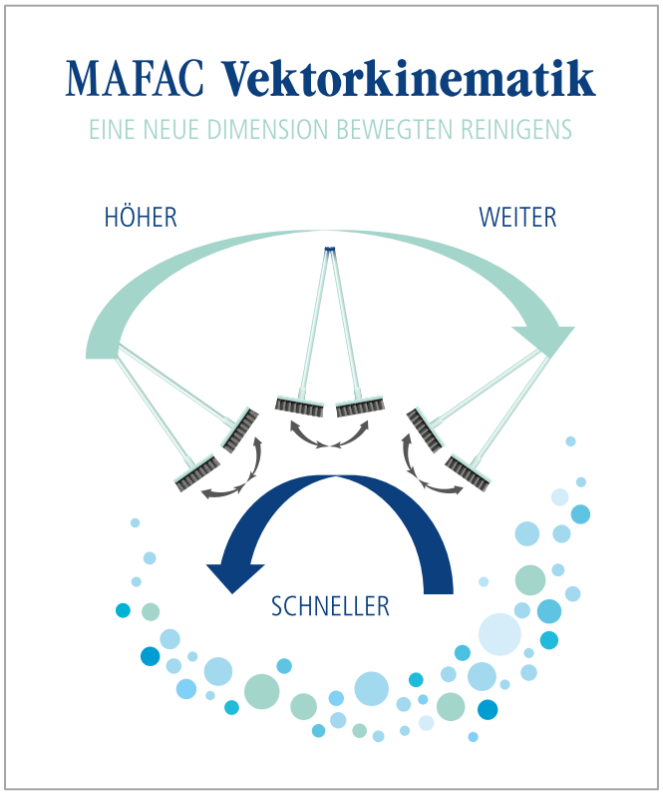
- Rocking and rotating spray tube, which impacts almost all areas evenly at all possible spraying angles
- More even distribution of impact
- Very few areas of sensitive components which cannot be impacted directly, hardly any spray shadow
- Rocking movement of +/- 35°
- Revolution speed of the nozzle tube linked with rocking movement
- Revolution speeds of nozzle tube and basket drive are calculated by an algorithm
- Vector fields for an even impact on the component geometries are created, these generate so-called hot spots

Vector kinematics

Patented nozzle movement

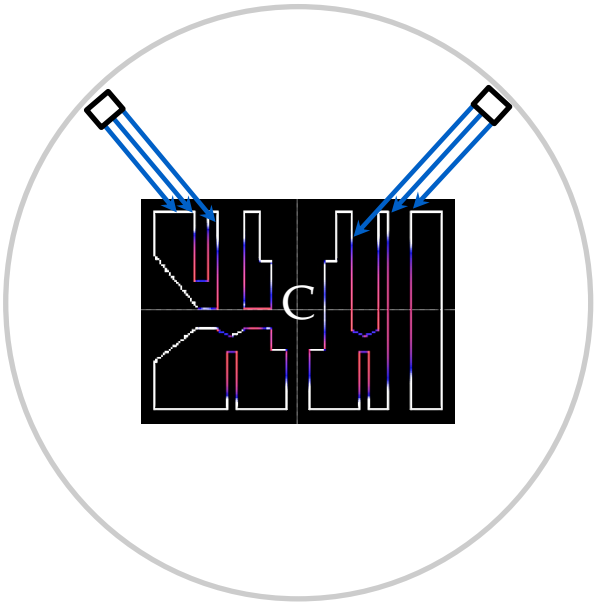
- The mechanic rotating movement of the nozzles within the nozzle tube system has been patented by MAFAC.



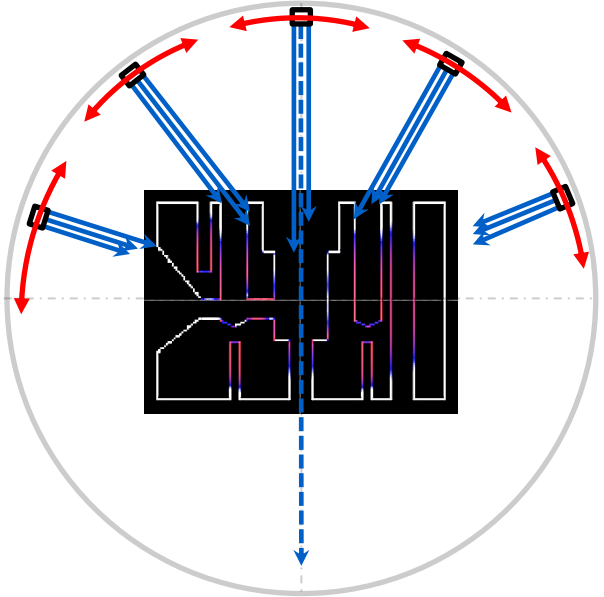


Vector kinematics

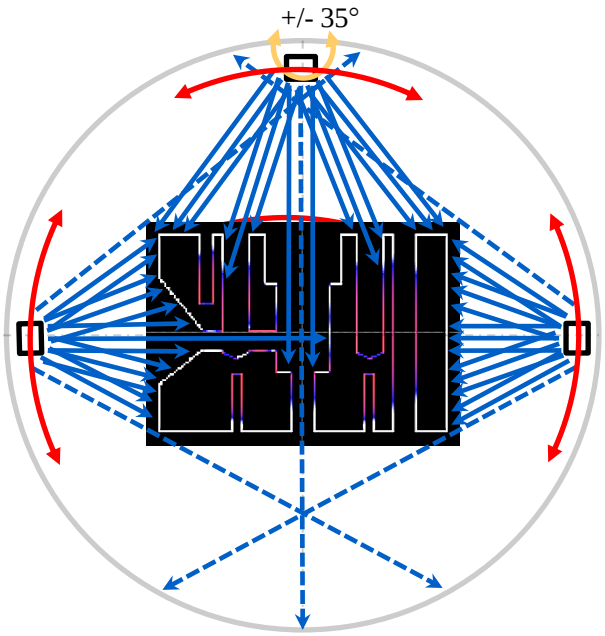
State of the art
rigid spray tube



MAFAC kinematics
rotating spray tube



MAFAC vector kinematics
rocking and rotating spray tube

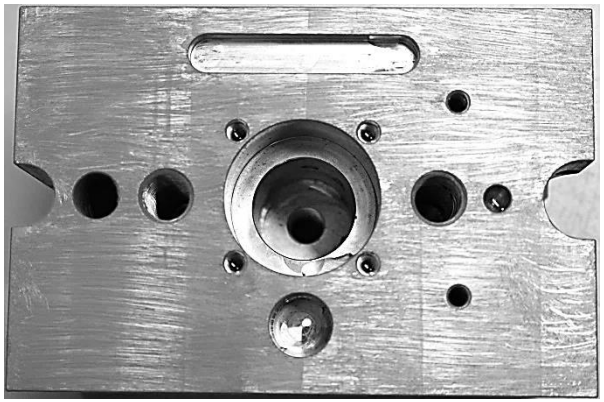


Vector kinematics

Impact tests

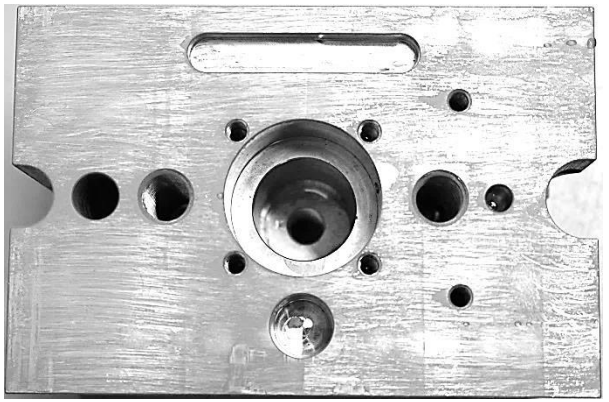
At a process duration of 5 min., the average percentage of the impacted component area is significantly higher with MAFAC vector kinematics than with the standard MAFAC kinematics*.

State of the art
rigid spray tube



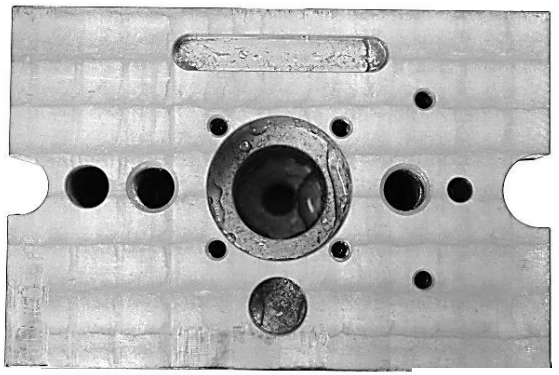
Uncleaned surface area: 1,009,926.47 mm²
Cleaned surface area: 142,980.78 mm²

MAFAC kinematics
rotating spray tube



Uncleaned surface area: 1,009,926.47 mm²
Cleaned surface area: 204,362.15 mm²

MAFAC vector kinematics
rocking and rotating spray tube



Uncleaned surface area: 1,009,926.47 mm²
Cleaned surface area: 426,928.57 mm²

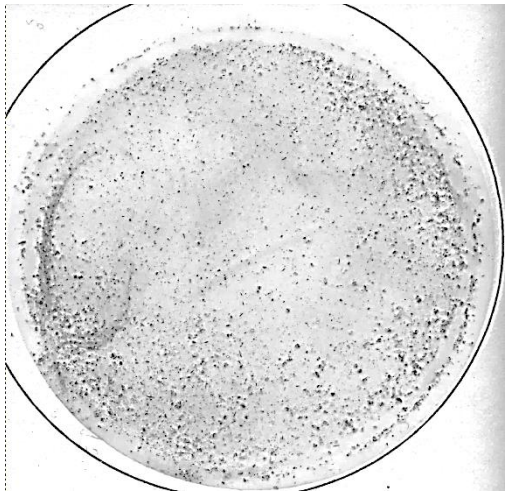
* Measured in the period May to July 2019, sensitive components with MAFAC standard parts with normal contamination

Vector kinematics

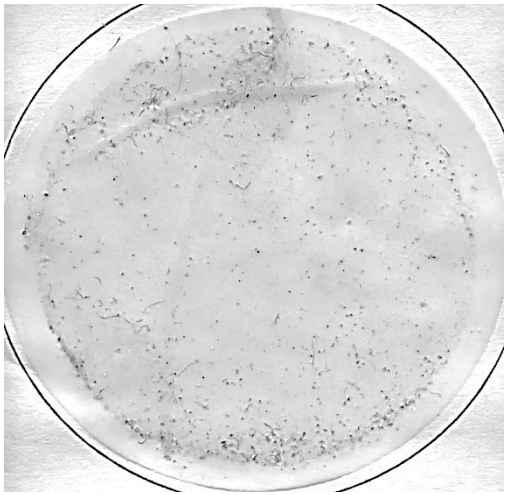
Gravimetry

In all areas cleaned with vector kinematics, the weight of particulate contamination on the components is **30 %** lower than with a stationary spray tube and **20 %** lower than with MAFAC kinematics*.

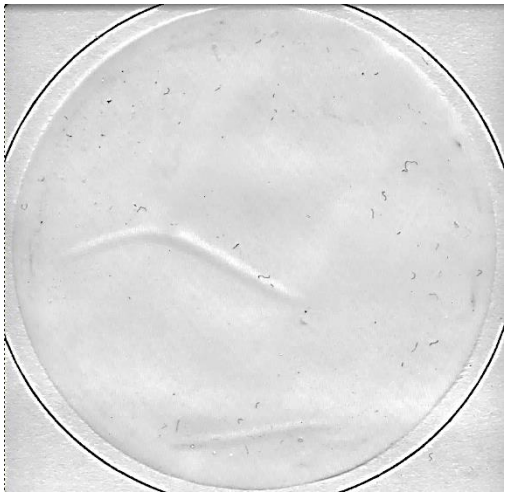
State of the art
rigid spray tube



MAFAC kinematics
rotating spray tube



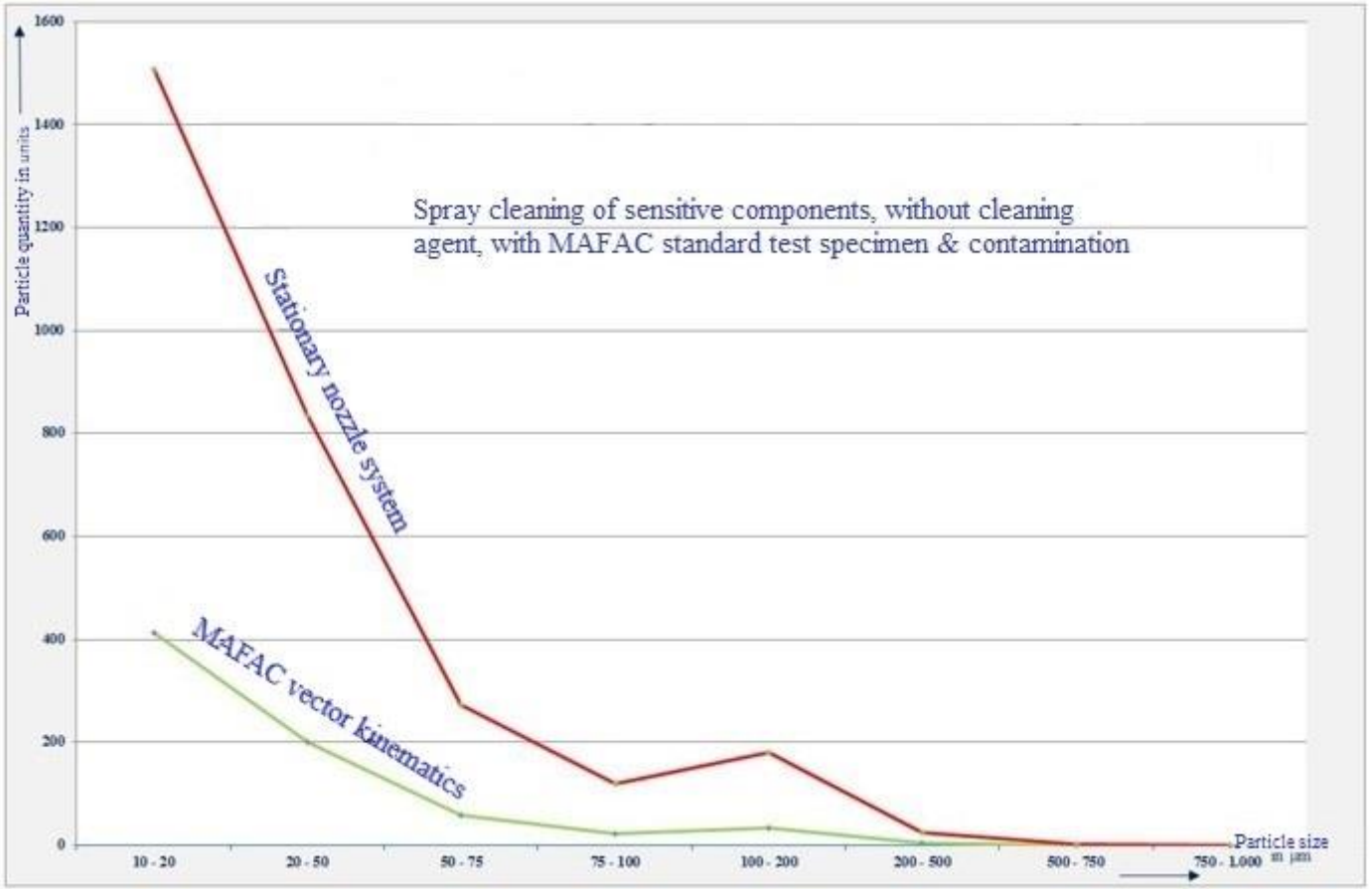
MAFAC vector kinematics
rocking and rotating spray tube



* Measured in the period May to July 2019, sensitive components with MAFAC standard parts with normal contamination

Vector kinematics

Particle size



In all areas cleaned with vector kinematics, the quantities of particles tend to be **80 %** lower compared with a rigid nozzle system*.

* Measured in the period May to July 2019, sensitive components with MAFAC standard parts with normal contamination

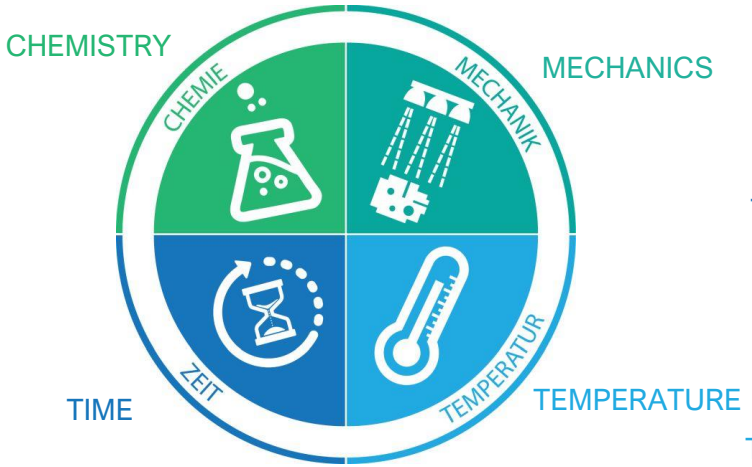
Vector kinematics

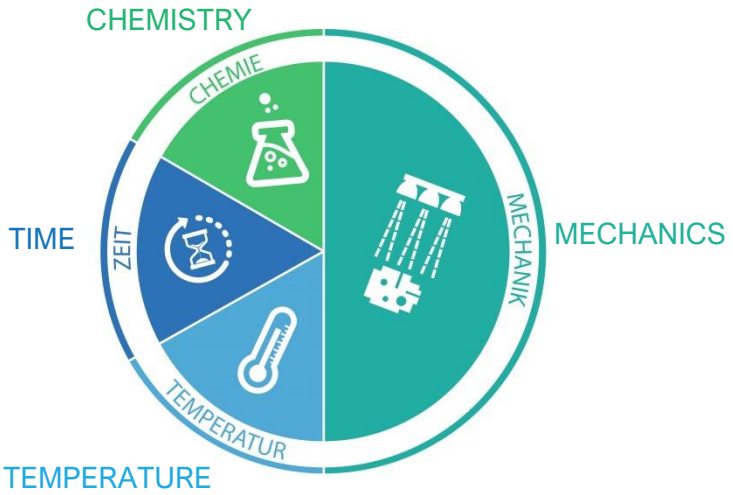
Drying and energy efficiency

In relation to Sinner's circle, vector kinematics leads to the desired cleaning result in a shorter time or a better result within the same specified time due to the larger mechanical share.

The entire process is optimised in terms of time and resources, as undercuts and blind holes are already reached during spray cleaning, which was previously only possible during the flooding process.

Flood cleaning also has a more intensive effect, as it has a higher flow turbulence in combination with vector kinematics. The same applies to the drying process, as the moving nozzles also achieve a better flow effect and thus a higher heat and material exchange. The entire process is therefore more effective in a shorter time.





Vector kinematics

Summary

MAFAC vector kinematics is a further development of the previous kinematics in the MAFAC cleaning chamber.

A relative rocking movement of the nozzle arm achieves a considerably more effective impact on the part to be cleaned.

The mechanic rotating movement of the nozzles has been patented by MAFAC.

Advantages of MAFAC vector kinematics include:

- the reduction of the particle quantity with the cycle time remaining constant tends to be 70 %
- significantly higher impact on the complete batch
- better impact on recesses in the components
- faster and more effective drying
- the particulate contamination weight (gravimetric) tends to be reduced by up to **30 %**compared to a rigid spraying system

Vector kinematics sets new standards in cleaning and drying quality, ensures better impact on the components

and also leads to increased energy efficiency.

Availability:

Tests on the MAFAC JAVA will be possible in the new pilot plant from 2020