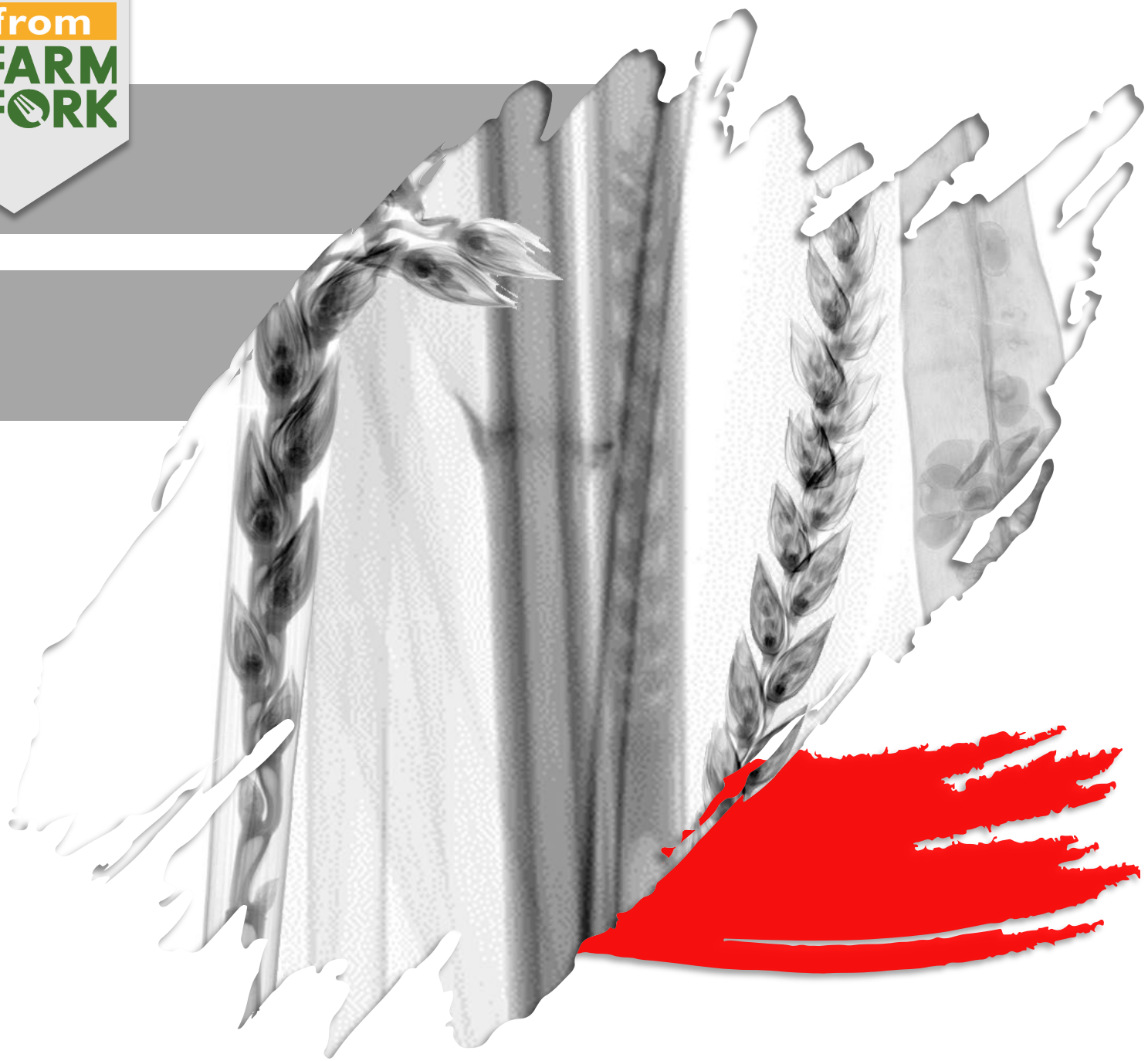
RADALYTICA a.s.

From Farm To Fork

„There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.“

Niccolo Machiavelli



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powered by ADVACAM

ROBOTIC IMAGING SYSTEM

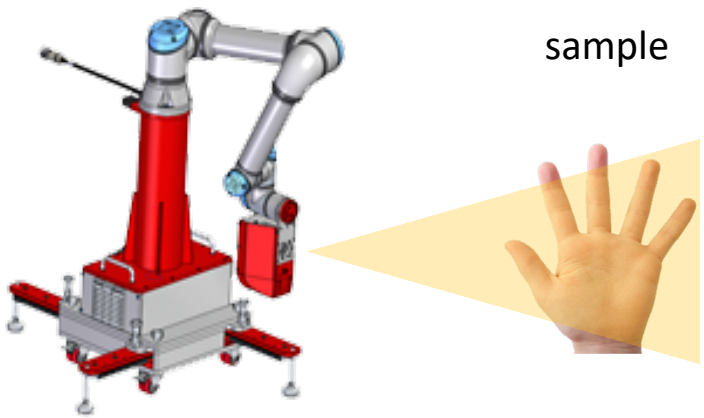
ROBOTIC IMAGING SYSTEM

A high-performance platform that is able to combine several imaging techniques.

RadalyX

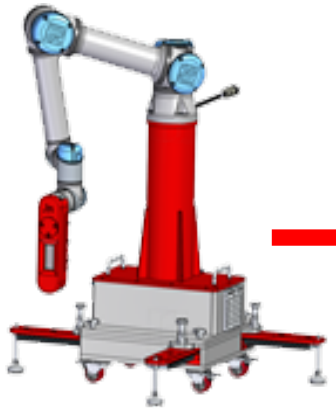
- The key parts of the scanner are two six-axis robotic arms. The first arm holds an X-ray tube, the second arm holds an imaging detector.
- Robots can move and rotate freely about the sample by precise synchronized movement and provides almost absolute flexibility of viewing angles.
- We are not limited in terms of size or shape of the sample.

X-ray source



sample

X-ray detector



X-ray image

- RadalyX allows to measure 3D images using computed tomography or laminography even in the selected area of large object.

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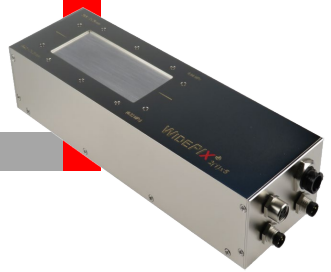
NEW GENERATION X-RAY DETECTORS

- Compared to common X-ray imaging technologies, such as films or flat panels, we use Advacam's new-generation X-ray detectors, which are also used by US NASA in space at the international ISS station for their unique properties. These imaging detectors are characterized by high resolution, almost unlimited range of grey levels and high sensitivity.

- Another advantage of using these advanced detectors is the fact that, thanks to their sensitivity, we are able to use up to half the energy of X-rays compared to existing technologies. This implies higher image resolution, but also lower demands on shielding against leakage of X-rays. This simplifies, reduces the costs and lightens the construction of shielding chambers.

Applications

- Non-destructive inspection

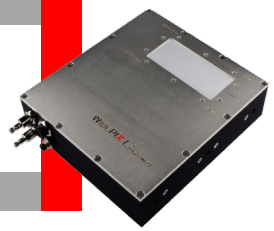


- Medical research

- X-ray difraction

- Geology

- Art authentication



- … others

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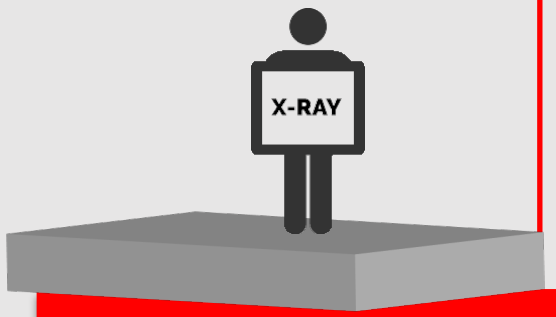
ADVACAM
Imaging the Unseen

X-RAY IMAGING EXAMPLE

An X-ray of a dry rose taken using a standard digital X-ray, used in industrial applications, food, security and medicine.

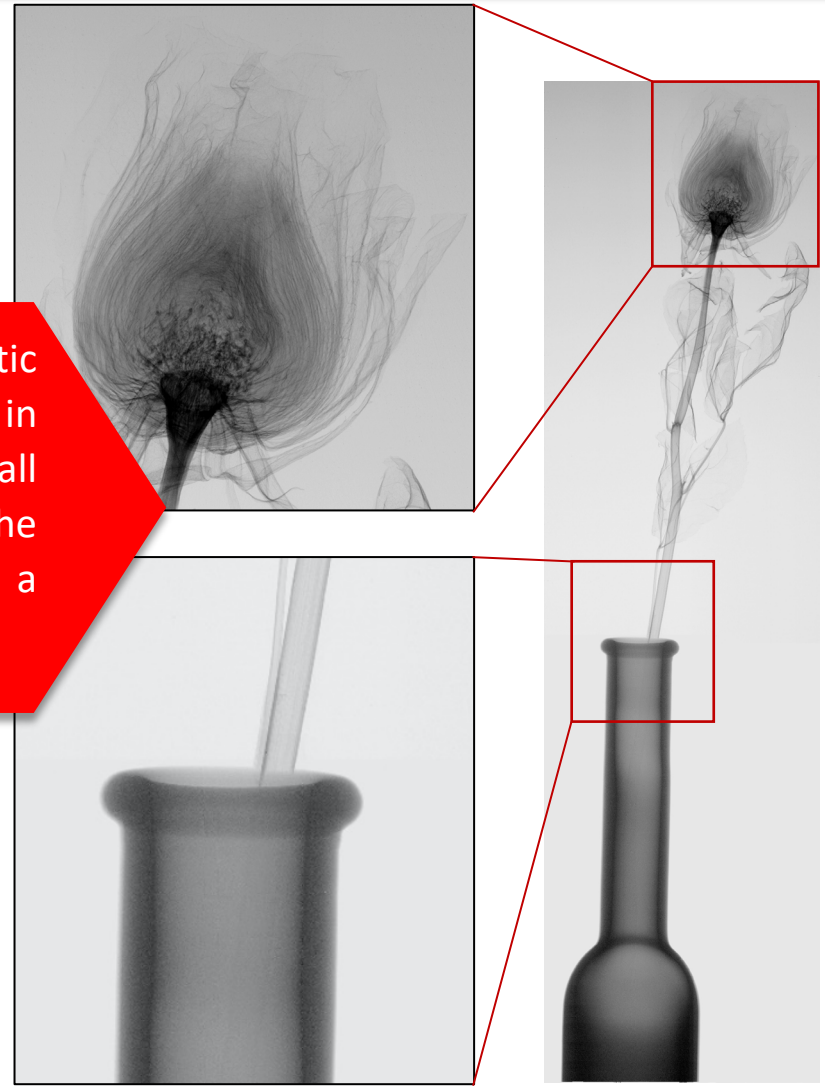


In this way, an X-ray image of a robotic system using Advacam detectors in high resolution and contrast displays all delicate parts of the dry rose at the same moment – a head and even a stem inside of the vase!

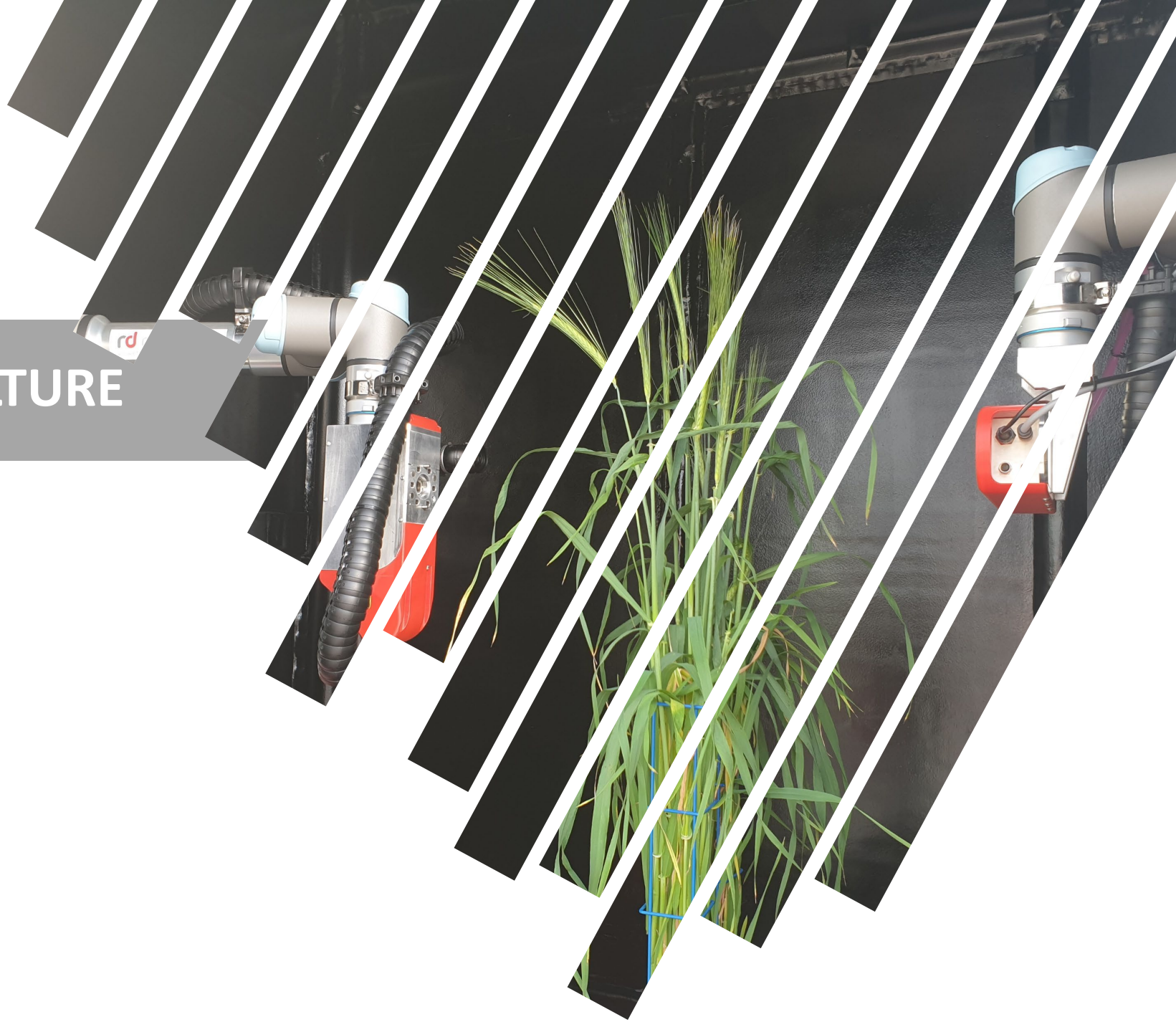
This is how a standard X-ray device displays a dry rose in a vase.

The rose CANNOT be displayed.

An X-ray of a dry rose taken by the RadalyX robotic imaging system, using the WidePIX detector from Advacam.

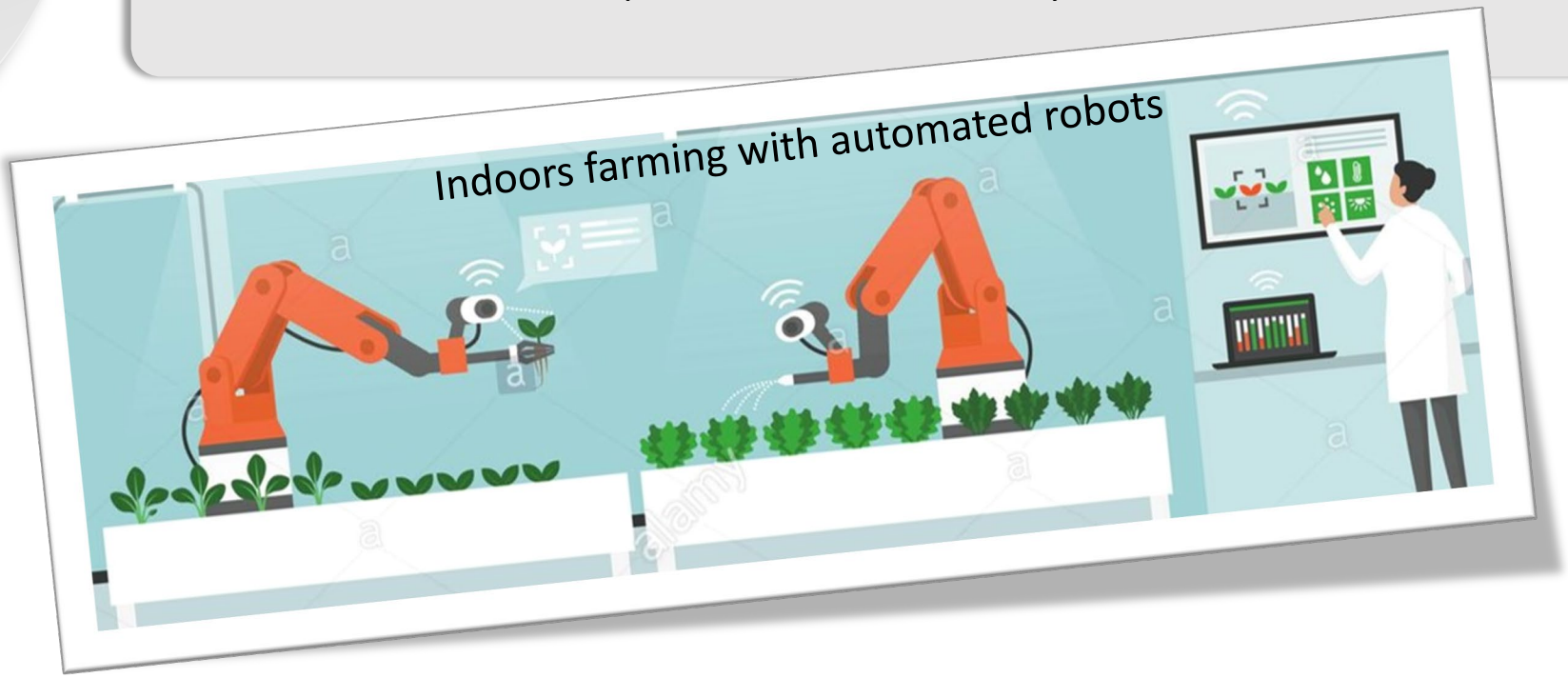


APPLICATIONS - AGRICULTURE



THE FUTURE OF AGRICULTURE

- Harnessing data collection, analytics and machine learning to help farmers make robust decisions about what to grow, how to maximize their incomes…
- … and how to feed the planet in a sustainable way.



Main goal is to make every aspect of farming more reliable, predictable and sustainable.

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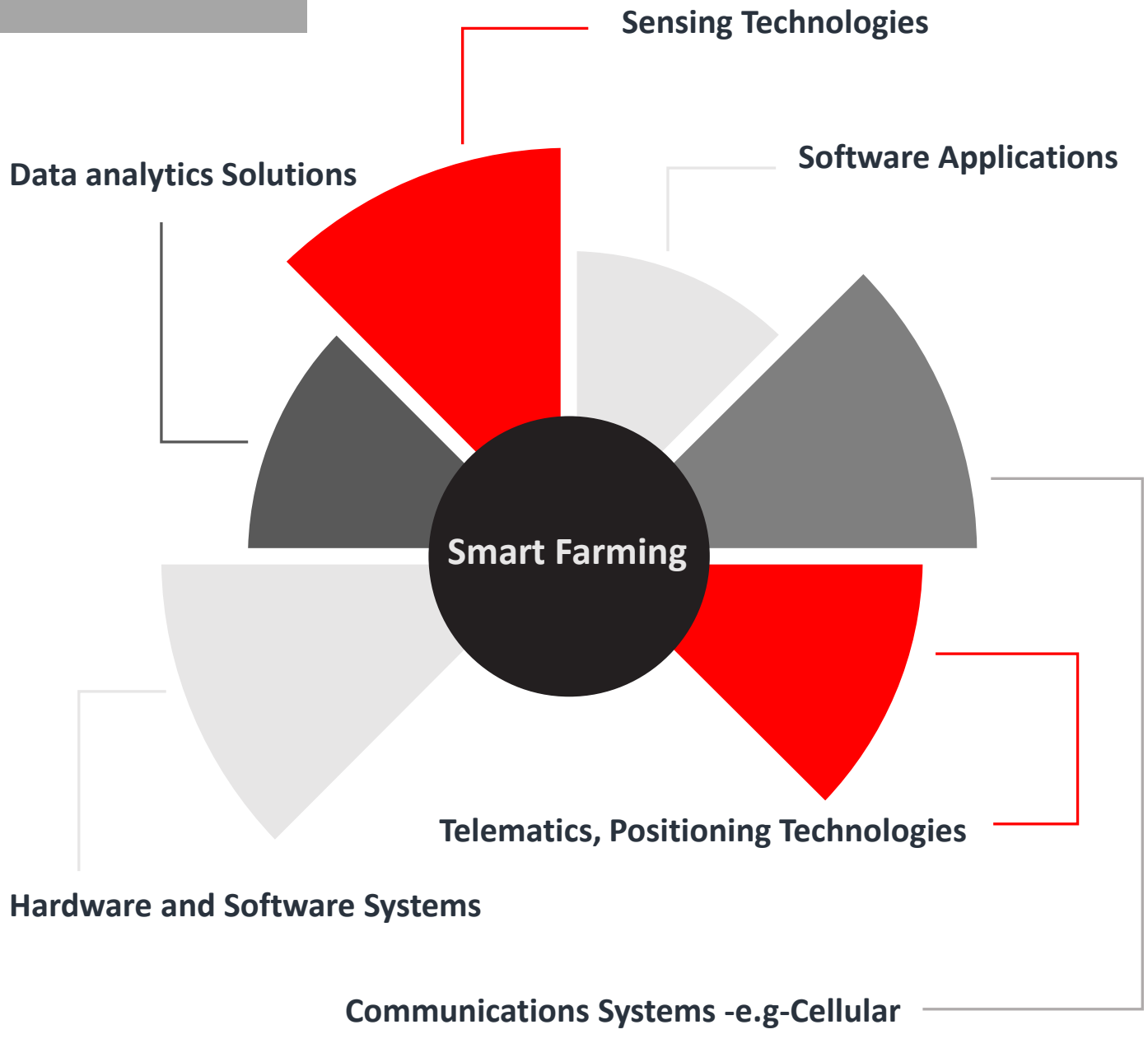
SMART FARMING

- An emerging concept that refers to managing farms using modern Information and Communication Technologies to increase the quantity and quality of products while optimizing the human labor required.

Among the technologies available for present-day farmers are:

- Sensors: soil, water, light, humidity, temperature management
- Software: specialized software solutions that target specific farm types or use case agnostic IoT platforms
- Connectivity: cellular, LoRa, etc.
- Location: GPS, Satellite, etc.
- **Robotics: Autonomous tractors, processing facilities, etc.**
- Data analytics: standalone analytics solutions, data pipelines for downstream solutions, etc.



ROBOTS IN AGRICULTURE

- Nowadays, robotics is making its presence into this complex sector, working on improving the future of agriculture.

- Robots are enabling farmers to be more efficient, and productive when managing crops. They can pick apples, collect strawberries, harvest lettuce and thwart weeds.

- The explosion in population, the evolution of AI and the rise in new developments in robotics have driven the world of agricultural robots to explode with innovation.

Robotics has reached a wide range of industries, redefining their work ethics and methodologies. As its innovation and capabilities have transformed many for the better, robots these days play an effective role in the field of farming.

- **Nursery Planting**
- **Crop Monitoring and Analysis**
- **Crop Weeding and Spraying**
- **Crop Harvesting**

Digital Phenotyping

RadalyX IN PHENOTYPING PLATFORM OF PSI COMPANY

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- Dynamic repeat collection of qualitative and quantitative information on plant phenotype - aboveground and underground parts of the plant
- Key to the breeding process, i.e. the search for suitable crop varieties (e.g. drought resistant crops), the development of protective and biostimulant products, technologies and agronomic practices

PHOTON SYSTEMS INSTRUMENTS

PLANT PHENOTYPING

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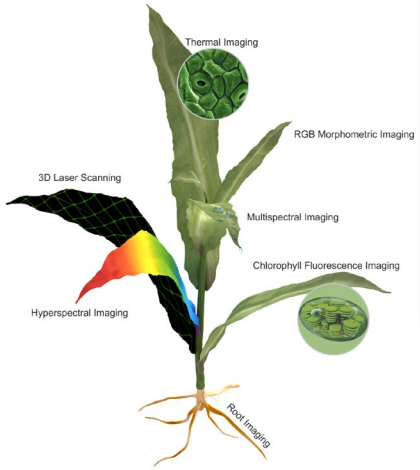
PHOTON SYSTEMS INSTRUMENTS

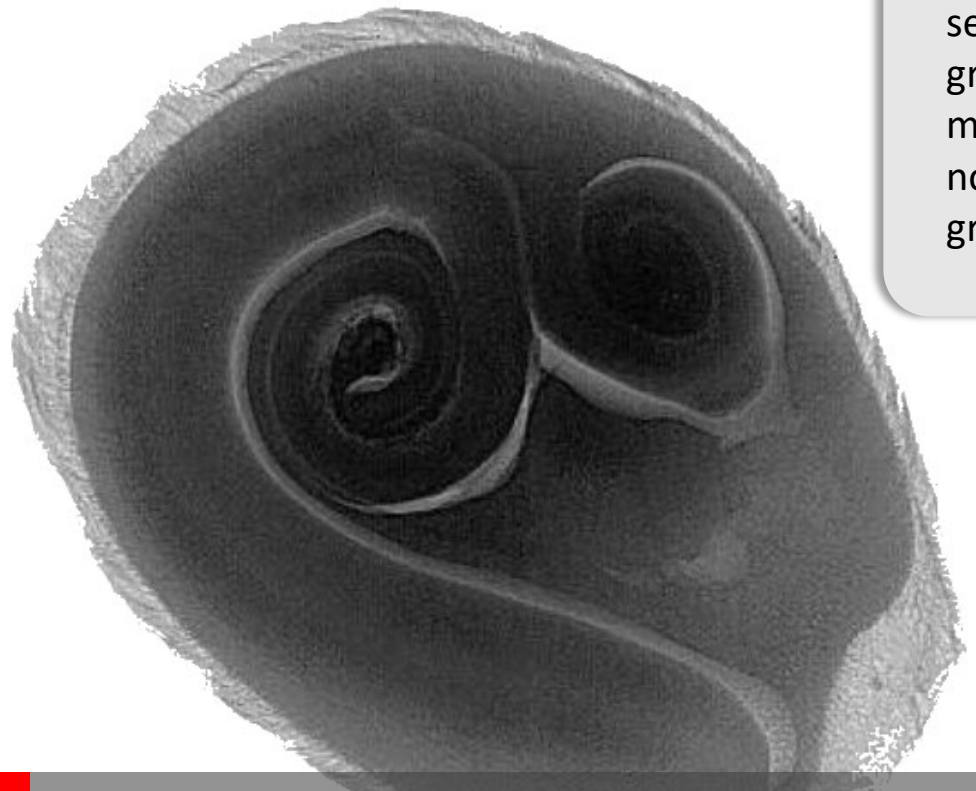
Use to accurately describe high-volume plant traits and properties depending on the environment.

The integration of RadalyX in PSI's phenotyping platform opens an entirely new field of X-ray imaging application in the field of automated plant phenotyping and breeding.



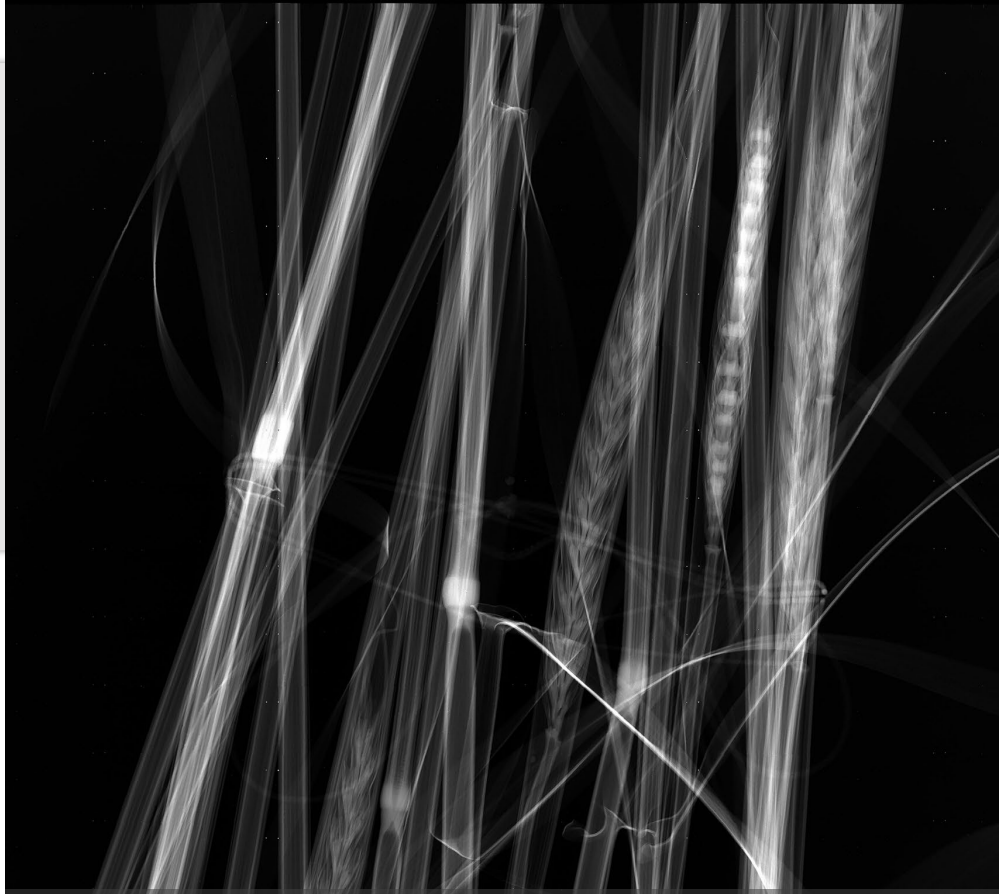
The unique concept of robotic X-ray imaging extanded by 3D computed tomography enables to detect and accurately characterize plant structures that are hidden beneath leaves and other plant envelopes, such as evolving ears of cereals, or are hidden beneath the surface of clay, such as potato tubers.

PHOTON SYSTEMS INSTRUMENTS



In a detailed X-ray of the tomato seed, sprouts can be seen as a sign of potential growth. If these sprouts are missing from the seed, there is no possibility of a plant growing from that seed.

CLASSIFICATION AND QUALITY ASSESSMENT OF YIELD



The characterisation of the yield by using X-ray imaging is possible at an early stage of development when the ear is growing through the stem and is not yet visible at all. However, individual ears can already be seen on the X-ray and the final number of grains can be predicted. Early estimation of the future yield of the plant is a significant parameter in breeding.

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Colorful RGB image showing two ears of barley with no apparent defects.

The X-ray shows us that some of the grains in the ear are empty.

PHOTON SYSTEMS INSTRUMENTS

BARLEY

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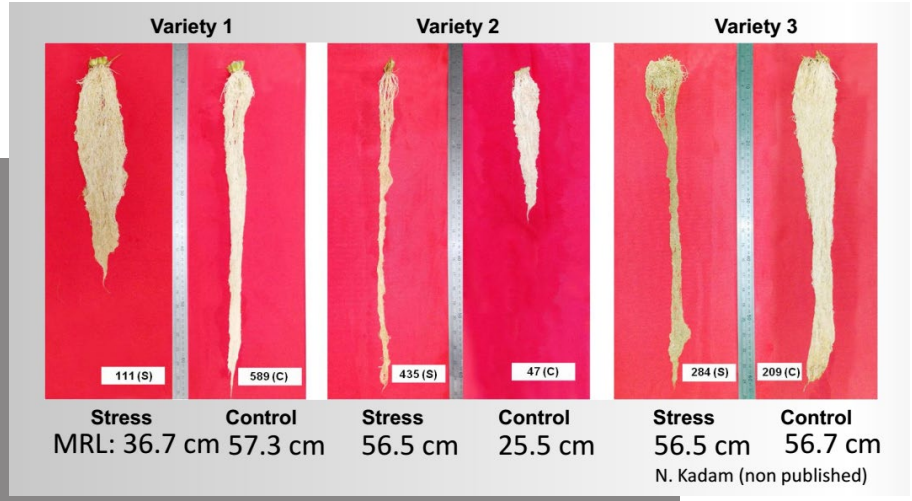
The color RGB image captures a high-yield, healthy barley at first glance.

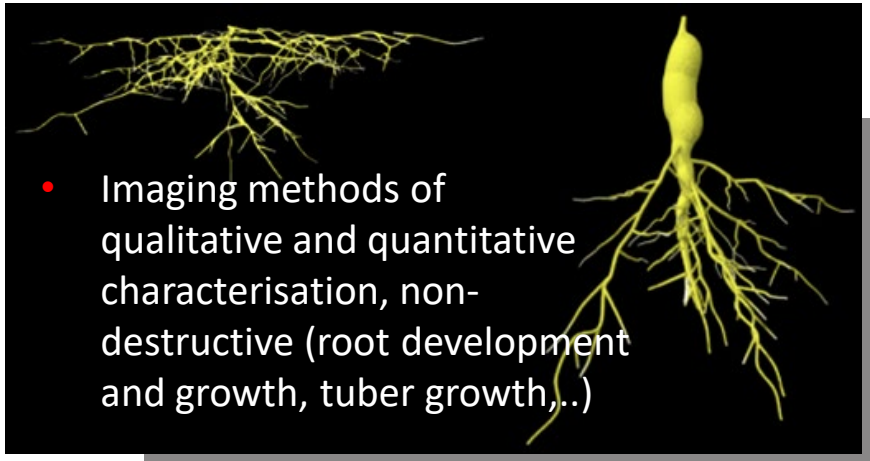
An X-ray reveals a high absence of the ear grains.

DYNAMICS OF GROWTH AND DEVELOPMENT OF ROOTS AND TUBERS

- Destructive methods time- and cost-intensive

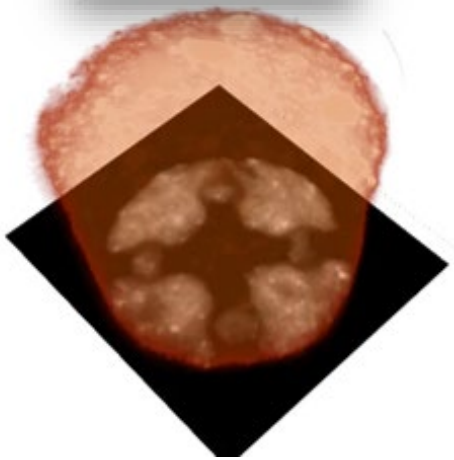


- Very reduced quality and quantity of information provided

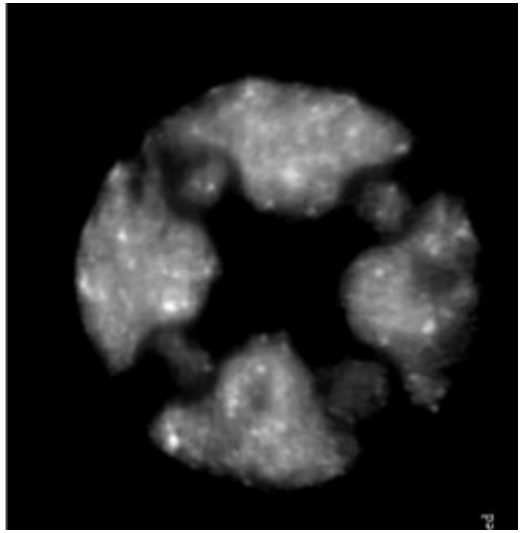


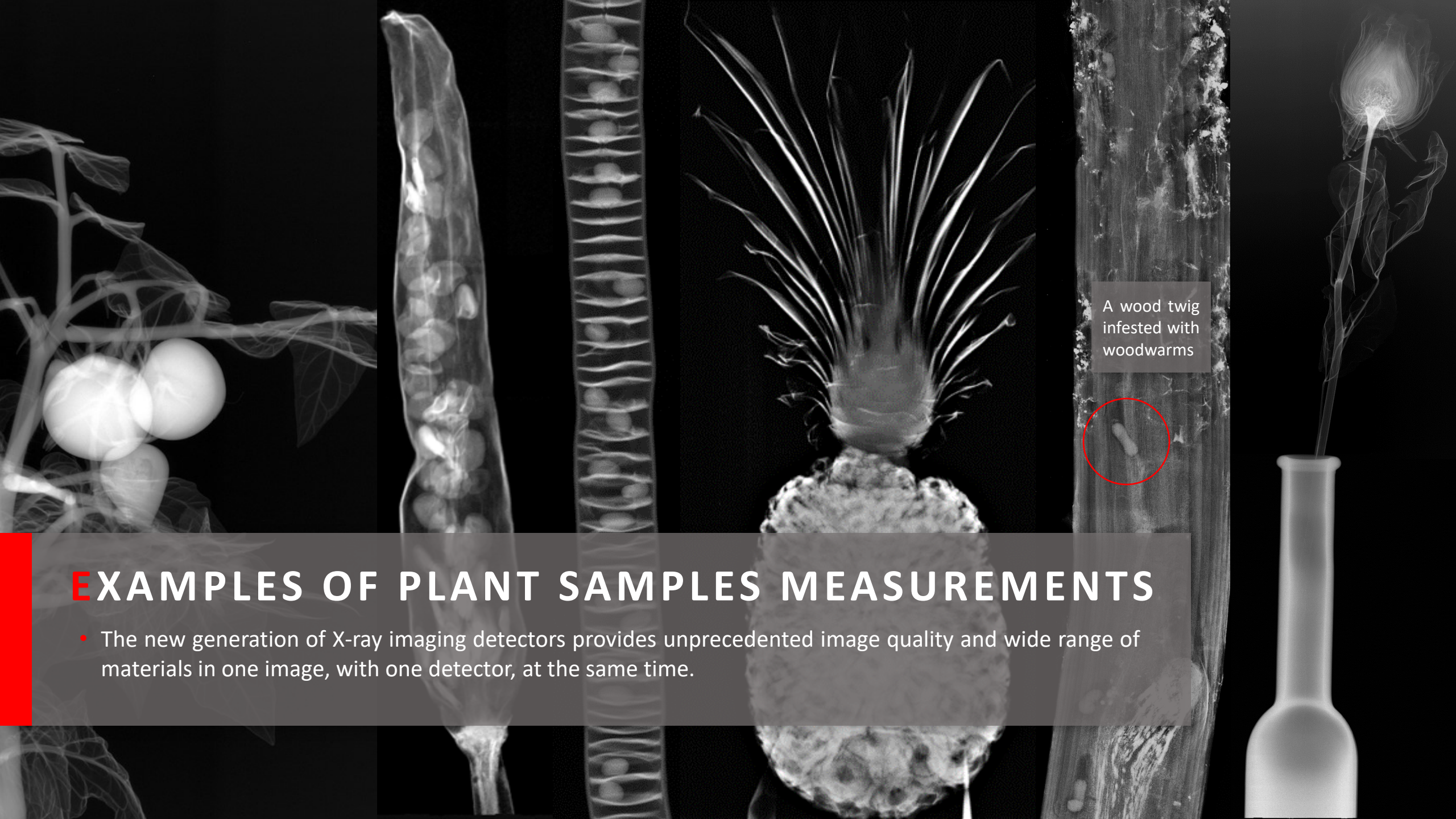
- Imaging methods of qualitative and quantitative characterisation, non-destructive (root development and growth, tuber growth,..)

- Assessment of biomass increase
- Assessment of the number, shape and volume of tubers



Computed tomography





EXAMPLES OF PLANT SAMPLES MEASUREMENTS

- The new generation of X-ray imaging detectors provides unprecedented image quality and wide range of materials in one image, with one detector, at the same time.

APPLICATIONS – FOOD INDUSTRY

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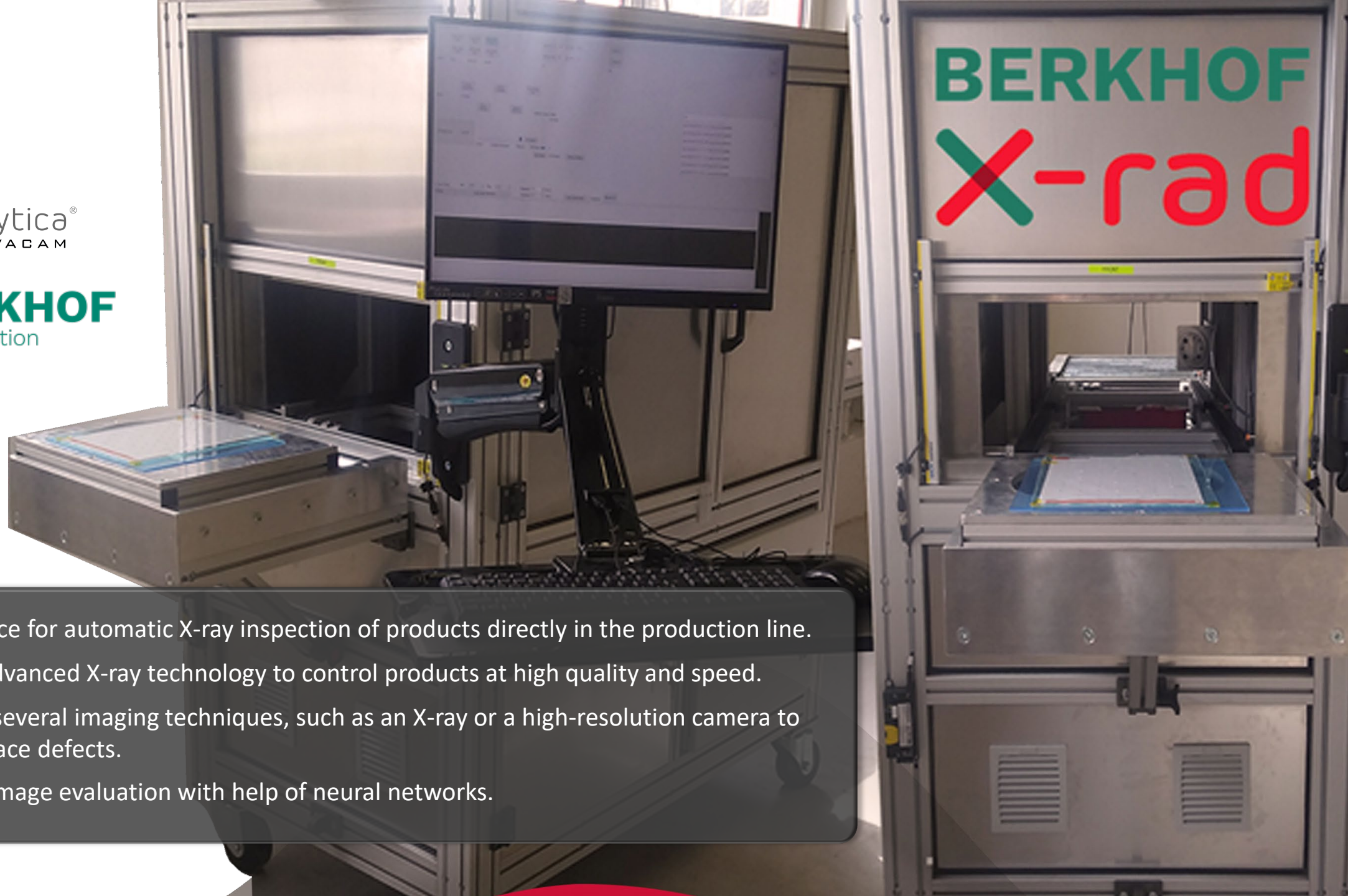
BERKHOF Construction



- A new device for automatic X-ray inspection of products directly in the production line.
- Contains advanced X-ray technology to control products at high quality and speed.
- Integrates several imaging techniques, such as an X-ray or a high-resolution camera to detect surface defects.
- Real-time image evaluation with help of neural networks.

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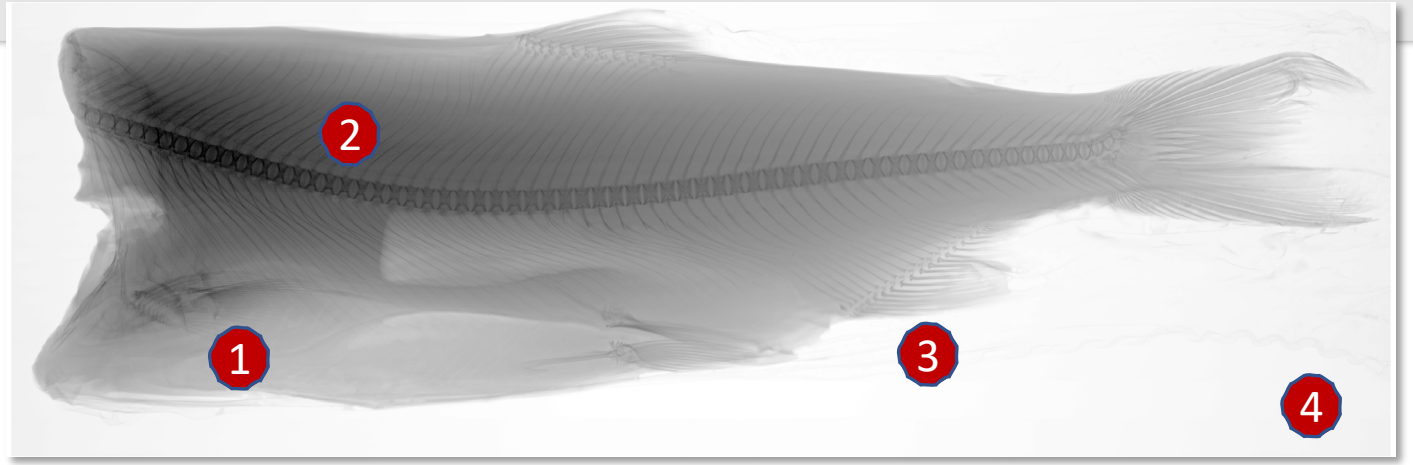
BERKHOF Construction

QUALITY CONTROL

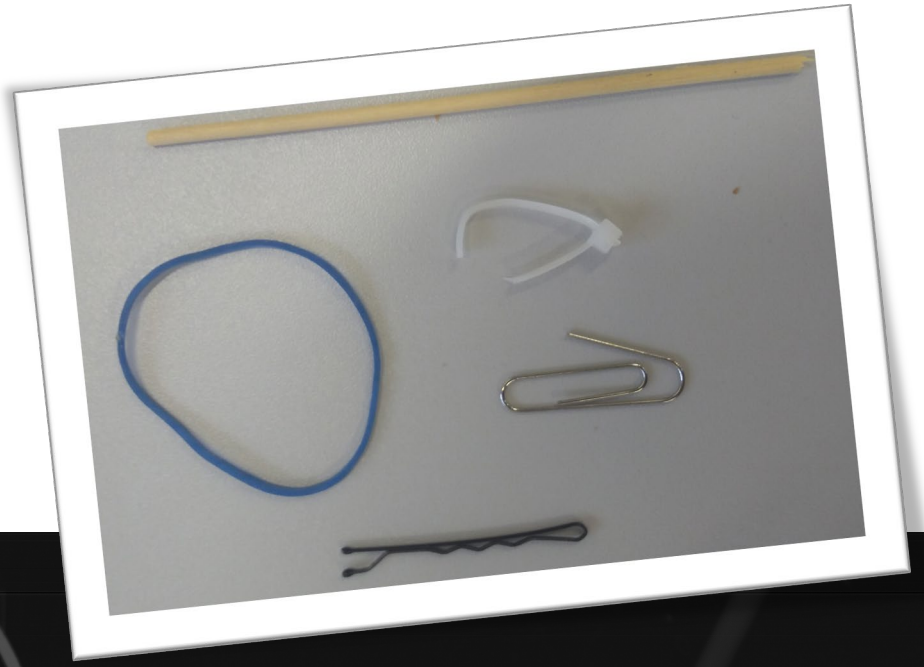
- Final verification of 100% of products is also possible without a problem.
- No matter what you need to see – can, flash, fishbones or the carton box around.

FOOD INDUSTRY

- In the picture bellow you can see a fish carcass before next steps of process.
- Please notice – beside flesh (1), fishbones (2), flippers (3) you can also see material of very thin plastic bag (4)!



- Detection of foreign objects in the product during a quality control (in this case, in a sausage).
- Thanks to the unique image quality and high resolution, we are able to detect different types of materials such as rubber, plastic, metal or wood.



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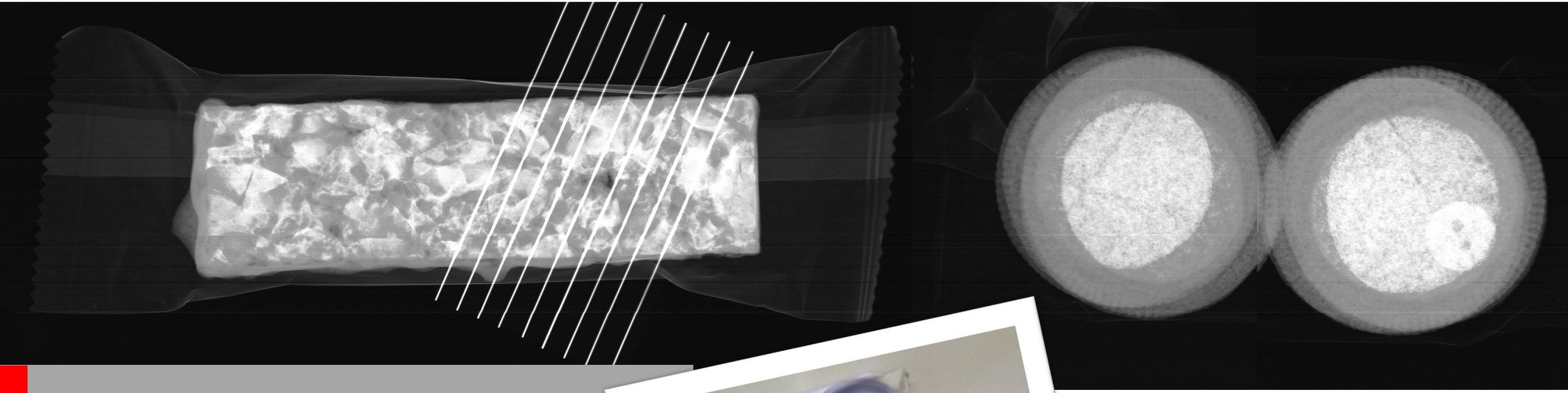
BERKHOF Construction

QUALITY CONTROL

FOOD INDUSTRY



QUALITY CONTROL

- Detection of foreign objects in the product during a quality control.
- This scan shows us a detection of plastic, metal, even a bit of cloth.

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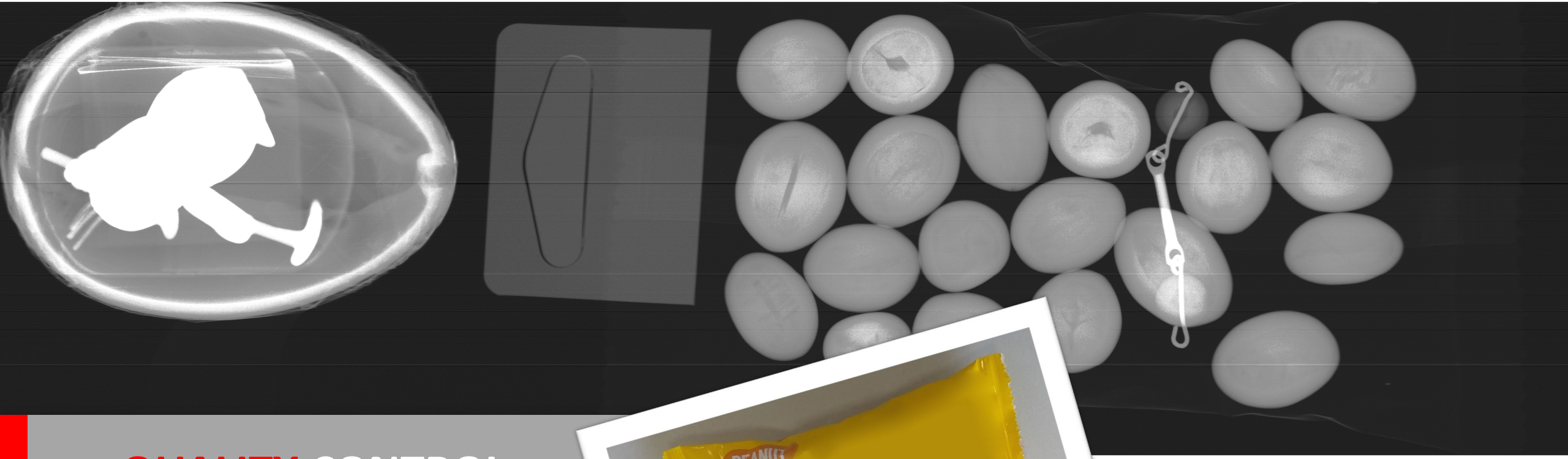
FOOD INDUSTRY



QUALITY CONTROL

- In addition to detecting foreign objects, content control is also important.
- Here we can check that the peanut lentils do indeed contain nuts, and that there is indeed a mole (with tools) in the chocolate egg with mole.

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BERKHOF Construction

FOOD INDUSTRY

BERKHOF Construction

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Nothing can stop
insects and rodents !!!

QUALITY CONTROL

FOOD INDUSTRY

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QUALITY CONTROL

FOOD INDUSTRY

Nothing can stop
insects and rodents !!!

- You see there's something inside, but you need to know if it should be there?
- Use a spectral scan to decide if it's something that improves taste or will damage your market opinion.

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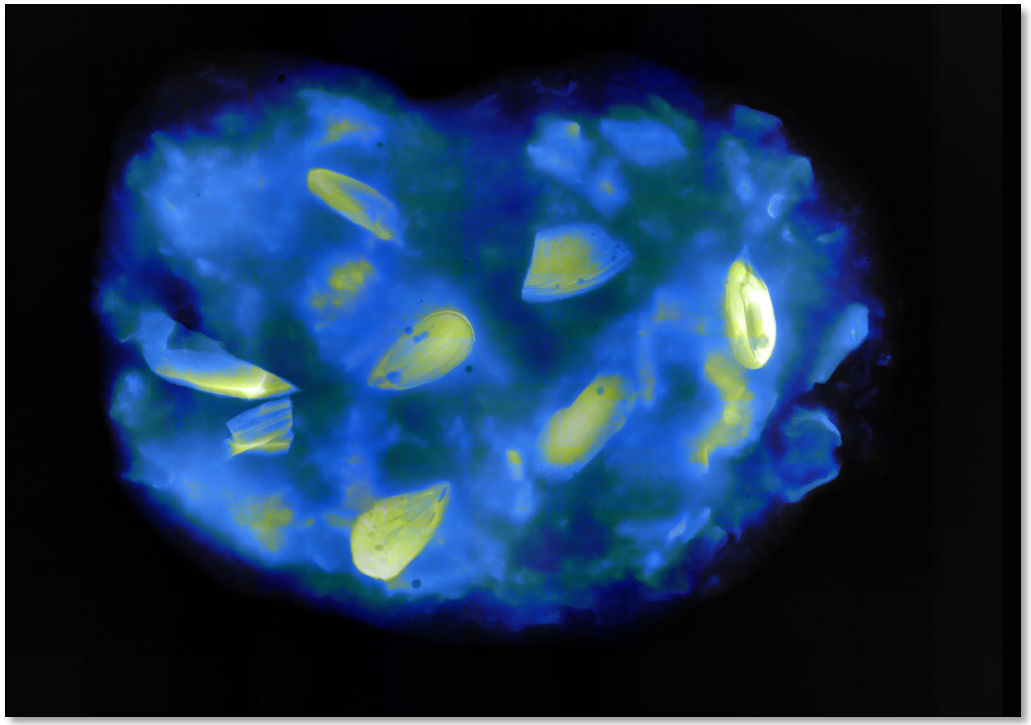
Shells in figs marmelade

2D scan

2D spectral scan



QUALITY CONTROL

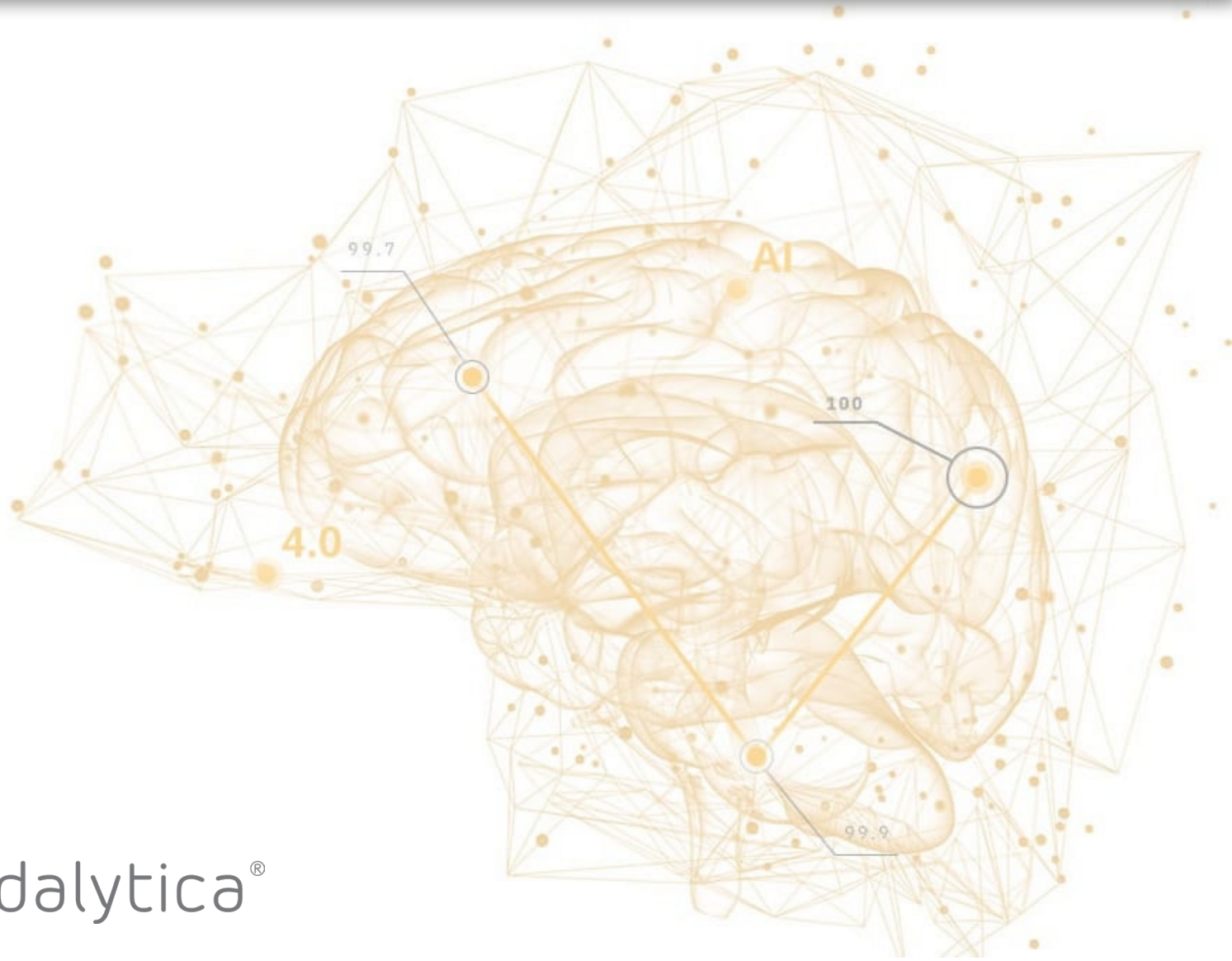
BERKHOF Construction

FOOD INDUSTRY

24 VISION

In principle, ***it thinks like a man, but it works with the precision of a machine.***

- **24 Vision system** works on the basis of **neural networks and AI.**
- **The system reliability achieved is more than 99%.**



24 VISION

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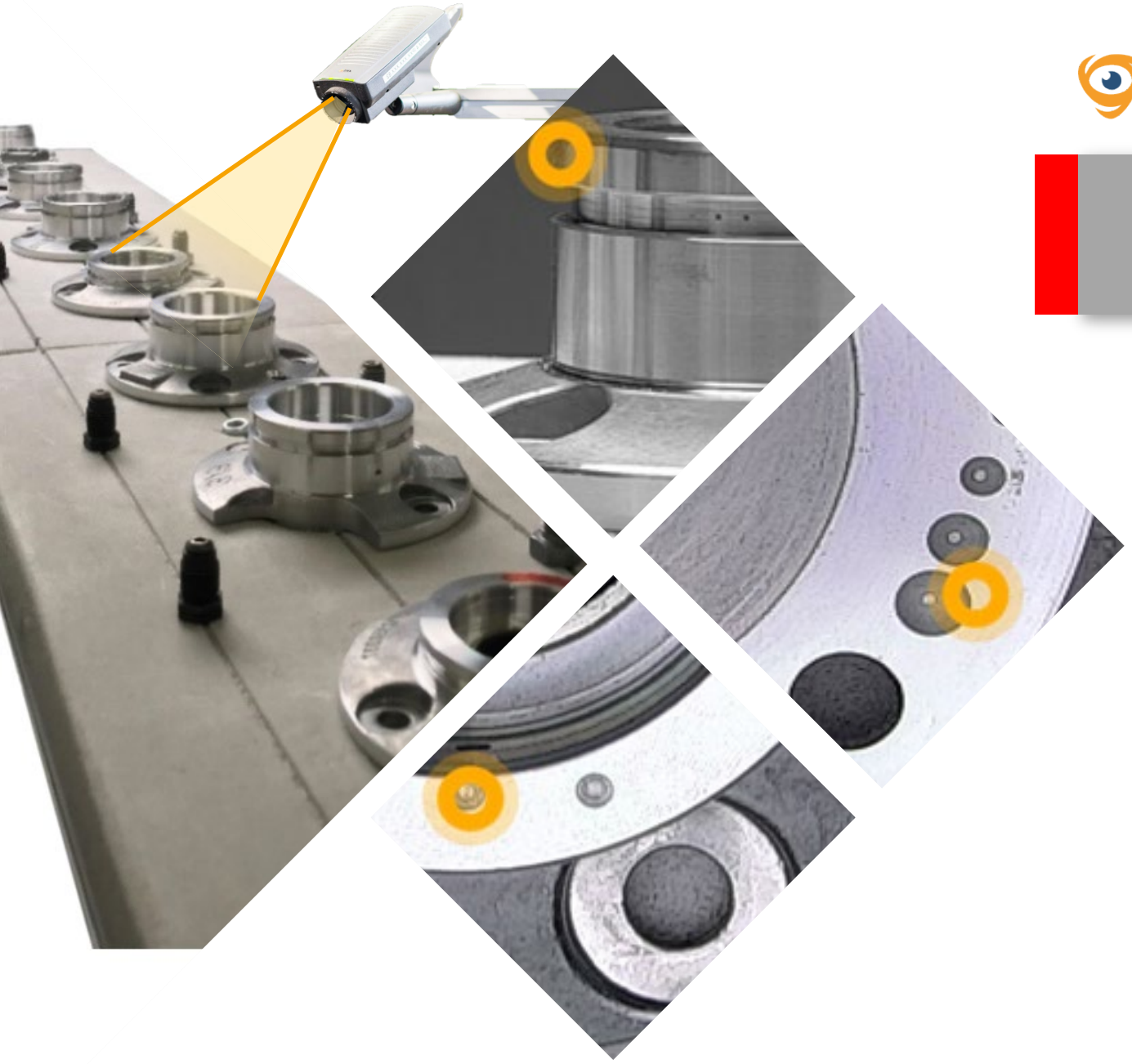

24VISION radalytica®

DEFECTS DETECTION

- ☑ **Unlimited number of areas**
- ☑ **Success rate up to 99%**

Benefits of using artificial intelligence in quality evaluation:

- Ensuring flawless manufacturing.
- Timely and flawless deliveries.
- Savings in operating costs and resources.
- Finding errors in the manufacturing process.
- Time saving.
- Increased production efficiency.

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