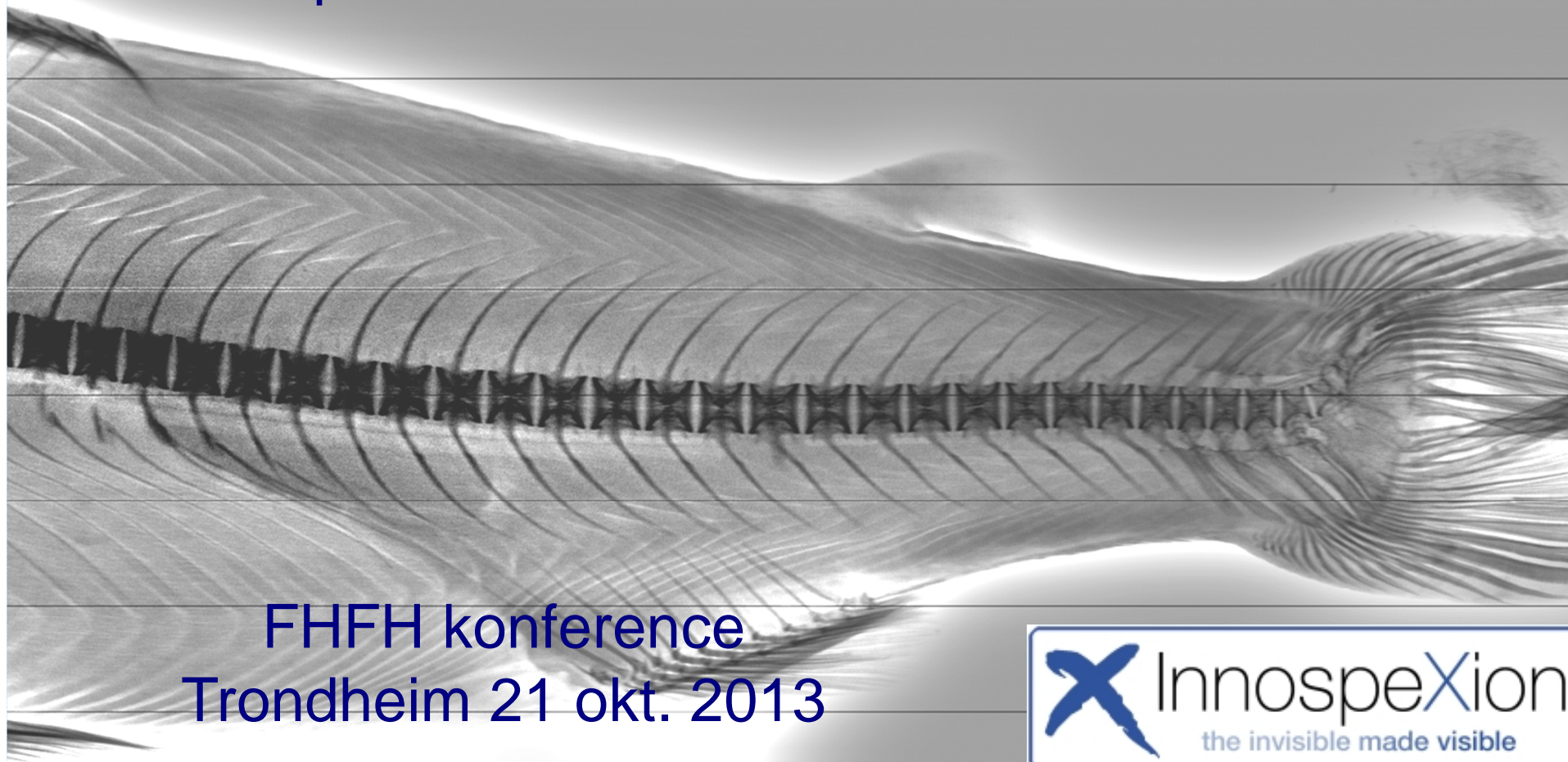


# Innovative X-ray Solutions

Food inspection: Fish



FHFH konference  
Trondheim 21 okt. 2013



# Innovative X-ray Solutions

## INNOSPEXION



### X-RAYS: Our business

InnospeXion uses the knowledge on X-ray interaction with matter to develop innovative techniques for inspection and characterisation, by imaging or by measurement of the spectrum of transmitted or scattered radiation. Since 2000, we have applied these principles for non-destructive testing services, prototype characterisation, manufacturing prototyping and for the continuous development of state-of-the-art industrial solutions. Since 2003, we have supplied intelligent and unique on-line, at-line or off-line x-ray based solutions to improve the productions cost-effectiveness. **The main success product is the low energy X-ray inspection systems that was awarded the Innovation Award 2007**

# Low energy X-ray inspection: 2007

## The new MCIS from InnospeXion



MCIS is based on  
low energy X-rays:  
Improved contrast  
Less radiation  
Low weight  
Simple design



Innovation Award

# Low energy X-ray inspection: 2009

The HYMCIS from InnospeXion



Innovation Award

**Second generation:**  
Hygienic design  
Full PLC control



# Low energy X-ray inspection: 2010-2011

The HYMCIS from InnospeXion



**Available in  
tailored  
versions from  
150 to 1600 mm  
conveyor width:**

Hygienic design  
Full PLC control  
0.1 mm detection  
Ultra high sensitivity

# Low energy X-ray inspection: 2011-2012

## The HYMCIS from InnospeXion



### Third generation:

PLC master - Versatile I/O design

Various Conveyor widths

Tailored design options

# Low energy X-ray inspection

The HYMCIS from InnospeXion

(probably) **The worlds most sensitive, and highest resolution, X-ray systems for on-line control at manufacturing speeds up to 120 m/min**

**Danish engineering – Made in Denmark**



# Low energy X-ray inspection

## The HYMCIS from InnospeXion

### What's that to do with fish?



The ordinary X-ray systems are not - in general - suitable for fish bone detection.

There are two main reasons:

1. The systems operate with a pixel size of 0.4x0.4 or 0.8x0.8 mm. This resolution is too coarse for fish bones. We use a special technology involving 0.1 x 0.1 mm resolution.
2. The systems use a detector that converts the X-ray information "image" using a crystal called Gadox, Gadolinium Oxysulfide. This material is however only effective at X-ray energies above 25 kV. But the contrast between meat and bones in fish is unfortunately optimal at a LOWER energy. Therefore the traditional X-ray systems have difficulty in detecting fish bones, EXCEPT when these are very large, typically mm-sized in diameter.

Our technology is very different as we use a detector that is effective from about 5 kV, meaning that we actually get a very clear image even of tiny bones.



## FACTS

- The lower the X-ray energy (in KeV), the better the contrast;
- The smaller the pixel dimension, the better the spatial resolution
- Röntgen unveiled the potential for low E X-rays a century ago

## CONSTRAINTS

- Low energy X-rays are easily absorbed – also by air!
- When a pixel is small, it receives very little "light", or radiation. Hence, the SNR in a low E X-ray image may be very poor
- For industrial automation, line speed may be high. Hence, even less radiation is received per pixel per time unit.

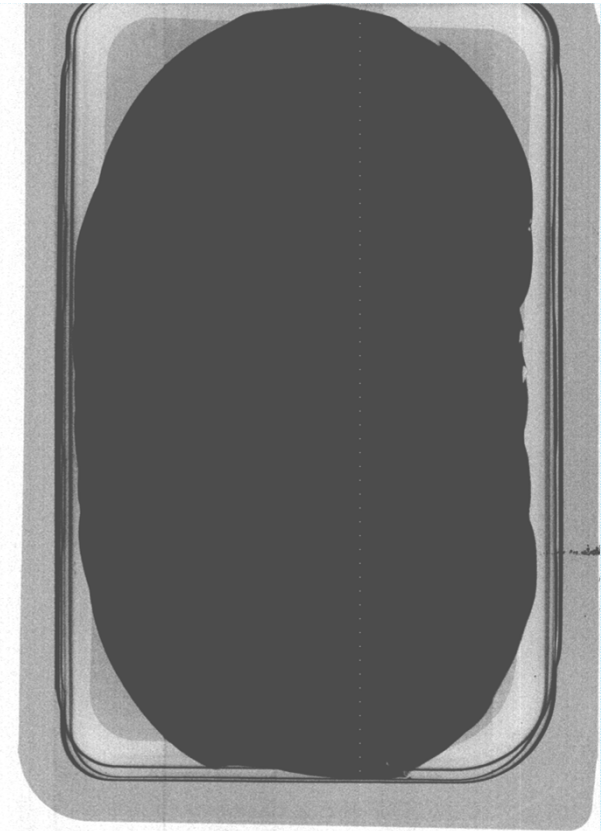
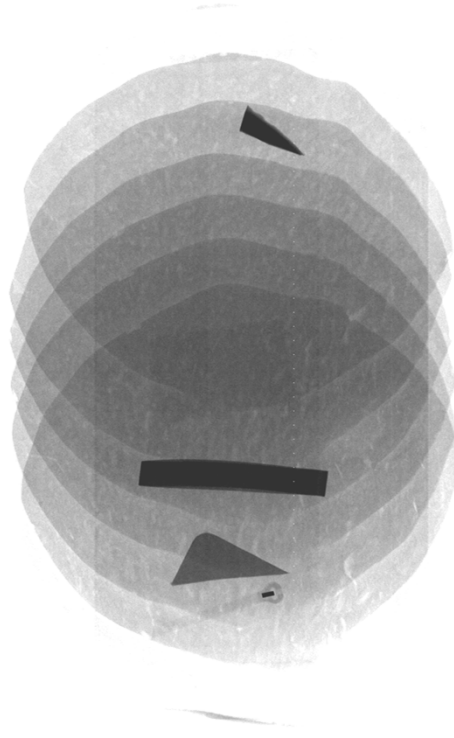
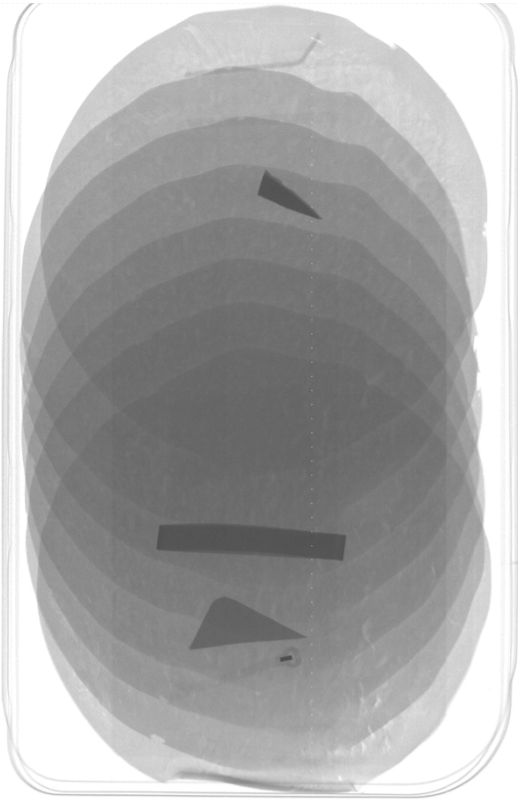
## THE SOLUTION

- Very stable X-ray source
- Very high quantum efficiency detection technology
- Design that limits the physical constraints

# X-ray imaging at high speed: Solutions offered by Low-Energy X-rays



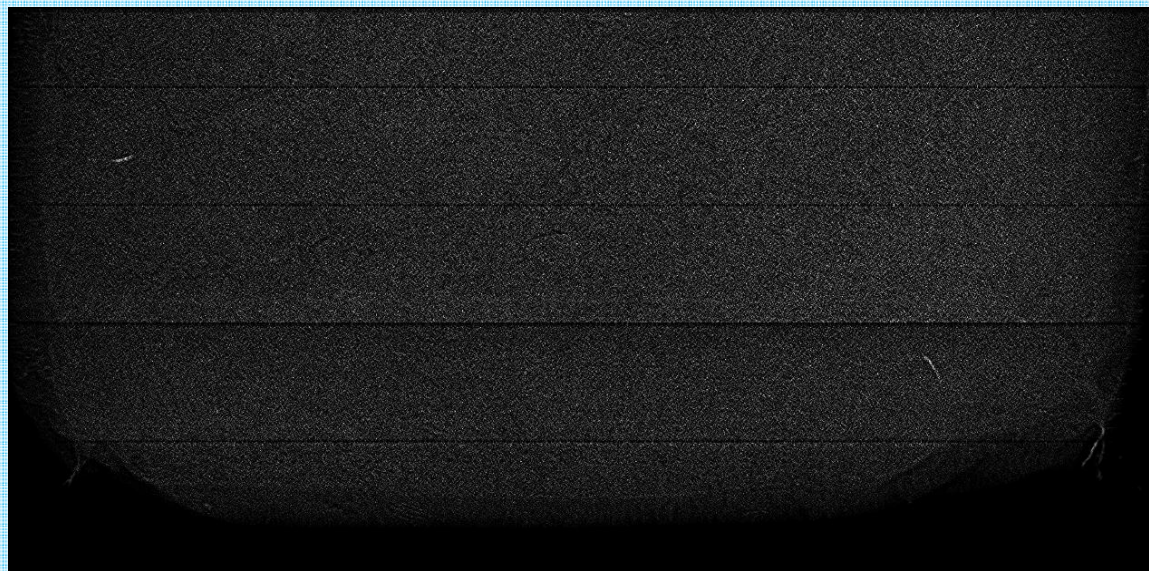
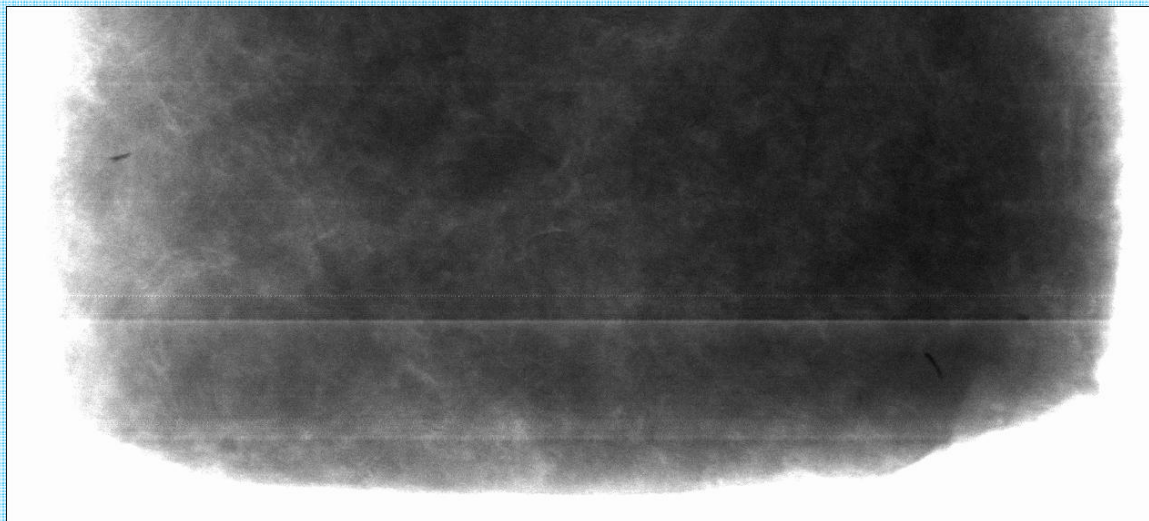
InnospeXion ApS – Horseager 14 – DK 4330 Hvalsoe – DENMARK  
Ph.: (0045) 4640 9070 – Fax: (0045) 4640 9044 - [www.innospeXion.dk](http://www.innospeXion.dk)



**WORLD CLASS X-RAY  
IMAGE QUALITY**



**X InnospeXion**  
the invisible made visible



FISH BLOCKS – 4-5 CM THICK TUNA

The quality of the image is the key for bone detection