

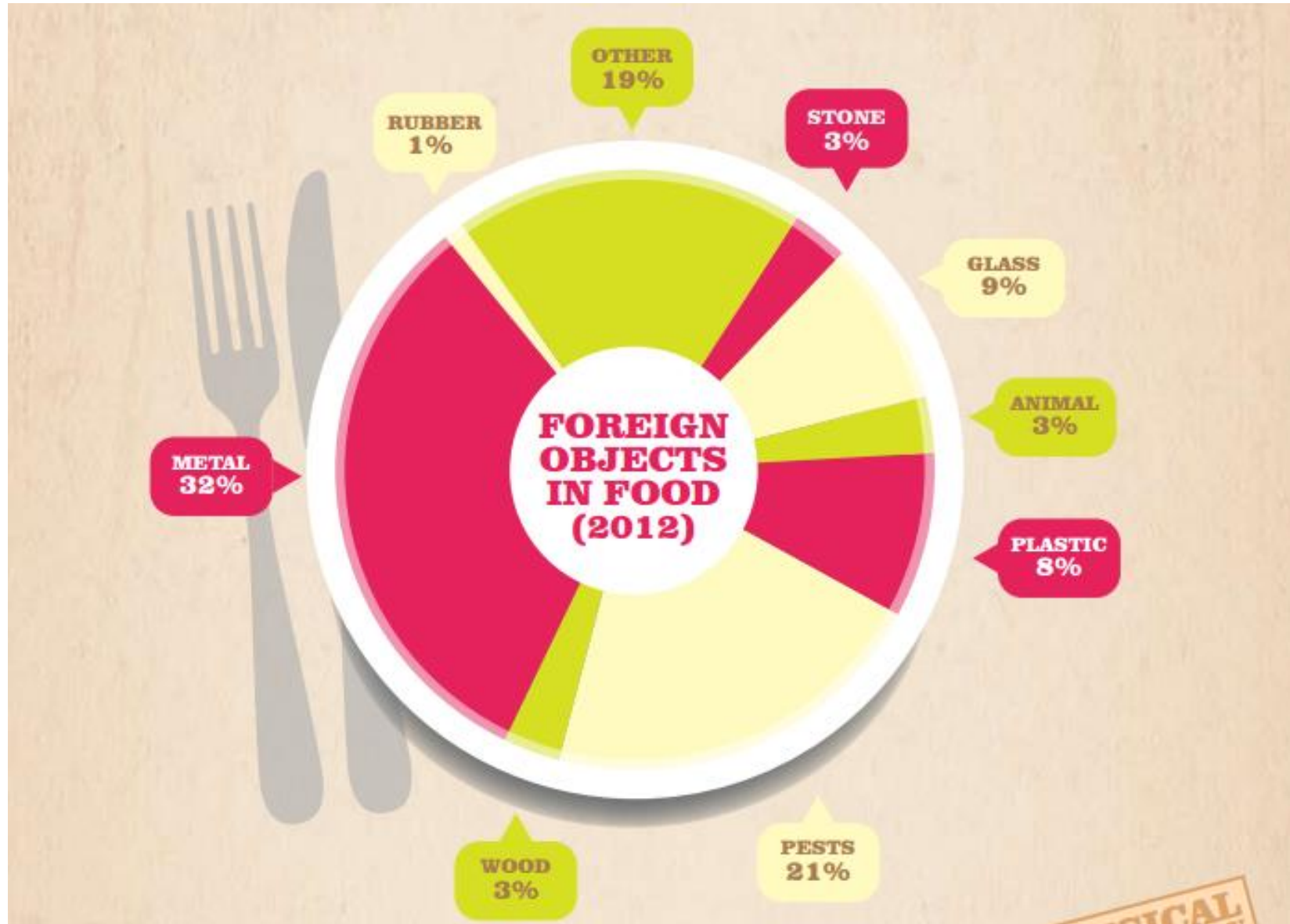
# Fremmedlegeme - håndtering - introduktion

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# Fremmedlegemehåndtering - introduktion

- Detektions udstyr kan finde eventuelle fremmedlegemer i dine produkter, men målingerne kan ikke stå alene
- Der skal eksekveres på eventuelle fund
- Forskellige håndteringsløsninger belyses, der passer til de aktuelle produkt cases



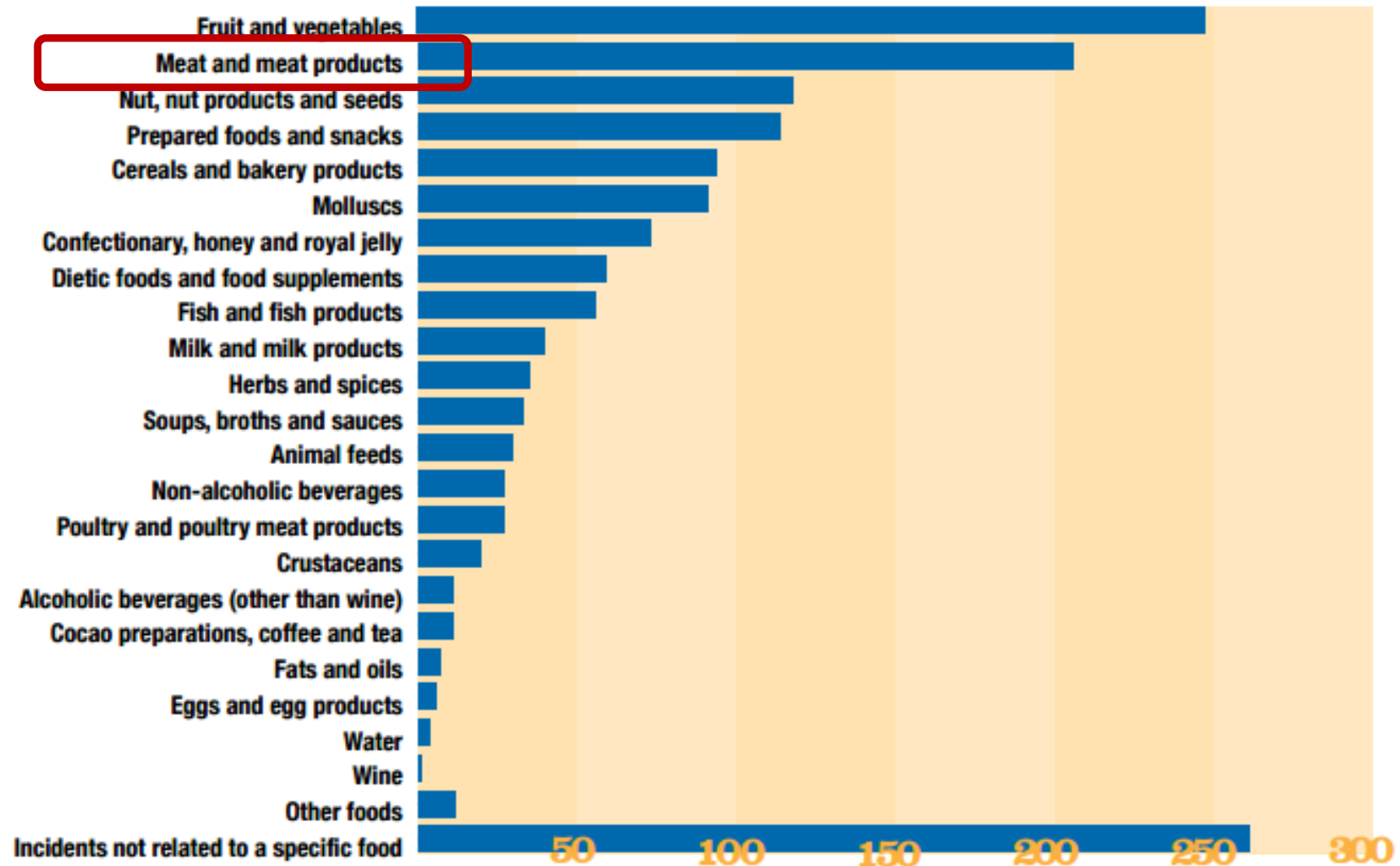


Figure 4. Incidents by food type 2012



FoodQuality  
news.com

Breaking News on Food Safety & Quality Control

## Plastic or rubber-related recalls double – Detectamet

By Joe Whitworth+, 13-Jan-2017

Related topics: Industry news, Dairy Foods, Fresh produce, Meat, fish and poultry, Bakery, HACCP

**Recalls due to products contaminated with plastic or rubber more than doubled in the past 12 months** according to Detectamet.

The number went from 26 between January and December 2015 to 53 in 2016, based on publically available data from the EU, US and Canada, compiled by the company.

Detectamet said the increase could be due to increased levels of monitoring rather than more food processing errors.

The firm added reports can be generic when it comes to the source of contamination but could include PBT insulation; electric cable; screen mesh; pieces of transfer belt and rubber seals.

Foreign body contamination issues can result in damage to equipment, costly product recalls, harm to the company's reputation and injury to consumers.





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**Mad Mor**

Yesterday at 6:55pm · 🌐





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# Instagram

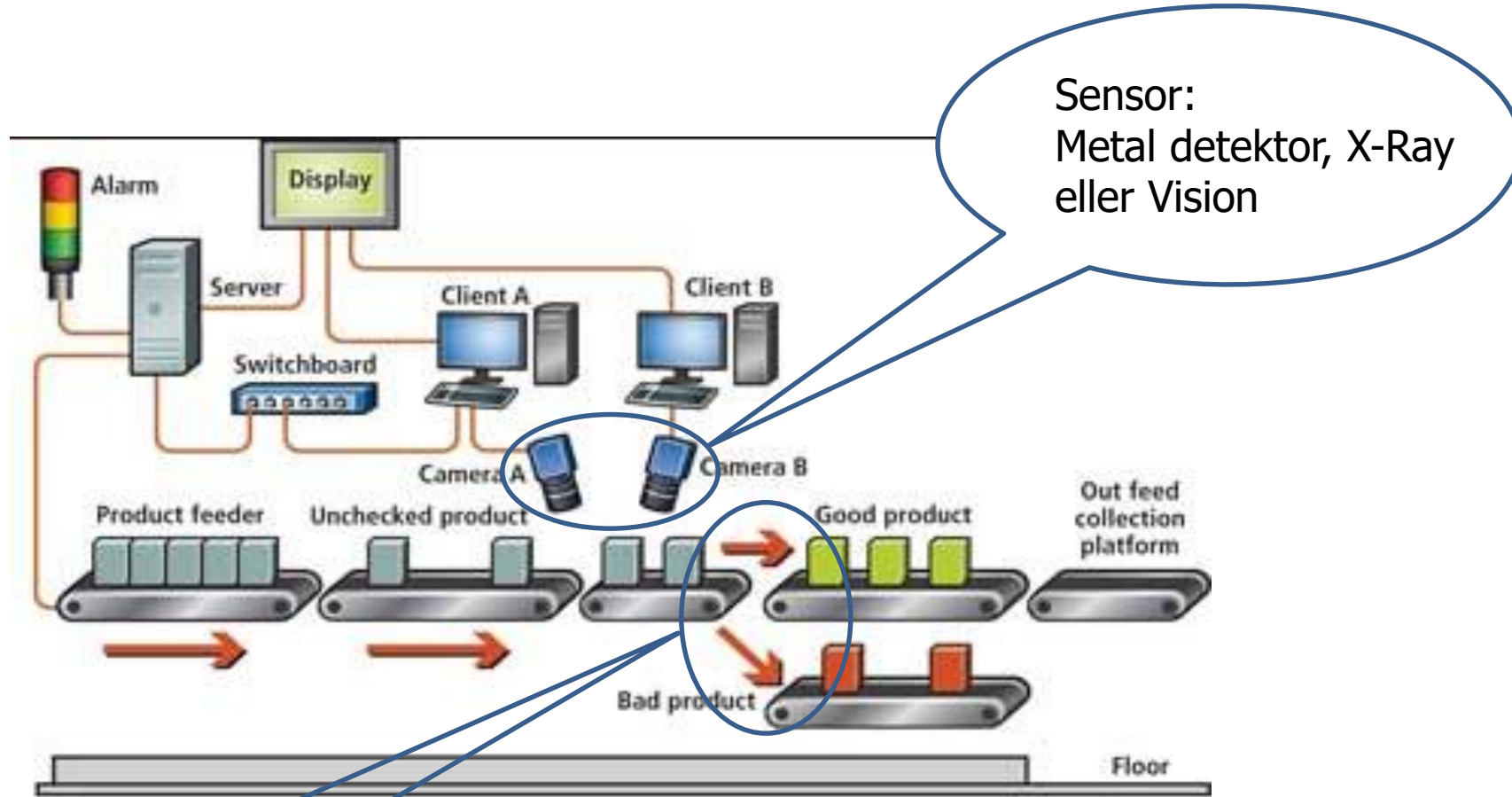
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# Detektion og håndtering af FO i produktet?



Fremmedlegeme-  
håndtering



# FO håndtering består af flere trin og overvejelser

- In-feed til måling – sikre optimal præsentation i forhold til sensor.
- Out-feed fra måling:
  - Taktning af produkt og FO efter måling frem til adskillelse af FO og Produkt – fx vha. en Encoder.
- Præsentation af FO for operatør til: validering, fjernelse og efterkontrol eller auto reject
- Automatisk reject
  - Værktøjer til fjernelse af FO – flere hensyn:
    - Produktet håndteres hygiejnisk.
    - Beskyttelse af rest produkt under fjernelse af FO.
    - Undgå for stort produkttab.
    - Registrering og dokumentation



# Metoder til effektiv fjernelse af Fremmedlegemer

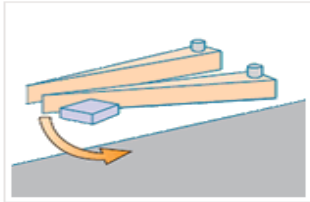
- **Lav frekvent forekomst**
  - **Automatisk stop – manuel fjernelse**
    - Hyppigt anvendt til fx metal detektor, X-ray, vision mfl
    - Fordel ved svært tilgængelig FO
    - Fleksibel og relativt billig forudsat operatør er til stede og hurtigt kan løse opgaven
    - Varianter med hjælpefunktioner hvor udpegning til operatør lettes
  - **Manuel fjernelse guided evt under bevægelse**
    - AR briller - løsninger
    - Projektion af FO position, - både til fast position eller under bevægelse
- **Høj Frekvens**
  - **Rejektor systemer**
    - bånd løsninger – i mange varianter
    - Mekaniske skubbe løsninger – i mange varianter
  - **Robot løsninger - ved høj frekvens af FO**
    - –større fleksibilitet i værktøj – løsningsrum – men dyrere og sværere at implementere



# Bånd Reject systemer

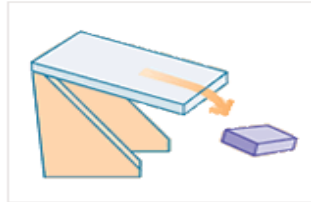
- Push out og bånd løsninger
  - simple, billige og "hurtige" men svær at gøre fin-detajleret

## Types of Rejectors



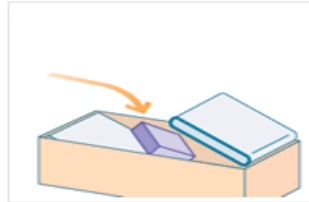
### Flipper Type

The most common type of rejector is the flipper. NG products are pushed aside by the rejector gates (arms). It is ideal for products in boxes and thick bags.



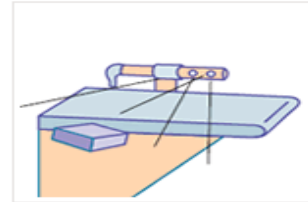
### Dropout Type

The rejection conveyor drops down to drop the NG product. It is ideal for products in thin bags.



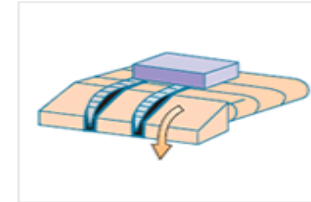
### Up and Out Type

The rejection conveyor flips up so that the NG product drops out of the line. It is suitable for products in thin bags.



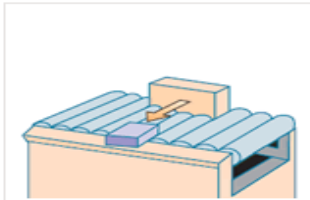
### Air Jet Type

NG products are blown sideways off of the line by a powerful air jet. It is ideal for small, lightweight packaged products at high speed.



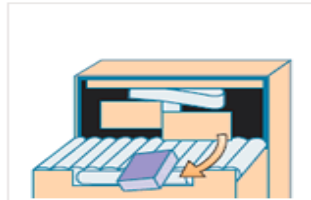
### Trip Type

In this unusual belt method, NG products are carried off either left or right by belts running crosswise to the product flow. It is suitable for rejecting large packaged products.



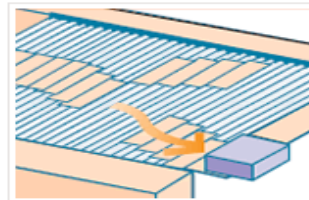
### Pusher Type

NG products are pushed off the line sideways by the action of a gate attached to an air cylinder. It is suitable for rejecting products in packages and thick bags.



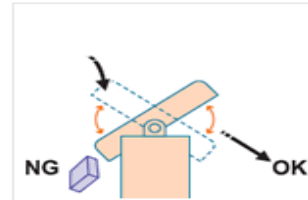
### Turning Type

This method uses a turning gate to reject NG products. It is suitable for rejecting products in large packages and in thick bags at comparatively high speed.



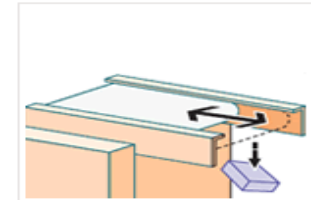
### Carrier Type

NG products are sorted horizontally without any shock due to rejection. Since the rejection process doesn't cause any damage, it is ideal for fragile products.



### Chute Type

Rejected products fall when the chute is reversed. It is ideal for rejecting relatively light bulk products.



### Shuttle Type

The belt on the rejector is expanded/contracted during the rejection to let the rejected products fall. It is ideal for unpackaged animal products and sticky bulk products.



# Robot-løsninger

- Delta robot
  - $\leq 0.3$  sekund per opgave
  - høj præcision ved operationer
  - håndtere emner med lav vægt og lav vægt af monteret værktøj (samlet 1- 8kg).
  
- Gantry robot
  - Typisk større robotter, der håndterer stor vægt på store arealer
  - I nogen udgaver kan hastigheder op til 2500mm/s opnås.
  - Kan i nogle tilfælde være den "billigere" løsning.



# Co Worker Robot løsninger

- Collaborative (samarbejdende) – fx Universal Robots
- Multi-tool (gribe, suge, klippe etc.)
- Hurtige at sætte op og indstille
- Faldende pris og lettere installation
- Stigende udbud Kompatibel til fødevarer





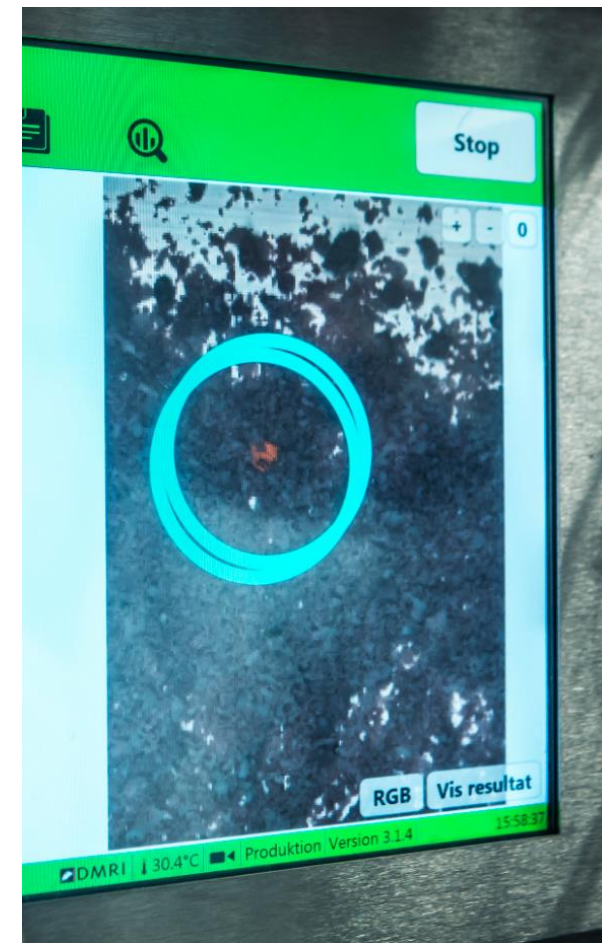
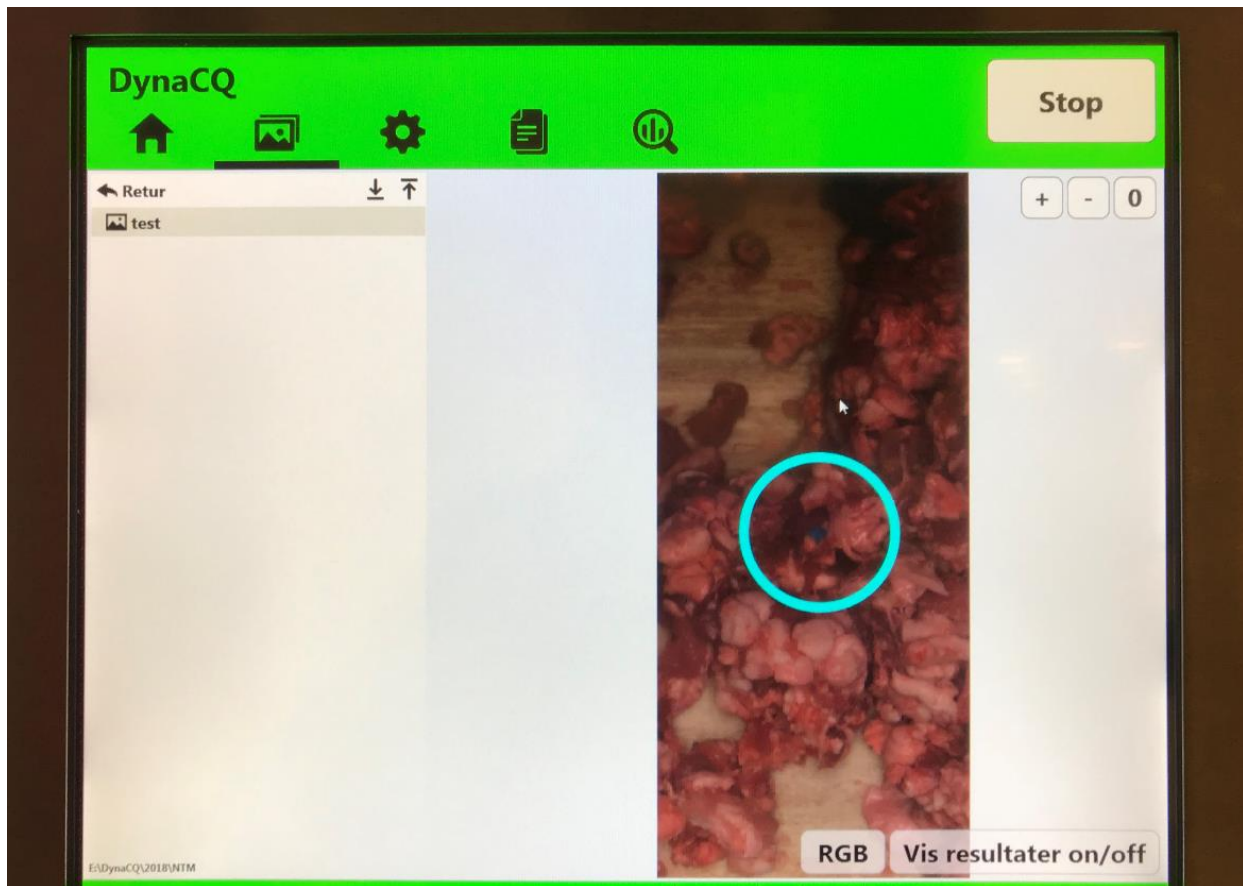
# Vision – detektion som løsning - case

- Når Produkt og fremmedlegeme bevæger sig for hurtigt for operatør overvågning
- Vision kan følge med
- Vision kan udpege hvor på båndet fundet er
- Lette manuel, eller trigge automatisk fjernelse





# Detektion og udpegning af position







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**Fedte grever**

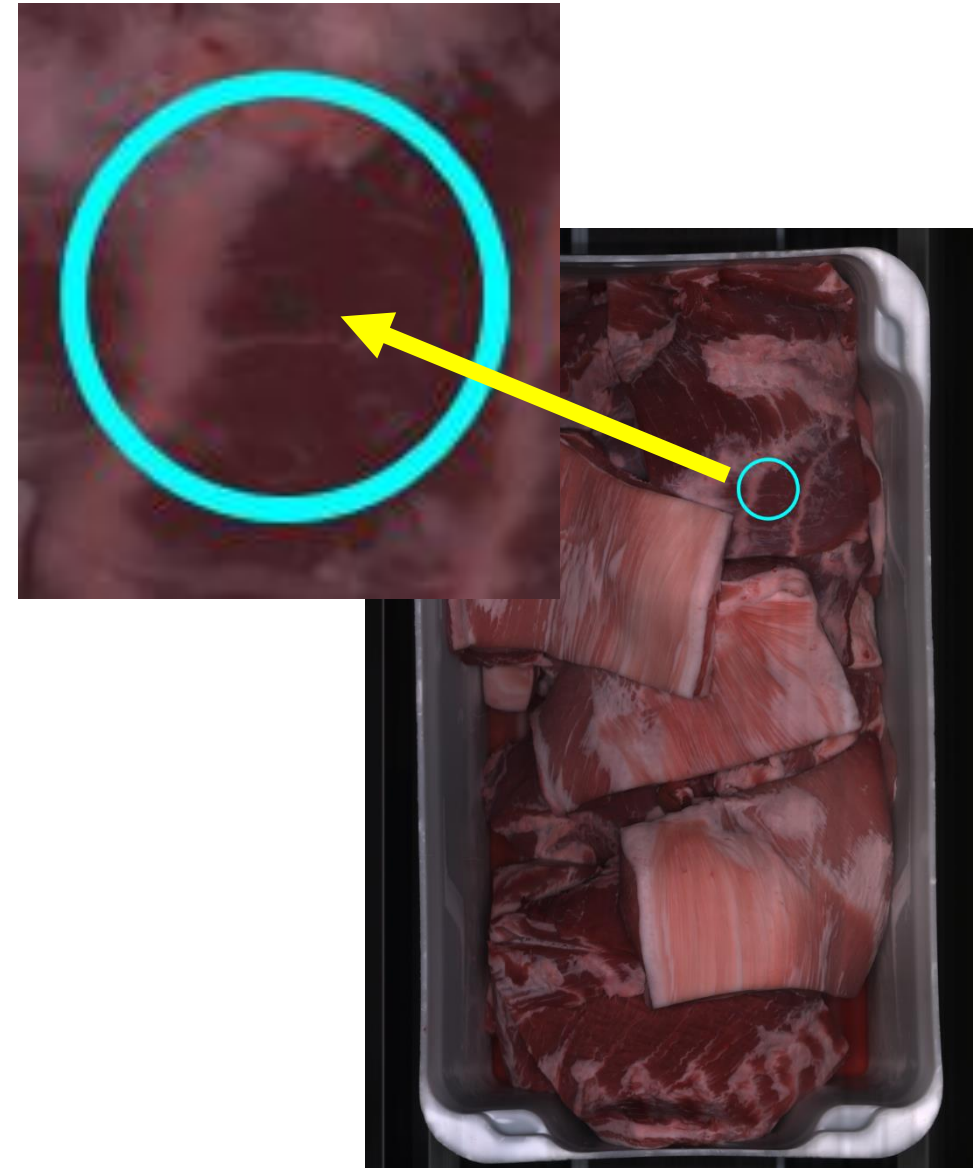


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# Example crate detection of plastic





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DynaCQ



ALPAC

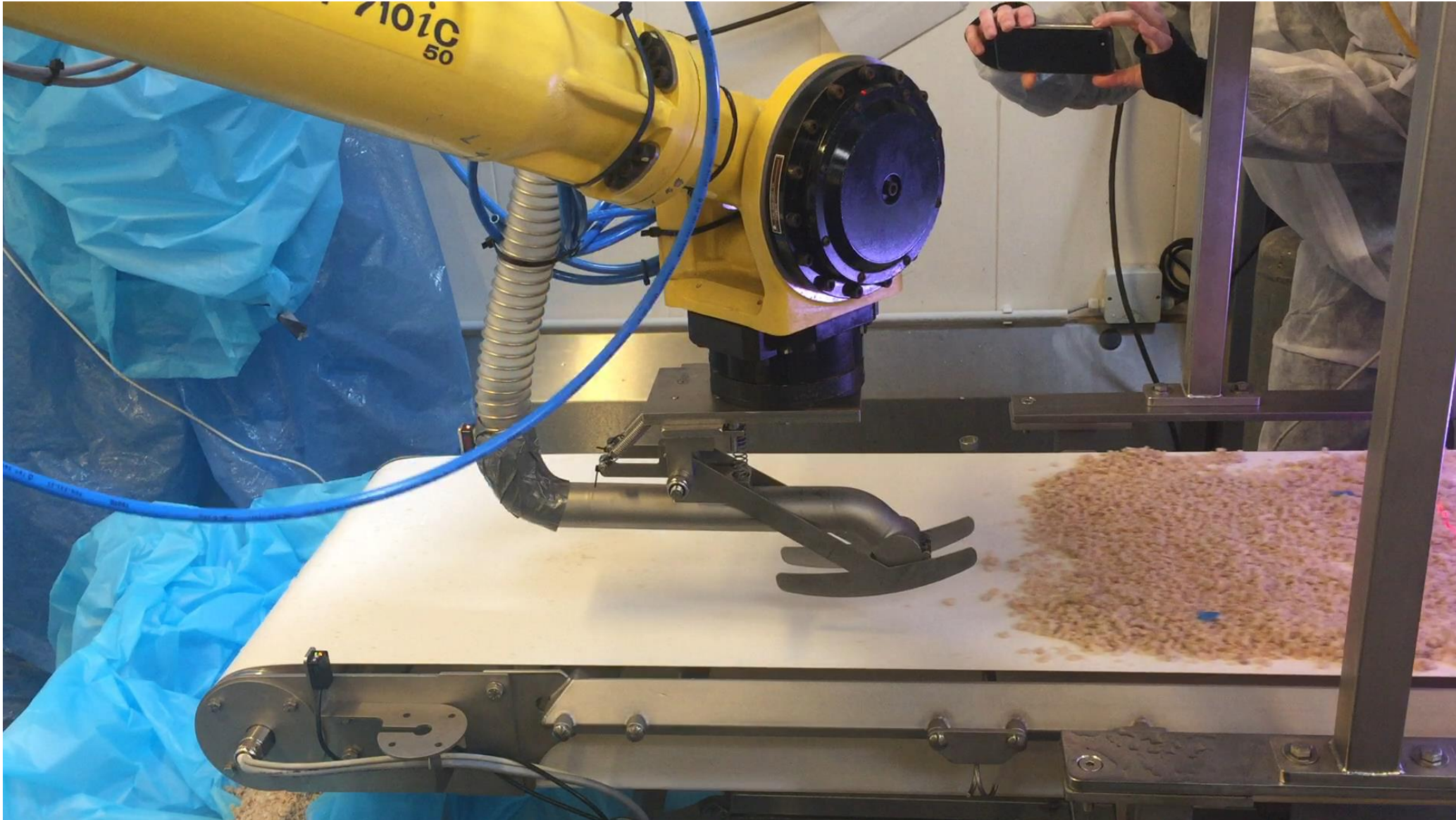


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# Robot arm med sug – grever



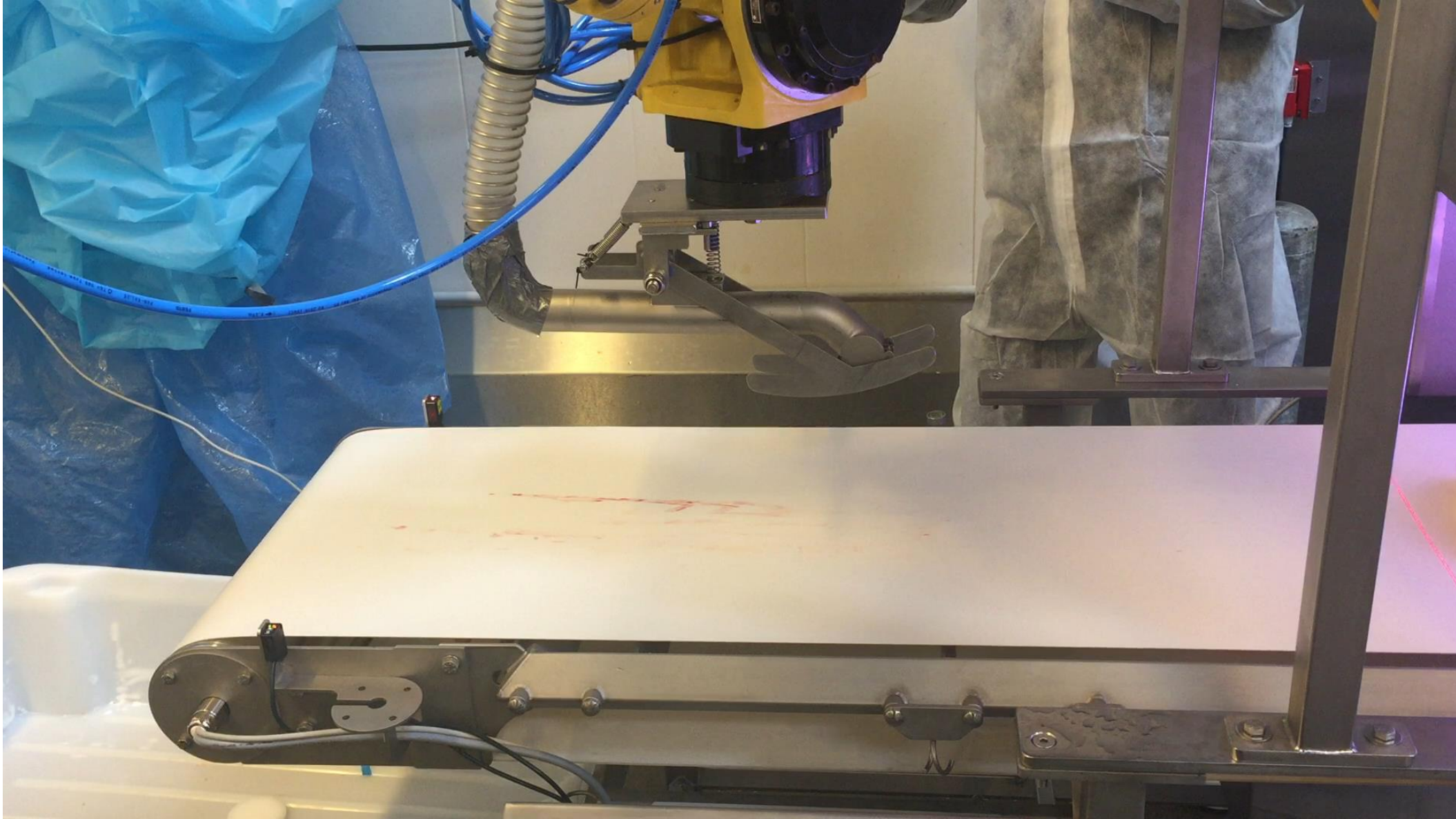


# Robot arm med sug – kam





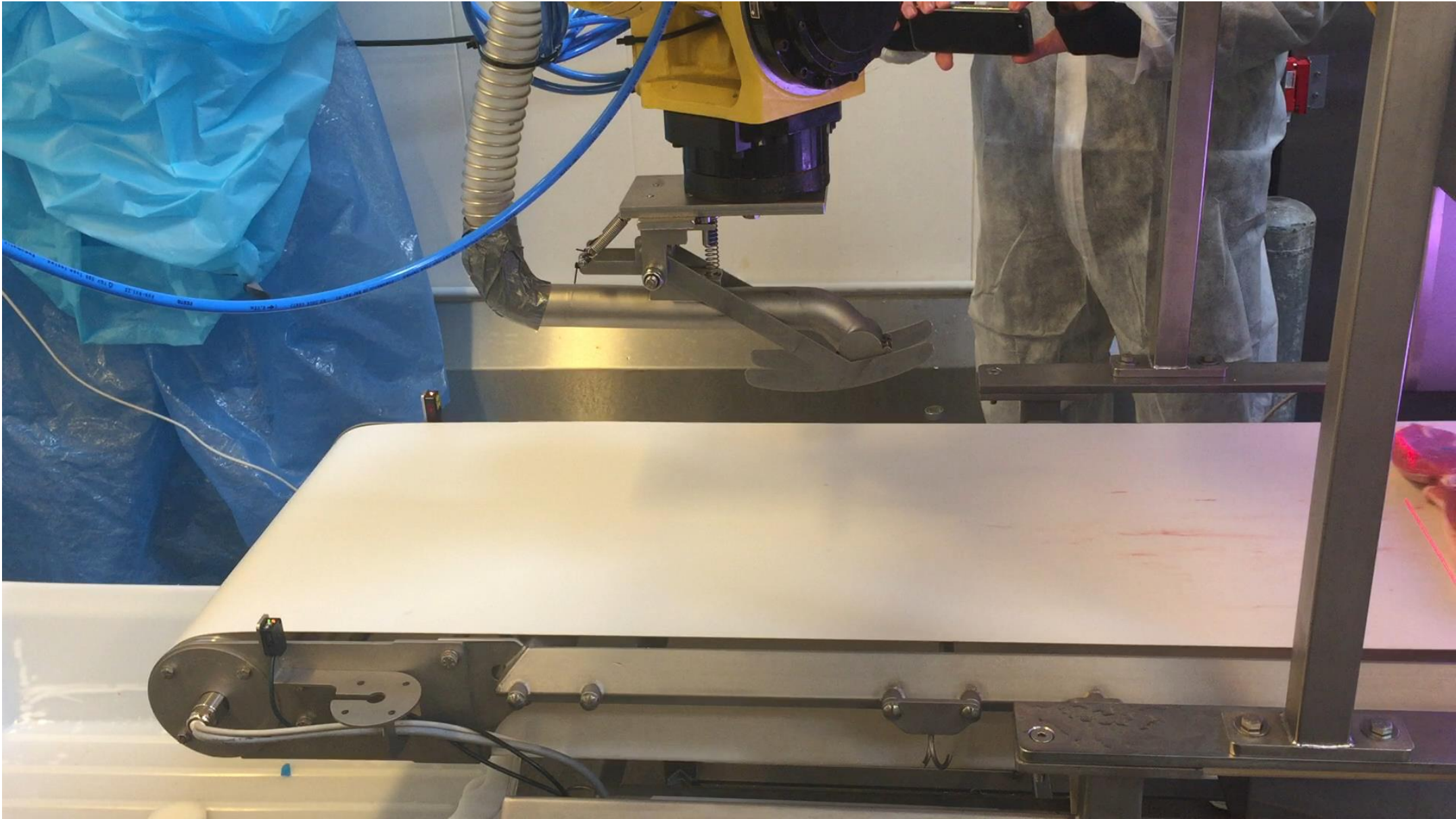
# Robot arm med sug – kam





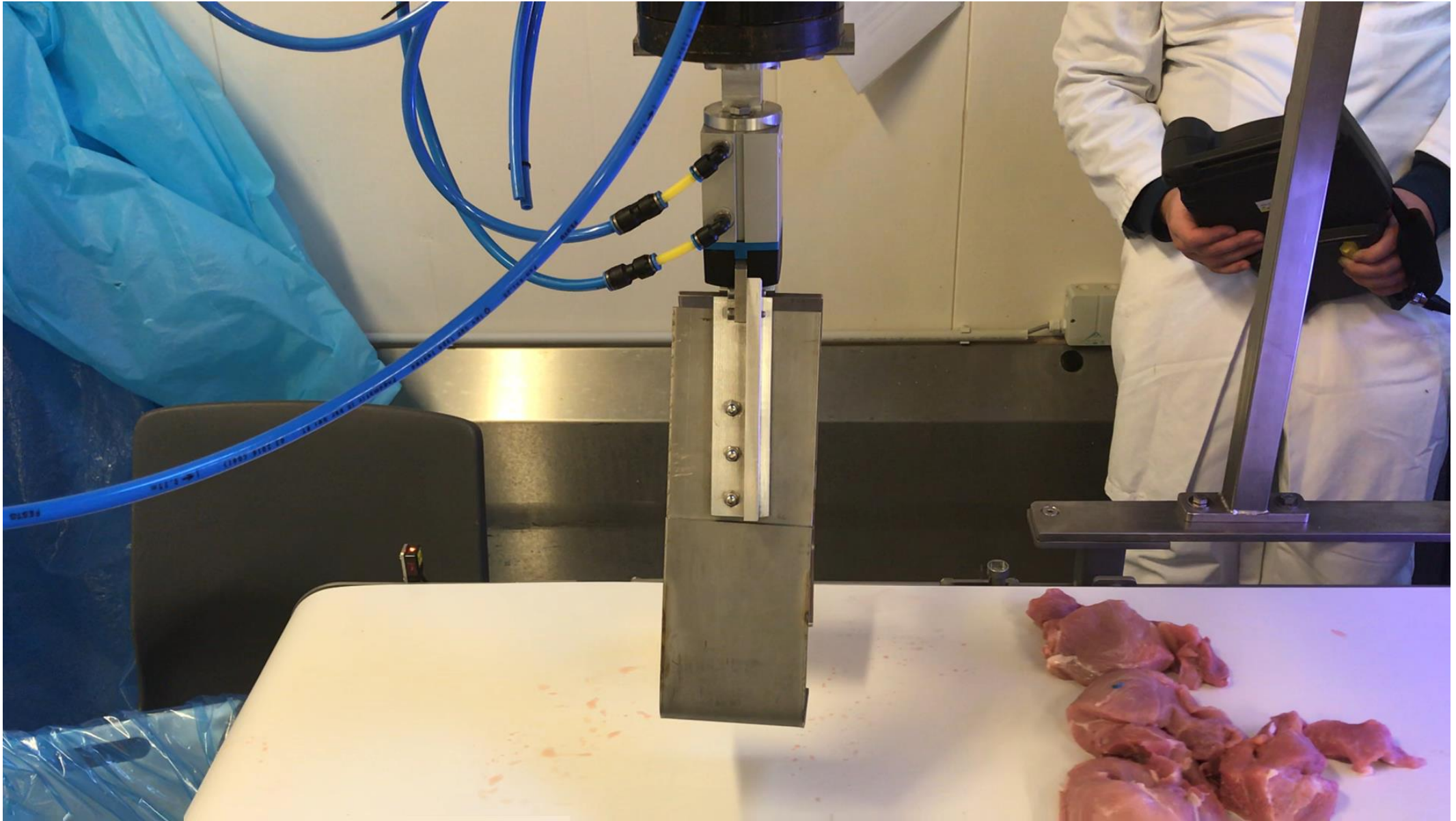


# Robot arm med sug – bryst





# Robot arm med griber - fx trim og delstykker





# Moving pointer – manual assist





# Moving pointer – manual assist





# Omkostning skala ved reject løsning

- Økonomi ved forskellige løsninger, størrelsesorden i DKK
  - Bånd stop 5000 - 25.000
  - Manual assist, moving pointer 50.000 - 75.000
  - Fra-sorteringsbånd 50.000 - 200.000
  
  - Robot løsninger
  - 8 kg Industri robot, 6 frihedsgrader 200.000 - 350.000
  - Gantry robot 75.000 - 150.000
  - SCARA 200.000 - 350.000
  - Delta robot 250.000 – 550.000
  - Collaborativ robot 150.000 – 500.000
    - + værktøj
    - + for Gribe, skubbe, klippe løsninger 5000 - 50.000
    - + Suge løsninger 50.000 - 350.000
  - Sikkerhedssystem for robotinstallation 100.000 – 200.000
  - Hygiejneinddækning af robot 50.000 – 75.000
- Alle estimater er for ny HW, hyldevare SW, eksklusiv evt ombygning af eksisterende linie, opstilling, excl driftsomk.



Delta robots vs SCARA robots

By Ilian Bonev | September 12, 2012 | Parallel robots

Ever since I wrote [my feature article on the Delta robot](#), more than a decade ago, I've been wondering whether the Delta robot — or any similar parallel robot — is really better than a SCARA robot. Of course, the Delta robot, invented by Prof. Reymond Clavel some [thirty years ago](#), has been a huge success. More than 10,000 units of pick-and-place Delta robots have been sold by ABB, SIG, BOSCH and many other companies. (ABB alone claims to have sold <https://coro.etsmtl.ca/blog/?p=55>



# Opsummering

- Løsninger er ofte linie specifikke, når detektionssystem og rejec-system ikke er tænkt ind fra produktionsanlægget start design
- Simple løsninger med operatør er meget fleksible, men koster lidt kapacitet, en udfordring hvis fund frekvens er høj
- Bånd løsninger er en mulighed – men sikker fjernelse er et krav, og det kan koste lidt produkt, eller om-arbejdning
- Robot løsninger er aktuelle når fund frekvens og produkt pris er høj, eller når området ikke er bemandet til manuel håndtering, nb krav til sikkerhed koster også



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More info her: <https://www.dti.dk/specialists/plastic-detection-made-easy/39325>