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Automatic cutting of pinbones and optimization of white fish fillet production

FHF workshop - fjerning av tykkfiskeben

Gardermoen – 27.11.2013

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Valka ehf

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Maximizing the value of fresh fillet products

How can we optimize the value of every kilo of raw material?

- Fishing – cooling – deheading – filleting – skinning
- Speed up the process from filleting to packing
- Improved material handling
- Optimization of the cutting of every fillet to maximize the amount of fish that goes into the most valuable products
- Minimize the give-away in packing
- Reduce the labour needed to produce each kilo of products

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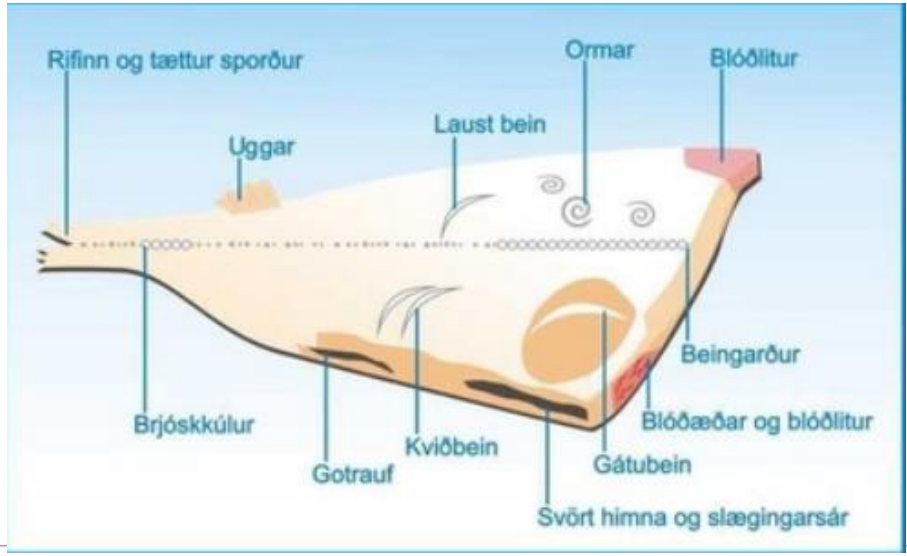
Trimming

The quality of fillets from filleting machine is not as good as it could be

- No portioning done
- Necessary to remove parasites, loose bones and blood spots
- Material handling can be greatly improved
- Control of feeding fillets to and from each station can be improved
- Automated quality registrations



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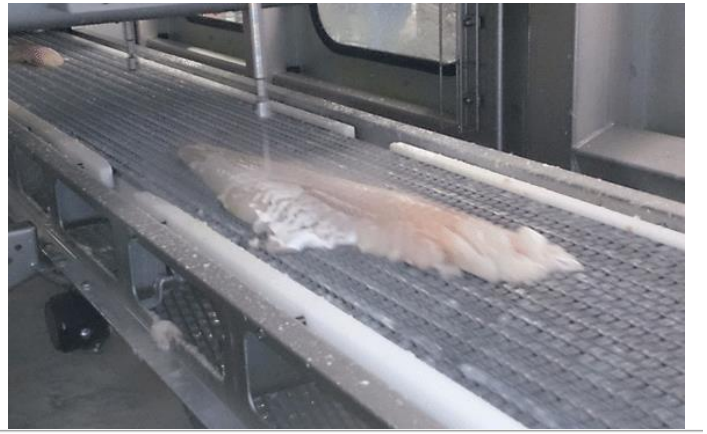
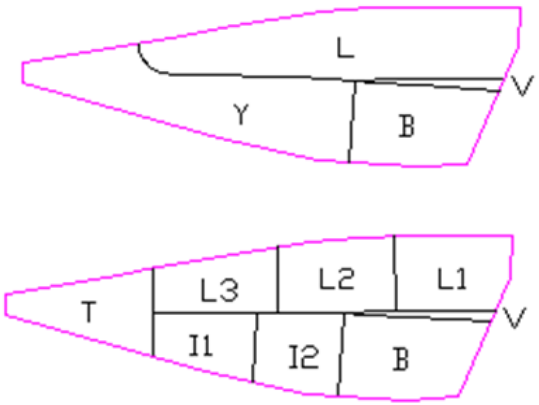
Cutting of the fillets

- X-ray guided cutting machines delivers:
  - Automatic cutting of pinbones with better yield
  - Optimization of the cutting of every fillet based on the value of each portion
  - The fillets are always cut in the same way
  - One machine can complete any type of cut in one step without limitations
  - Possible to cut fins and belly flap bones





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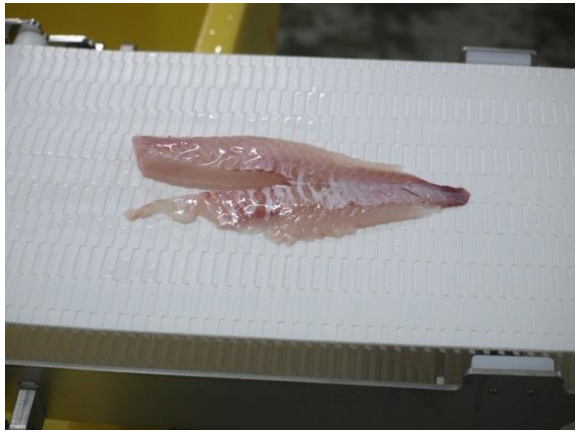
Experience of the cutting machine- redfish

A machine for redfish was installed at HB Grandi in Reykjavík in September 2012

- Made it feasible to cut pinbones from redfish fillets down to a weight of 50g
- Cuts also j-cut and loins
- The yield in v-cut fillets increased from 89%-91% to 94-96%
- Throughput is 500-1200 kg/hour depending on the size of the fillets
- Less than 1 bone / 2 kg
- Very reliable



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Experience of the cutting machine – cod

A machine for cod was installed at HB Grandi in Akranes in August 2013

- Throughput in the factory has increased by c.a. 50%
- The throughput is from 1.500 - 6.000 kg/hour of fillets depending on the fillet size
- The ratio of loins from fillets has increased by 6-8% primarily because the machine always cuts in an identical way
- The pin bone percentage is a little bit better than with manual cutting
- Less than 1 bone / 10 kg
- Very relieable

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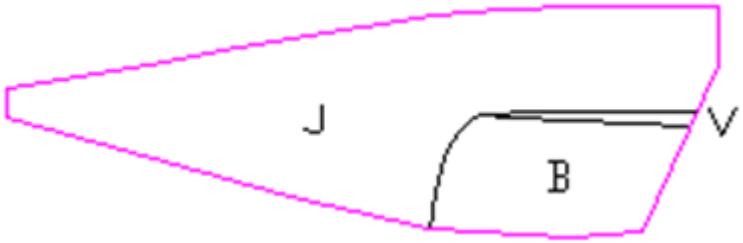
Cutting of haddock and saith

So far only trials have been made

- Bones can reliably be identified
- J-cut yield in haddock with skin off 88.4% – 7.1% – 4.5%
- J-cut yield in haddock with skin on 90.4% – 6.4% – 3.2%
- 16 kg where 100% bonefree
- Compatible results have been obtained in saith



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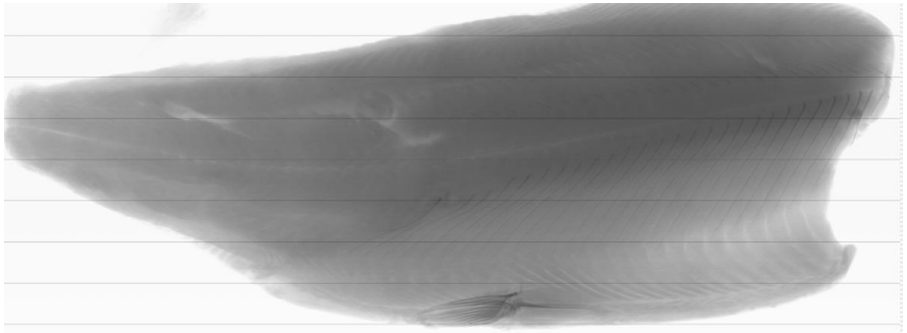
Cutting of salmon

Only preliminary testing done so far

- Bones can be identified – soft part can be lost
- With the right nozzle and right pressure the water does not cut through bones
- White material in cut is an issue
- Angular cut is essential



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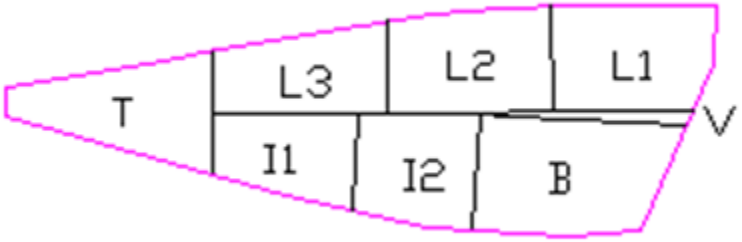
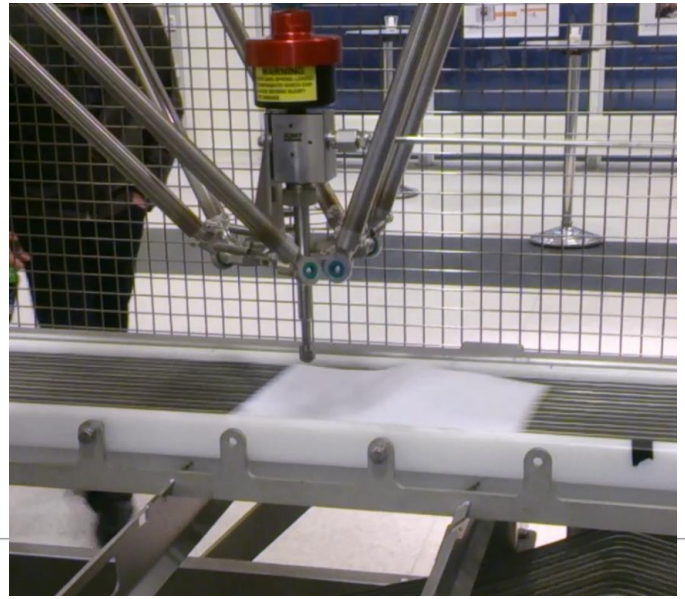
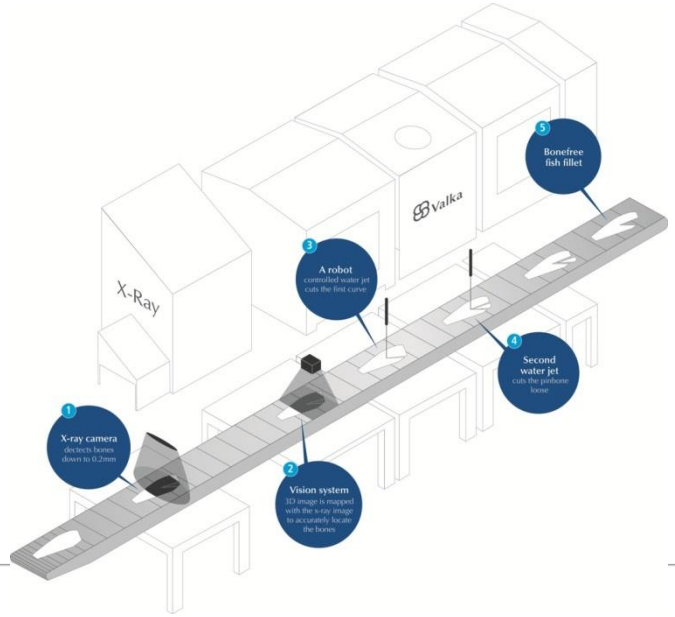
Next step – perpendicular cuts

- Testing goes well
- Includes cutting optimization with defined value on each portion
- Key patterns will be ready in December this year
- Three installations in beginning of 2014







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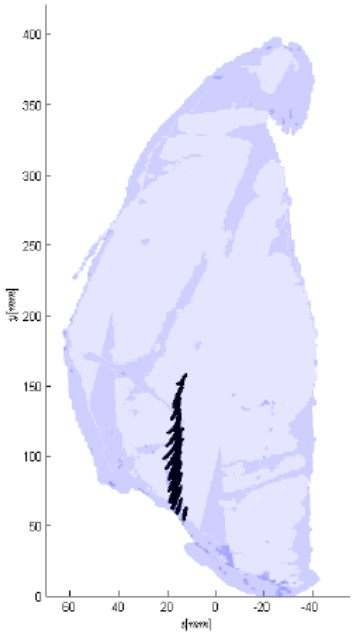
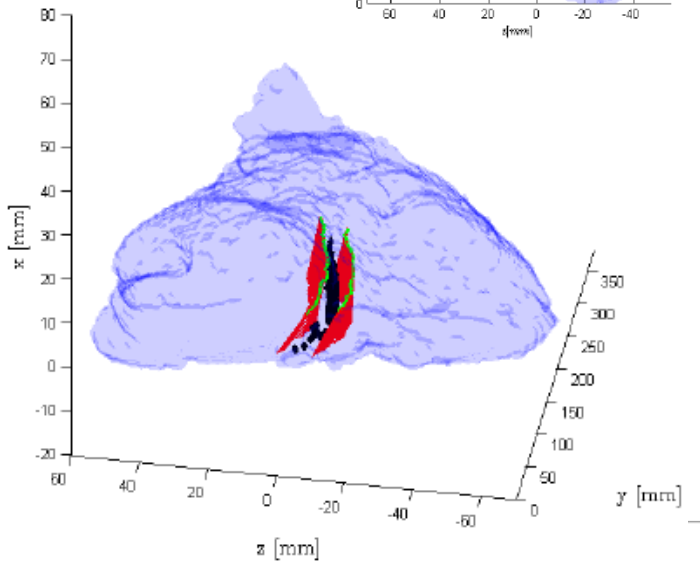
Next step – angular cuts

- 3D images from SINTEF/FHF have been very valuable
- Estimated improvement in yield for cod is about 1-2 % of fillet weight
- Optimal robot is being evaluated
- X-ray analyses is being evaluated for obtaining 3D position of bones
- Aim is to have a prototype ready in December 2014
- Huge demand on computer power
- Existing machines will be upgradeable





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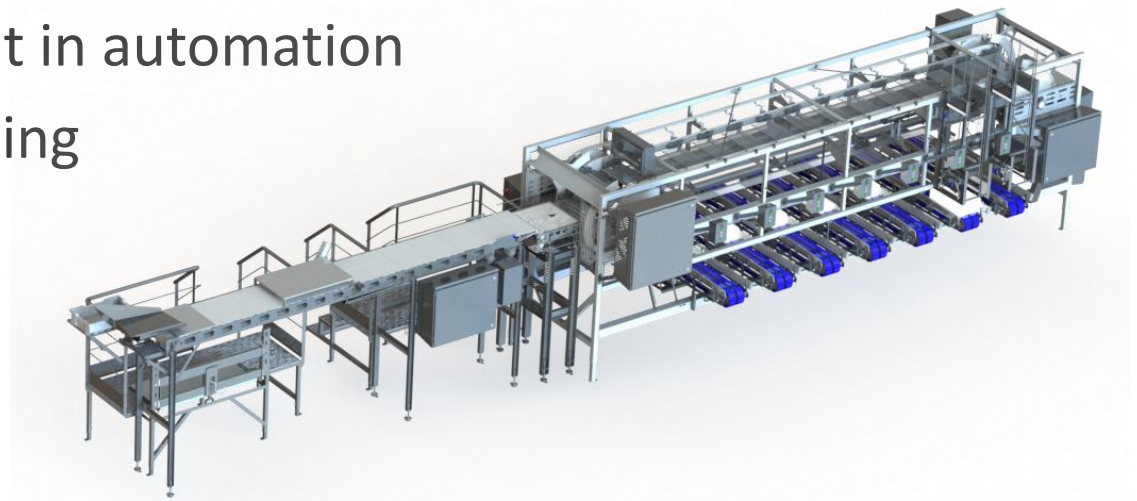
Grading & packing

- Automatic grading and alignment in boxes
- Throughput 80 pcs/min
- Give-away about 6-10g – or 0.25% in 3kg box
- Excessive give-away with traditional graders or in manual packing is normally not less than 1.5% and significantly more in 400g+ loins or fillets going in 3 kg packs
- Significant improvement in automation
- Excellent product handling



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Automation in data handling

- Automatic link to fish markets
  - Easy to register catch from own boats or in direct purchase
- All order related communication in one place
  - Customers can enter their orders
- Automatic traceability reports and catch certificates
  - All delivery documents are created automatically
- Powerful quality module for all quality registrations
  - Simple registrations with Ipad or touch screens
- Automated contribution reports
  - Contribution analyses by suppliers, customers and products

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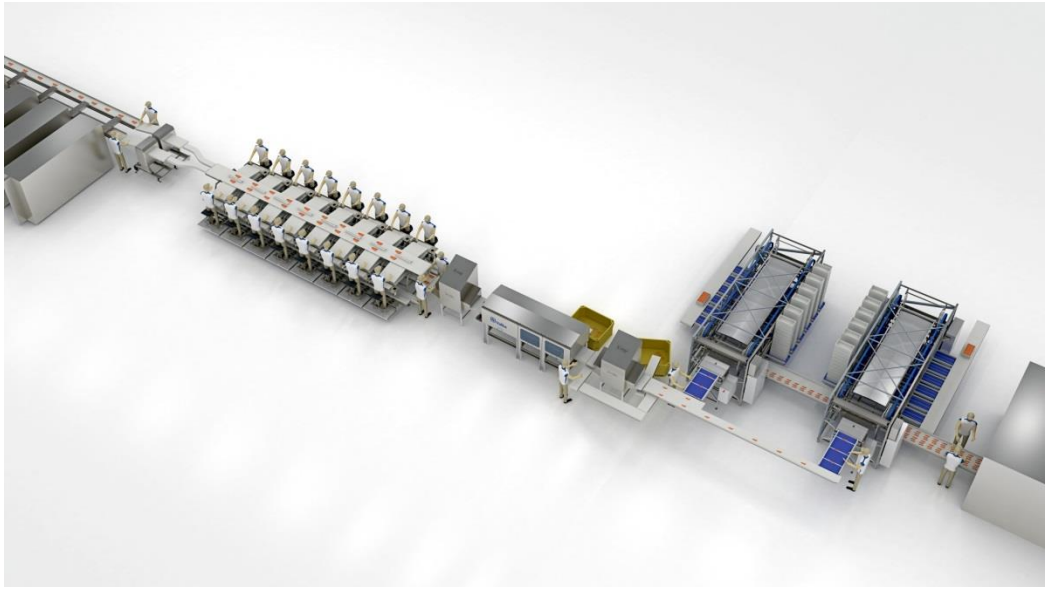
Summary

- Main improvements obtained in white fish fillet production:
  - More throughput in trimming and simpler work
  - Faster flow and therefore easier to ensure that the product has the right temperature when it is packed
  - Greatly improved product handling
  - Reduced give-away
  - More automation and throughput in packing
  - Optimized loin-yield
  - Less pinbone yield loss
  - Automated registrations
  - Full traceability
  - Accurate analyses



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