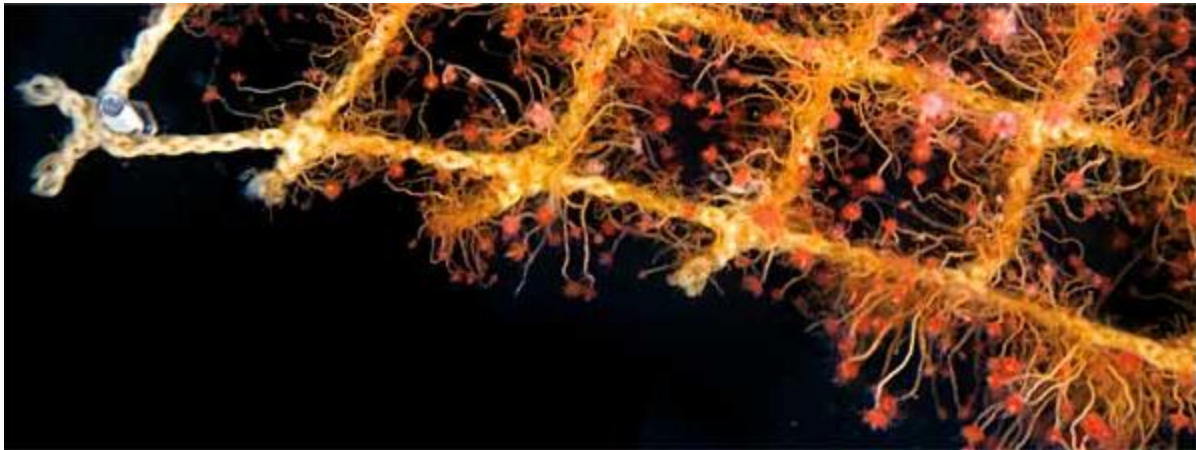


# Production Management for maintenance of closing nets from fish farms

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SINTEF Technology and Society

# Cleaning up the fish farming industry



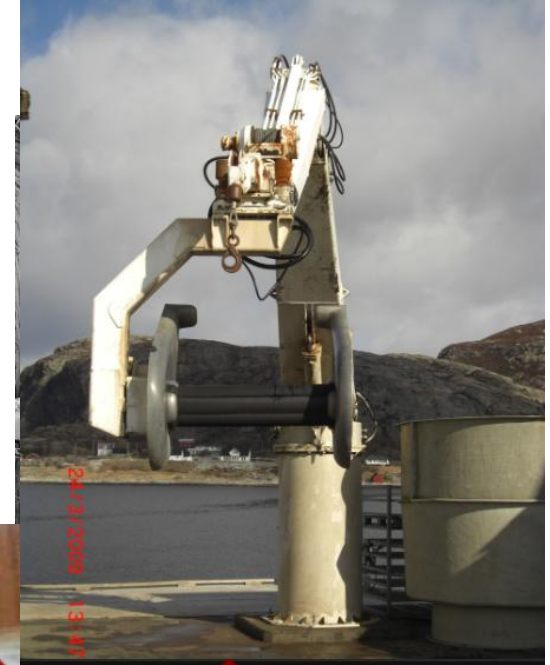
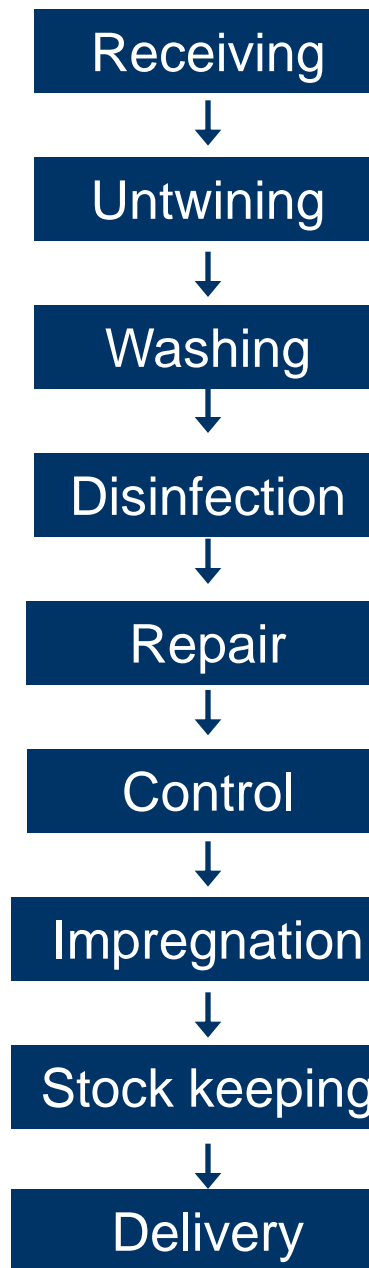
*Foto: Thor Nielsen*

# Hepsø Notservice AS

- Service station for the fish farming industry
- Established in 1997
- Washing, disinfection, testing, repairs and impregnation of fish farming nets
- 4 full time employees



# Process



Destruction

# The Project's Characteristics

- Objective: The project's objective is to develop a suitable production management system to give the company an effective overview and support of work operations and inventory management.
- Total Costs: 130 000 NOK
- Financial support: 88 000 NOK from The Research Council of Norway (programme: Competence broking)

# Project Challenges

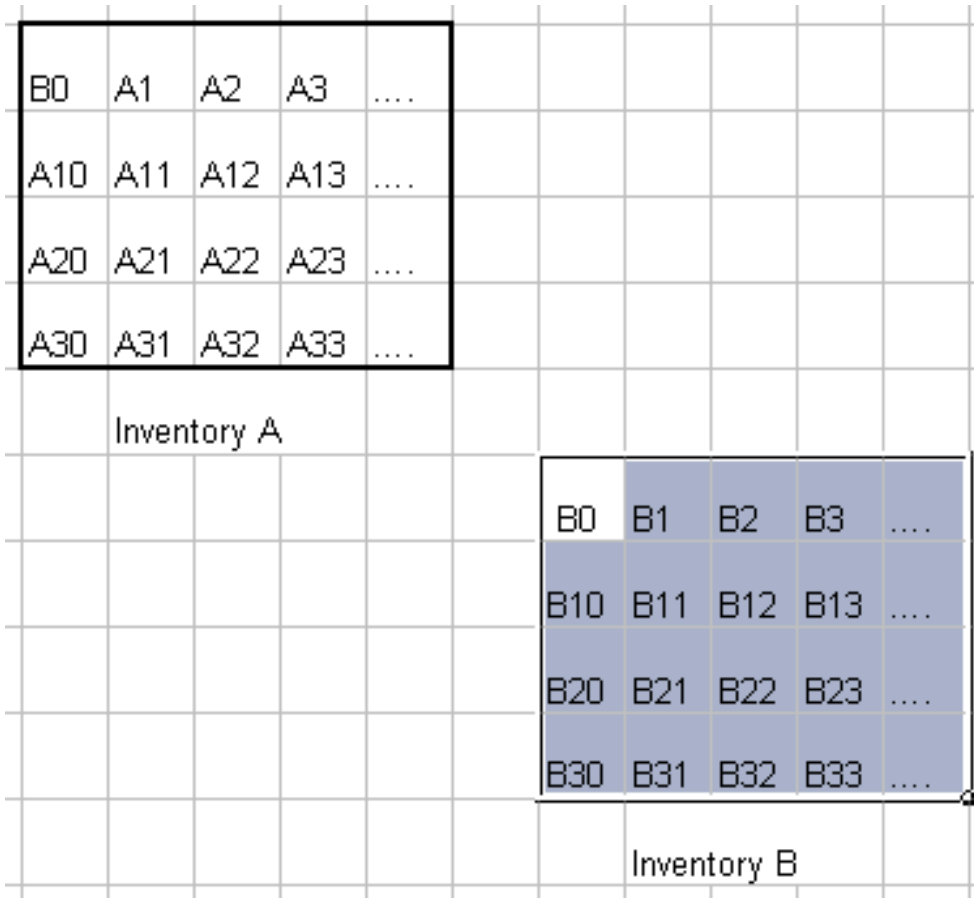
- Identify where requested nets are stored in the local inventory
- Some of the workers quite old, and have limited or no experience with computers
- New work procedures: Transition from paper based forms to electronic registration of information
- Computerized calculation of net strength
- Limited economical resources

# Facing the challenges

- Creating a number system for the inventories which can be reflected in the program
- Implement electronically variants of forms, so the workers can identify their “old” working way
- Creating a calculation system for net strengths
- Using Excel as a system basis, which is a well known tool to the management. Fast and easy to implement
- Implement the database as an integrated part of Excel
  - Introducing a new challenge:
    - Single user system! A challenge every 14th. Day; when invoices are created simultaneous with normal working operations.

# Storage identification system

- A simple number system for the inventories of the nets



- All spots are marked at the storage ground. Each mark represent a net storage spot.
- The ID is stored in the data system telling where to find the net.
- Own letters (S, R and M) for big customers




# Tags following the plastic bags containing nets

	A	B	C	D
1	Etikett			
2				
3				
4	Kunde:	Refsnes Laks		
5				
6	Fra anlegg:	Mia		
7				
8	Kontakt-	Per Pettersen		
9	person:			
10				
11	POSE			
12	Produktnr: 12345			
13	Omkrets: 80			
14	Dybde bunntau: 30			
15	Omfar: 60			
16				
17				

- As a security, the company wanted the program to produce tags to accomplish the nets at their storing place!

# Electronic variants of forms

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1																	<b>14.1 ARBEIDSLISTE</b>															
2																																
3	HEPSØ NOTSERVICE AS																Dato inn: 22-09-2008															
4																	Dato ut: 29-09-2010															
5																	Kunde: Refsnes Laks															
6																	Fra anlegg: Mia															
7	Ordrenr: 2009001																Kontaktperson: Per Pettersen															
8	Produktnr: 12345																Telefon: 76543344															
9	Lagerdato: 29-09-2009																Til anlegg: Holmen															
10	Lagerplass: A3																															
11																																
12																																
13	Omfar: 60																Omkrets: 80															
14																	Dybde bunntau: 30															
15																	Dybde senter: 15															
16	Dimensjonsklasse: IV																Minste bruddstyrke: 55															
17																	Minste bruddstyrke fellingstau: 3400															
18	Min. antall sidetau: 16																Min. antall løftetau: 4															
19																	Min. antall krysstau: 2															
20	Dato																Fakturerert															
21	Dato vasket: 29-09-2009																<input checked="" type="checkbox"/>															
22																	Sertifikatnr nottråd: S1															
23																	Sertifikatnr notline: S2															
24	Dato desinfisert: 29-09-2009																28 timer medgått.															
25																	Sertifikatnr materiell: S3															
26	Dato ferdig rep.: 29-09-2009																<input checked="" type="checkbox"/>															
27																	Sertifikatnr tau 1: S4															
28	Dato impregnerert: 29-09-2009																<input checked="" type="checkbox"/>															
29																	Sertifikatnr tau 2: S5															
30																	Impregneringsstoff: gull															
31	Styrkeprøver utført den: 29-09-2009																															

- Implement electronic variants of known forms.
- This is an example of a part of an existing form which are made electronically in the program

# Net strength calculation

Omfar: <input type="text" value="60"/>	Omkrets: <input type="text" value="80"/>	Dybde bunntau: <input type="text" value="30"/>	Dybde senter: <input type="text" value="15"/>
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Dimensjonsklasse: <input type="text" value="IV"/>	Minste bruddstyrke: <input type="text" value="55"/>	Minste bruddstyrke fellingstau: <input type="text" value="3400"/>
Min. antall sidetau: <input type="text" value="16"/>	Min. antall løftetau: <input type="text" value="4"/>	Min. antall krysstau: <input type="text" value="2"/>

---

Dato	Fakturer
Dato vasket: 29-09-2009	<input checked="" type="checkbox"/>
Dato desinfisert: 29-09-2009 <input type="text" value="28"/> timer medgått.	
Dato ferdig rep.: 29-09-2009	<input checked="" type="checkbox"/>
Dato impregneret: 29-09-2009	<input checked="" type="checkbox"/>

Sertifikatnr nottråd:	S1
Sertifikatnr notline:	S2
Sertifikatnr materiell:	S3
Sertifikatnr tau 1:	S4
Sertifikatnr tau 2:	S5

Impregneringsstoff: gull

---

Styrkeprøver utført den: 29-09-2009

<b>Strekprøver i hoppenett:</b> Sted: A: <input type="text" value="40"/> B: <input type="text" value="40"/> C: <input type="text" value="40"/> Krav: Min. 60% av styrkekrav til ny not Minimumkrav utgjør: <b>33</b> <b>GODKJENT</b>			<b>Strekprøver under fellingstau</b> Sted: A: <input type="text" value="40"/> B: <input type="text" value="40"/> C: <input type="text" value="40"/> Krav: Min. 65% av styrkekrav til ny not Minimumkrav utgjør: <b>35,75</b> <b>GODKJENT</b>		
--	--	--	--	--	--

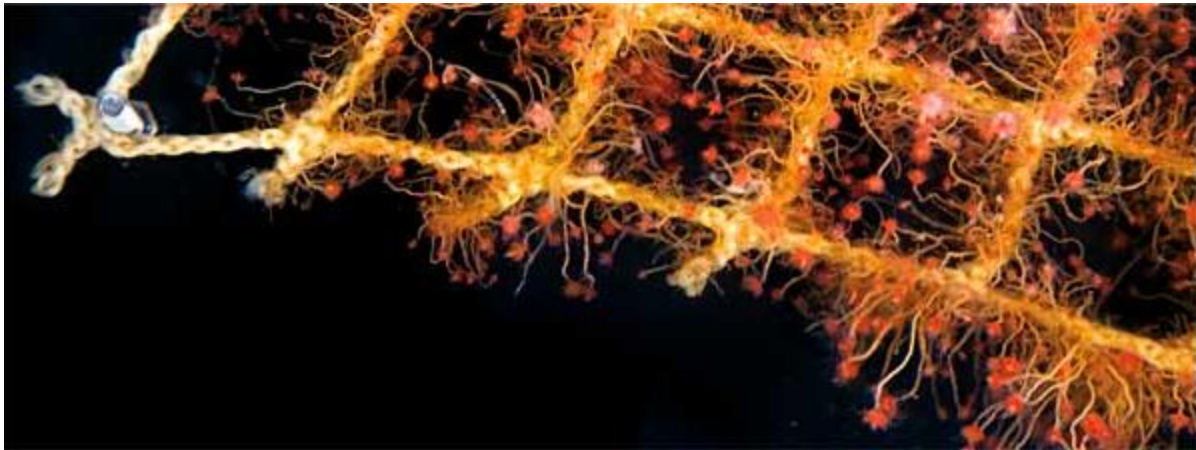
## Input parameters:

- Omfar
- Circumference
- Depth at center

## 6 results:

- Dimension class
- Breaking resistance
- Breaking resistance of decrease rope
- Minimum no of:
  - Side ropes
  - Lift ropes
  - Cross ropes

**"Omfar" = number of vertical treads inside one alen (old Norwegian measure which is approximately 2 feet).**



In this case 2 feet (1 alen) gives 5 omfar  
(Each net hole is a square)

# The menu driven process

ORDRE - FIX Kommando Meny ▾	Ny ordre (ny not)	
	Ny ordre (kjent not)	
	Hent ordre	Ctrl+A
	Lagre ordre	Ctrl+Q
	Slett ordre	
	Velg Start-ark	Ctrl+S
	Søk kolonneverdi	Ctrl+<
	Merk for sortering	Ctrl+Z
	Skriv ut skjema	
	Skriv ut alle skjema	
	Lag notdata filer	
	Lag programkopi	
	Velg driftsmodus	
	Vis Guide	
	Om Ordre-FIX	

New order (new net)  
New order (known net)

Fetch an order from the database  
Store an order to the database  
Delete order

Select the start sheet  
Search column value  
Mark area for sorting

Print current form  
Print all forms

Create net information files  
Create program copy

Select operating mode  
Show user guide  
About the program

# The Start Sheet

- Gives an overview of the nets:
  - What is done with the nets, and when
  - Where they are (storage location or out to customer)
  - Approved or not according to classification
- Search for specific values in the columns
- Possibility to sort the overview

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1																			
2																			
3																			
4																			
5																			
6																			
7	Ordre-FIX versjon 3.2																		
8																			
9																			
10	Ordrenr	Produktnr	Kunde	Omkrets	Dybde bunntau	Omfar	Dim. klasse	Godkjent	Kontaktperson	Telefon	Lagerplass	Fra anlegg	Dato inn	Dato vasket	Dato testet	Dato impregner	Dato til lager	Dato ut	Til anlegg
11	2009002	12345	Refsnes Laks				?						23-09-2009					-	
12	2009003	12345	Refsnes Laks	80	30	60	IV		Per Pettersen	76543344			24-09-2009					-	
13	2009001	12345	Refsnes Laks	80	30	60	IV	x	Per Pettersen	76543344	A3	Mia	22-09-2008	29-09-2009	29-09-2009	29-09-2009	40085	29-09-2010	Holmen

# Creating customer's overviews

- Files with information about nets owned by specific customers
- One file per customer
- Customer files can be distributed on e-mail or linked to Hepsø's internet page with password for each customer

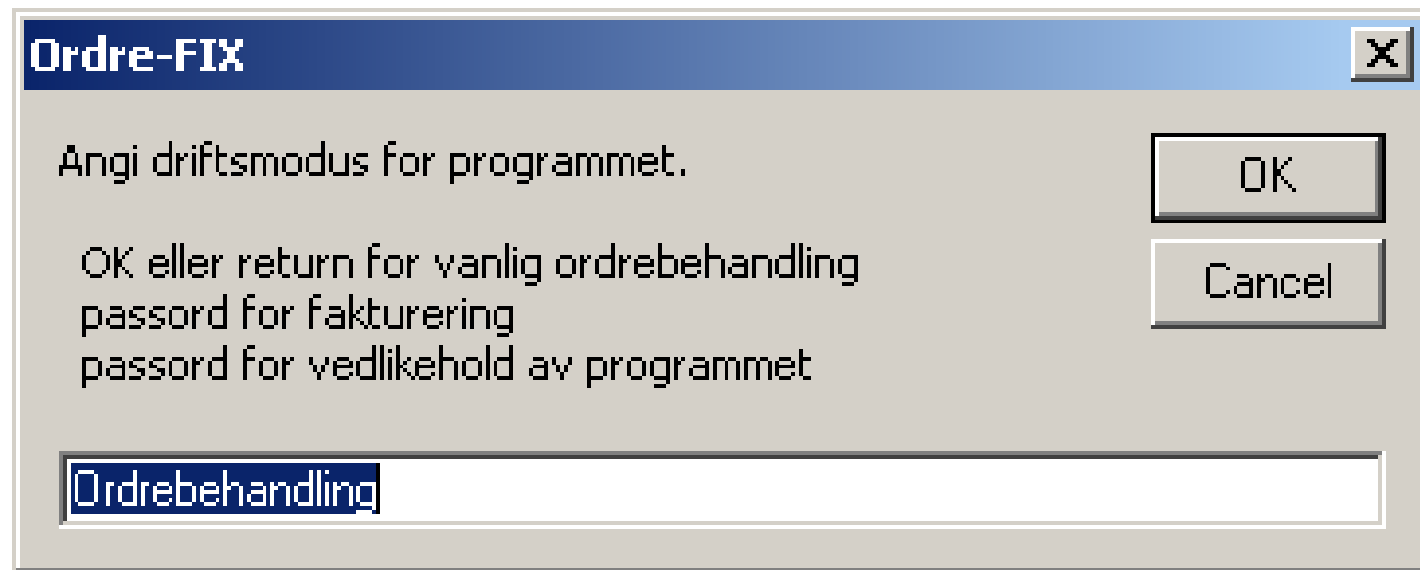
## ■ File examples:



20090921-084328#Andre kunder.txt  
20090921-084328#Marin Harvest.txt  
20090921-084328#Refsnes Laks.txt  
20090921-084328#Salmar.txt

# The menu function Operating Mode

- Switch between normal operation mode,
- Invoicing mode or
- Program Maintenance mode





# Parallel work (normal operation mode and invoicing mode)

- Implemented database gives a single user system
- Every 14 days (4 hours) normal operation mode and invoicing have to use the system simultaneously.
- Solution: The database is designed in such a way that to parallel work can be done on two copies and afterward be merged after use
- Menu function implemented to create a copy of the program

# Using Excel to meet the limited resources

- Graphical handling
- Excellent calculations methods
- Good programming environment
- Fast handling of data
- Cheap
- Management familiar with use of Excel, no extra training needed

# The Current Project Status

- First operative version is delivered customer
- Shall be used and tested for a ½ year.
- Possible changed may then be implemented
  
- Potential for selling the idea to other net cleaning farms along the coast of Norway

**Thanks for your attention!**

**Eirik Borgen and Annette Hoff**