

# Tanker fra dag 1

Produksjonsmetoder

Materialer

Utforming

Plan for arbeidet

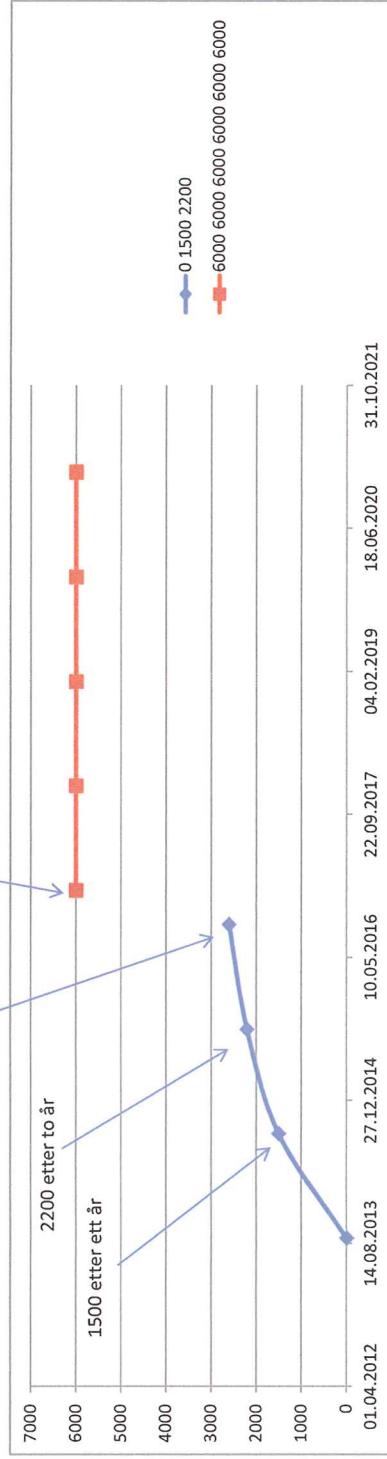
1. Forarbeid - forstå kostnadsdrivende faktorer, forstå hvordan man bør konstruere
2. Se på eksisterende løsninger
  - Eksisterende produksjonsmetoder og materialer
    - Hva er i bruk?
    - Hvem leverer hva?
    - Hva produseres hvor?
    - Hvordan beregnes kostnad for dagens løsninger? *Anbud*
    - Tidligere erfaringer?
  - Alternative produksjonsmetoder og materialer
    - Hvilke alternativer finnes?
    - Hvilke vil kunne gi kostnadsreduksjon?
    - Miljøaspekt?
    - Begrensninger ved metoden?
    - Begrensninger ved materialet?
3. Velge deler å se nærmere på (trau, dører til multipack, ramme, dør til eclipse?).
  - Hvilke belastninger (fysisk, kjemisk, temp osv.) må delene tåle? *Braker krav spec*
  - Hvorfor ble produksjonsmetode og material valgt? *Ikke billig* *Produktkrav*
4. Kalkyle for når prosess eller material blir gunstig/ugunstig basert på deler
5. Gjennomførbarhet? Forsøke alternativ del.
6. anbefaling *Umulig, mange variable*

MET Matrise for Multipac luke

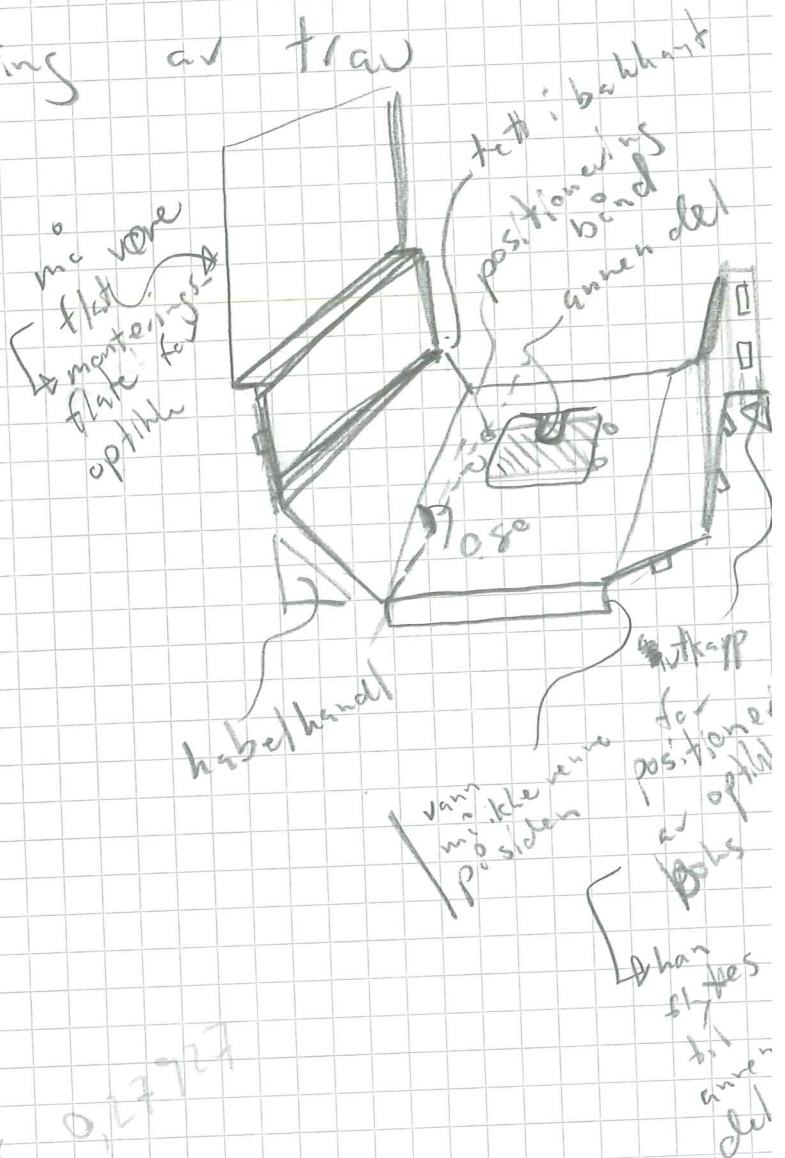
	Materials Cycle Input/Output	Energy Use Input/output	Toxic Emissions
Produksjon og levering av materialer og komponenter	AluZink-Sheetmetal	High energy content of materials	
		Process energy for forming into sheetmetal	
		Transport energy supplier - stanseplass	
Produksjon av del	Metallavkapp	Stansing	
		Knekking	
	Pulverlakk - avfall	Pulverlakkering	
		Transport energi, fra knekk/stanse - montasje	?
	Popnagler - avfall		
Distribusjon		Transport	
Bruk			
Ved endt levetid	Metall kastes		AluZink-Stålplatedel m popnagler



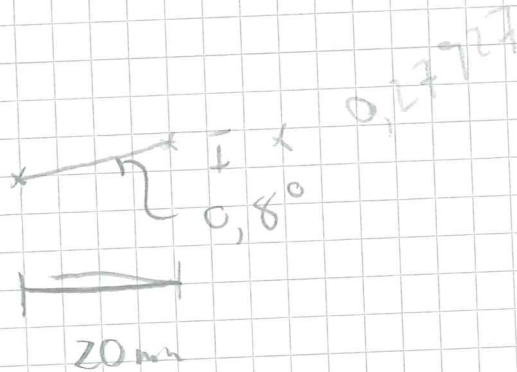
Dato	Fullt innfaset	Uttfasing
01.09.2013	1500	1500
01.09.2014	1800	1800
01.09.2015	2100	2100
01.09.2016	2400	2400
30.12.2016	2700	2700
30.12.2017	3000	3000
30.12.2018	3300	3300
30.12.2019	3600	3600
30.12.2020	3900	3900
01.01.2021	4200	4200
30.12.2022	6000	6000



# Forsøk 1 Termoforming av trau



- Slippvinkel
- Posisjonering
- Fresbarhet



283,6885

Valg af produktionsmetode

Pris med transport og lagring

kompleksitet

størrelse

antal

materialer og fremstiller, lath osv

transportbehov → velet, stabilitet

leveringstid

lagerbehov

produktionskostnader

maskinhold og brug

menneskehold

skema

afhænger af det

—  
og fremstiller  
leverandører

—  
og produktions  
metoder

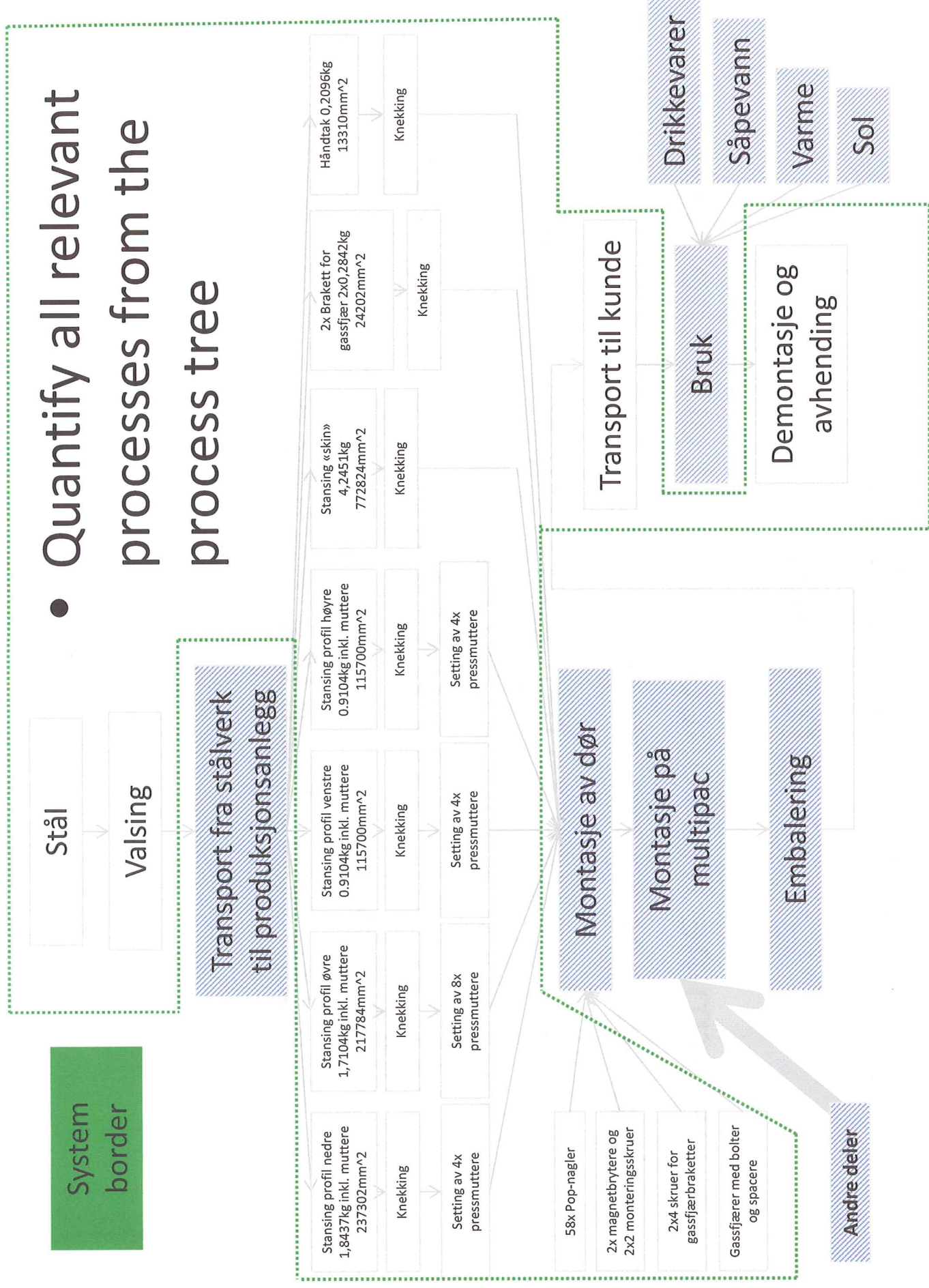
# Step 1: Define goal and scope

- Describe the product or product component that is being analyzed
  - Hinged door for access to conveyer belt
- Describe the purpose of the analysis:
  - The purpose is to compare different production methods to look at the differences in environmental impact. Find hotspots in current solution and see if they can be reduced with re-design, use of other materials and/or production methods.
  - The results will be used for decision of production method, design and material.
- Define the level of accuracy required
  - A rather superficial level of accuracy is required; there is no accurate data.

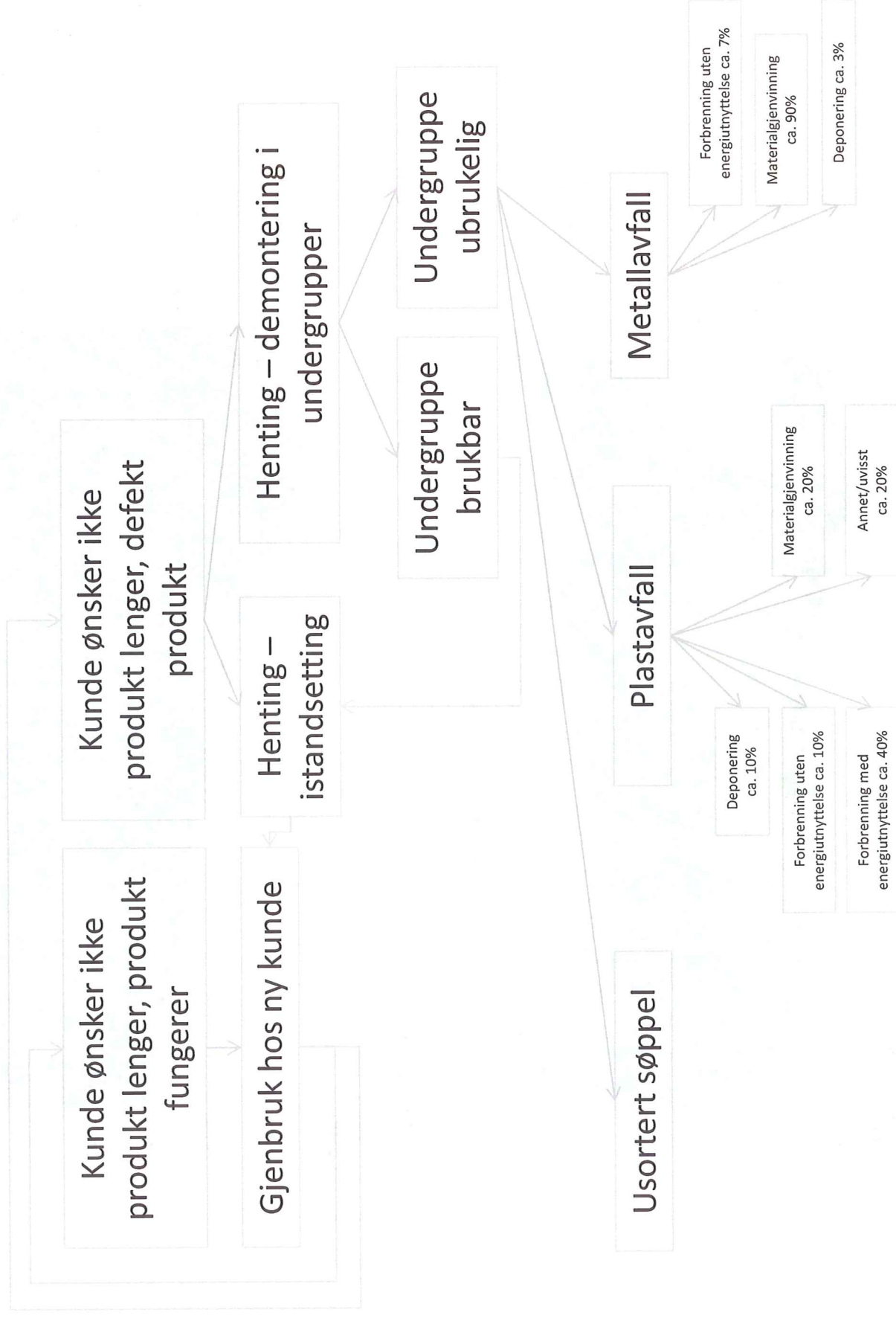


System  
border

- Quantify all relevant processes from the process tree



# Avhending av multipac



Stål

Valsing

Transport fra stålverk  
til produksjonsanlegg

Stansing profil nedre  
1,8437kg inkl. muttere

Kneking

Setting av 4x  
pressmuttere

Stansing profil øvre  
1,7104kg inkl. muttere

Kneking

Setting av 8x  
pressmuttere

Stansing profil venstre  
0.9104kg inkl. muttere

Kneking

Setting av 4x  
pressmuttere

Stansing profil høyre  
0.9104kg inkl. muttere

Kneking

Setting av 4x  
pressmuttere

Stansing «skin»  
4,2451kg

Kneking

2x Brakett for  
gassfjær 2x0,2842kg

Kneking

Håndtak 0,2096kg

Kneking

58x Pop-nagler

2x magnetbrytere og  
2x2 monteringskruer

2x4 skruer for  
gassfjærbraketter

Gassfjærer med bolter  
og spacere

Montasje av dør

Montasje på  
multipac

Embalering

Transport til kunde

Bruk

Demontasje og  
avhending

Drikkevarer

Såpevann

Varme

Sol

totalt 104 kg



2x2 skruer fester magnetbryter

2x4 skruer fester brakett for gassfjær

2 braketter for gassfjær - 2 knekker hver

2 bolter for å feste gassfjær

4 spacere i plast til gassfjær

2 låseringer el. fester boltene til gassfjærene

250kr?

Pris: 600kr?

935kr?

2 gummiropper ligger mellom lokk og boks

2 magnetbrytere

1 profile low – 8 knekker, 1 håndknekk

1 profile top – 8 knekker, 1 håndknekk

1 profile left – 2 knekker

1 profile right – 2 knekker

1 «skin» – 7 knekker

1 handle innside – 1 knekk, 1 fold

58 pop-nagler

20 pressmuttere

## Step 4: Calculate

1. Note the materials and processes on the form and enter the amounts.
2. Find the relevant Eco-indicator values and enter these.
3. Calculate the scores by multiplying the amounts by the indicator values.
4. Add the subsidiary result together.



# FLEXFORMING

Med flexforming i en av våre Quintuspresser kan du tøyne grensene for hva du kan gjøre med dine plateprodukter. Produkter kan produseres med underkutt, dobbelkrommede flater og dype daler. Alle formbare platematerialer kan benyttes. Vi kan også forme ferdiglakkert plate. Du kan endre platetykkelse og materiale uten å behøve å gjøre endringer i verktøyet. Flexforming gir dessuten perfekte flater og det kreves minimalt med etterbeid. Det behøves bare en verktøyshalvdel noe som gir lavere kostnader og korte ledetider. Den formgivende verktøyshalvdelen lages ofte av aluminium eller støpegods.



## Formbare materialer

Stålplate  
Rustfri plate  
Aluminiumsplate  
Ferdiglakkert plate

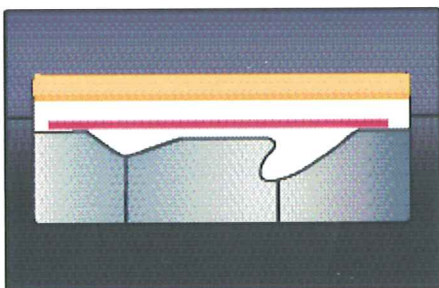
## Maskinkapasitet

Vi har to Quintuspresser som kan ta verktøystørrelser på:

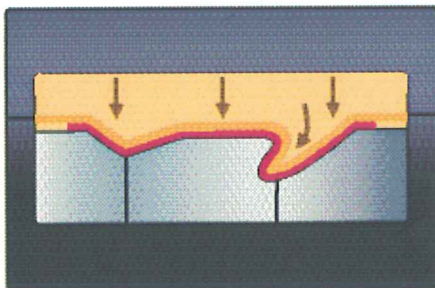
H 300 x B 1600 x L 3000 mm  
H 240 x B 1100 x L 4000 mm

## Radier

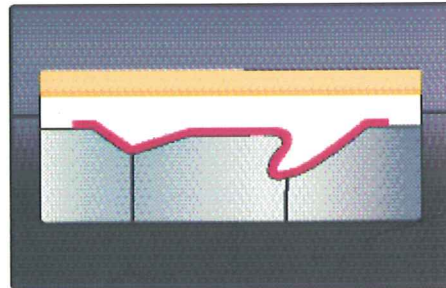
Hjørneradier: Min høyde / 3  
Bunnradier: Min (3-6) x platetykkelse  
Toppradier: Min 1,5 x platetykkelse



Platen (rød) legges over verktøyet (grått).



Ricinolje pumpes inn ovenfor ett gummi-membran (gult). Trykket (opp till 1400 bar) er isostatisk, det vil si jevnt fordelt over platen. Presskraften på opp till 93000 tonn tas opp av Quintuspressen gjennom hundre mil med metalltråd.



Membranet løftes opp. På kort tid har en del blitt ferdig. Nå kan detaljen gå videre til vår laserskjærer.

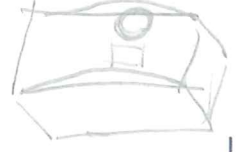
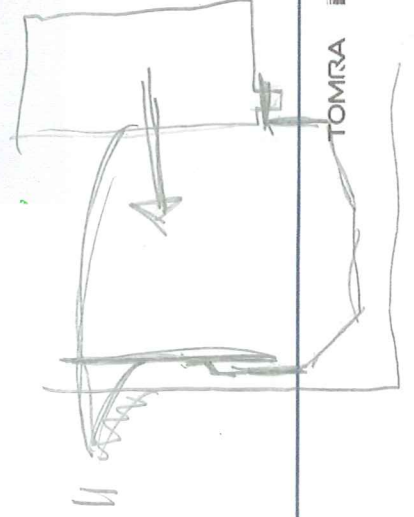
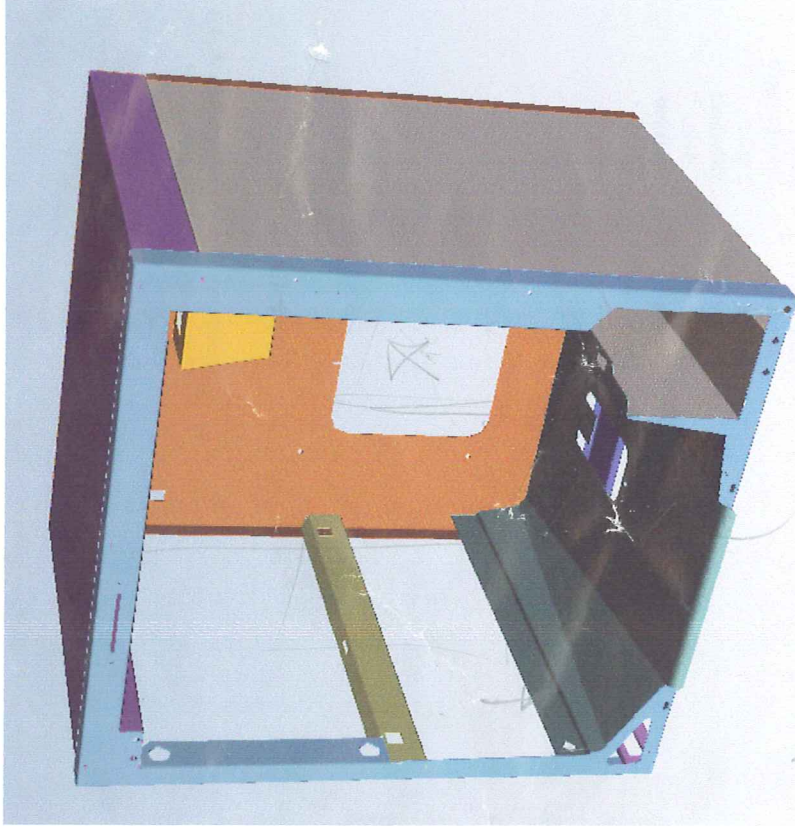


# FIRST PRIORITY

Main goal: Establish and identify possible new production methods for BASEUNIT ECLIPSE considering production volume and place of manufacturing.

Keywords:

- PartNumber: **51360042 – BaseUnit Eclipse**
- Yearly production volume
  - Year 1: 500
  - Year 5 3500
- Suggest/implement changes to adapt to production method.
- Production location: China or Poland



Trav Eklipse

slisse m med  
14/7/2017

# Brukerkravspesifikasjon - operatør

Lett å rengjøre

Ikke lekket væske ned i resten av maskinen

Føre væske vekk uten søl

Være "stiv nok" stiv nok for 2 bølger

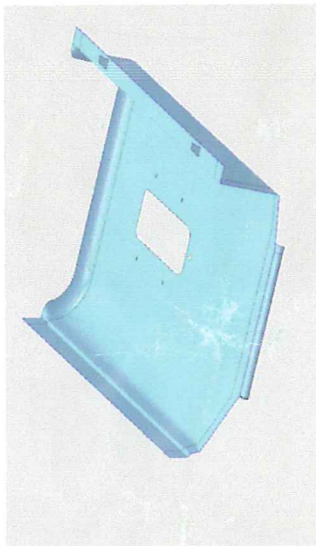
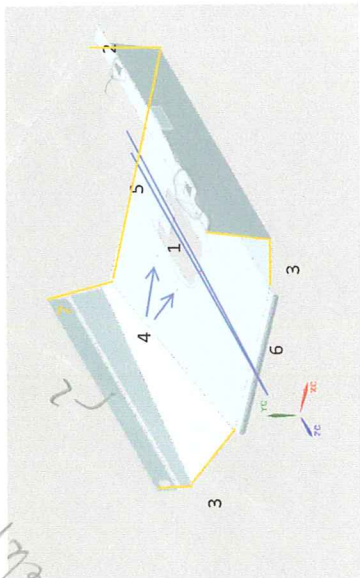
Sitte på plass, parallele flater blir parallele osv.

transport  
band  
stabilitet

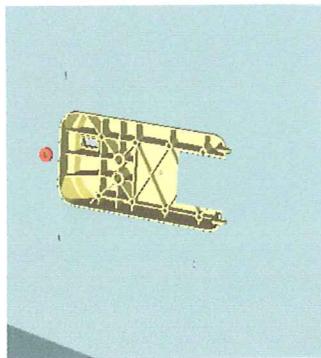
## Funksjonskravspesifikasjon

- 1 Posisjonering av transportbånd
- 2 Har pr i dag posisjoneringsansvar for optikkboksen
- 3 Har pr i dag egenposisjonering vha. tabs
- 4 Støtter bla. Kabelskinne under med tabs.
- 5 Heining for å føre væske ut mot front
- 6 Leppe i forkant som fører væske ned i oppsamlingsbeger
- 7 Ca tett i bakkant og deler av forkant

Tamp



Forslag Vakumtrekk AOE00006-B



# Luke multiple

## Brukerkravspesifikasjon

Ikke føles slarkete

Dekke til farlige komponenter

Hindre tilgang mens maskinen går

Ved brann umuliggjøre kontakt med elektronikk eller kvern

Brukervennlig - til tross for uønskede plassering

Ergonomisk

Lett å rengjøre

## Produktkravspesifikasjon

1 Minstekrav til stivhet - hvis man løfter i ett hjørne, henger det andre ikke mer enn x antall millimeter ned

2 Hel overflate

3 Ikke smeltbart materiale

4 Ikke for tung. Nåværende vekt 10,4kg+ er litt for tungt. Montasje er tungt ("må være 2 mann").

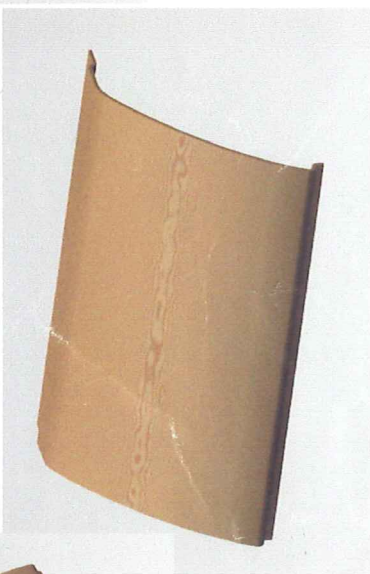
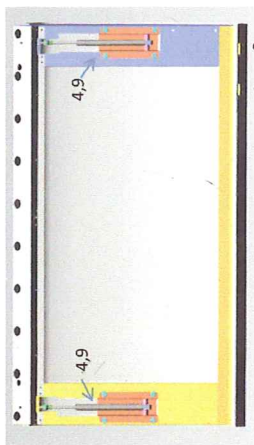
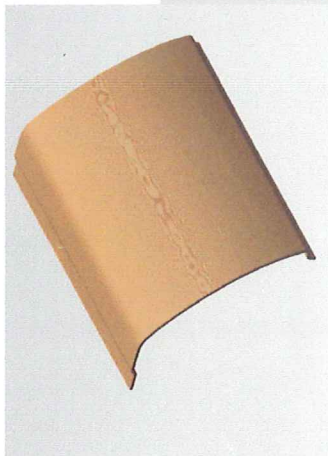
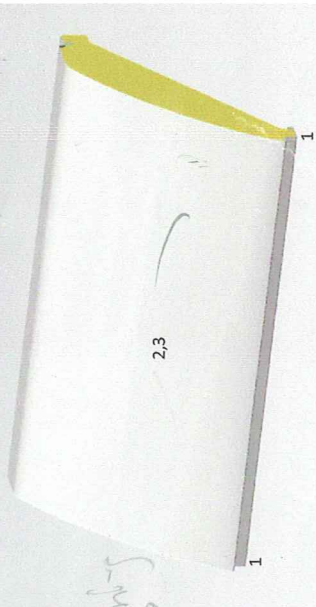
5 Luke er plassert høyt, i et område man ikke ufortrødent kan yte mye kraft - lett. "Ok" i bruk pga. gassfjærer.

6 Må tåle vann

7 Må ikke ha kroker og krokar som er vanskelige å komme til i, og ei heller åpne u-profiler som samler vann. Da må man i alle fall ha hull for å slippe ut vannet

8 Magnetbrytere (Zstk.) for umiddelbar stopp ved åpning av kabinett

9 Distinkt forskjell på åpen eller lukket. Pr. i dag gjennom bruk av gassfjærer - åpner seg hvis åpen, lukker seg hvis lukket



max rengjøringstid?  
max vannopsamling

lyd barnd  
vannopsamling  
vassgjennomstrøming





MET-matrix

- finn minste radius

Knut Tore Fausa

- Lag spant DXF

920 29 256

Konstruktør - elhornes

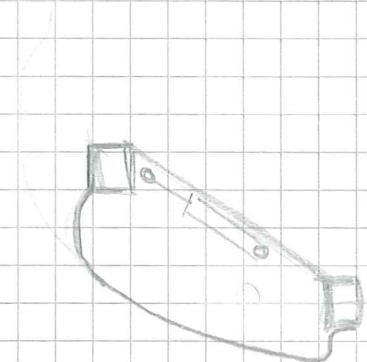
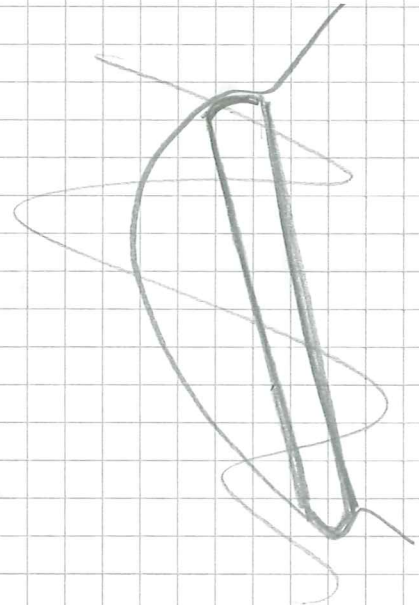
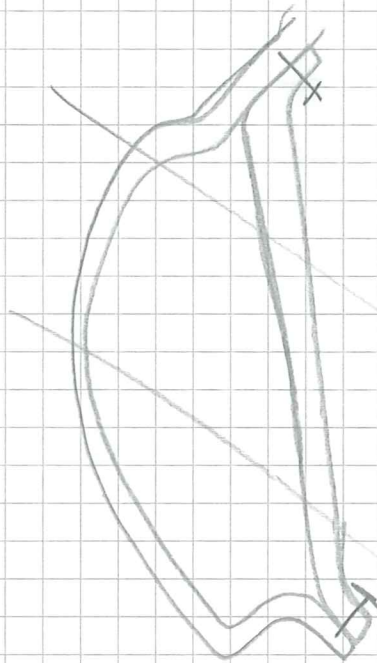
knut.tore.fausa@elhornes.no

valle med

bjarne

0.67.10.3

Elhornes tynes





## Arne Olav Eide

**Subject:** Snakk med Anne-Carine om kostnadsestimater og estimering

**Start:** ti 15.01.2013 09:00

**End:** ti 15.01.2013 09:30

**Recurrence:** (none)

**Organizer:** Arne Olav Eide

$\frac{x}{480}$

fan 0,8 =

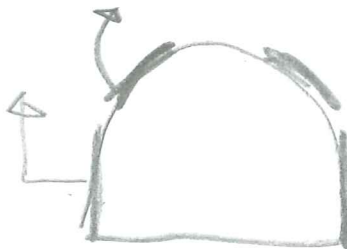
Kostnader for

Dør eclipse

Baseunit eclipse

-Trau eclipse

-Andre deler tilgjengelig



Luke multipac

Dør multipack

Tidligere modeller

T-820 front termo-formet fra plexx

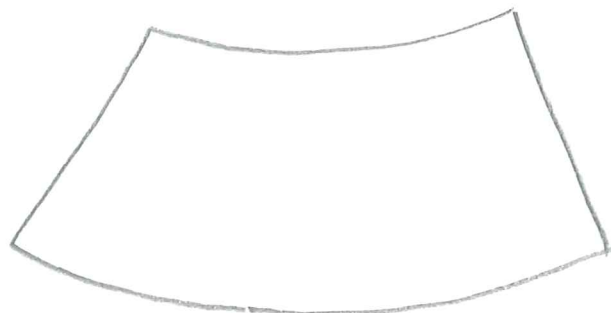
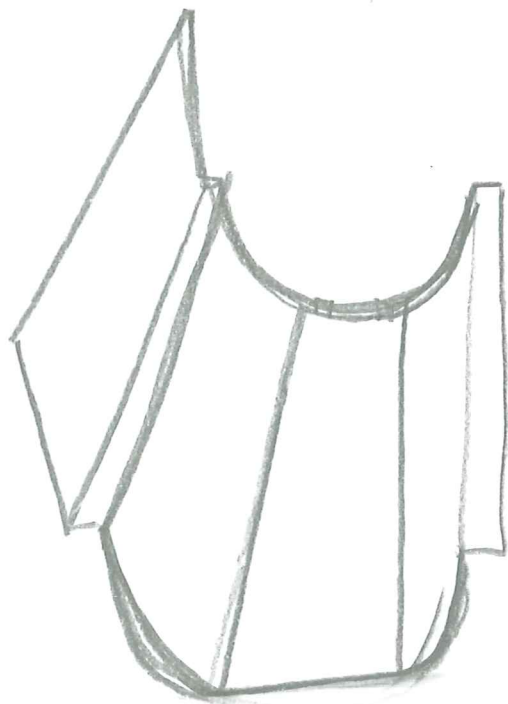
T-600 front sprøytstøpt

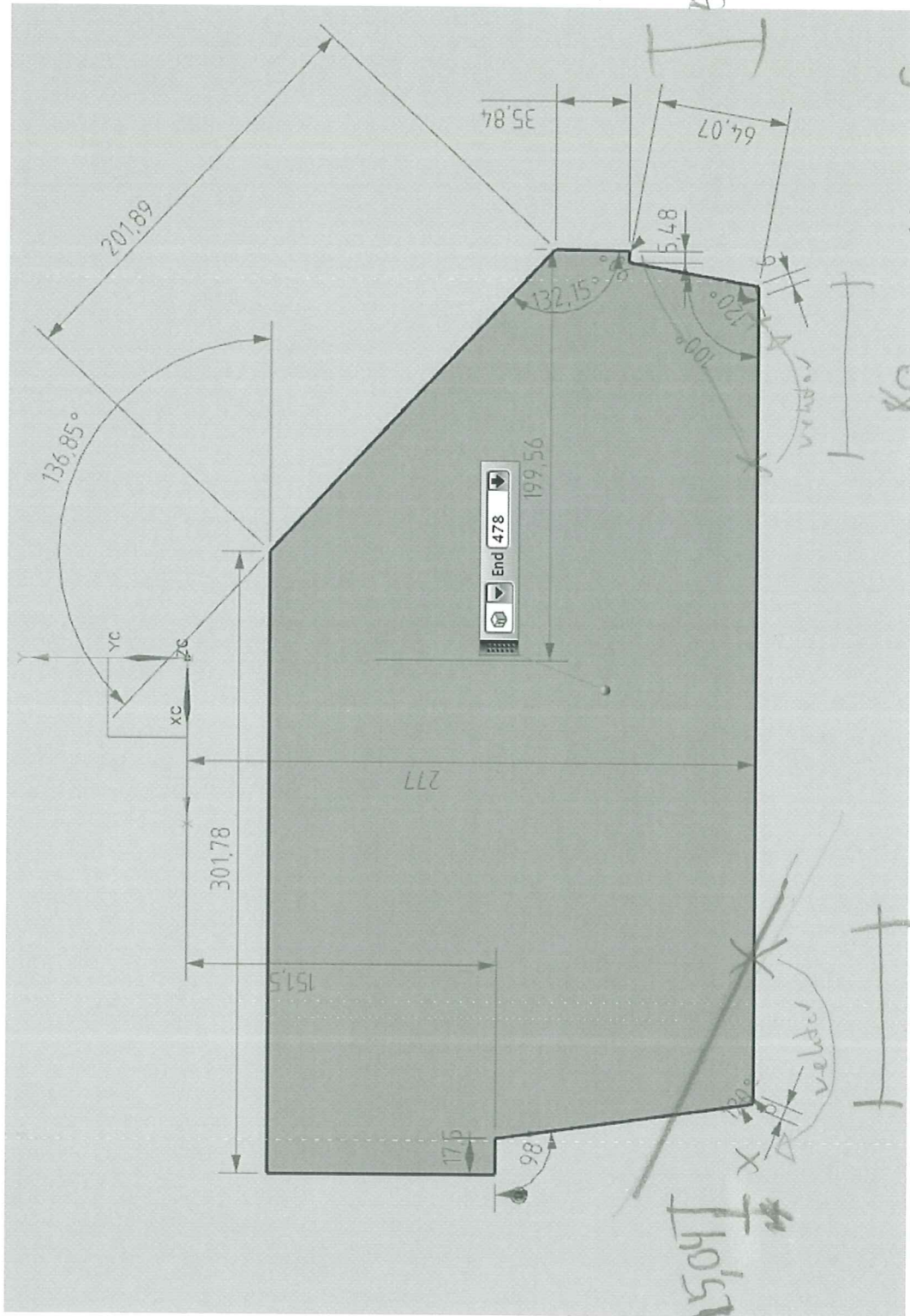
Forsøk for UNO, stål, kaldformet med høyt trykk.

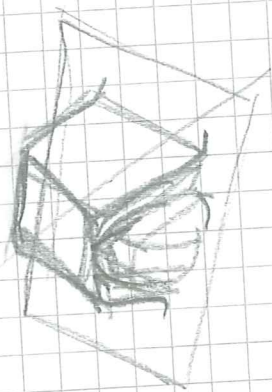
20 € stansing hvelv

1,5 €

40 € blisom overflate beh.









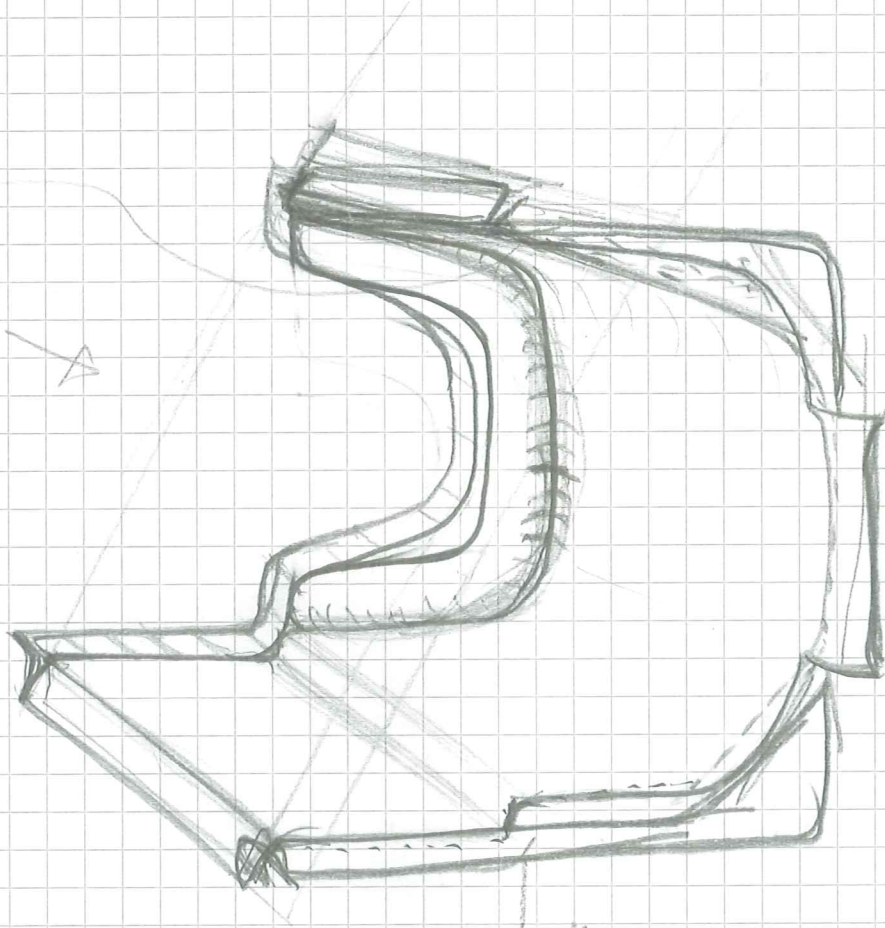
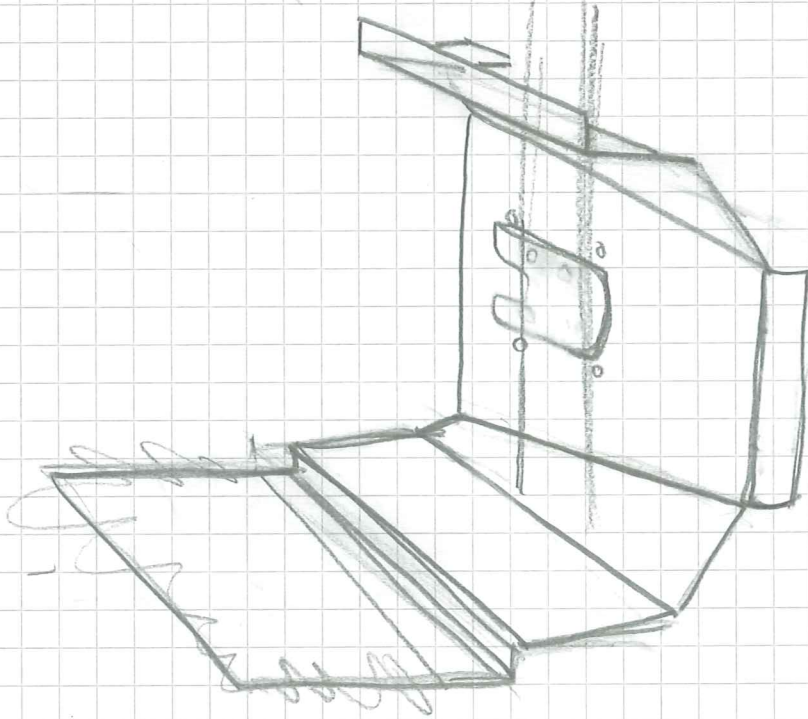
1400  
- 1184

$$264 / 2 = 132$$

1625 mm  
5' 2 9/16"

1400 - 1184 = 216  
for attaching

6' 4"



6' 4" (right)

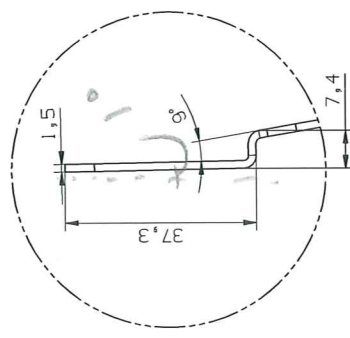
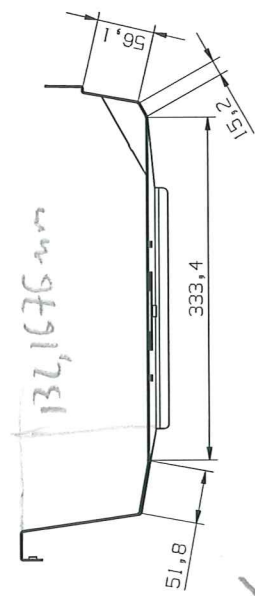
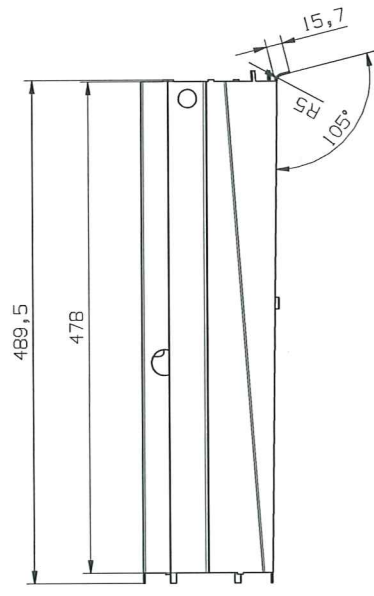
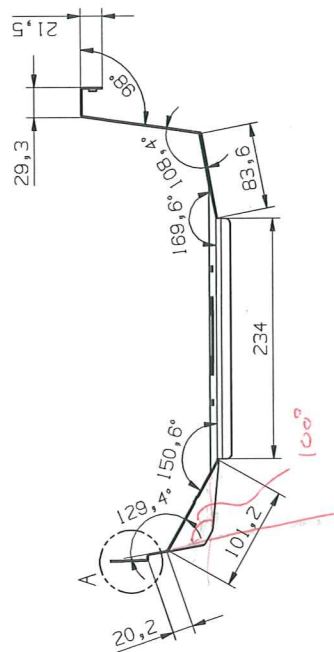
14.01.13

165  
115  
50

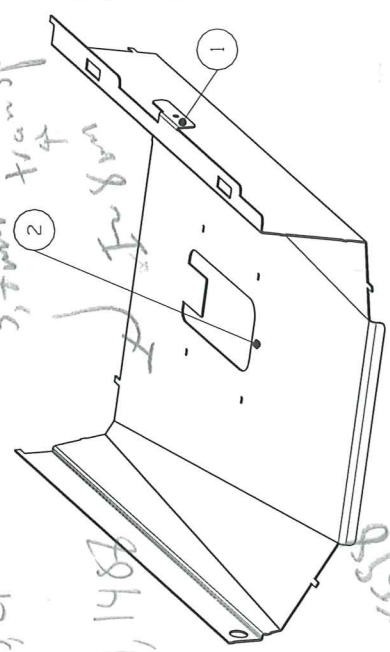
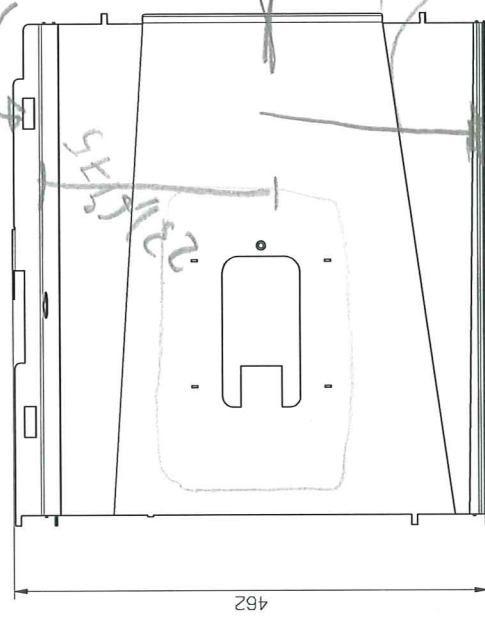
1184  
1184  
0

2112  
2112  
0

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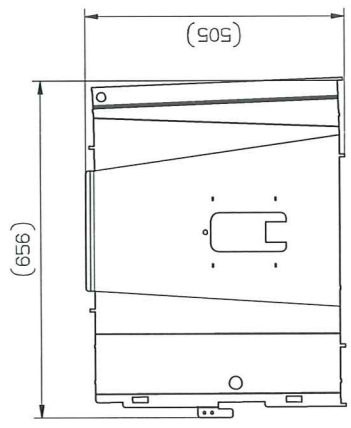


DETAIL A  
SCALE 1:1



DEBUR ALL EXPOSED EDGES

Make holes for press/clinch items according to manufacturer's specifications.



K=0.27  
R=1.0 mm  
SCALE 1:10

2	68006170-08	PS-M6-1-Z Nut	1	-	-
1	68006170-04	PS-M4-2-Z Nut	2	-	-
Item Part No.		Description	Qty.	Specification	Rev.
Surface Treatment		Material Sheet_steel-DC01AM			
NONE		General Tolerance	Scale	Format	Proj.
		ISO 2768-1M	1:5	A3	
Dr. PR		28.01.13	Note: All parts must be RoHS compliant		
			Rev.	Sign./Date	
TOMRA		PLATE BOTTOM BASEUNIT		Part No.	Rev.
				51360042-02	B
				TOMRA SYSTEMS ASA, NORWAY	

# Pris-estimat?

- Form
- Mate
- stk pr

- Materiale - tykkelse nødvendig?
- stk pris 5 mm

Hvordan posisjonere del i maskin?  
Hvordan feste del?

Bærer ca 2kg + motorvekt

3-4kg electron

## Posisjonierer annen del

$$600 \times 600$$

0 idag

5-6005k:2016

Uffasing  
2021 = 50

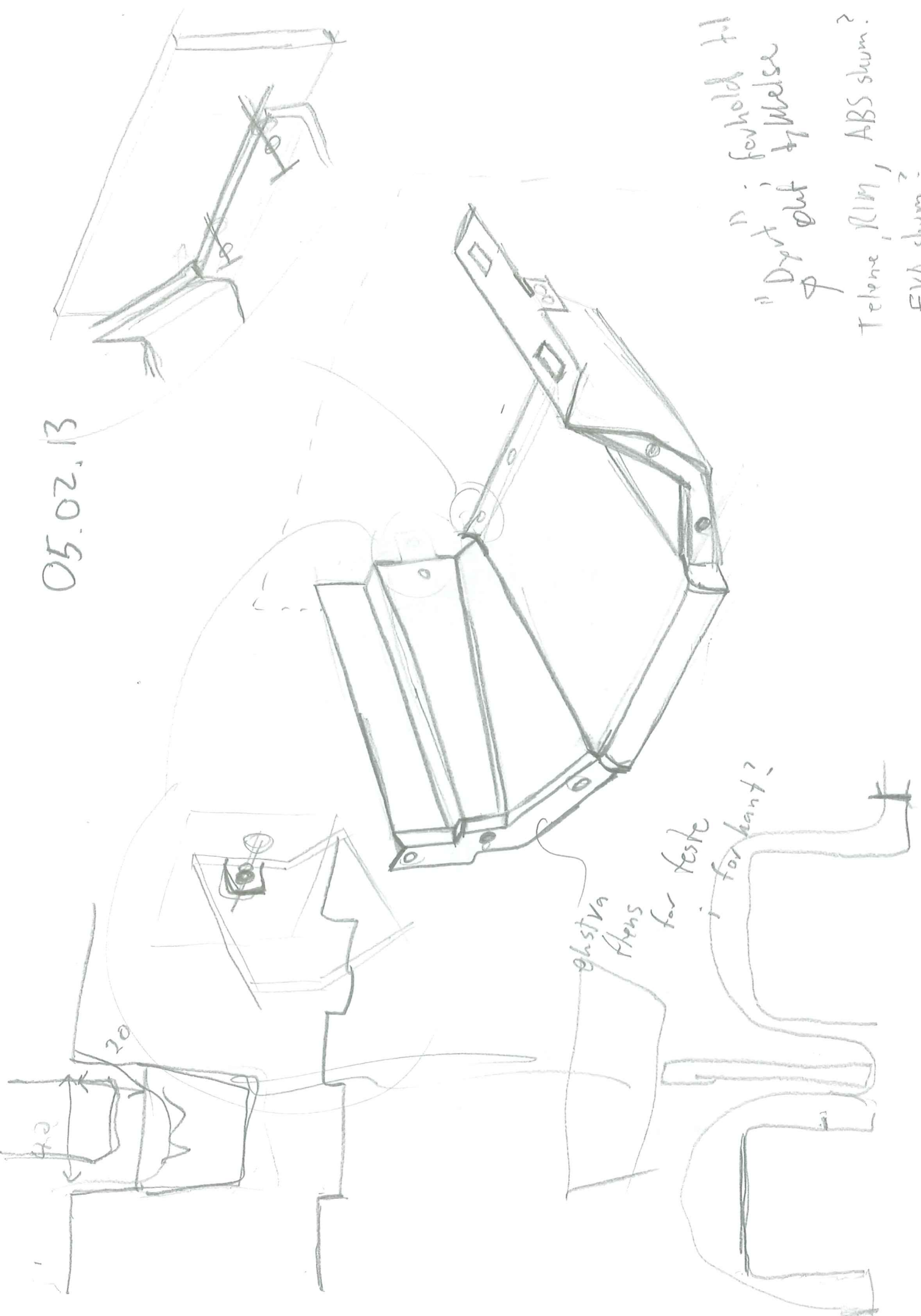
462mm

489mm

150mm



05.02.13



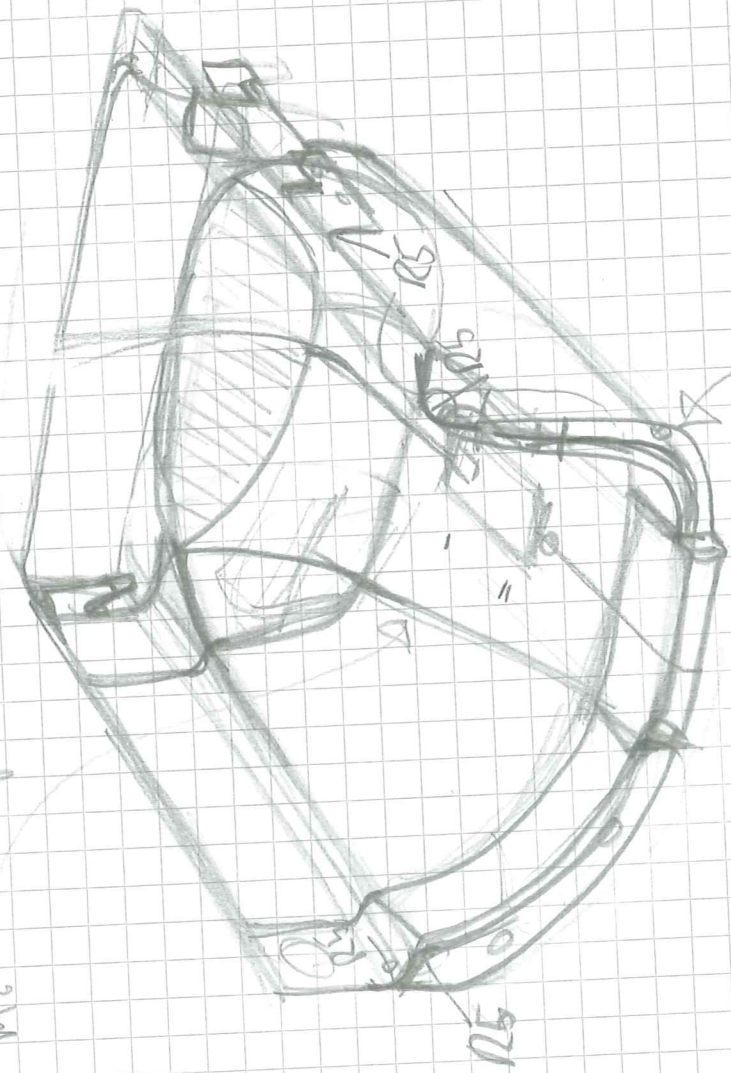
ghstia  
Hens  
for teste  
i forhant?

"Dyrt" i forhold til  
afvik  
af Melse  
Telone, RIM, ABS skum?  
EVA skum?



6.2.13

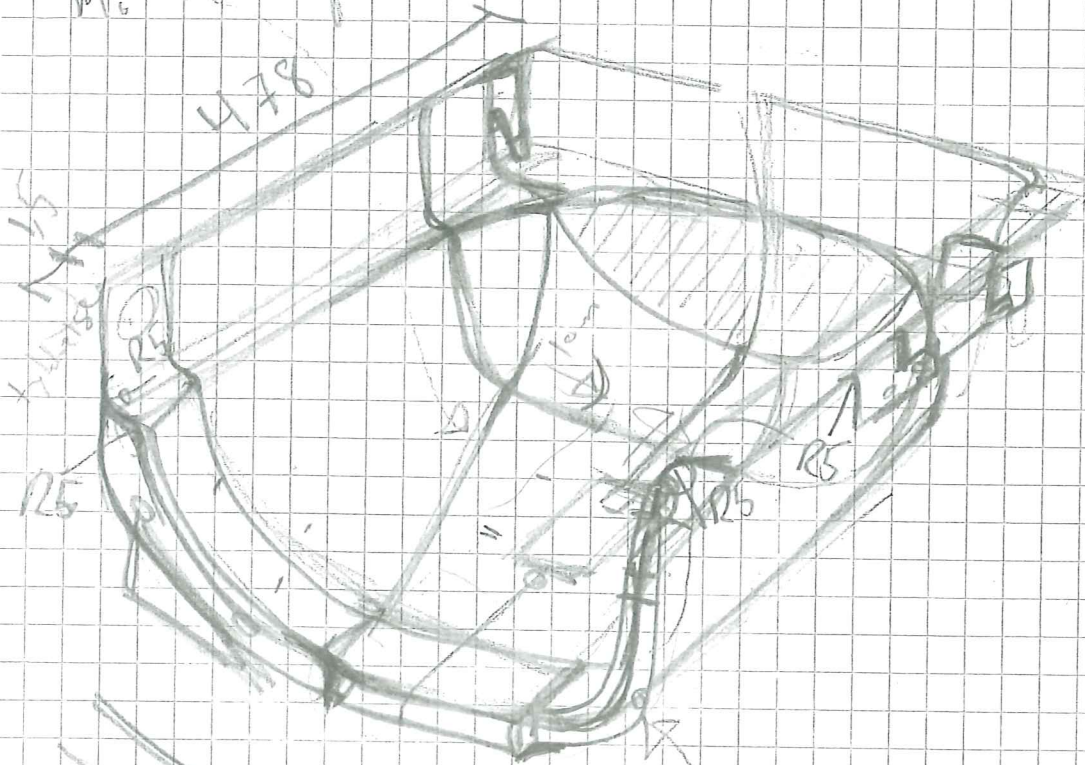
no more glass  
til motor



no better  
over  
dangers

7.2.13

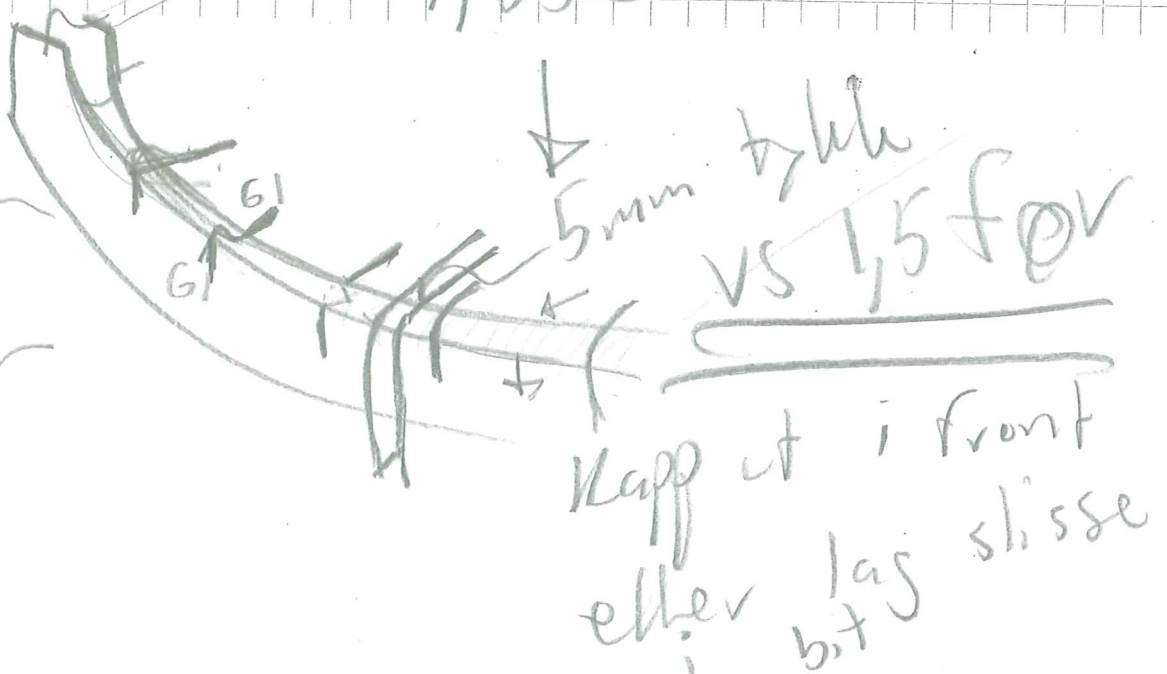
1) M: være plass til motor



M: legge seg over dagers  
hent

Delen er ikke symmetrisk om noen  
akse

Husk





Sepi

Endringer gjort p. h v rende  
base unit

→ store, små?

→ sannsynlighet

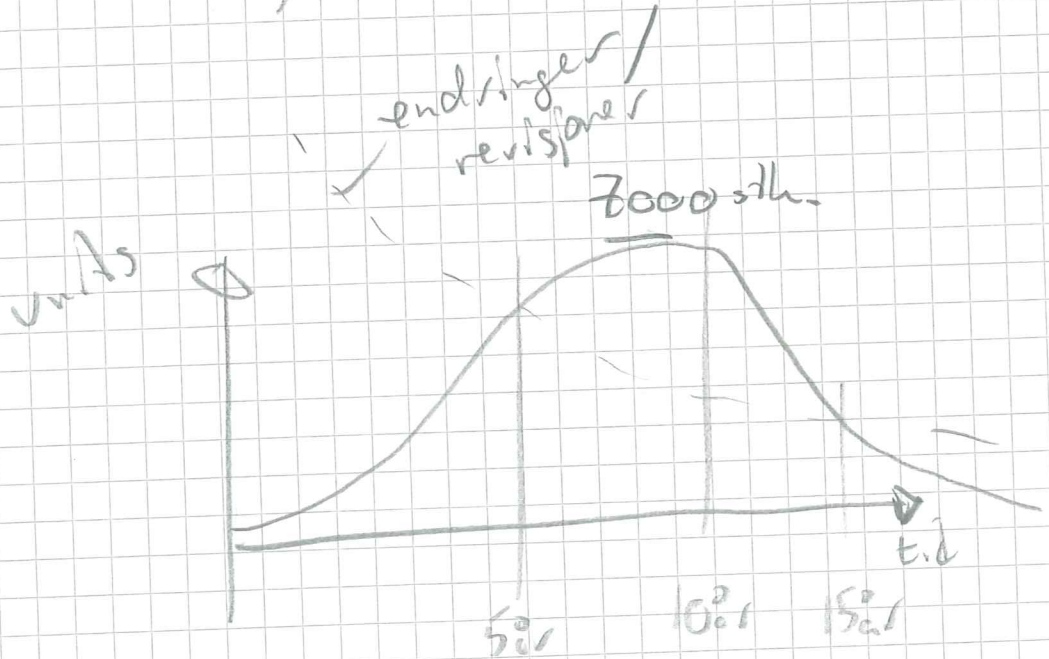
→ - " -

→ Enhver oppsett i eclipse

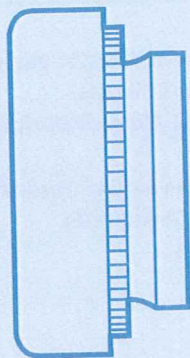
for mange / f. endringer

at et evt. spr ktestop-

venhet r blir vrak t i l pet av t vet











*The SELF CLINCHING BUSH is a threaded fastener which incorporates a knurled platform and a groove. This platform, when embedded in the sheet, causes the displaced material to flow evenly into the groove of the fastener to give a positive lock.*

## ADVANTAGES

-  HIGH TORQUE RESISTANCE
-  REVERSE SIDE OF THE SHEET REMAINS TOTALLY FLUSH
-  SMALL AND NEAT, IDEAL FOR ALL ELECTRONIC OR PRECISION EQUIPMENT
-  EASY ASSEMBLY WITH ANY SQUEEZE PRESS



## DESIGN GUIDE

### HOLE PREPARATION

Holes may be punched or drilled and a tolerance of  $-0.00 +0.08\text{mm}$  must be maintained.

### SHEET HARDNESS

This must be less than 80 R<sub>B</sub> (150VPN) for steel fasteners and 70 R<sub>B</sub> (128 VPN) for Stainless Steel fasteners.

### INSTALLATION

This must always be carried out using a squeeze action - NEVER a shock load.

### SHEET THICKNESS

Self Clinching fasteners are suitable for any thickness of material down to a minimum of 0.8mm (M2-M5) - for other thread sizes see table.

### SHANK NUMBER

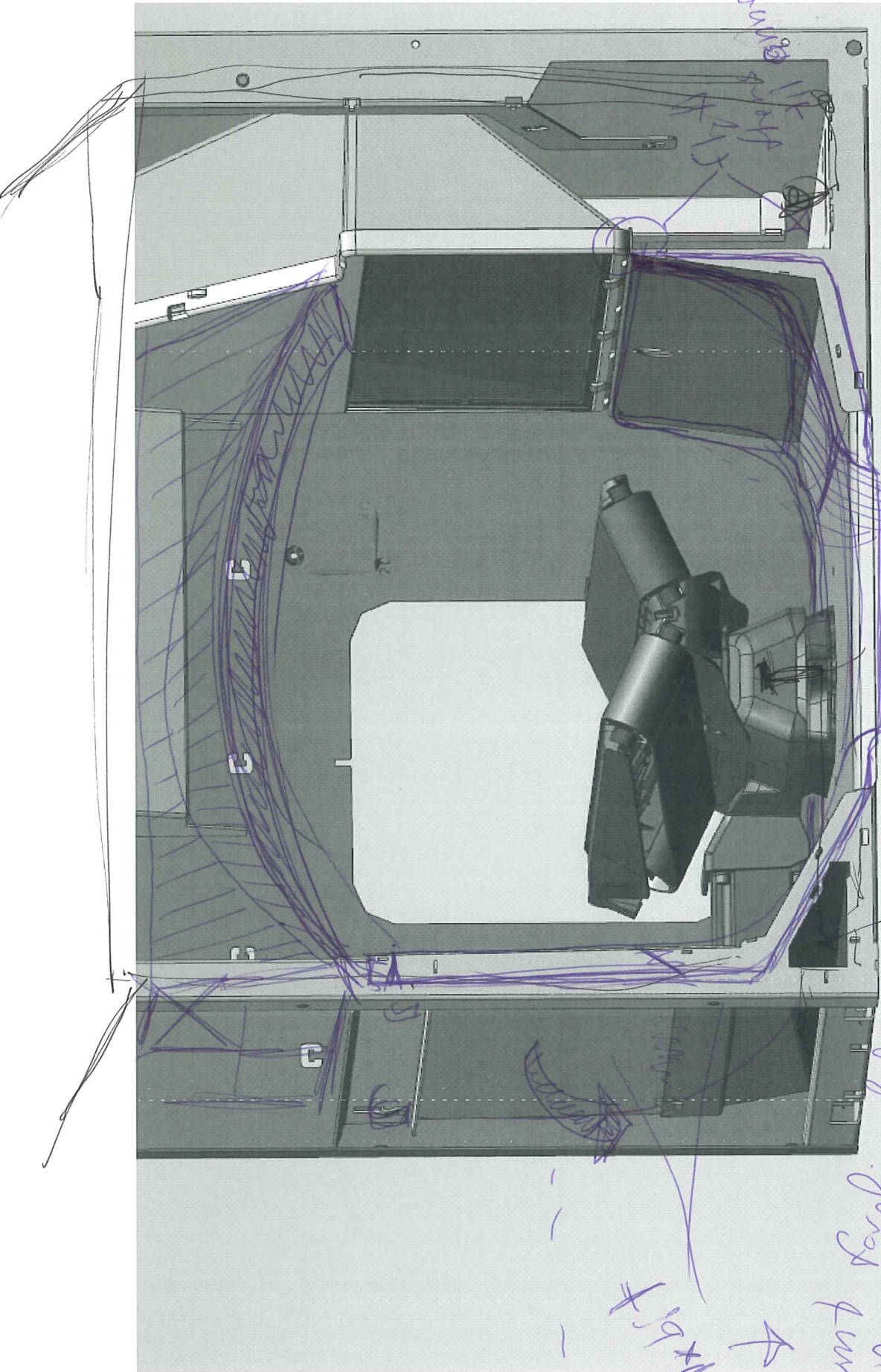
Always choose the longest shank possible for the sheet thickness. This will optimise stripping strength and resistance to side loads.

### DIRECTION OF LOAD

We recommend that Self Clinching fasteners should always be loaded from the pilot end.

(See method of assembly diagram on page 24)





Tom: tilgang til  
hublin hublin's  
stol på barmhjertig  
spejlskab  
Day lab

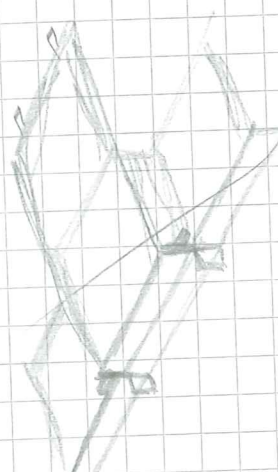
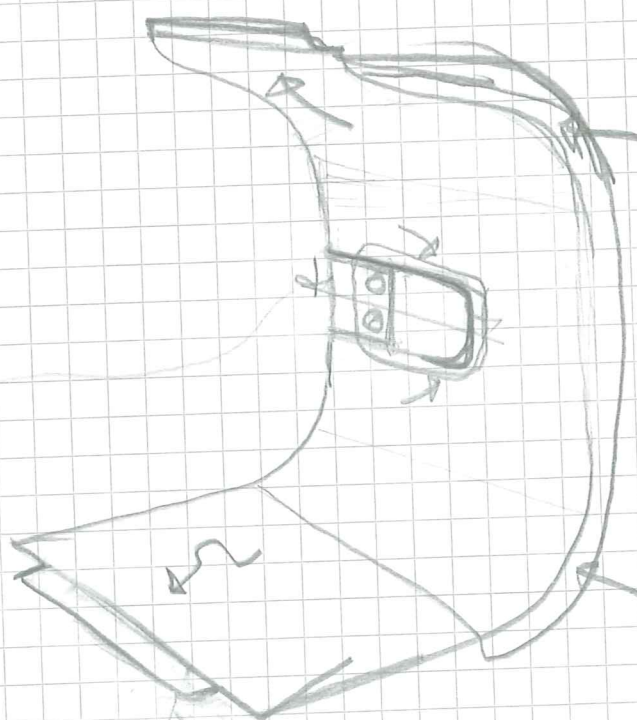
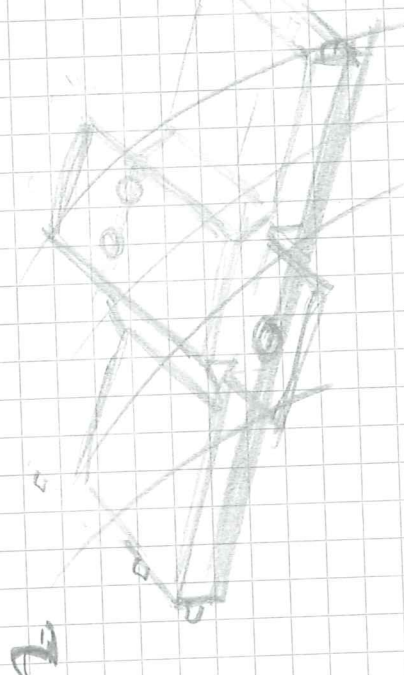
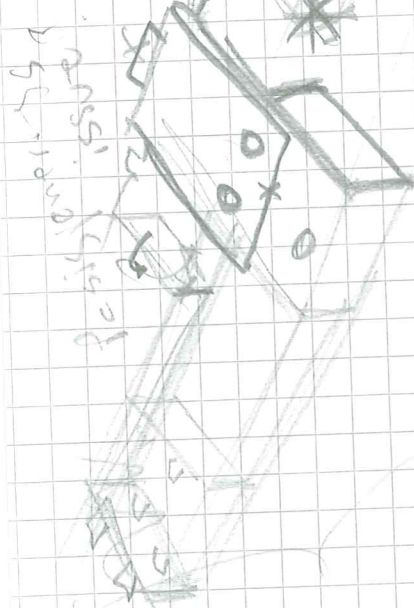
13.02  
144?  
kontrolleret med design

Dunst farvel. Det  
Hjælpere var 7 del. 7 del.  
- Når to psc tilgang?  
spejlskab Hans Georgs.

150213



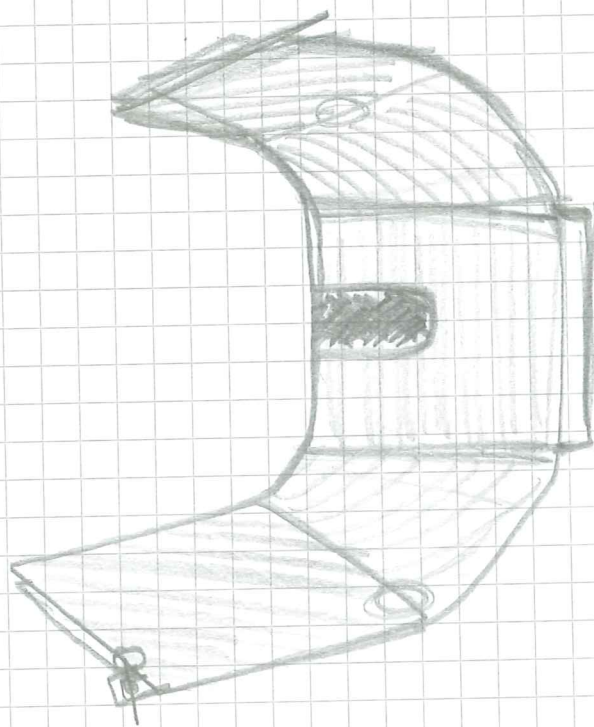
4.



3.









20.02.13

$C_p$  varmekapasitet

$$20,70 \rightarrow 44,98 \text{ J/molK} \text{ avg } 33,34$$

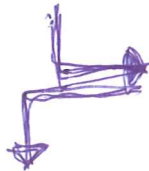
$25^\circ \sim 150^\circ$

Wohlschlag

Wohlschlag Heat Cap

$$1,55 \text{ J/gK} \rightarrow 2,73 \text{ J/gK}$$

$$\text{HDPE } 0,9415 \text{ g/cm}^3$$



$$6775,2 \text{ g}$$

Velit del

$$100 \times 60 \times 2 \times 0,6 \text{ cm} = 7200 \text{ cm}^3$$

Smeltepunkt

$130^\circ \text{ ca.} \rightarrow \text{approximately } 150 \text{ mm}$

$$E = C_{p,m} \cdot m \cdot \Delta T$$

$$E = 2,73 \text{ J/gK} \cdot 6775,2 \text{ g} \cdot 150 \text{ K}$$

$$E = 2489,886 \text{ kJ} = \frac{2489}{3600} \text{ kWh} = 0,69 \text{ kWh}$$

20 øre / kWh

$$W = \text{J/s}$$

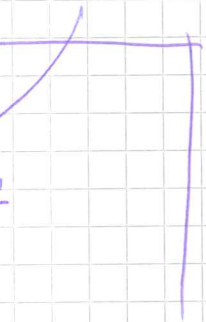
$$1 \text{ kJ} = 1 \text{ kW} \cdot 1 \text{ sek}$$

$$= 1 \text{ kW} \cdot 3600 \text{ sek}$$

$\frac{3600}{3600}$

Rotasjons-

stop hvorfor så dyrt?



Selubarendu

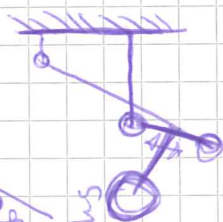
fra ca 30°

0°



35°

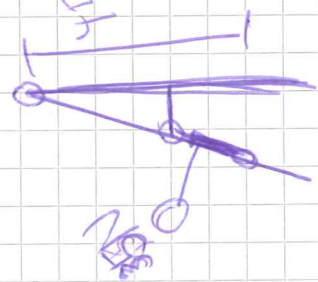
$$3N = 35 \text{ kN}$$



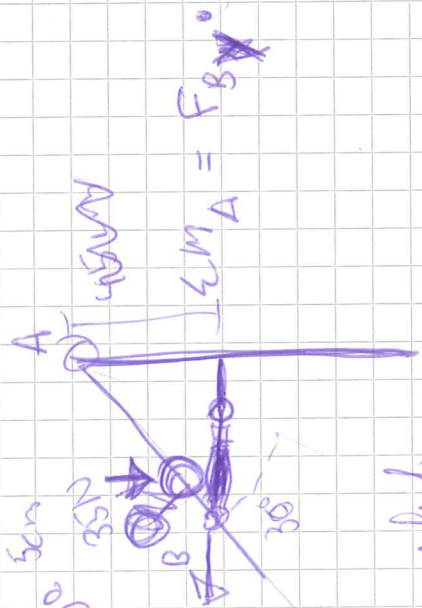
5cm

30°

45cm

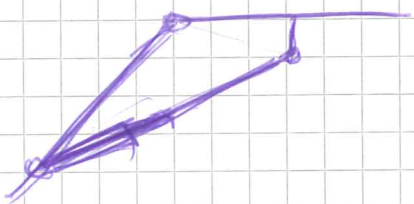


40cm

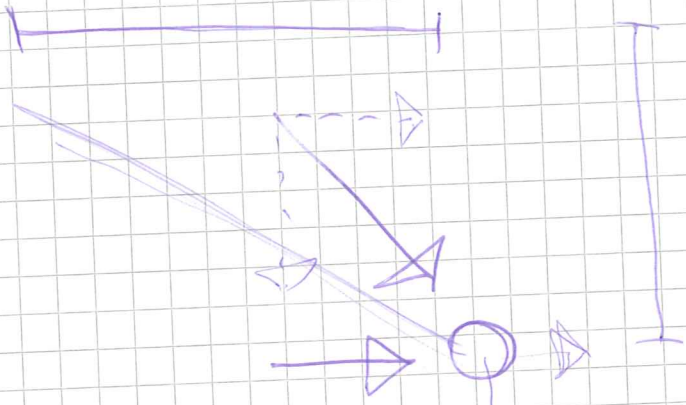
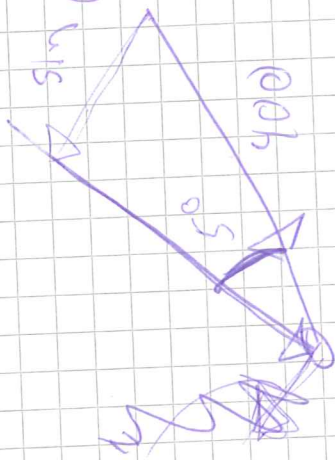


Likelihood

$$M_A = F_B$$



120°



$$1148.8 = 3$$

9.5  
3

100

$$0 = (31.4 \cdot 22.5 \cos 90^\circ + 92.05 \cdot 1148.8) = 0$$

$$0 = 61.4 \cdot 22.5 \cos 90^\circ + 92.05 \cdot 1148.8 = 107$$



06.03.13

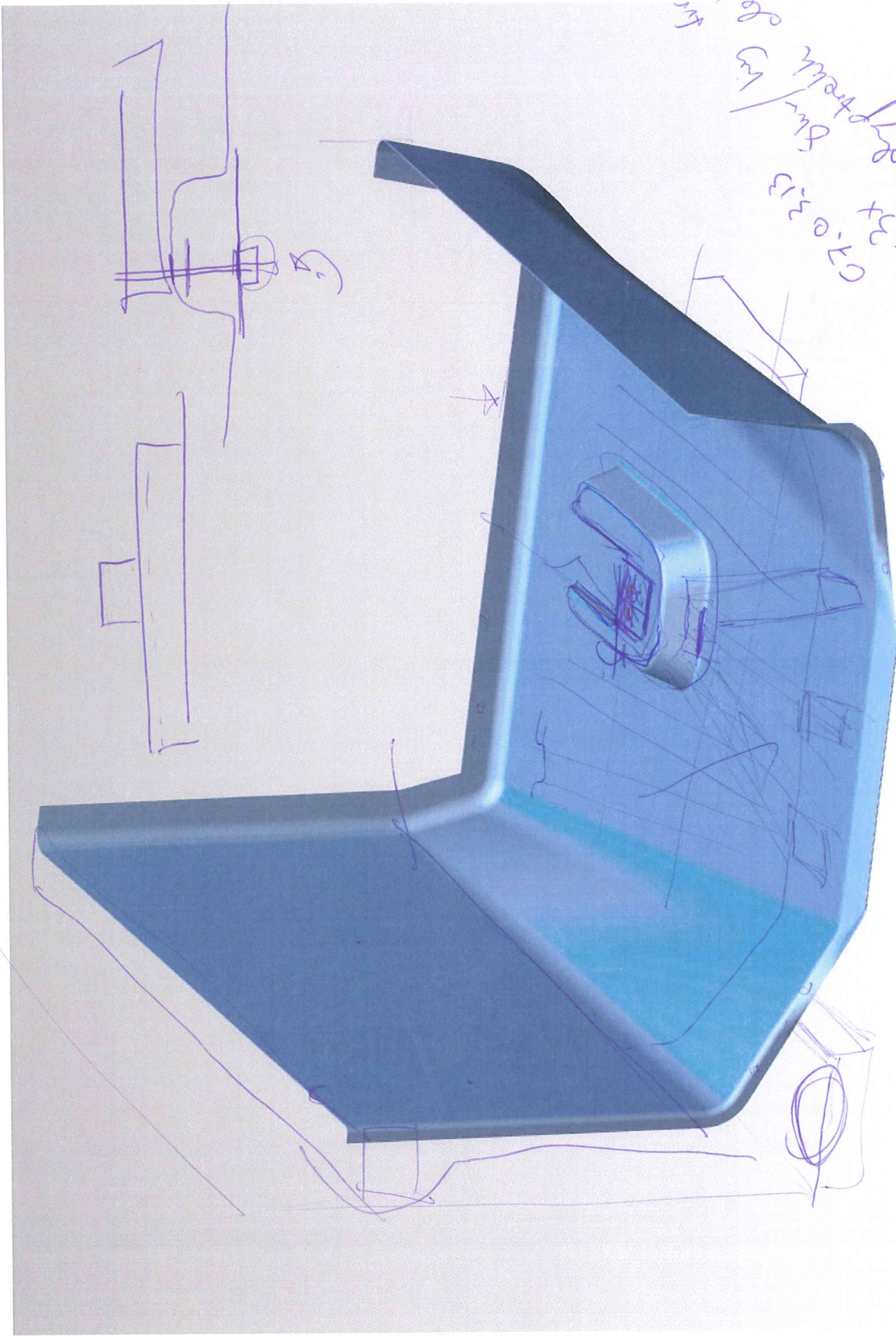
		shln	spant
material	$10 \times 0,8 - 5$	40	20
lin	$+ 150 \text{ g/m}^2 \cdot 15 \text{ m}^2 \cdot 0,8$	6	0
press	$+ 200 \cdot 2/60$	7	0
fres	$+ 200 \cdot 10/60$	33	30
puss	$+ 200 \cdot 5/60$	16	10
lakt	$ans \times 2$	102	60
		204	120
=			

Wooden door

324

price example



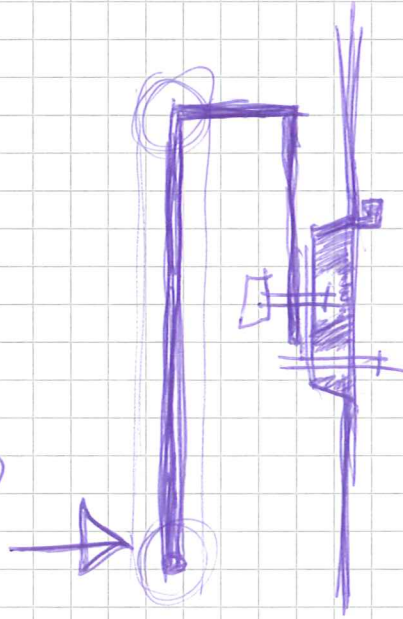


23x  
07.03.13  
Skizze für  
die für  
Stoß  
test

08.03.13  
Esper 12.8

10703.13

$$10 \text{ kg} = 98 \text{ N}$$



2.227

0.62

95

med fest assy 2 - fem km [2] 62

gør dette

0.74 mm afbøjning

på fjærens top

- 1.406 mm nedsenkning

ved snave

$$M = 98 \cdot 2.227 = 218.1 \text{ Nm}$$



$$\sum M_B = 218.1 \text{ Nm} - A_y \cdot 0.62 - 98 \cdot 2.227 = 0$$

$$\sum F_y = A_y + 98 - 98 = 0$$

$$A_y = 98$$

$$218.1 \text{ Nm} - 62 \cdot 10^{-3} (98 + 98) - 95 \cdot 10^{-3} = 0$$

$$218.1 - 62 \cdot 10^{-3} \cdot 196 - 95 \cdot 10^{-3} = 0$$

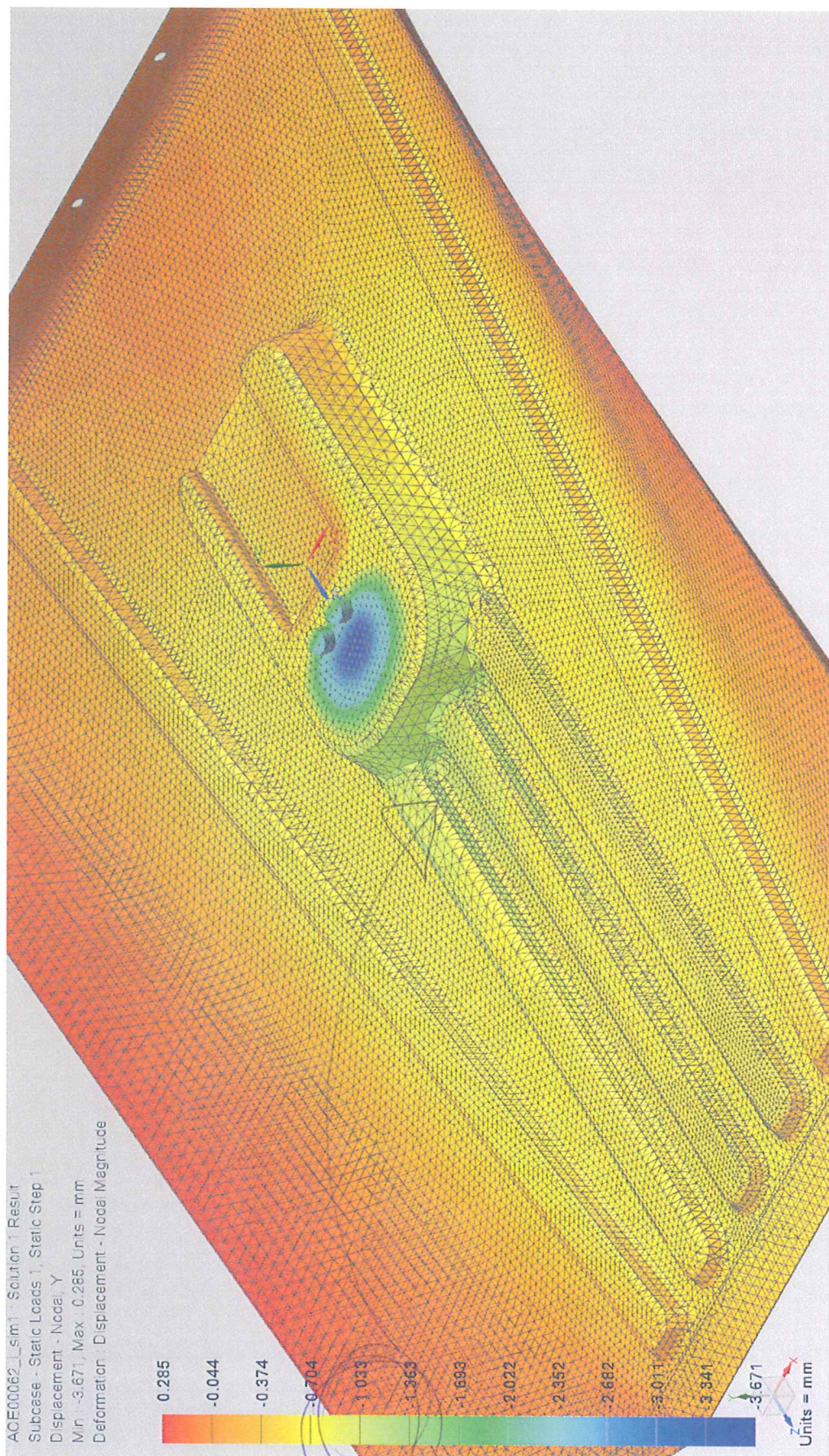
$$C_1 = 15.924$$

$$C_2 = 101.43 \text{ N}$$

$$A_y = 194.43 \text{ N}$$

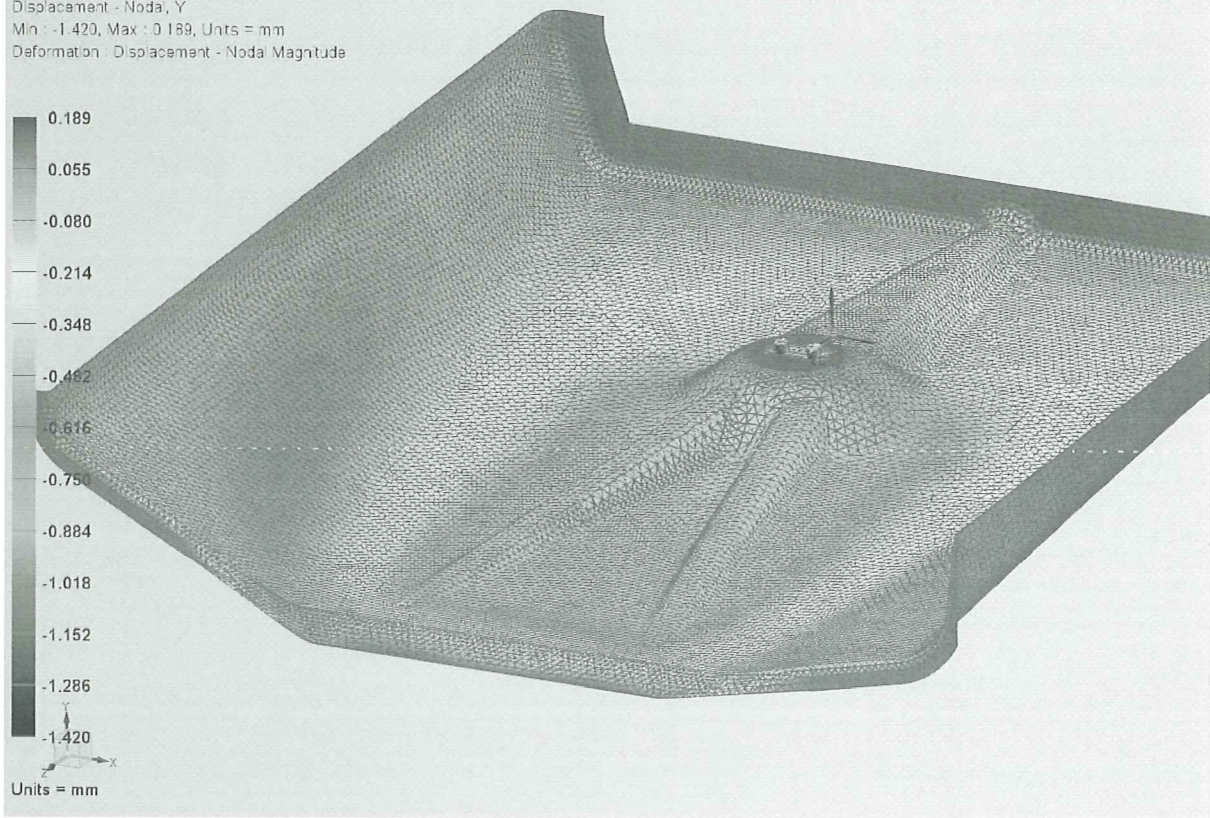
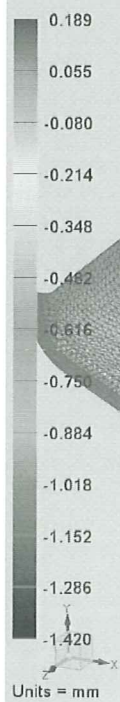


08.03.13





AOE00091\_B\_0\_7\_sim1 : Solution 1 Result  
Subcase : Static Loads 1, Static Step 1  
Displacement - Nodal, Y  
Min : -1.420, Max : 0.189, Units = mm  
Deformation : Displacement - Nodal Magnitude



forsøke på å vng<sup>o</sup>  
møtende / smaltende riller i front  
for best visbarhet

11.03.13

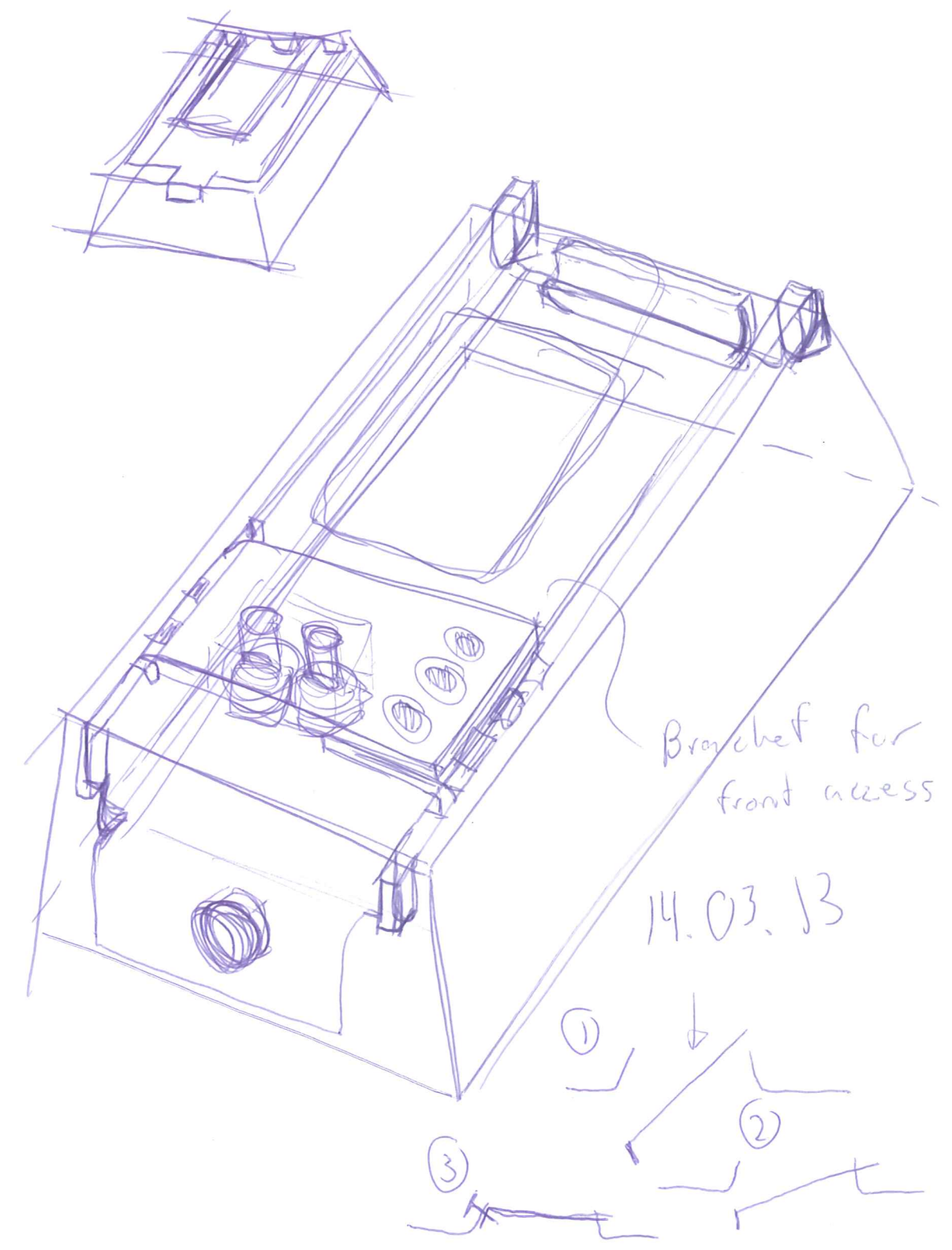
For 2.1  
to work when fixed  
or to the CBU



Access is required from above  
below to unscrew the bolts for the  
weight cell.

This ~~can~~ can be solved  
by use of a bolt from  
the front of the built in  
base.

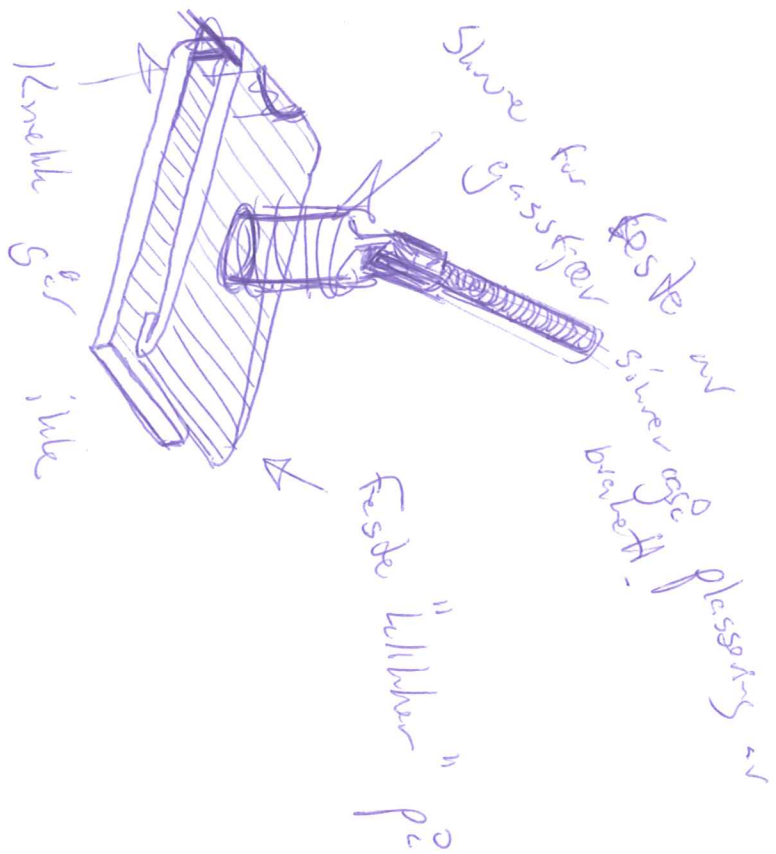
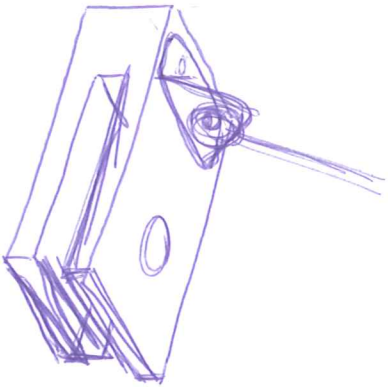
By doing this or similar 2.1 fixed  
no ~~front access~~ provides easy access to  
weight cell ~~and~~ but in addition gives  
enhanced functionality w. washability and  
no need for support ~~beams~~.



Bracket for  
front access

14.03.13

12.03.13





ALUTRAGE

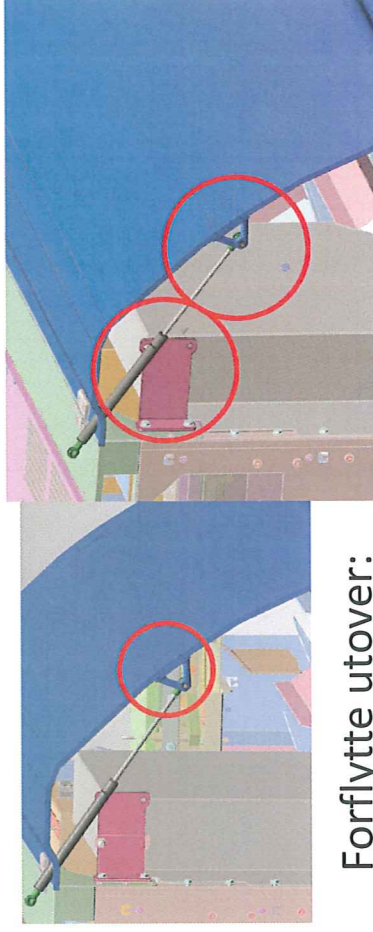


Ekstrudere/valse alu-profil vs støpe sink/alu

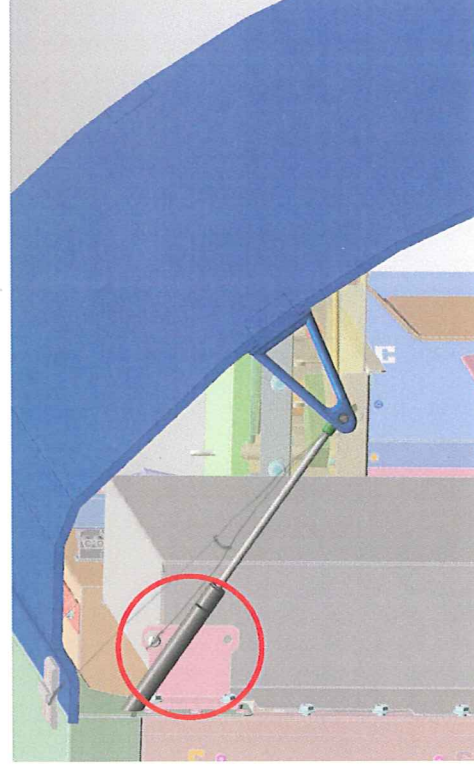
Est/vals: + sikkert billig pr meter – får ikke krumning i ytterflate og må bore hull til skrue.

Støp: + krum flate – må ha ekstra «pinne» i verktøy for hull.

14.03.13

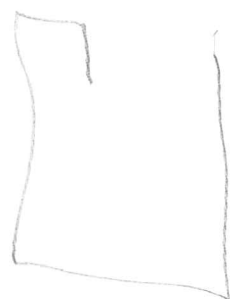
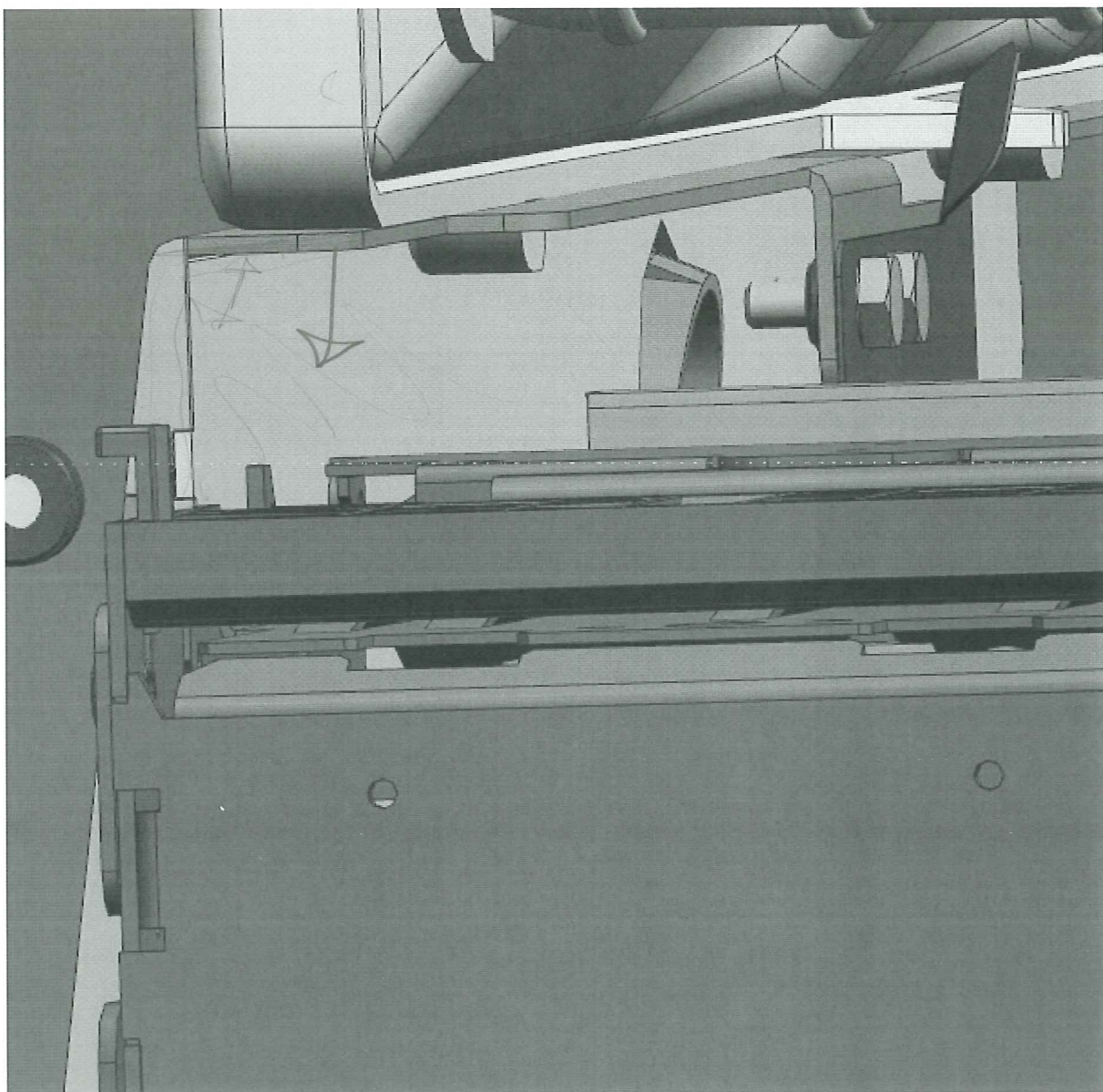


Forflytte utover:



Dagens løsning

Tom treier på to  
festepunkter. mer for life



Ok a ha  
Shens, feste for  
fjær i annen  
bist

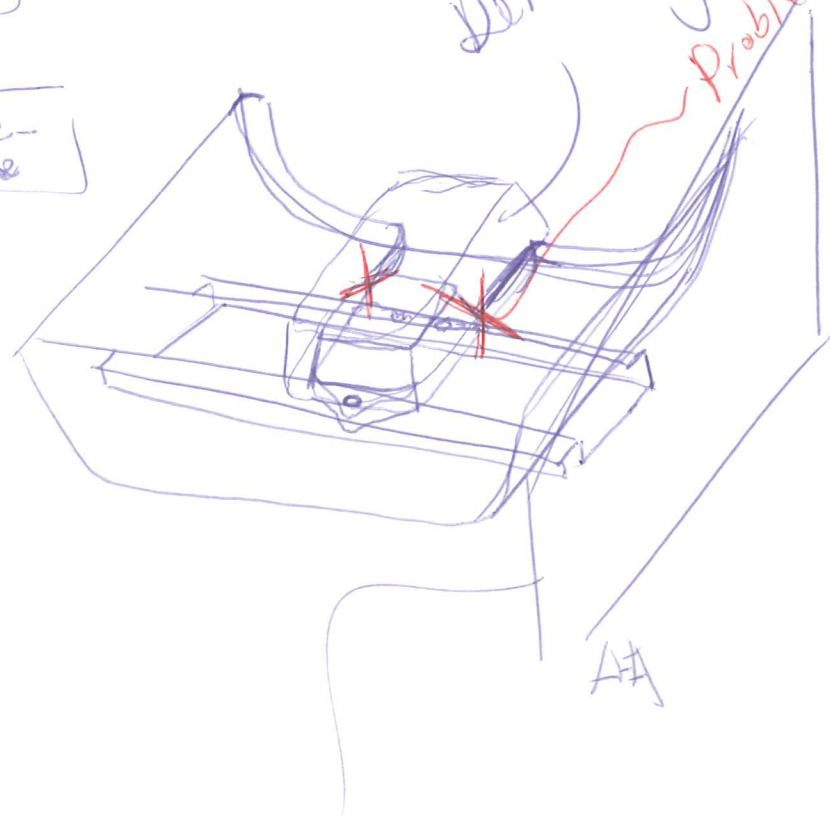
-Hans Georg

13.02



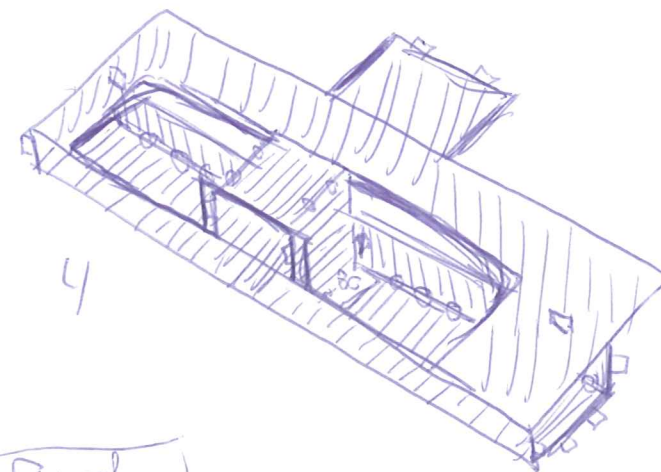
2.2  
Weak

Remove-able

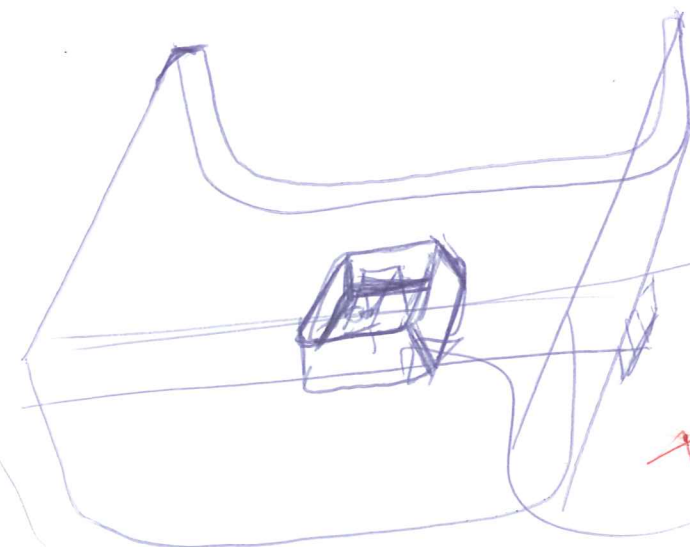


Del over base godt

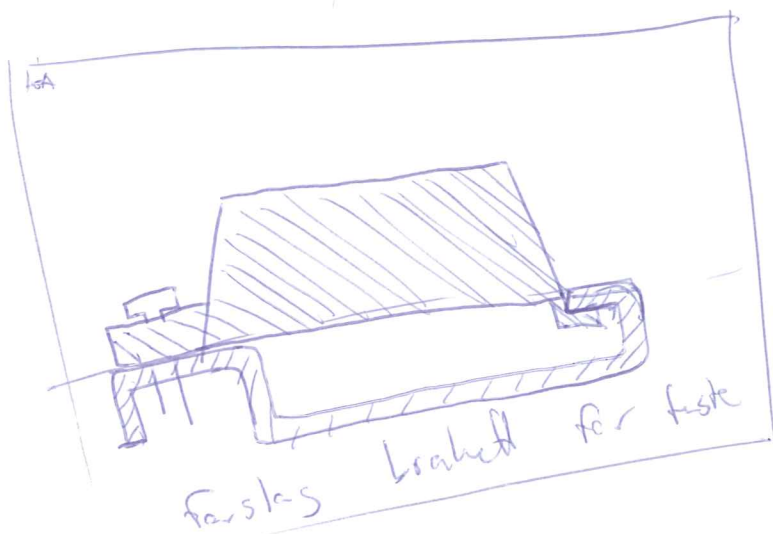
Problem: fordi dagens base er formet slik den er & brette vil det være umulig å brette kanten på inn hugget opp for forsegte.



Fixed



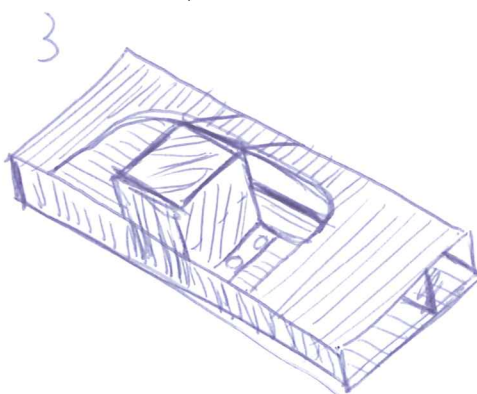
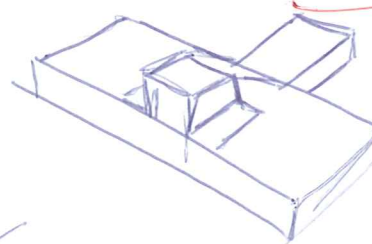
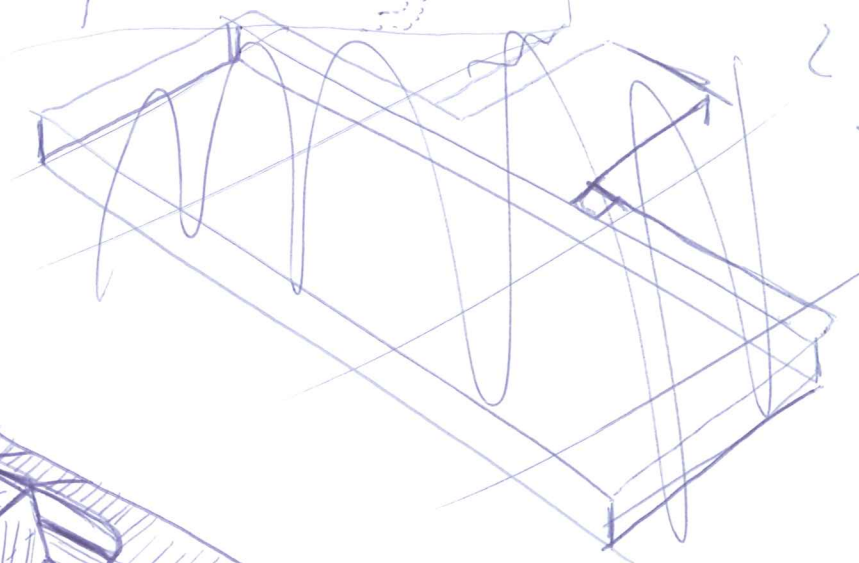
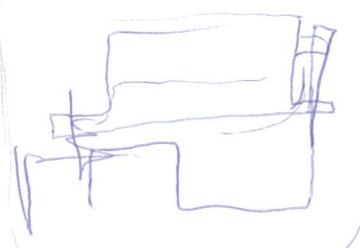
Gir ikke access til vekt-celle



forslag braket for feste

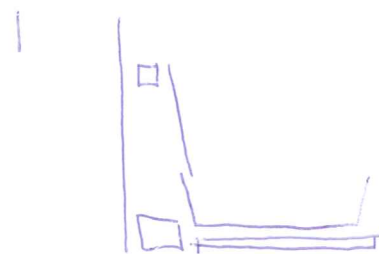
Kristians forslag 14.03.13  
Bakke flens fortsetter opp. Gir ikke pga basens utforming

holingen 2mm

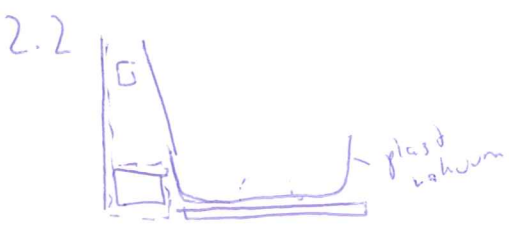




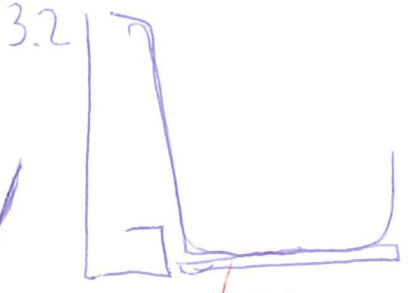
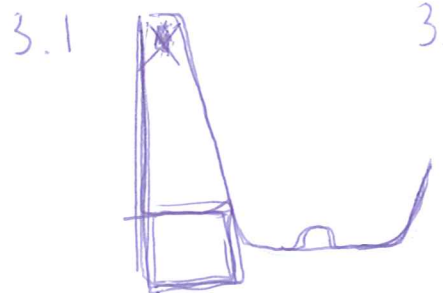
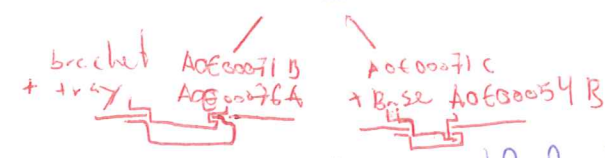
11.03.13



- 2.1 Steel tray w. int. base
- fixed or removable
  - fixed base or external



- 2.2 Plastic tray w. support beams
- "stiff" / weak + beefed up support
  - fixed or removable + impossible no access to weight cell
  - unnecessary. weight cell accessible from removable base



Orange

Bla

Green

- 3.1 Steel all inclusive w. base, reflex - removable

- 2.3 Injection molded tray
- stiff enough
  - w/ no base

2.11



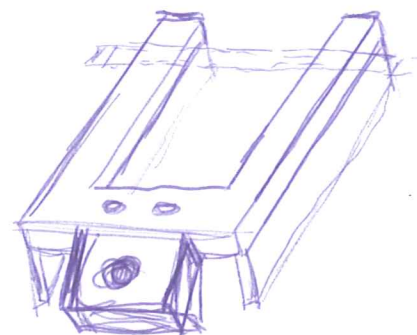
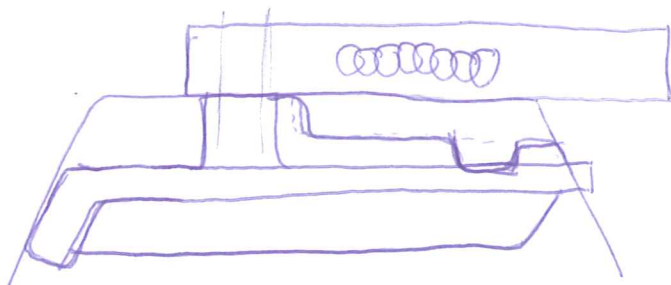
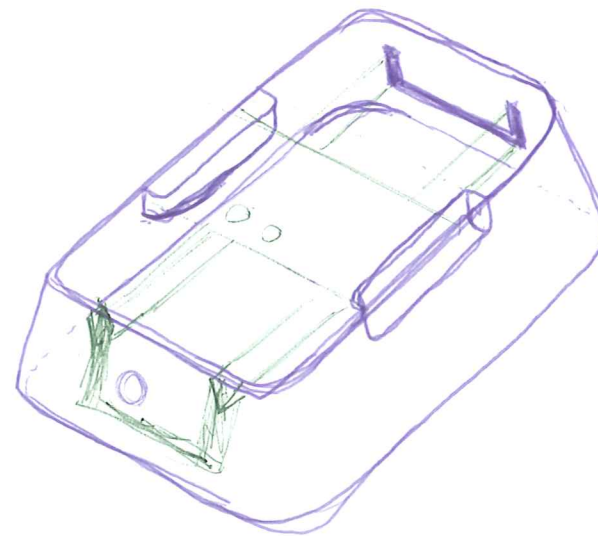
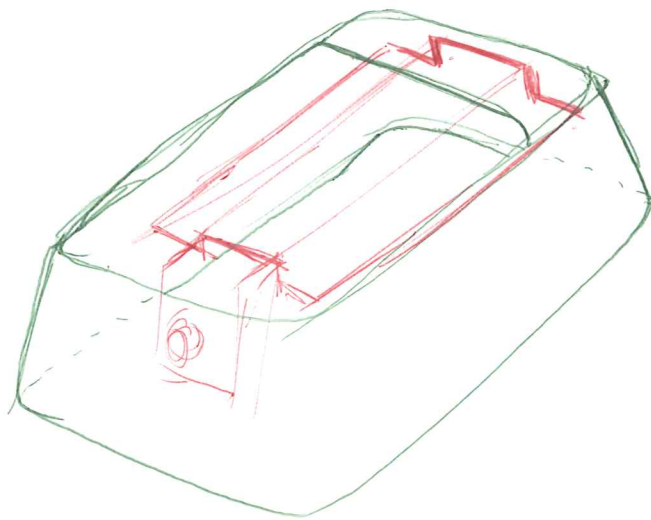
- 3.2 Rotational molded w. reflex - beefed up support

15.03.13

Surprisingly the PPS base cost can be 6 yuan or ~ 6hr, making any attempt at lowering the cost of this part a bit of a waste.

Any bracket to mount the weight cell would be more expensive.

An integrated base is therefore only profitable when the tray is removable.



04.06.13

Price 40 NOK, 6 NOK was "fake" price from supplier.

To do: 19.03.13

- Perm

✓ - Simuler dagers bjelke + tray  
- del nytt tray i del med og uten refleks.

✓ - Spør om testing av innfesting i fjør.

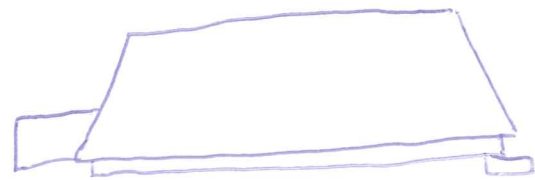
✓ - Løsning for 3.1 og 2.1 + fixed

✓ - I AOE00077 skal refleks-feste-plan flyttes 1,4431 mm vertik.

- ~~Alu meco standard V-profil~~

1,4431



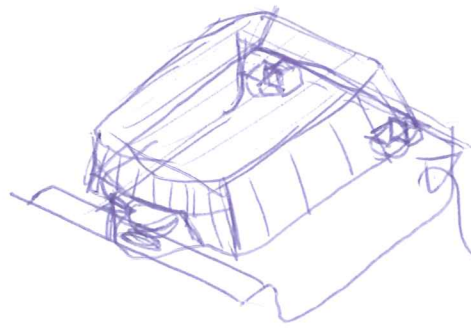


H  
5,5mm

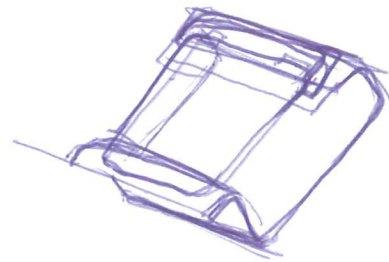
14.03.13

2.2

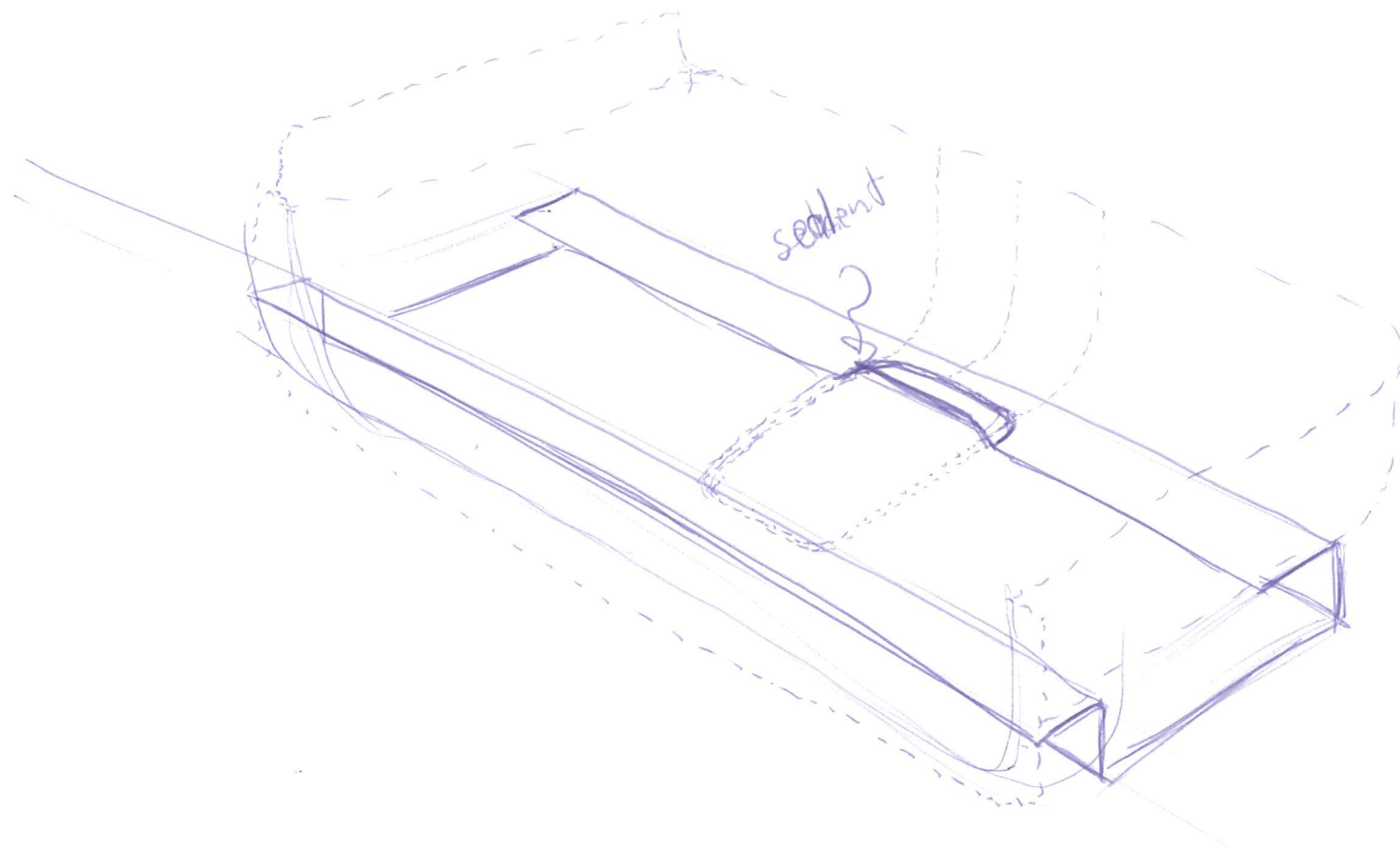
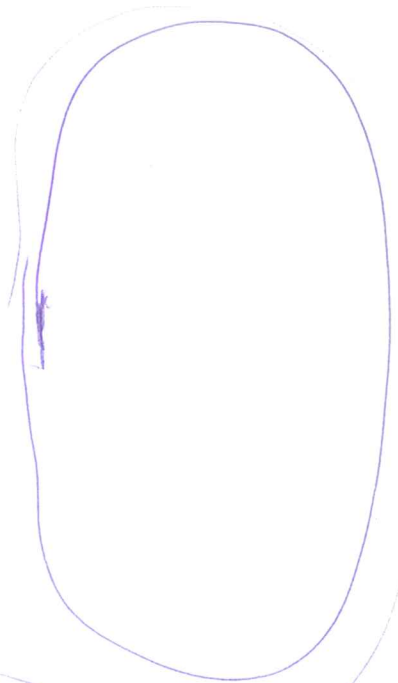
Plast trau, ploglete med b t helke  
Tett. Ikke uttakbart



h lls n



Weak + Fixed



02.04.13

Month Year	Customer	Customer Name	Part No	Description	Qty Invoiced	
2011_04	300005	TOMRA LEERGUTSYSTEME GMBH	50092113	WEIGHTCELL COMPLETE HCP	10	
2011_05	10100	TOMRA SYSTEMS ASA	50092113	WEIGHTCELL COMPLETE HCP	6	
2011_05	300044	TOMRA JAPAN LTD	50092113	WEIGHTCELL COMPLETE HCP	20	
2011_06	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2011_07	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2011_09	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2011_10	300030	TOMRA SYSTEMS AB	50092113	WEIGHTCELL COMPLETE HCP	5	
2011_10	300033	TOMRA SYSTEMS GMBH	50092113	WEIGHTCELL COMPLETE HCP	40	
2011_12	300005	TOMRA LEERGUTSYSTEME GMBH	50092113	WEIGHTCELL COMPLETE HCP	4	
2011_12	300025	TOMRA SYSTEMS B.V.	50092113	WEIGHTCELL COMPLETE HCP	2	
2011_12	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2012_02	300033	TOMRA SYSTEMS GMBH	50092113	WEIGHTCELL COMPLETE HCP	41	
2012_03	300012	SOCSE LATINOAMERICA	50092113	WEIGHTCELL COMPLETE HCP	1	
2012_03	300025	TOMRA SYSTEMS B.V.	50092113	WEIGHTCELL COMPLETE HCP	1	
2012_03	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	180
2012_06	10100	TOMRA SYSTEMS ASA	50092113	WEIGHTCELL COMPLETE HCP	4	
2012_06	300033	TOMRA SYSTEMS GMBH	50092113	WEIGHTCELL COMPLETE HCP	60	
2012_06	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2012_07	300005	TOMRA LEERGUTSYSTEME GMBH	50092113	WEIGHTCELL COMPLETE HCP	4	
2012_07	300027	TOMRA SYSTEMS A/S	50092113	WEIGHTCELL COMPLETE HCP	2	
2012_08	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2012_09	300033	TOMRA SYSTEMS GMBH	50092113	WEIGHTCELL COMPLETE HCP	60	
2012_10	10100	TOMRA SYSTEMS ASA	50092113	WEIGHTCELL COMPLETE HCP	7	
2012_10	300035	OY TOMRA AB	50092113	WEIGHTCELL COMPLETE HCP	10	
2012_11	300033	TOMRA SYSTEMS GMBH	50092113	WEIGHTCELL COMPLETE HCP	40	
2013_01	10100	TOMRA SYSTEMS ASA	50092113	WEIGHTCELL COMPLETE HCP	22	
2013_01	300012	SOCSE LATINOAMERICA	50092113	WEIGHTCELL COMPLETE HCP	1	
2013_02	300025	TOMRA SYSTEMS B.V.	50092113	WEIGHTCELL COMPLETE HCP	2	
2013_03	300025	TOMRA SYSTEMS B.V.	50092113	WEIGHTCELL COMPLETE HCP	10	252

Odd Arne Rohdel - Narkun

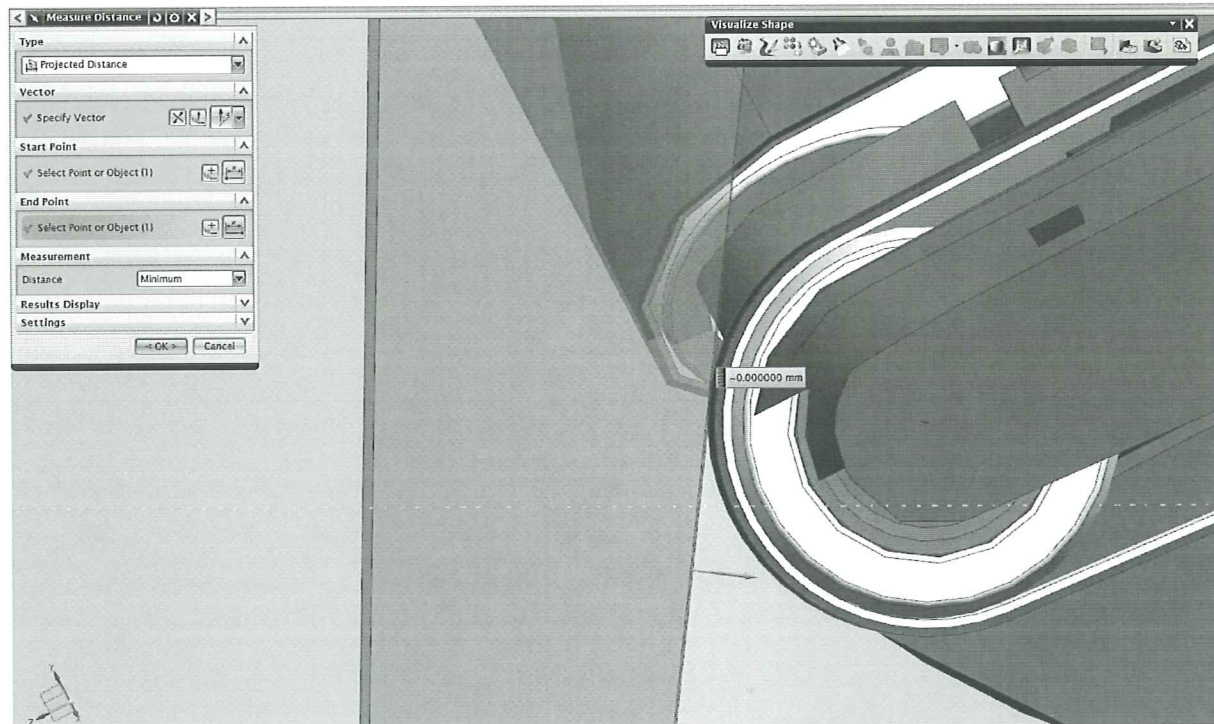
2 av 100 gir ut

Fenol/papir og alvrum

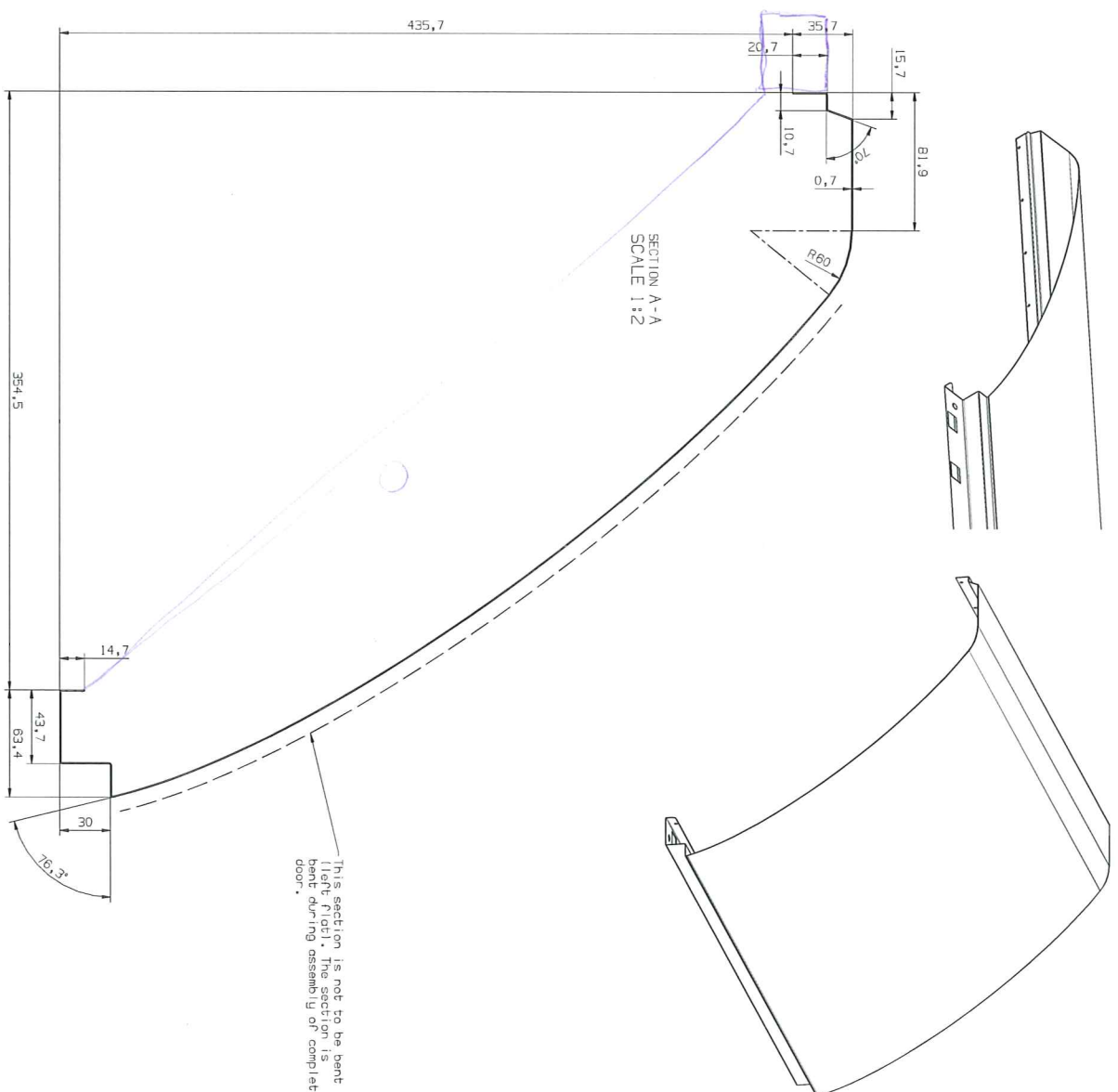
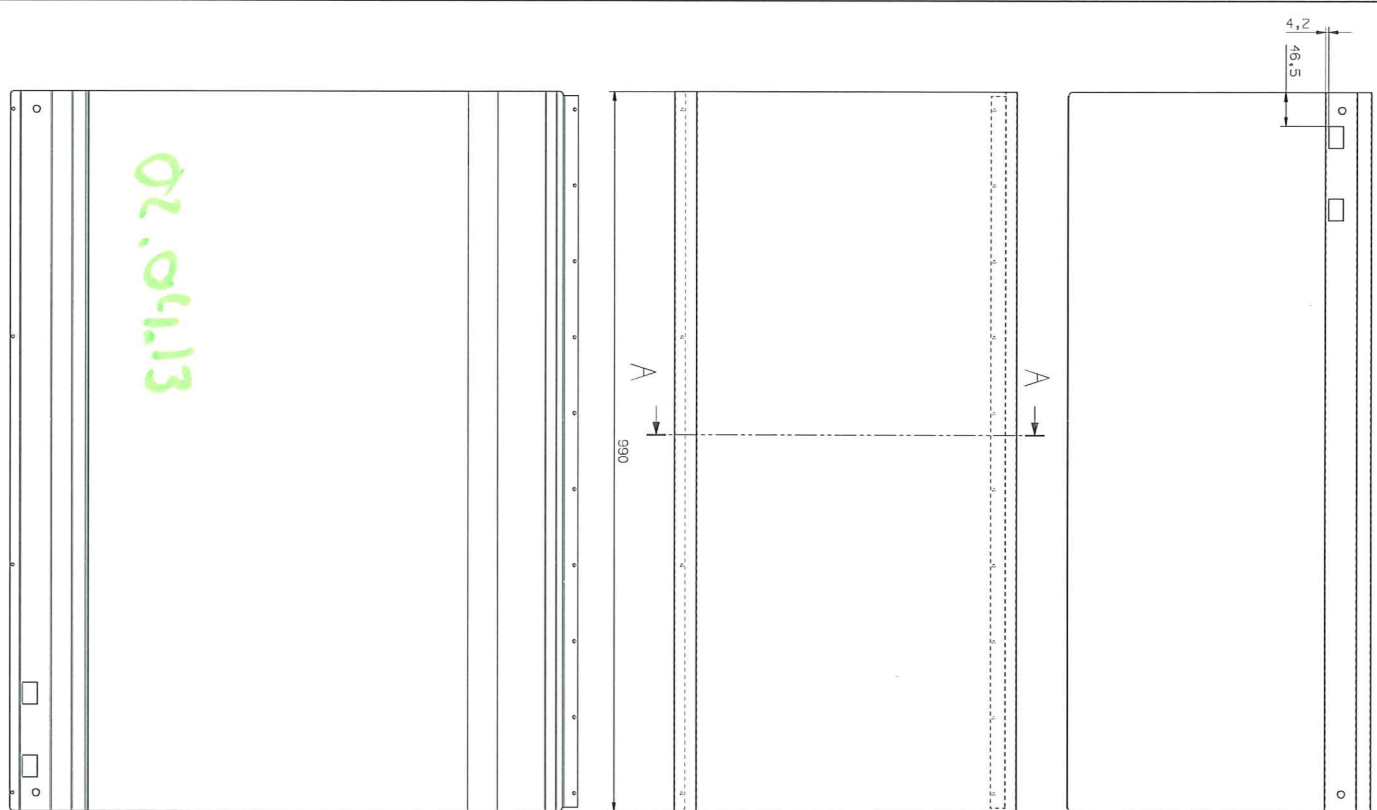
Alvrum 60-100 000

uu

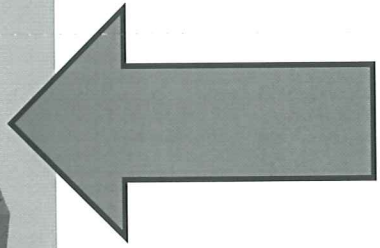
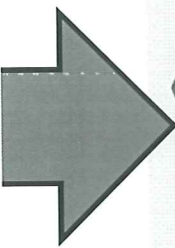
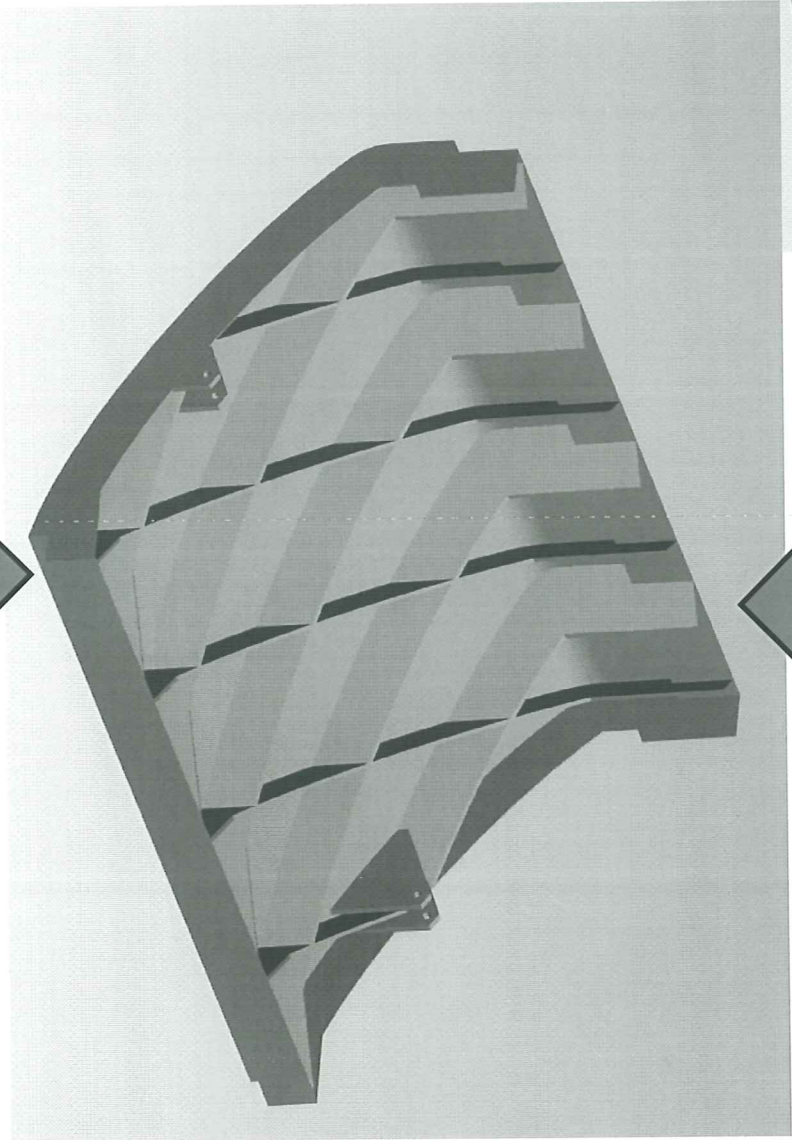
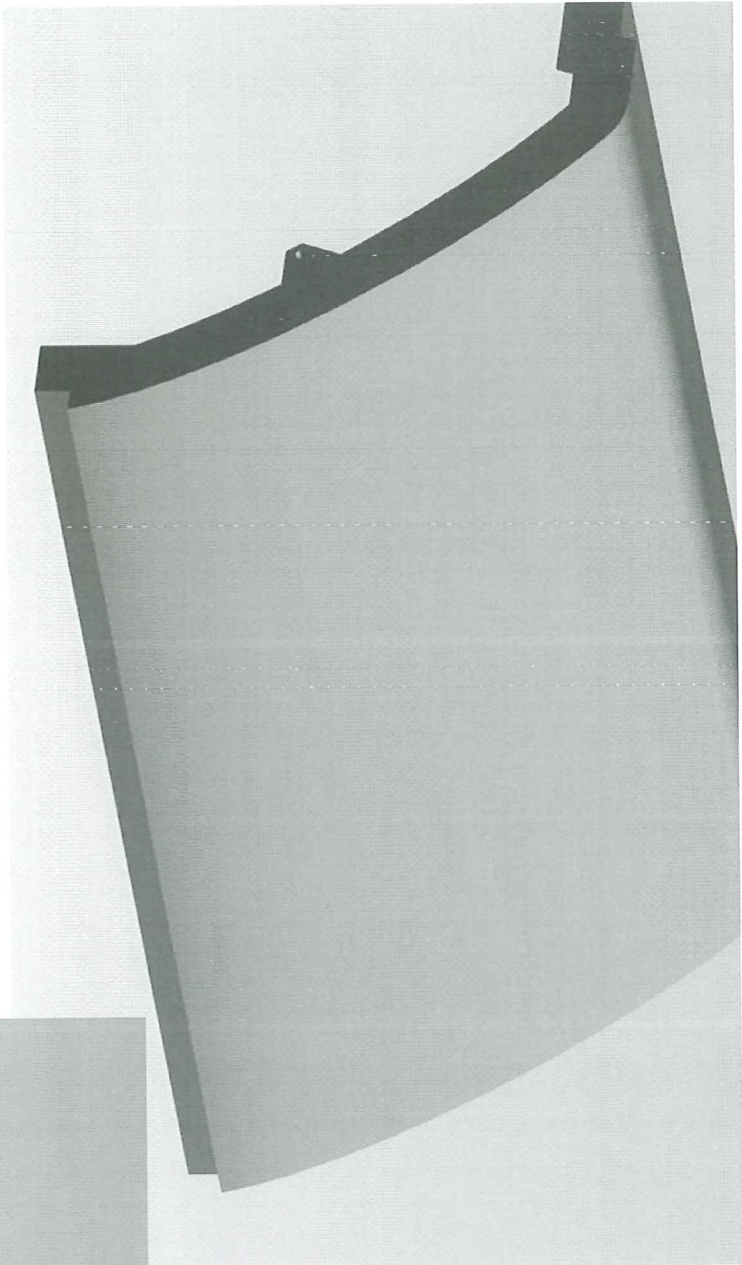
02.04.13







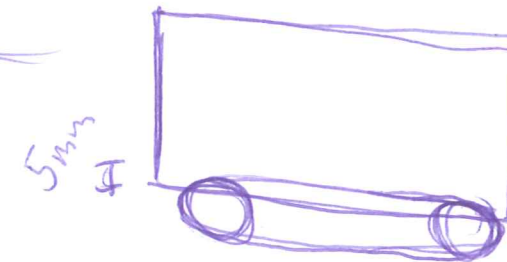
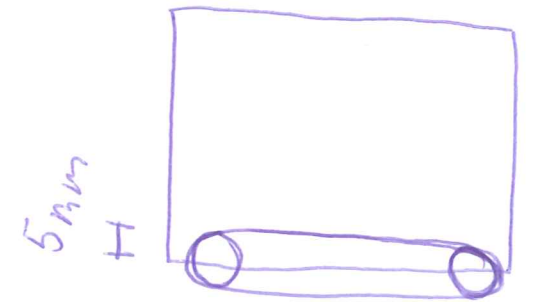
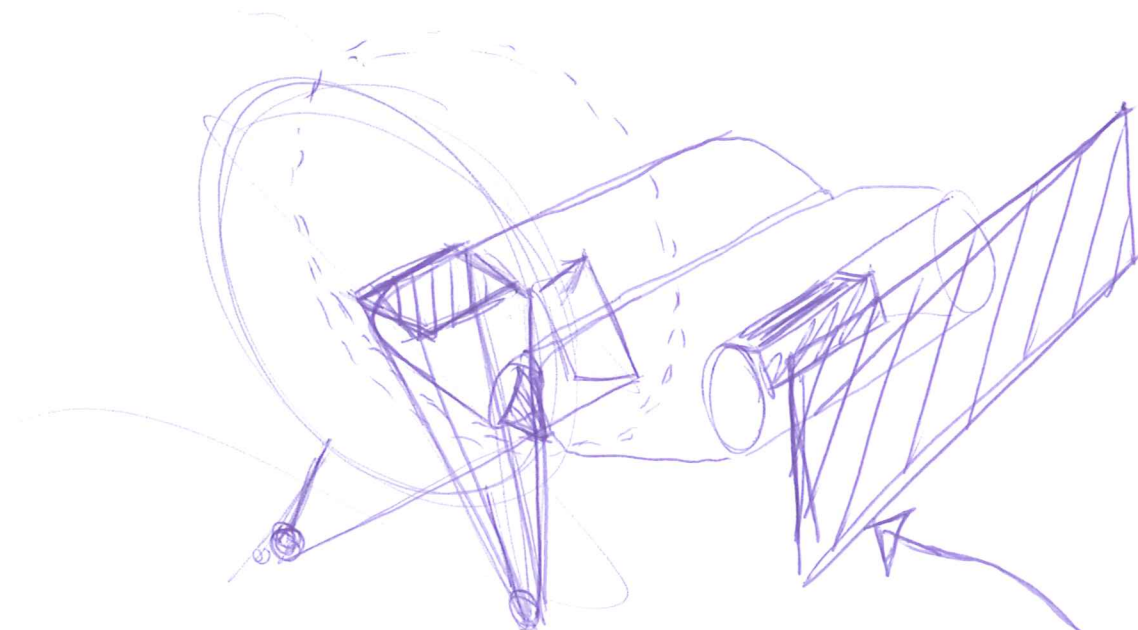
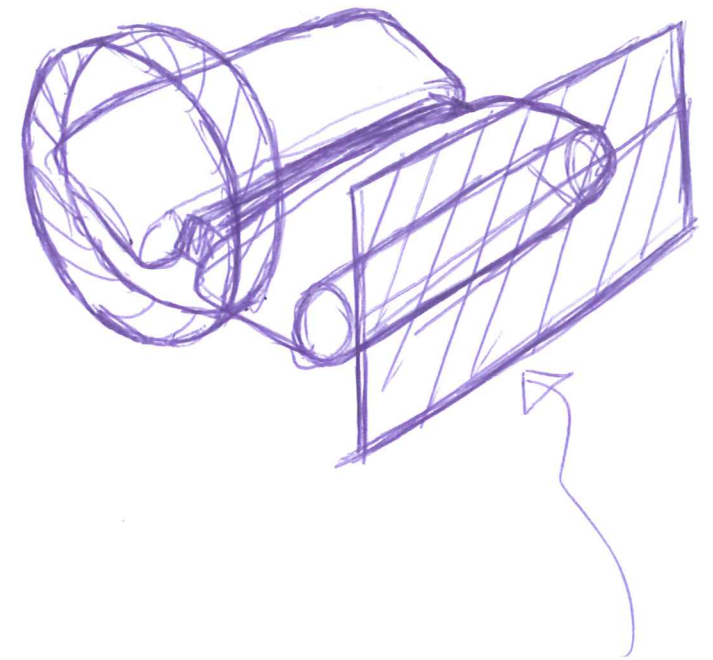
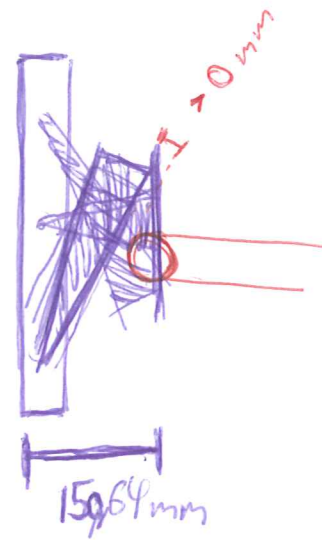
Item	Part No.	Description	Qty.	Spec Location	Rev.	
Accessories						
NONE		Sheet, Steel - D001AM	General Tolerance	Scale	Format	
			ISO 7/8"-1M	1:5	A2	
D- H60	04-09-10	Notes: All parts must be fully compliant.	Proj.			
			B	DM 23.05.2011		
			Rev.	Sig./Date		
		Part No.	Rev.			
		SKIN DOOR UPPER MUP	51136057-05 B			
		MULTIPAC				
		TOMRA SYSTEMS ASIA, NORWAY				



05.04.13

Hele 7920 9 0360 000 - c

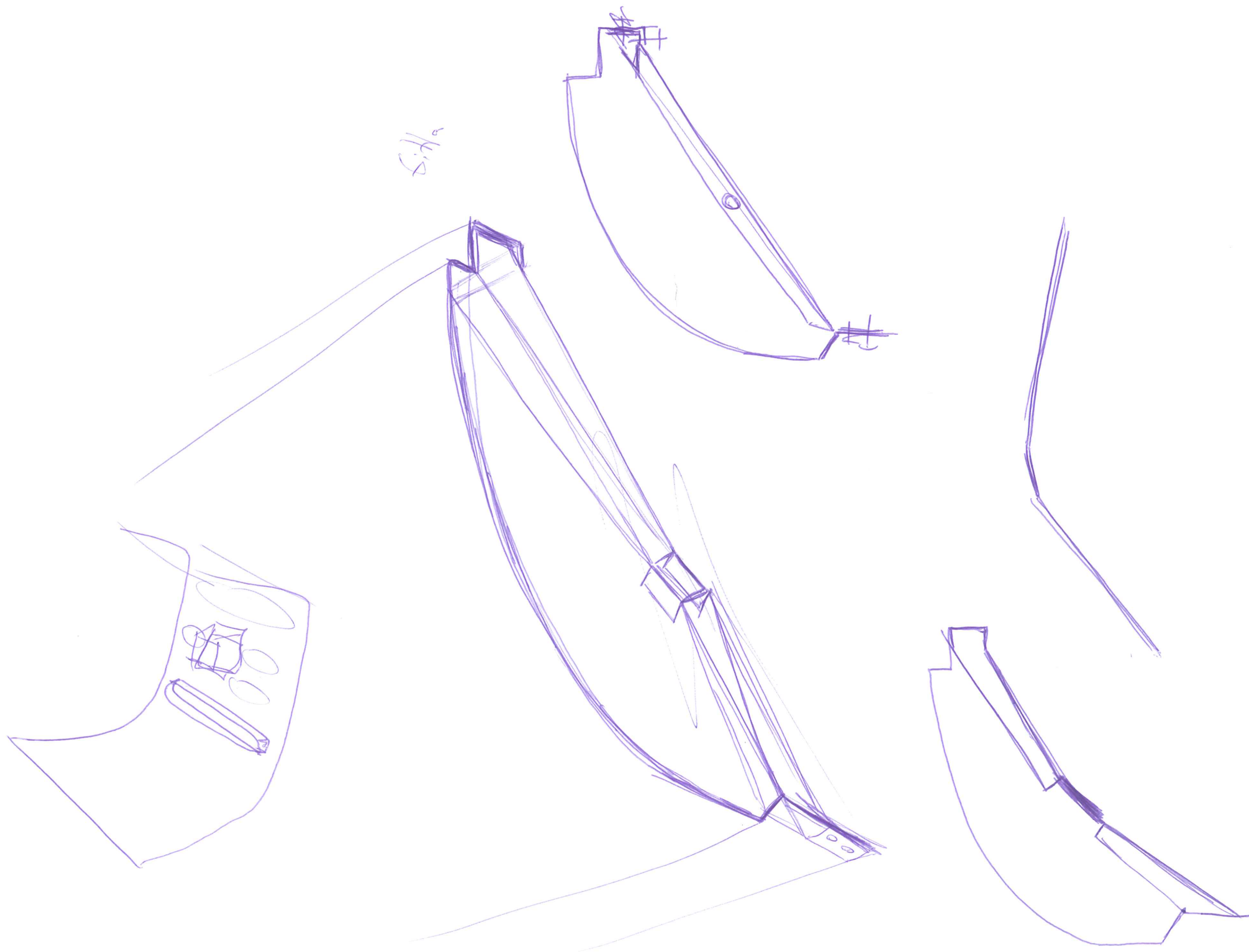
02.04.203



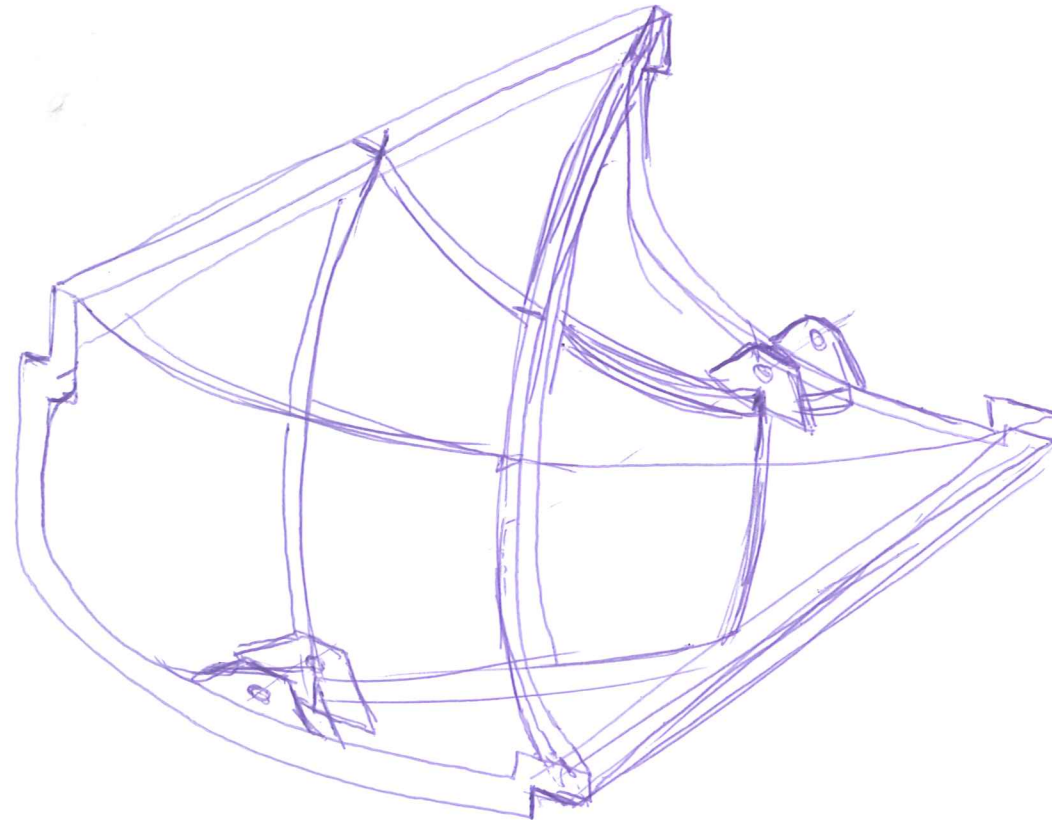




S: 1/4



04.04.13



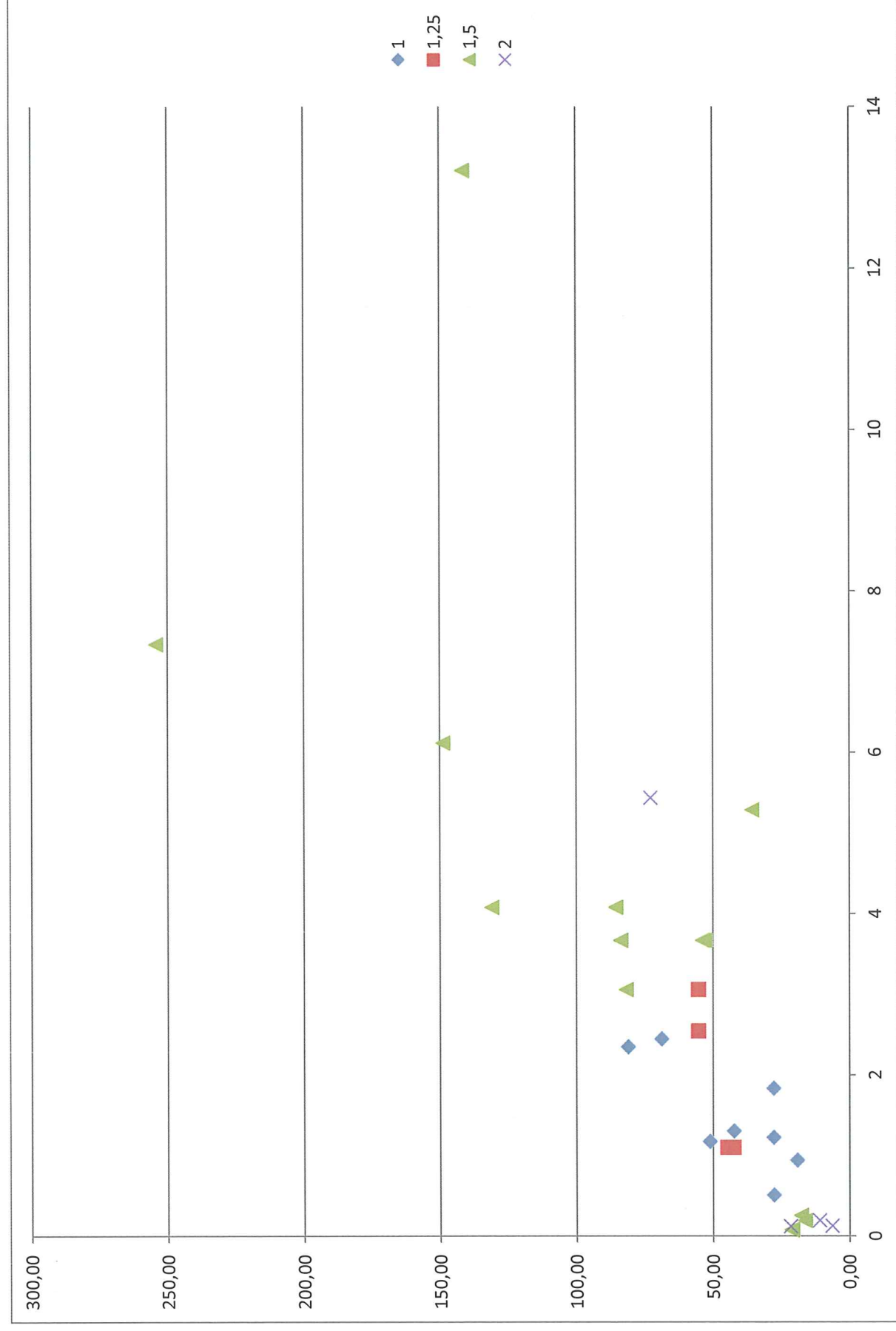






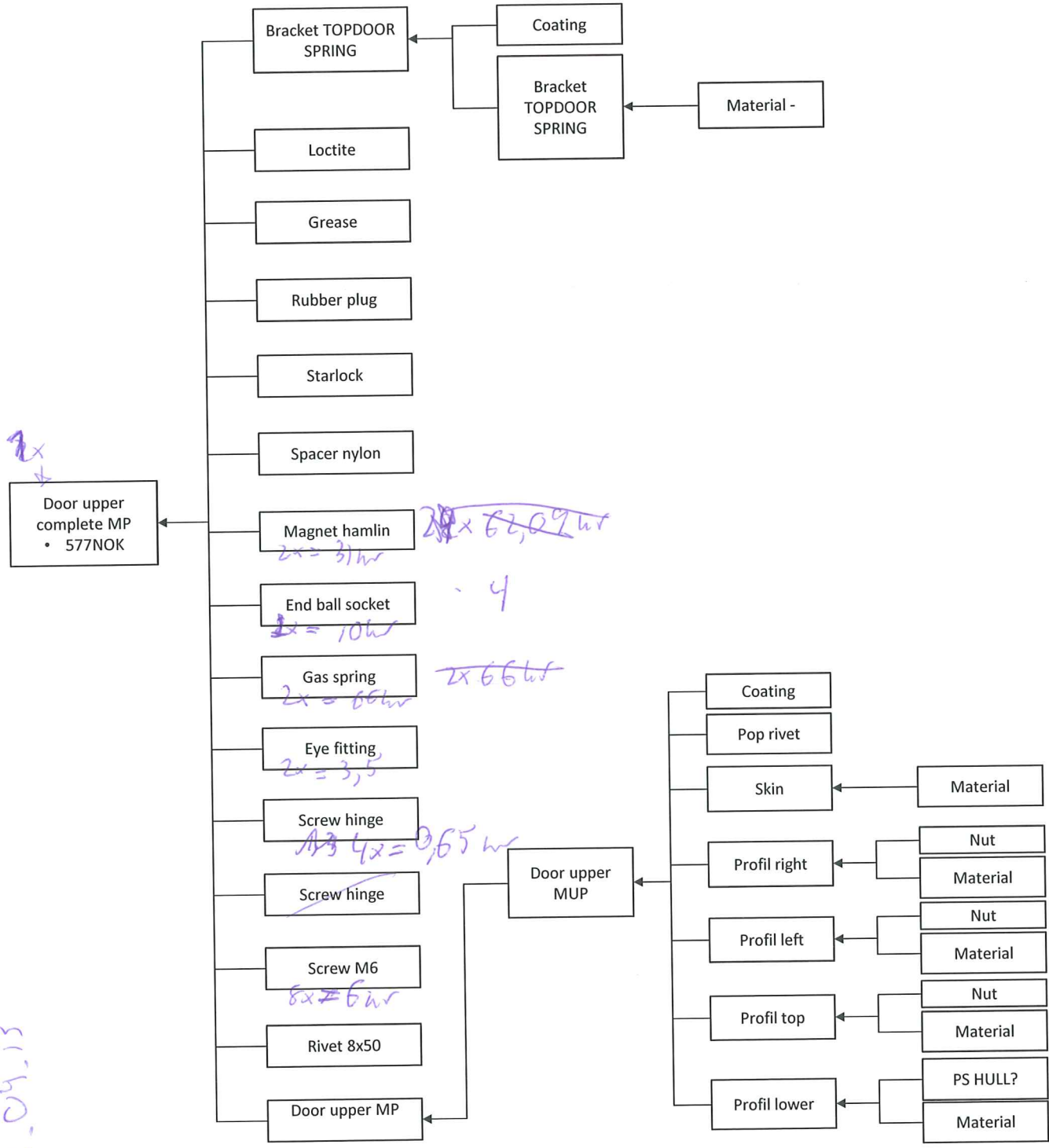


12.04.13



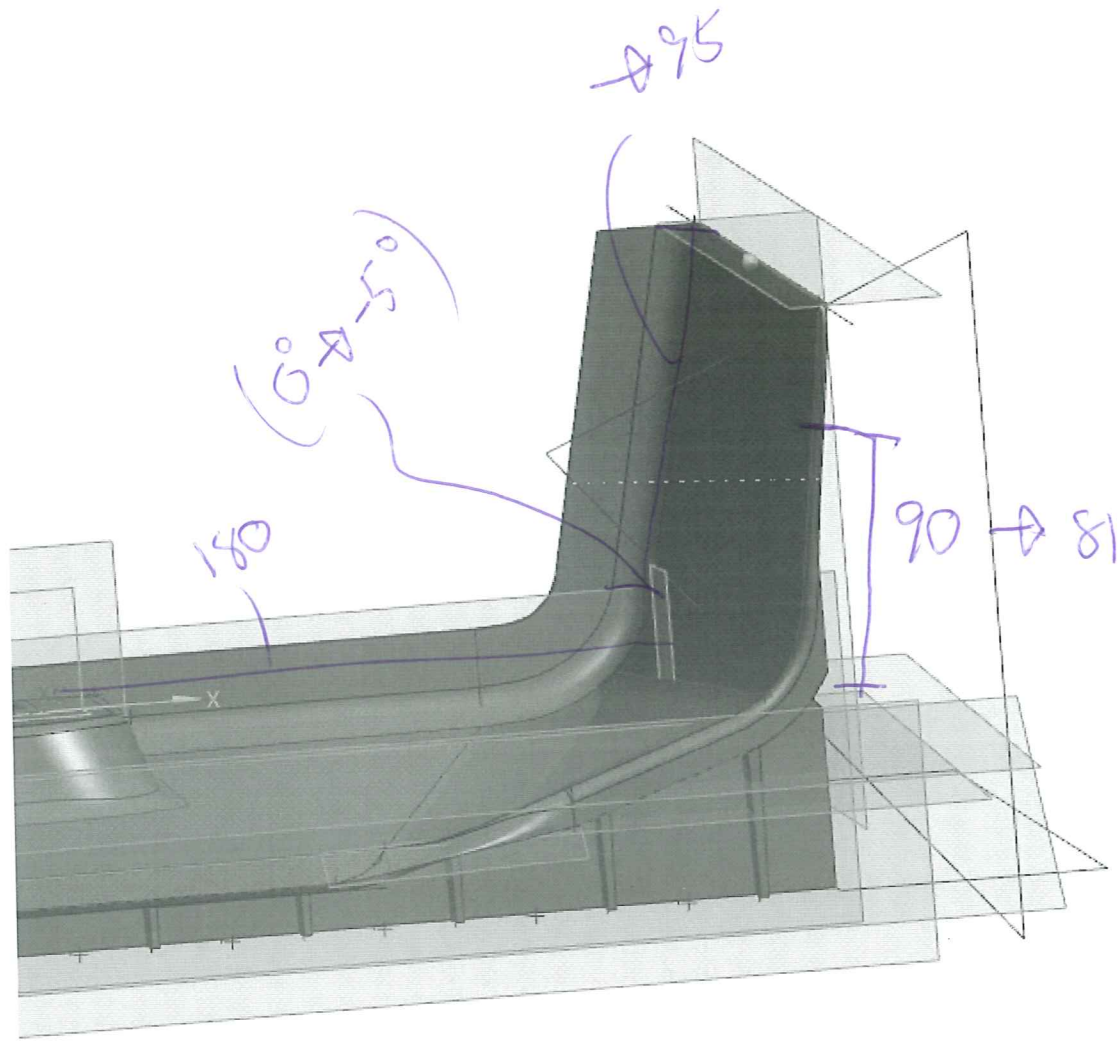


Cost, material use, number pr unit



12.04.13

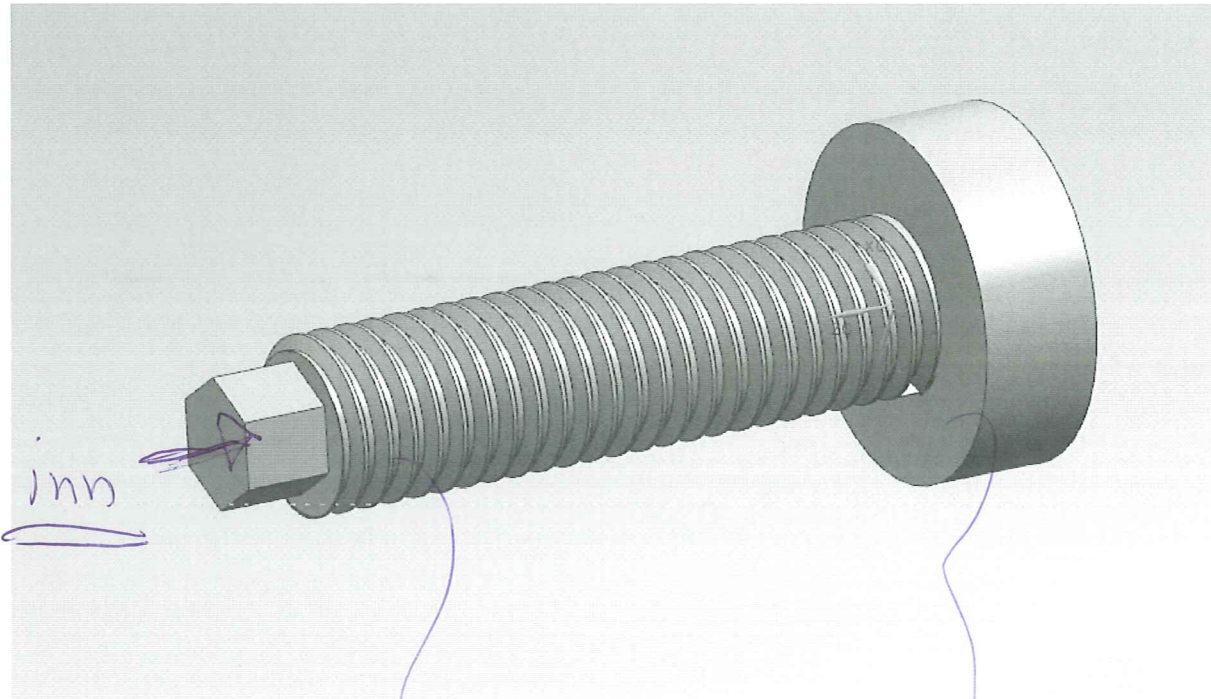
AOE 00084 - I CORRECT SLOPES







17.04.13



inn

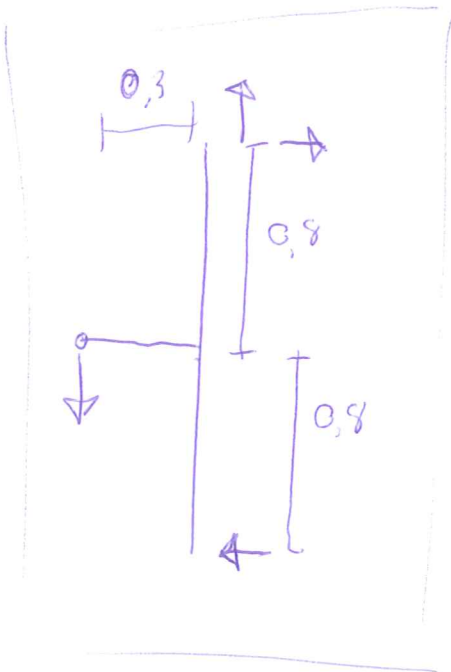
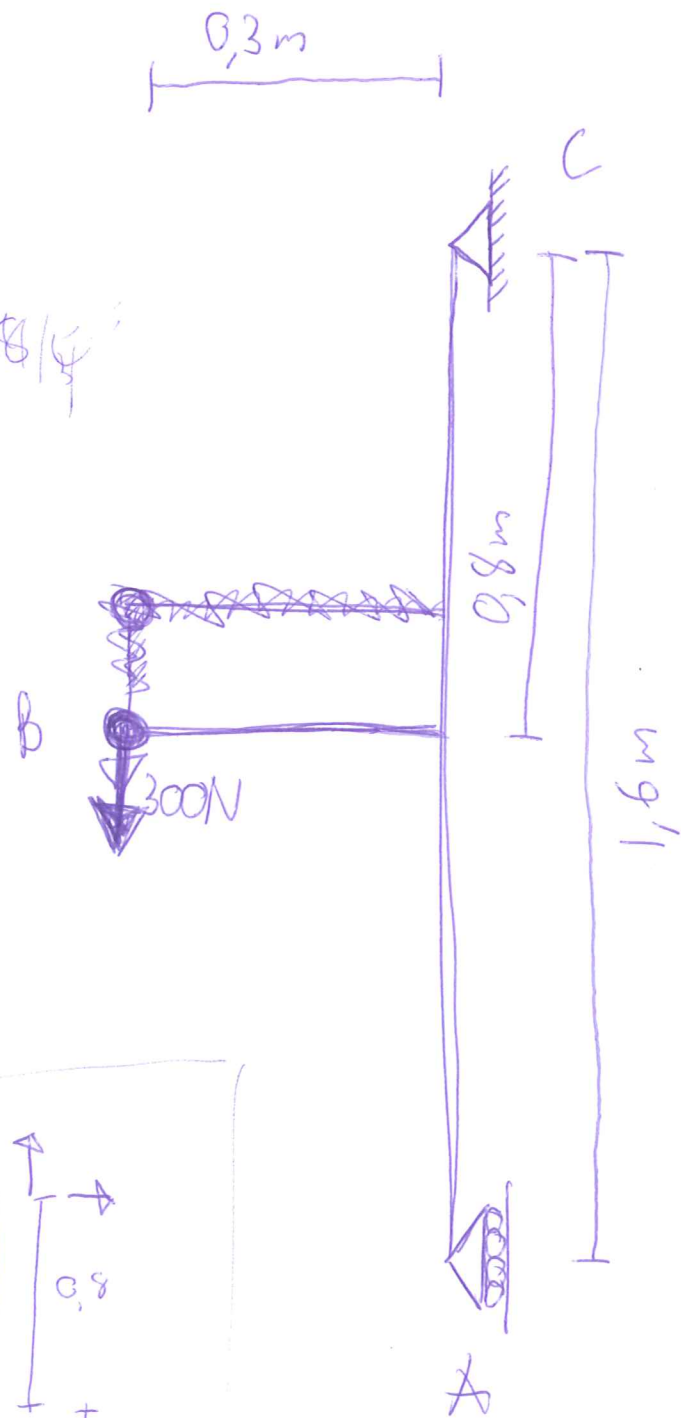
Settschraube

Lösemutter

24.04.2013

$$\frac{20}{-16-12} = \frac{8}{4}$$

$$\frac{8}{4}$$



$$B_y = 300\text{N}$$

$$A_y = 0$$

$$C_y = 300\text{N}$$

$$C_x = ?$$

$$\sum M_A = 0$$

$$B_y \cdot 0.3 - C_x \cdot 1.6 = 0$$

$$C_x = \frac{300 \cdot 0.3}{1.6} = 56.25$$

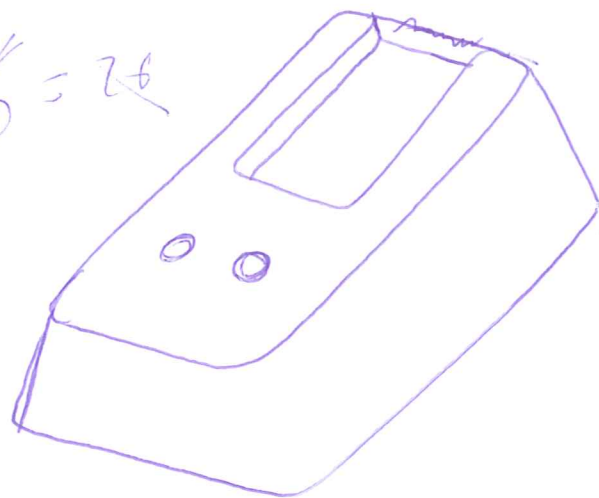
$$\sum F_x = 0$$

$$A_x = -C_x$$

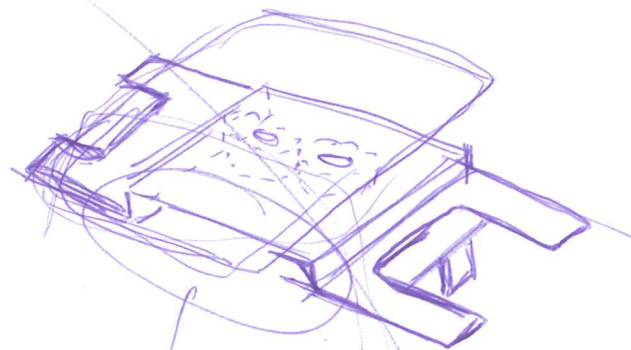
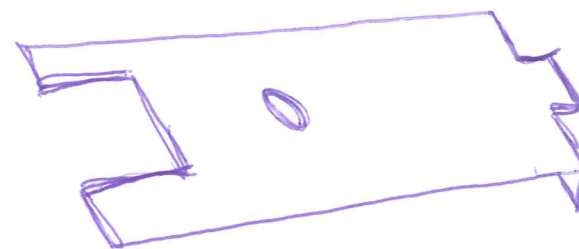
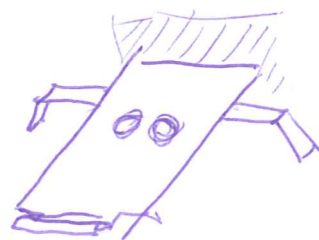
25.04.13

9/1 - 16 = 26

25



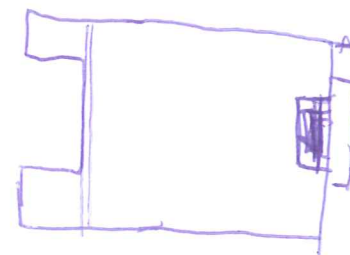
2



Ingen kraftoverføring  
i front = dimt



3





29.04.13

1200 max

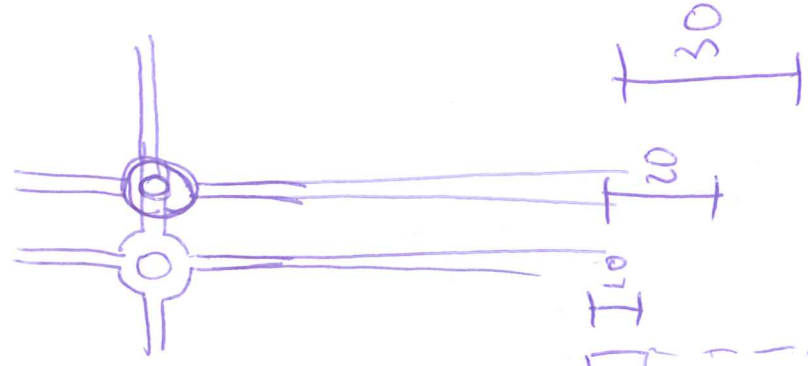
max 0,7 - 0,8 mm

Welter - Østerrike

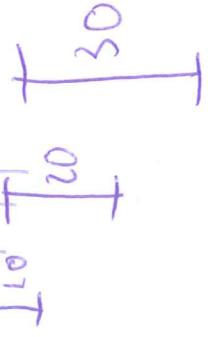
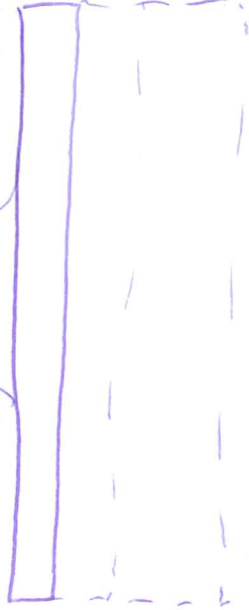
max 100 mm left

30.04.13

Bend 10 480 mm



I 2,115  
II 1,8  
I 9,402  
II 0,593  
I 0,416  
II 0,350

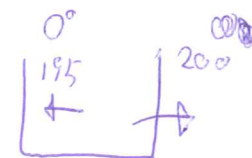
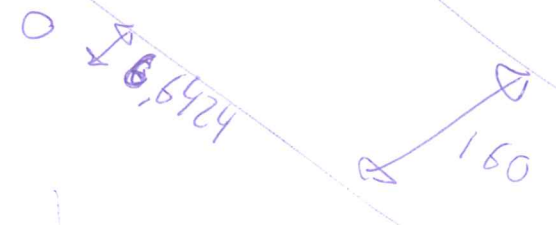
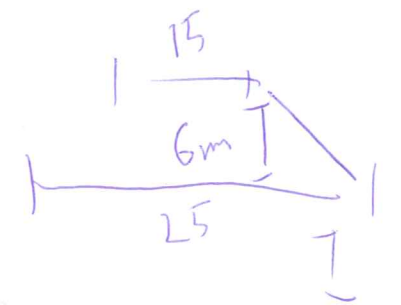
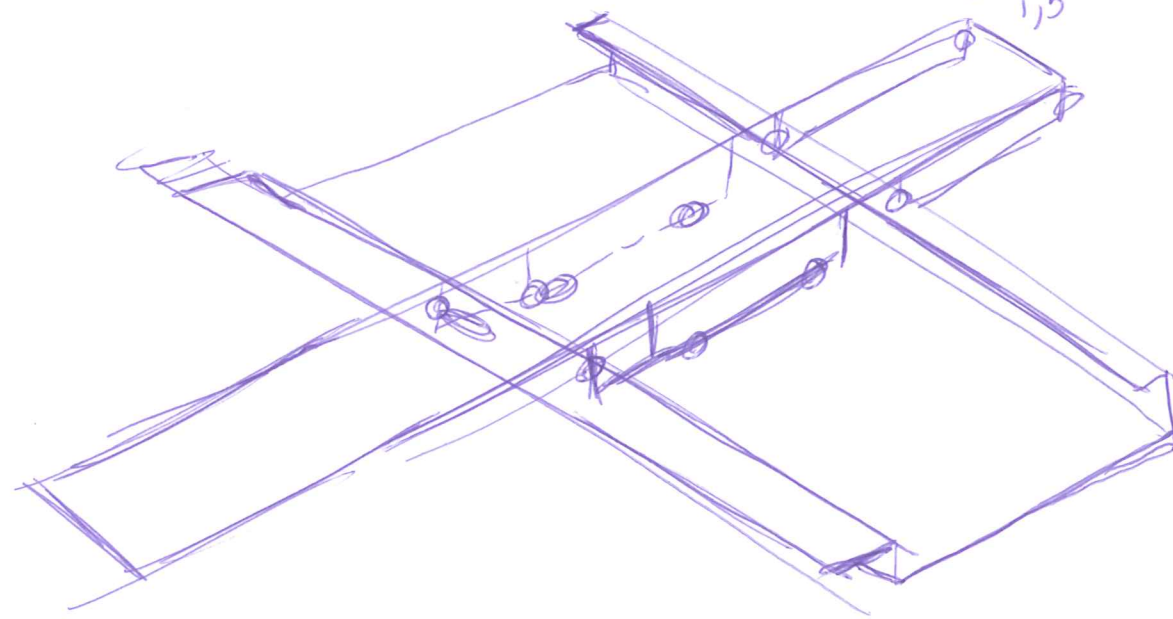
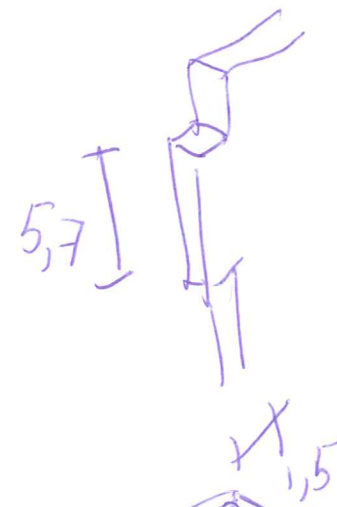
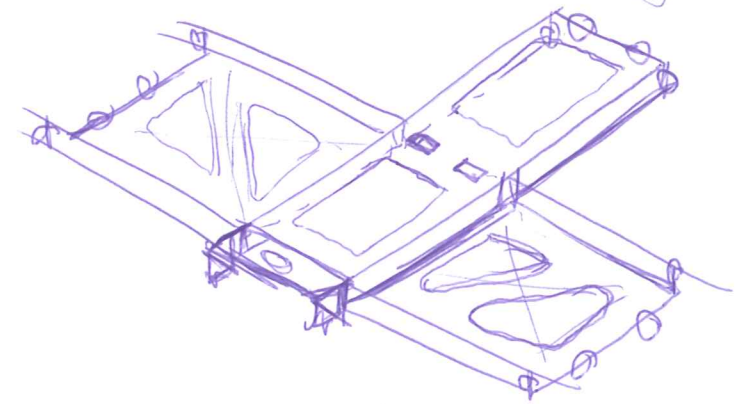


$$120,7 - 117 = 3,7$$

1,2748

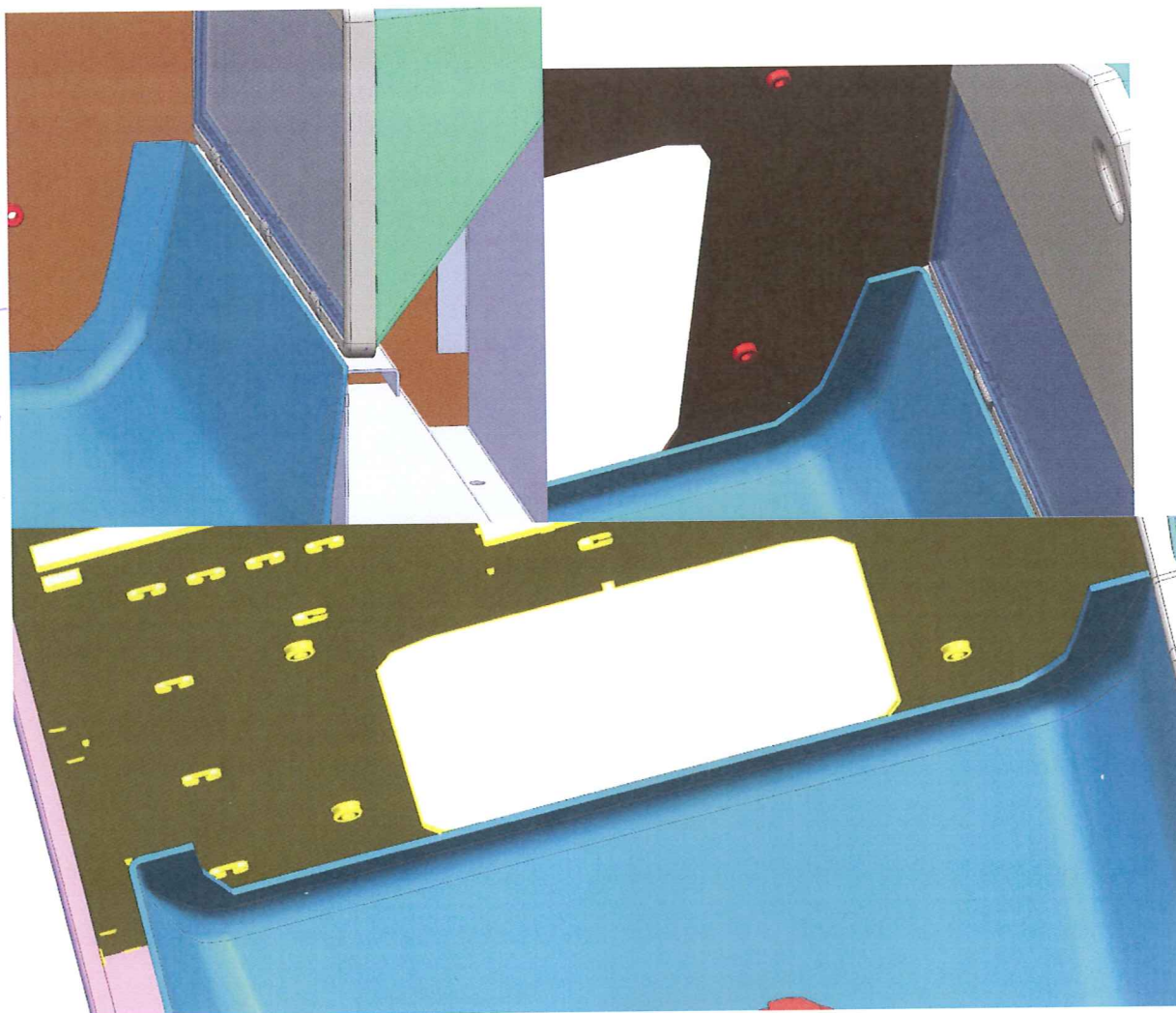
115,4547

7,7314

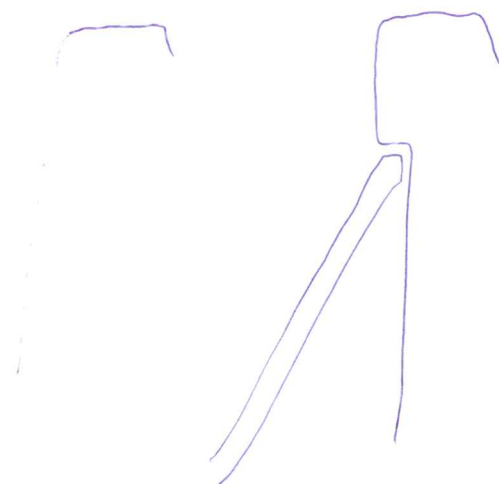


1,5  
13:15

Trohle  
berh  
vs.  
pahnins/  
s./kon



med Tor Helge 13.05.13





12.04.13

Viktigste kritiser / Dør

Struk

Design

Konstru

Sikkerhet

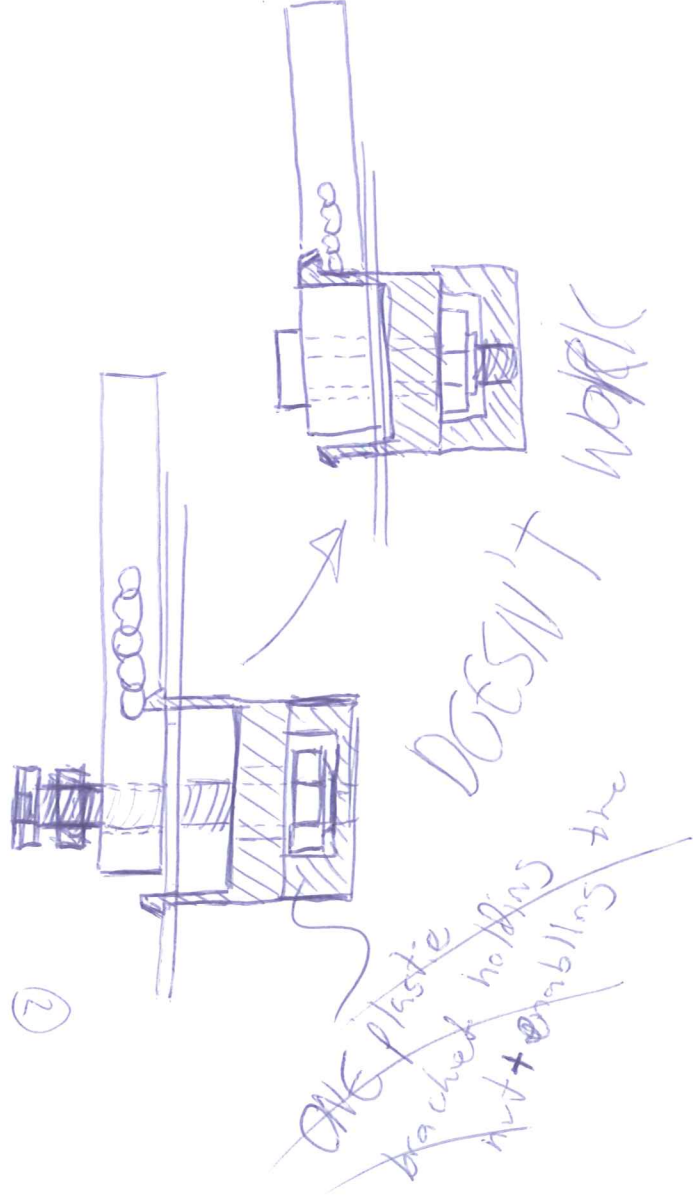
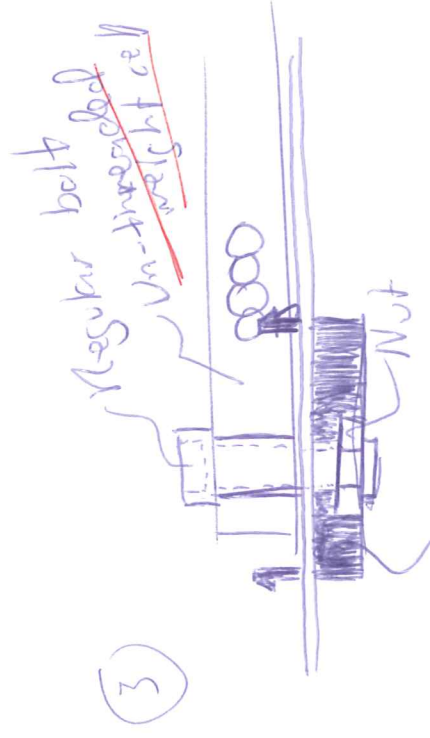
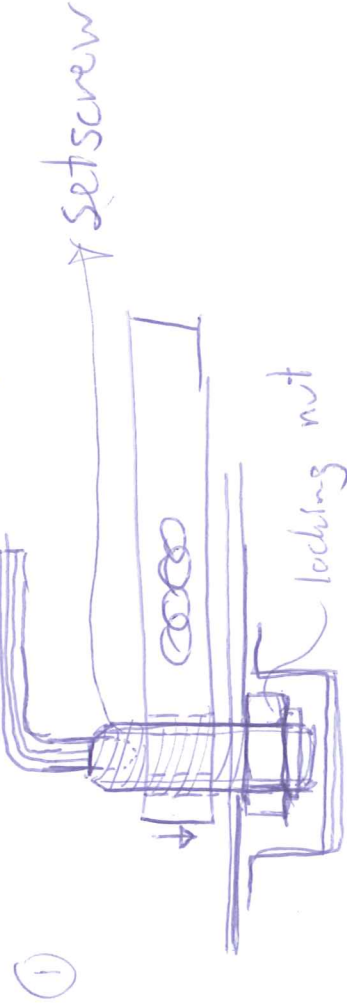
Montasje

~~Dør~~ ~~verig~~  
siste stykke

pea@iai.dk

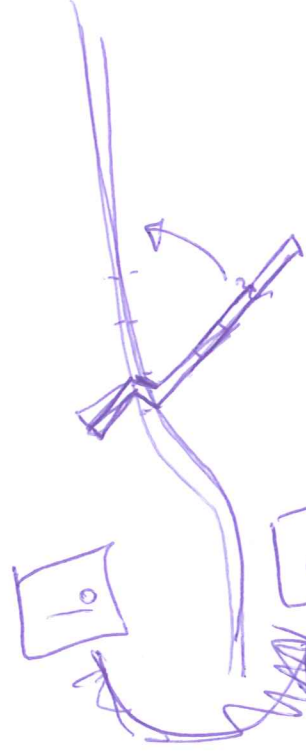
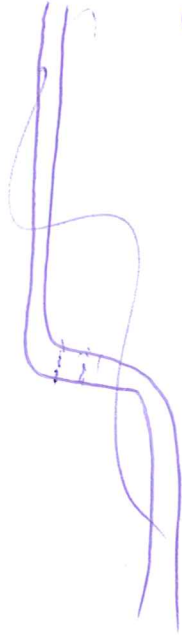
17.04.13

Alternative fixtures weight cell



17.04.13

① v.2

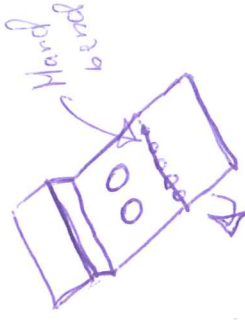
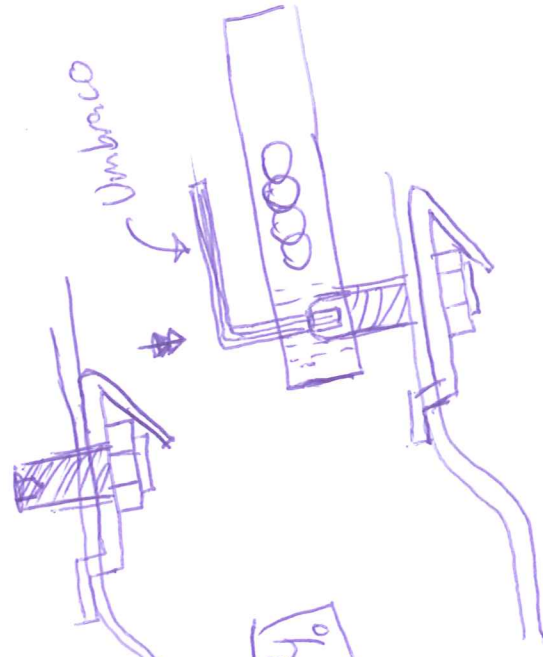
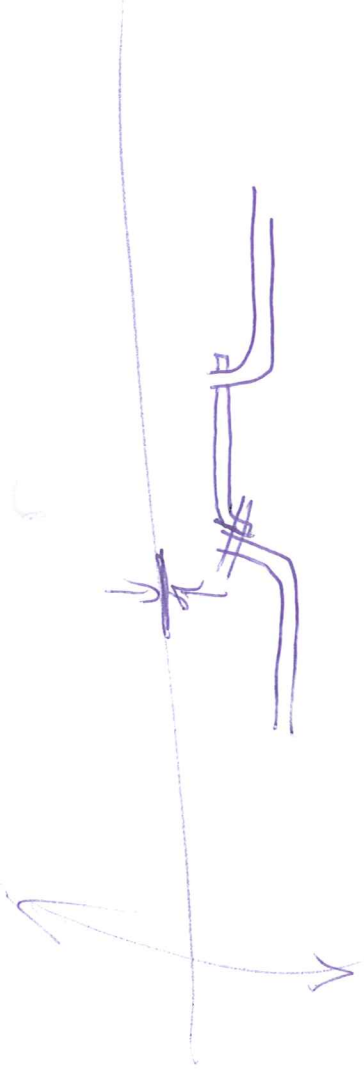


Problem:

Two surveys:

Both have to be

turned "simultaneously"

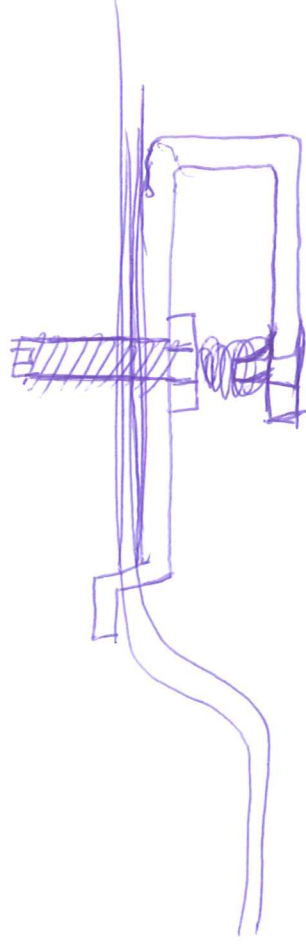
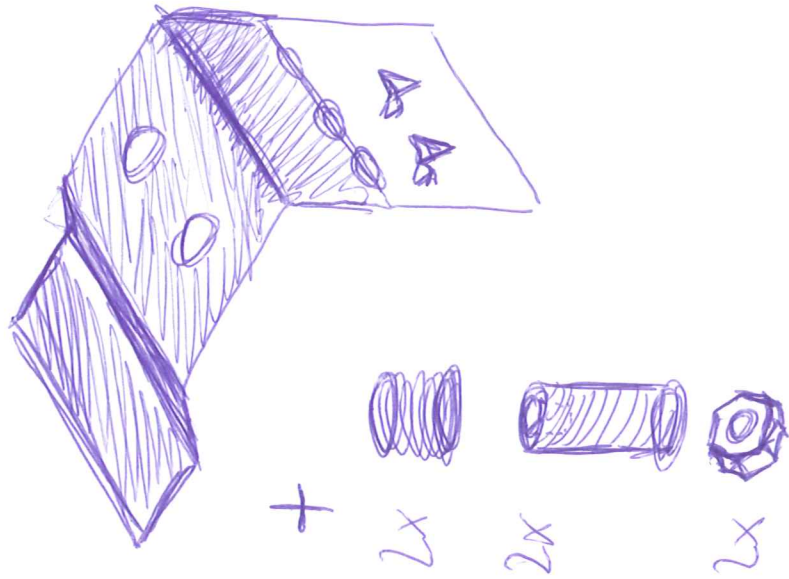




17.04.13

① v.3

To enable separate  
turning of the two  
screws the bracket  
has to ~~spring~~ return  
and spring back.



06.05.13

1 dag

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

1 time

Vakuumtrekk → kant opp  
 2x-stål → stål flod + braketter  
 Spreydestop → stivhet + dim  
 All innk stål → fiks hull til reflekt +  
 Rota

1,6hs → 2x3,6x17 = 5hr (10-50)

AOE 00070 F

AOE 00062 Q

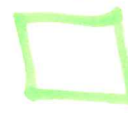
15.4 → 9.5 Stål ☒  
 1m ☒  
 Vacuum ☒

1 dag

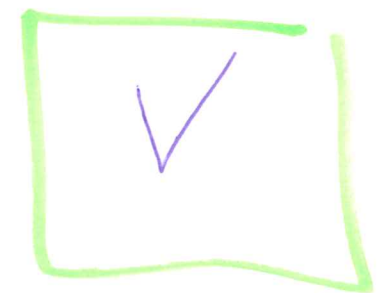


form → kant i front

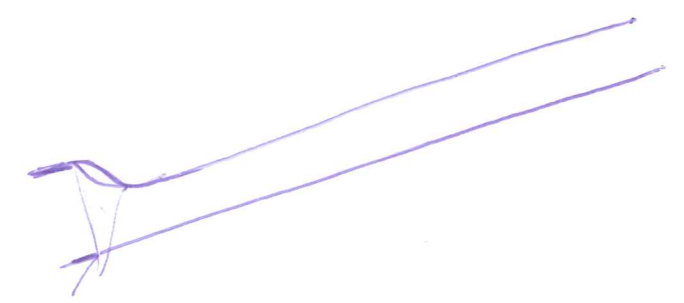
1 dag



Simuler kabinett stivhet  
 uten trav (+bjelke)/m nytt trav



Bjelke

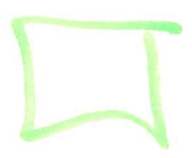


1/2 dag

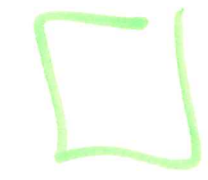
?

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

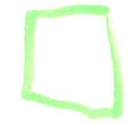
Trespant → my form + ende plate (r)  
 Redusjonsstop → dim  
 RIM → Gjennomførbarhet + pris + ~~dim~~  
 Vase/rulle → Gjennomførbarhet, pris, design. Sim? Pret?



Stivhet?

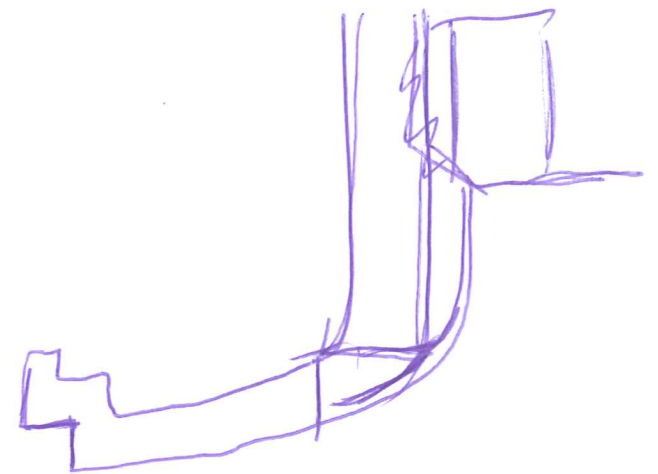
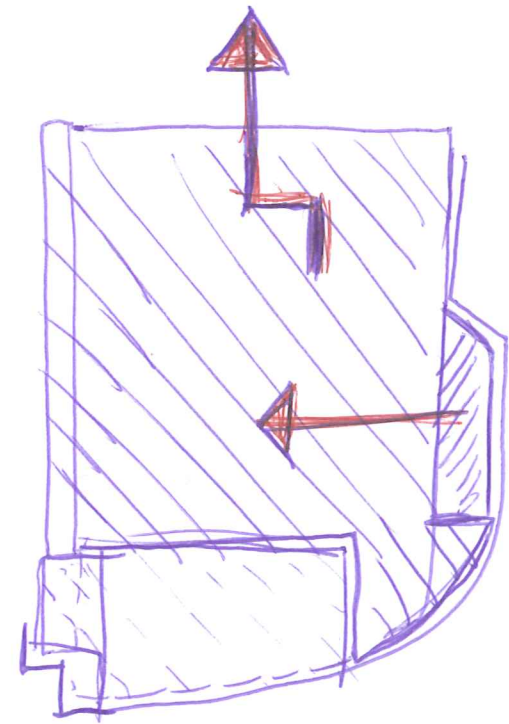
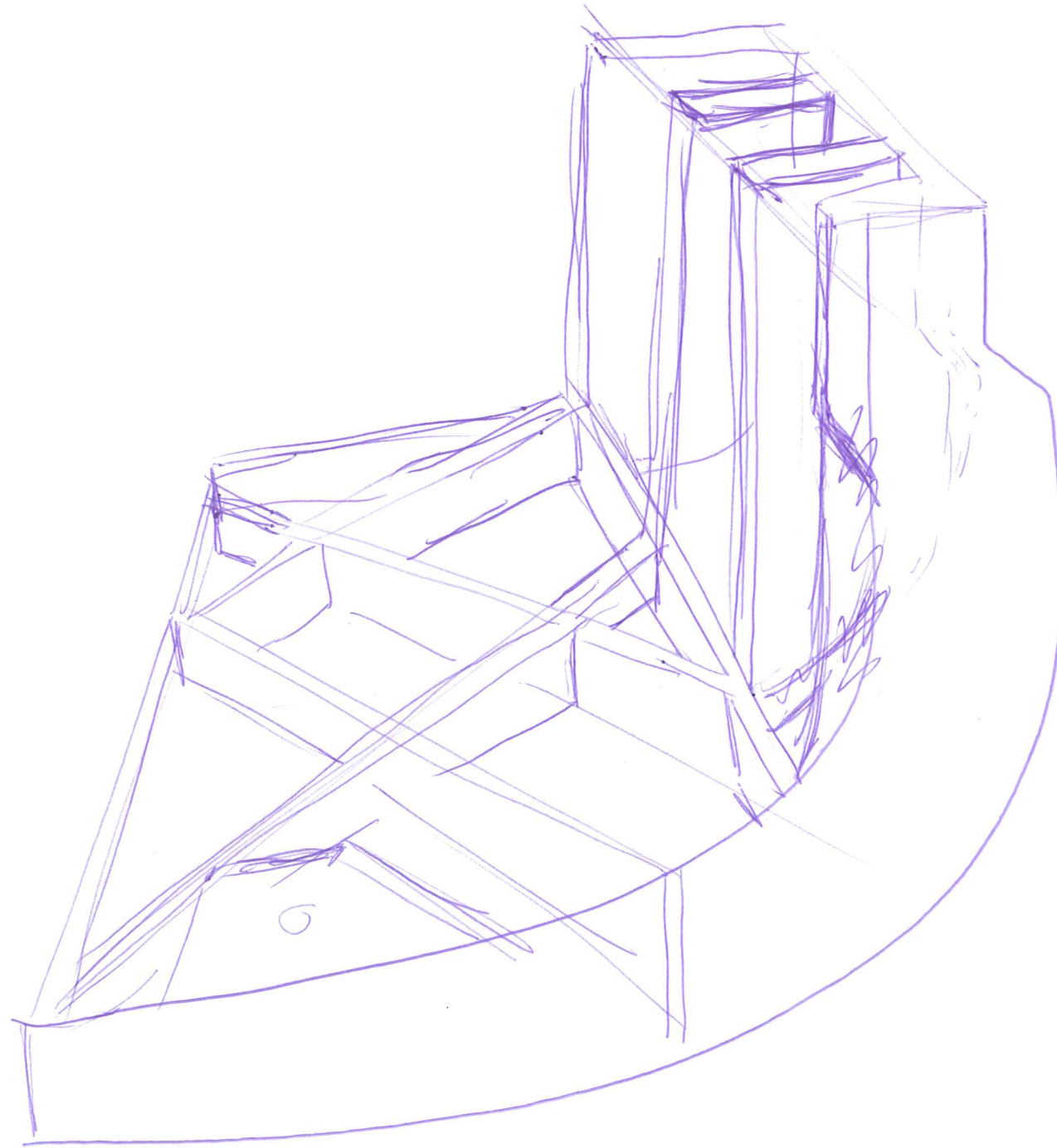


Svar fra Welser - Camilla, pris, ++



ECO99

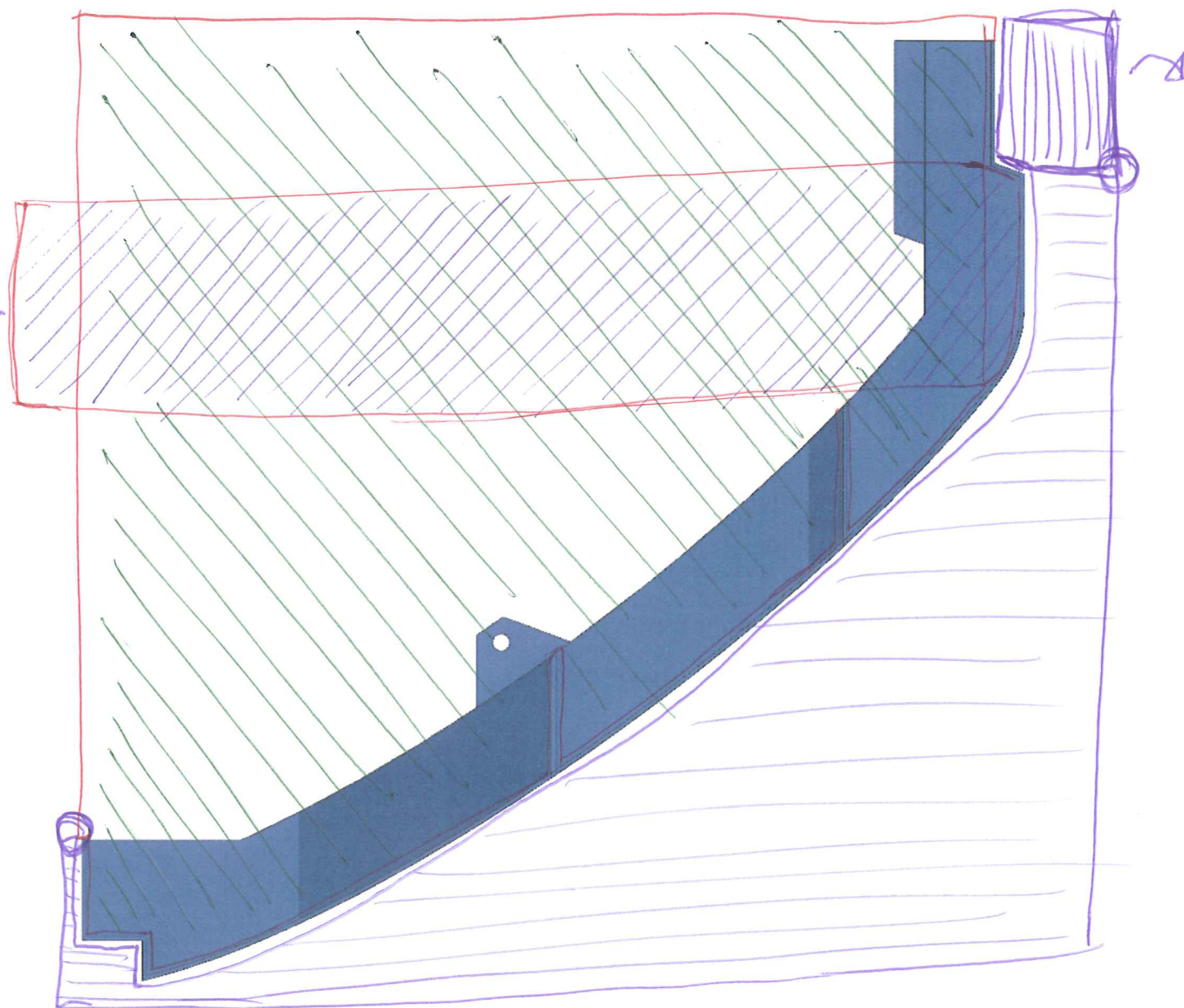
06.05.13



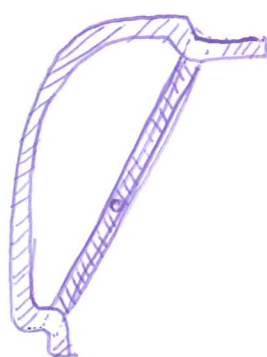
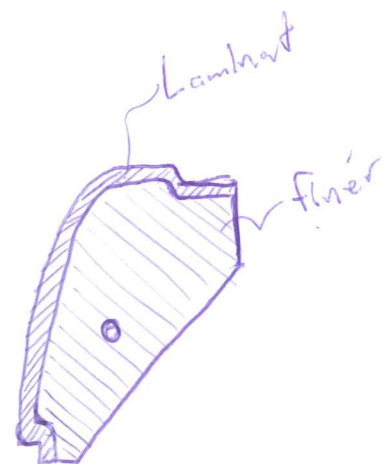




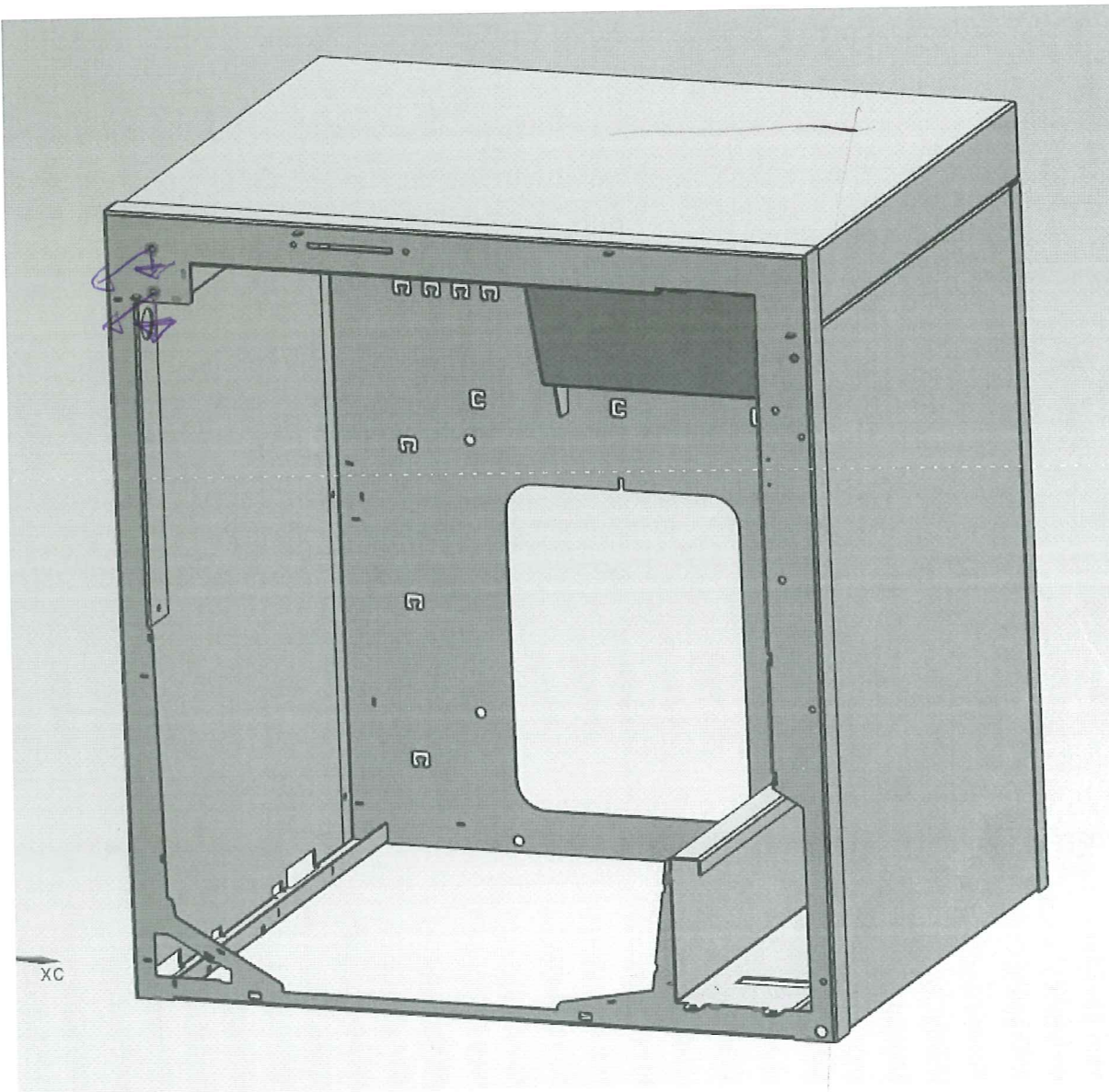
06.05.13



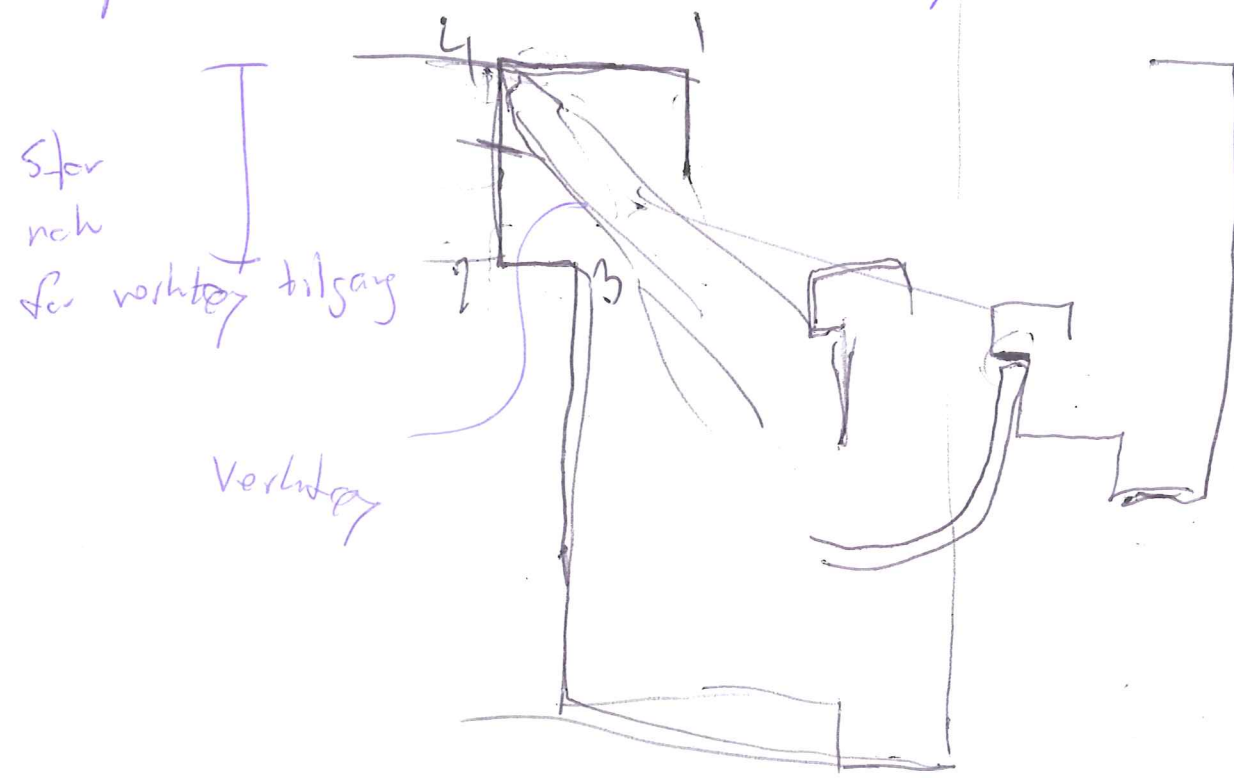
R/M form gjennomførbarhet



14.05.13



Gennemforbartet og knækket på højre side flate





Ok  
16.05.19



# Innfesting + telling

70 Vakuum

- hant på høyre sideflatebel delkor høyre hant, rettels venstre, lepper foran og påhaling bak.
- 2x popnagel/skrue i bakhand  $\rightarrow$  festes og mellom base og brakett. Kun for plassering + telling

2 skrue med trampet

84 Sprøyte-  
stop

- Som vakuum
- 2-4 skrue i front
- 2-5 skrue i bakhand

Pop? Trampet

62 Stel  
hel

- Som vakuum
- Som sprøyte stop

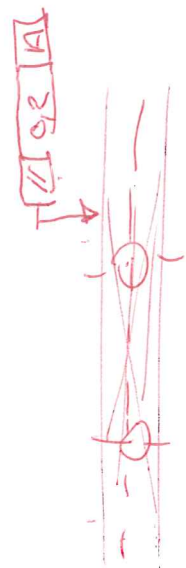
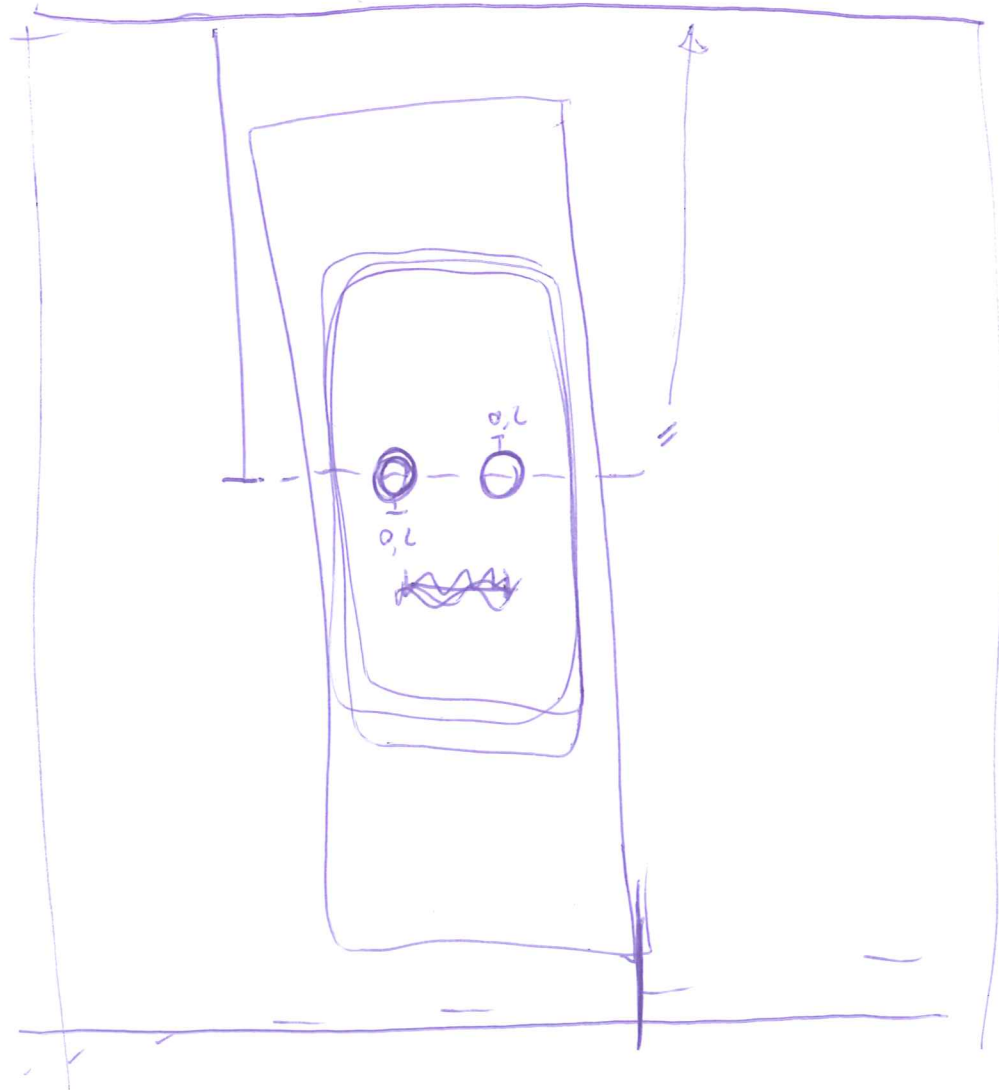
2+2  $\rightarrow$  trampet?  
press innstelen av truv?  
2 skrue fra baksliden

105 Stel  
delt

- Snel

21.05.13

$0,5/60^s$



$$9,4 \overline{) 15}$$

234

$$\frac{15}{0,4} = \frac{234}{x}$$

$$x = 6,24$$

4



Introduction

-RUMS

-Part selection

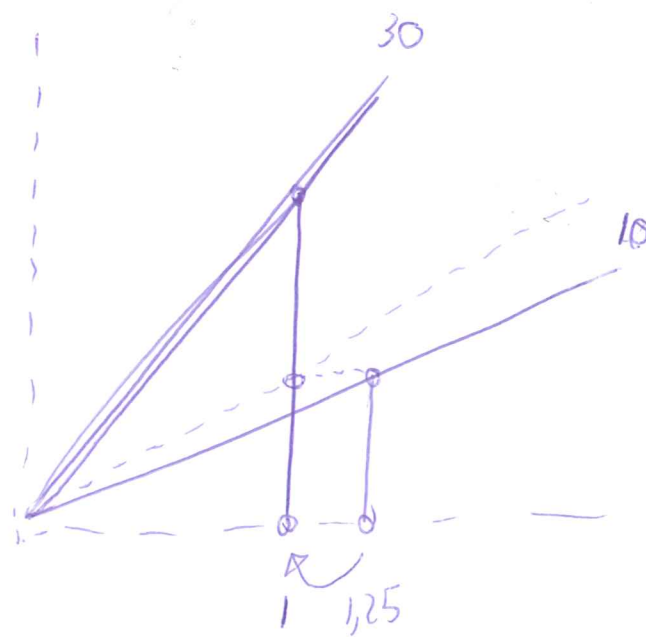
Methodology of development

Requirements

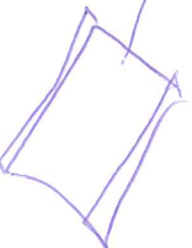
User

Product

Rematerialize hoster 10hr /kg



Part weight  
= 1kg  
Material weight  
= 1,25 kg

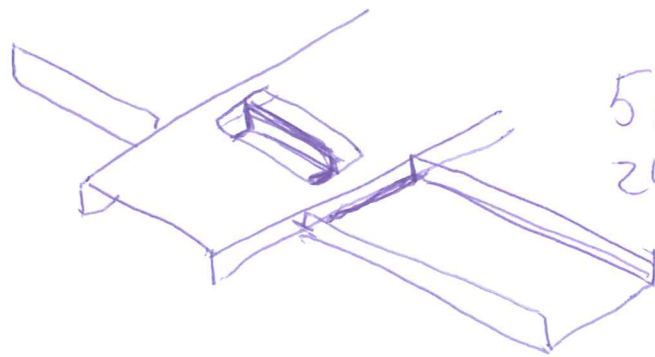


Montasje-prosedyre vakuum trau

Brakett { En brakett elektro settes på plass i b.-unit.  
4x Tabs vrls for å løse i bakkanal  
1x Tab låses på midten.  
3x punktvis elektro i midten

Trau Trau sveises ikke vs 2x i front  
5x + bak

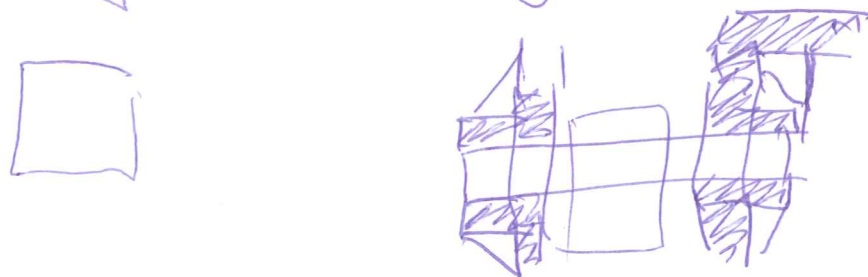
2.7291



15387  
52 4 → 1,2338  
24 9,3051

6,1233

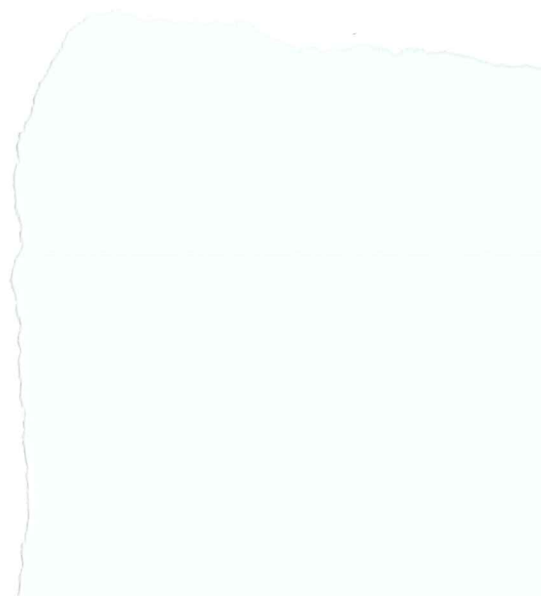
☐ Prioritering av hvar



- Simulere vedlag sverst edeltrav
- Simulere bruket for innfesting
- Kostnad transport

1600-91

Edge protection  
73 94 72 76





Arbeidsplan 13.5 →

Trav

Vakuum — Stlv brakett — Tabs  
— Trav — Innfesting — Pris (Tipping)

→ Tetting  
Frontplate

Sprøytestopp — Innfesting  
— Tetting  
— Pris (Tipping)  
— 45° front-slm

Stål alt inn uttakbar — Innfesting  
— Tetting  
x — Pris/prod pga endringer

Stål kappet sveis — Innfesting  
— Tetting

✓  
✓ — 0,3021 + 1,2335 → 24 hr + 52 hr  
✓  
✓  
✓  
✓  
x ✓

✓  
✓  
✓ Tom Webbe "CK"

Dgr

Laminat — Pris 2 (Becker)  
+ Brakett — Pris (Kina)  
+ Endeplate — Pris (Tipp)  
Rotasjonsstopp — Inserts i modell?

RIM — vattel/striketsribber for prod x ✓  
— Pris (Kina)

Valsel profil — pris / gjennomførbarhet  
+ Braketter — pris (topp)  
+ Endeplate — konstruor  
— pris

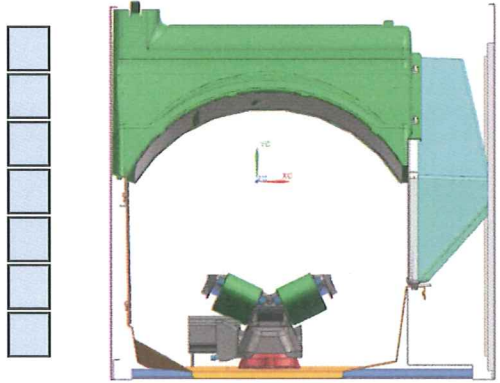
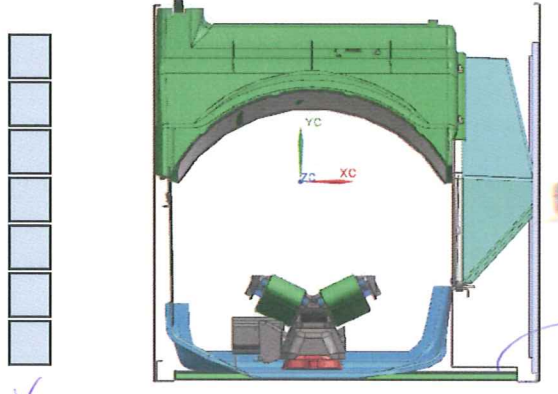
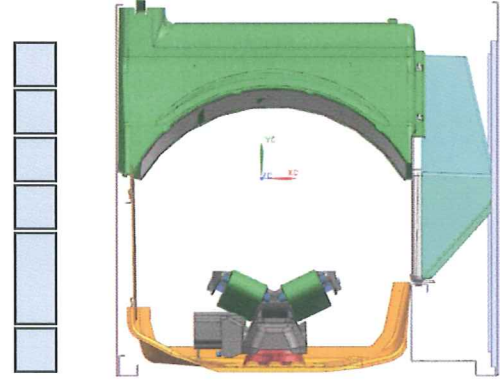
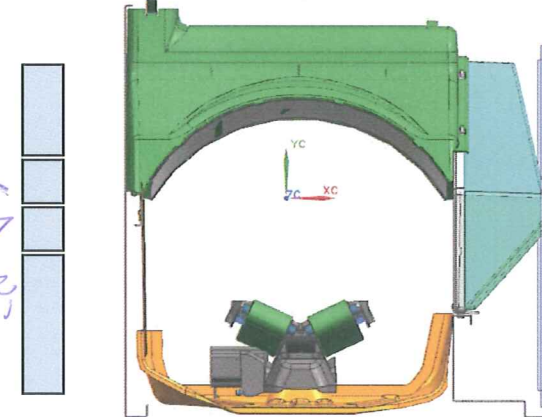
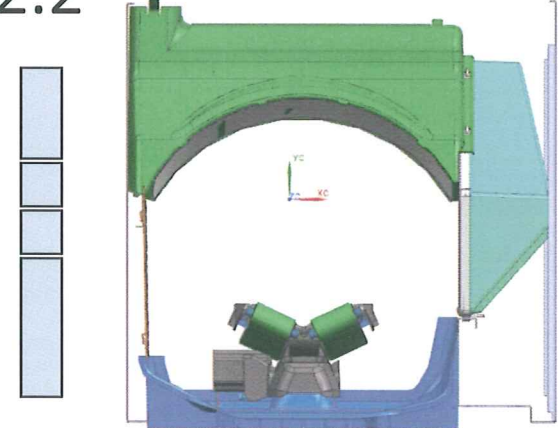
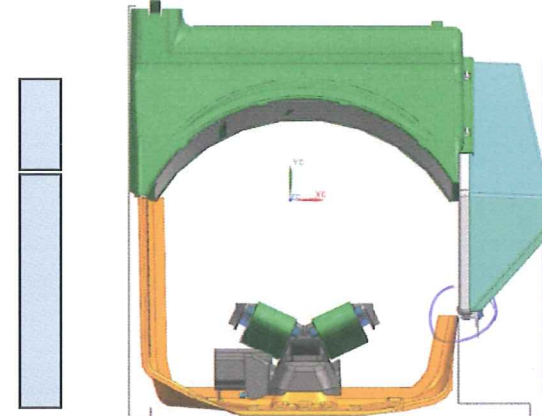
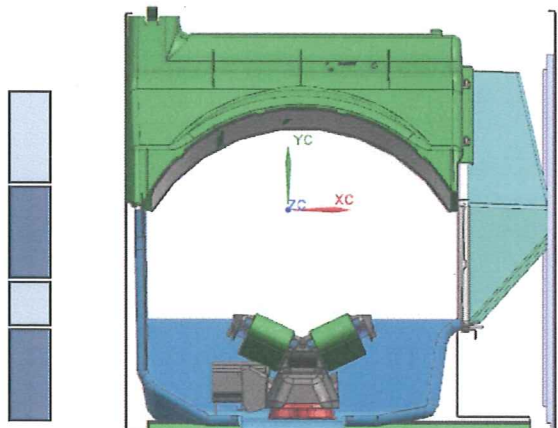
har mast → Wolff borte til 17. mai  
Illustrative  
Har mast

Design review 7  
→ 2

Spill tray
Left side
Lower left
Mid left
Reflex
Support below
Tray
Base

Spill tray
Left side
Lower left
Mid left
Reflex
Support below
Tray
Base

Spill tray
Left side
Lower left
Mid left
Reflex
Support below
Tray
Base

	Steel		Plastic
No integration	Fixed	Removeable	
	<p>1.1</p>  <p>Stamping and bending</p>		<p>1.2</p>  <p>✓ AOE00070 Vacuum forming</p>
Rigid structure	<p>2.1</p>  <p>AOE00083 Hard-tool shaping</p>	<p>✓</p>  <p>Hard-tool shaping</p>	<p>2.2</p>  <p>✓ Injection molded</p>
Reflex integrated		<p>3.1</p>  <p>✓ Hard-tool shaping</p>	<p>3.2</p>  <p>rotational molded</p>

2 delt bracket

For key  
to str hole  
to my crane

Low hole  
to the str hole

For last bar

WASTE  
TIME

Metallic  
wastes  
2010

	Total waste treatment	Incineration / energy recovery (R1)	Recovery other than energy recovery	Recovery other than energy recovery - Backfilling	Recovery other than energy recovery - Except backfilling	Incineration / disposal (D10)	Disposal	Deposit onto or into land	Land treatment and release into water bodies
European Union (27 countries) and Croatia	79 050 000	20 000	78 600 000	20 000	78 580 000	0	420 000	400 000	20 000
Germany (until 1990 former territory of the FRG)	9 663 285	17 015	9 627 337	1 349	9 625 988	82	18 851	18 851	0
Finland	877 162	0	868 182	0	868 182	1 135	7 845	7 845	0
Sweden	1 800 705	0	1 800 518	0	1 800 518	0	187	187	0

158 060  
000

Brenning  
dårlig  
Kast  
<-  
<-  
<-

Brenning  
bra  
Gjenvinning  
<-  
<-  
<-

0,025 %  
0,176 %  
0,000 %  
0,000 %

99,431 %  
99,628 %  
98,976 %  
99,990 %

0,025 %  
0,014 %  
0,000 %  
0,000 %

99,405 %  
99,614 %  
98,976 %  
99,990 %

0,000 %  
0,001 %  
0,129 %  
0,000 %

0,531 %  
0,195 %  
0,894 %  
0,010 %

0,506 %  
0,195 %  
0,894 %  
0,010 %

0,025 %  
0,000 %  
0,000 %  
0,000 %



046.13

Assembly of the current upper door

	Distance	Repeated	Code	Time [TMU]	Time [sec]
Walking to shelf	2,5		KA	62,5	2,25
Pickup and placing of upper and lower profile, right and left side wall.			AH2	45	1,62
Walking back to table	2,5				
Assemble lower profile and side walls using pop rivets		21		8400	302,4
Placing of upper profile on assembly	1		PC1	30	1,08
Assemble lower profile and side walls using pop rivets		14		5600	201,6
Walking to shelf	2,5		KA	62,5	2,25
Pickup and placing door skin	0,4		AH2	45	1,62
Walking back to table	2,5				
Mount skin using pop rivets		14		5600	201,6
Pick up and place brackets for gas-spring	0,5		2 AK2	90	3,24
Mount brackets with use of screws		8	ZB2	240	8,64
Walking to shelf	2,5		KA	62,5	2,25
Place door on pallet			AH2	45	1,62
				730,17	12,1695

14

Assembly of Rolled profile concept

	Distance	Repeated	Code	Time [TMU]	Time [sec]
Walking to shelf	2,5		KA	62,5	2,25
Pickup and placing door skin, and two sidewalls			AH1	25	0,9
Walking back to table	2,5		KA	62,5	2,25
Assemble brackets onto skin with use of pop rivets		24		9600	345,6
Walking to shelf	2,5		KA	62,5	2,25
Place door on pallet			AH1	25	0,9
				354,15	5,9025

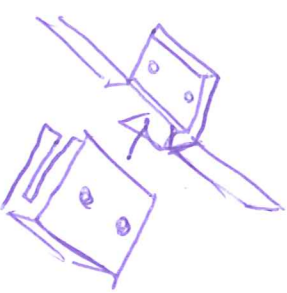
5-6

Assembly of Wood concept

	Distance	Repeated	Code	Time [TMU]	Time [sec]
Walking to shelf	2,5		KA	62,5	2,25
Pickup and placing door laminate			AH1	25	0,9
Walking back to table	2,5		KA	62,5	2,25
Place brackets on laminate	0,5		2 PC2	80	2,88
Place screws in place		4	PC2	160	5,76
Assemble brackets onto skin with two screws each		4		120	4,32
Walking to shelf	2,5		ZB2	62,5	2,25
Place door on pallet			KA	25	0,9
			AH1		21,51
					0,3585

3

For the reaction injection molded, and rotationally molded concepts assembly is not required.

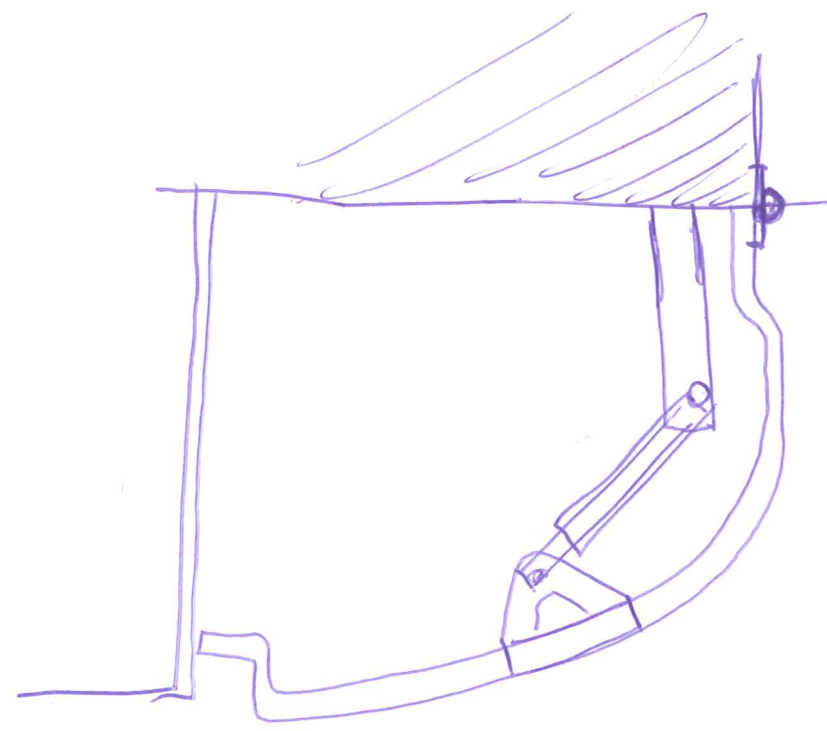
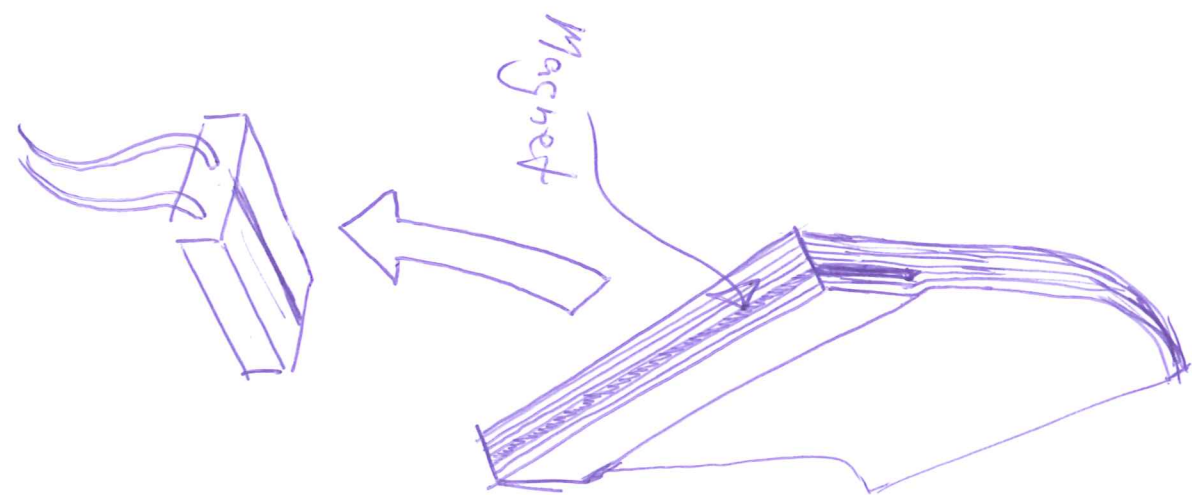


04.06.13

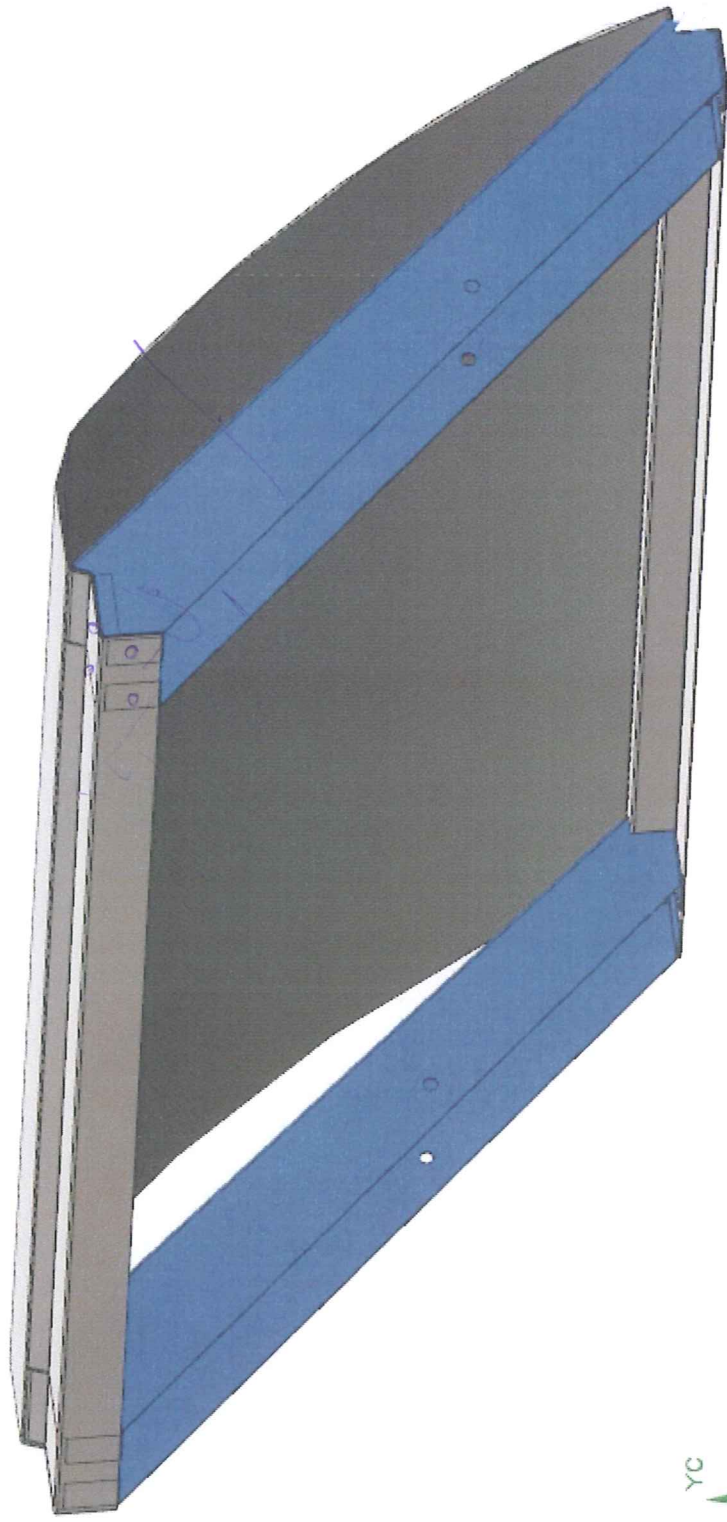
20 spots i front

Assembly of the current common base unit

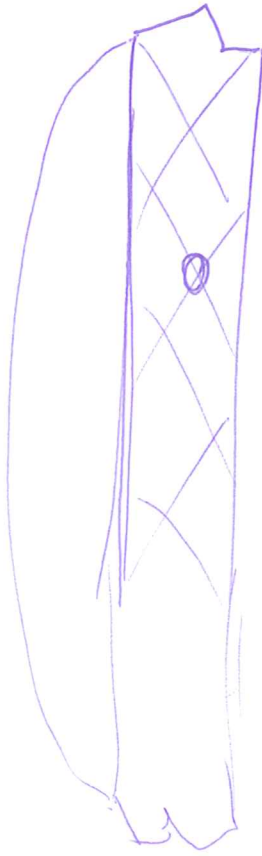
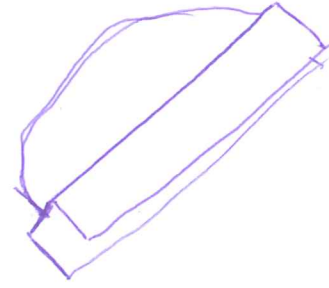
	Distance	Repeated	Code	Time [TMU]	Time [sec]
Pickup and placing of rear plate			AH1	25	0,9
Walk to storage pallet	2,5m		KA	62,5	2,25
			AH2	45	1,62
Pick up and place on table - lower and higher left bracket, right sidewall and support bracket					
Walk back to table	2,5m		KA	62,5	2,25
Placing of right wall			PC1	30	1,08
Twist tabs for secure position right wall		2	ZB1	20	0,72
Placing of high left			PC1	30	1,08
Twist tabs for secure position high left		2	ZB1	20	0,72
Placing of supportbeam			PC1	30	1,08
Twist tabs for secure position support beam		4	ZB1	20	0,72
Placing of lower left			PC1	30	1,08
Twist tabs for secure position lower left		2	ZB1	20	0,72
Pick up and place on table - top wall, cable support and tray	2,5m		AH2	45	1,62
Placing of top wall			PC1	30	1,08
Twist tabs for secure position of top wall		2	ZB1	20	0,72
Placing of cable support			PC1	30	1,08
Twist tabs for secure position of top wall		4	ZB2	40	1,44
Placing of tray			PC1	30	1,08
Twist tabs for secure position of tray		6	ZB1	60	2,16
			AK2	75	2,7
Pick up and place on structure - front surface					
		8	ZB1	80	2,88
Twist tabs for secure position of front surface					
Placement in jig for correct angles	1m		AK1	50	1,8
Visual control			VA	15	0,54
Spot-welding		41		12300	442,8
Grinding of welds and tabs		41		6150	221,4
			AK2	75	2,7
Pick up and place on structure - left side plate					
					698,22
Driftsteknisk tilleggstid (15%)					104,733
Operatør-tilleggstid (5%)					34,911
Tillegg for hvile (25%)					174,555
				1012,419	16,87365
					98,42963



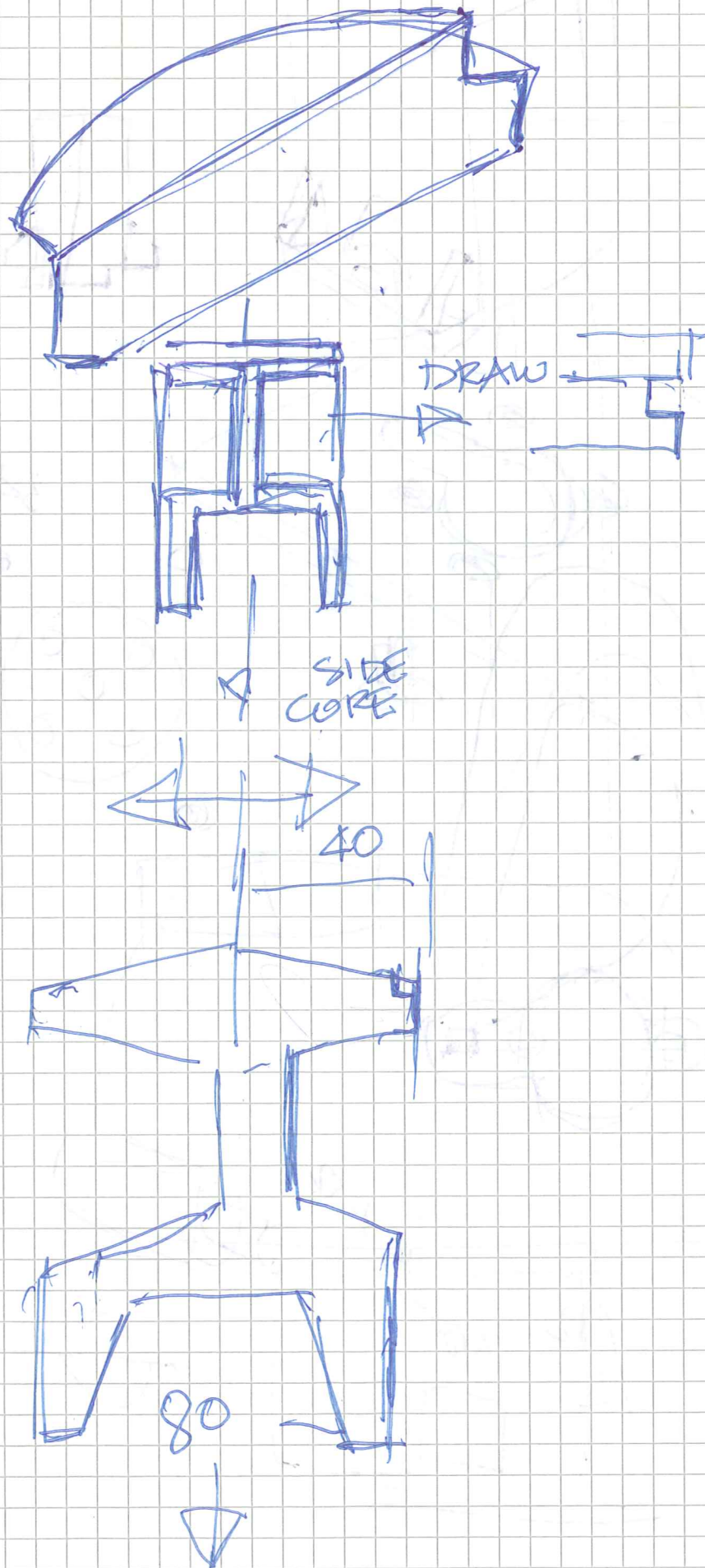


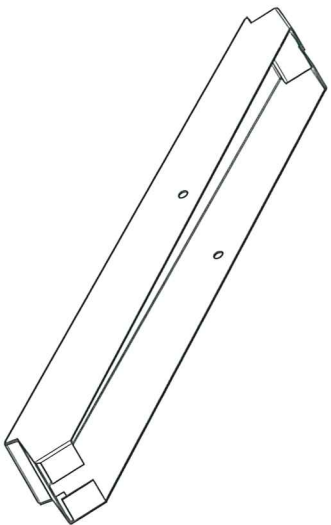
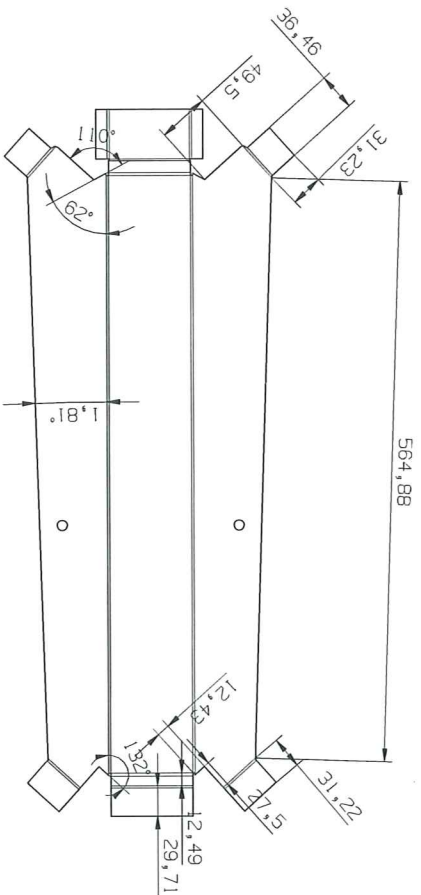


yc




Tips for  
Colln of Time  
22.05.13

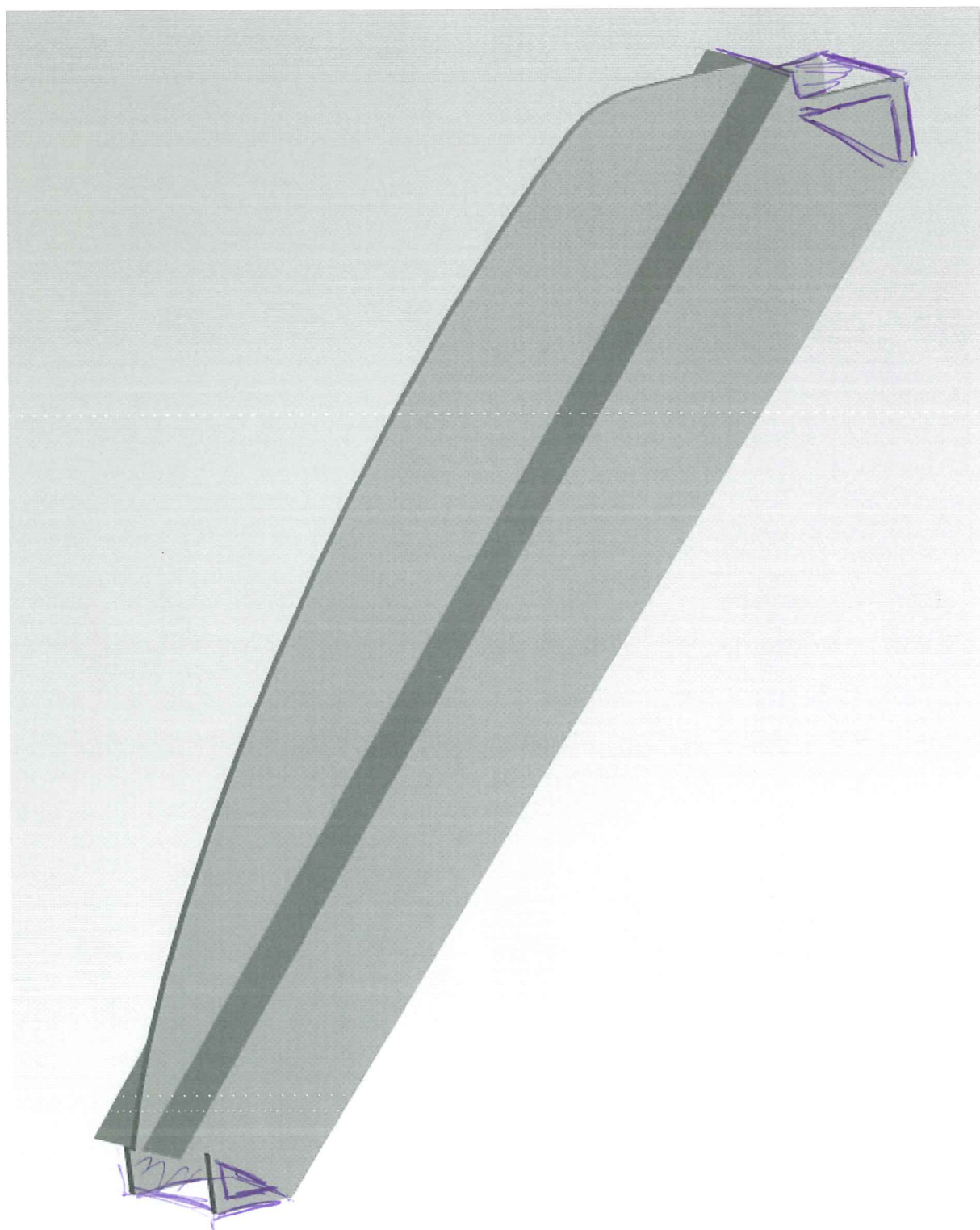


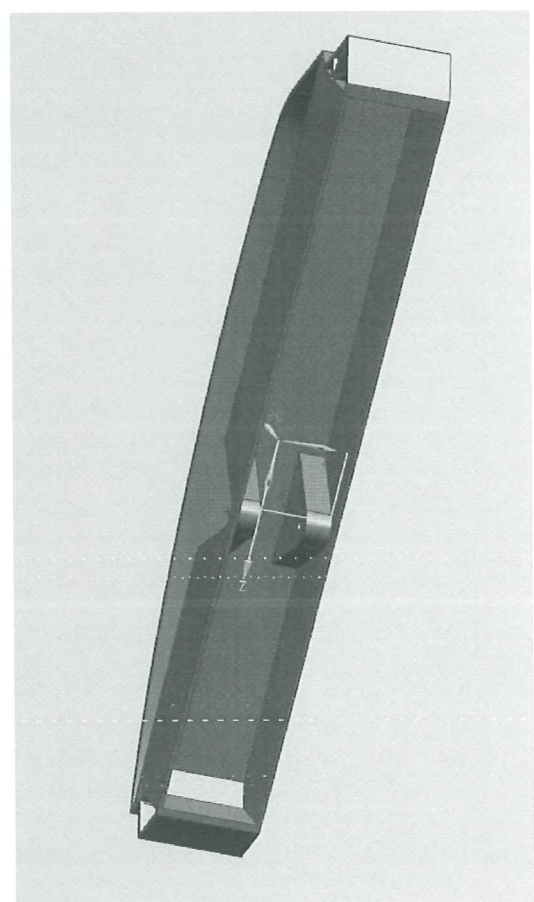
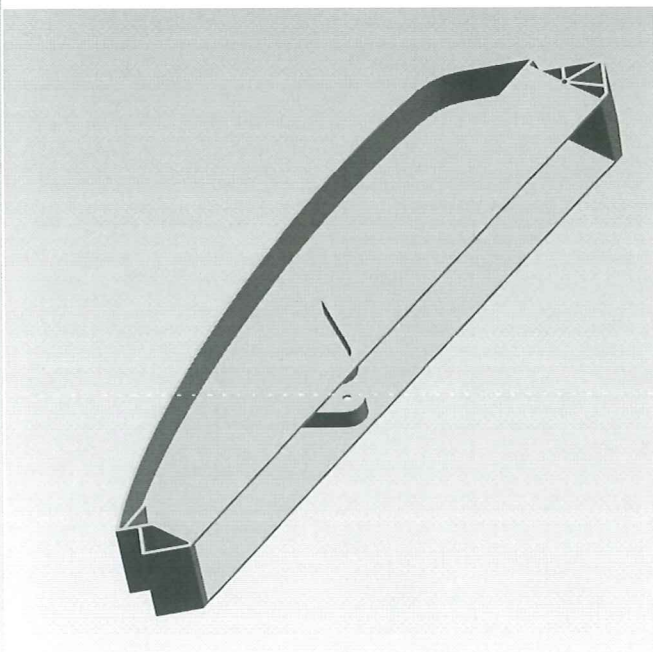
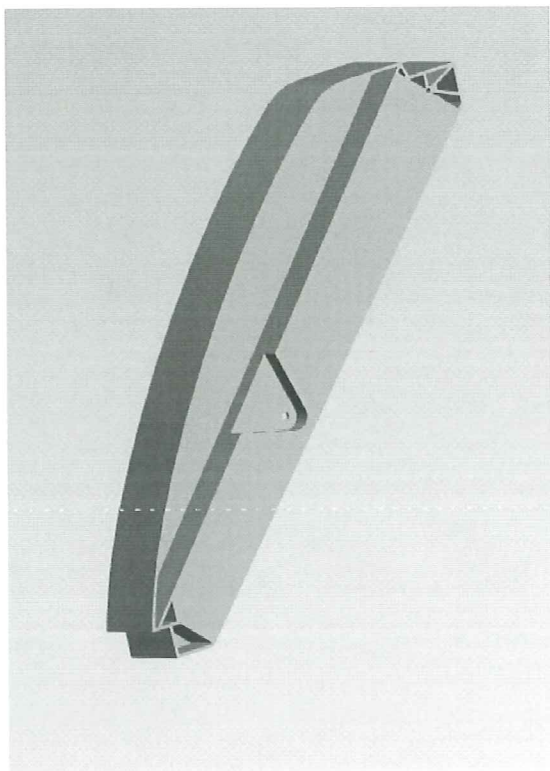


DEBUR ALL EXPOSED EDGES  
Make holes for press/clinch items according to manufacturer's specifications.  
All measures valid without surface treatment unless specified otherwise.

Item	Part No.	Description	Qty.	Specification	Rev.	
Surface Treatment		Material	Aluzinc-Sheet-Steel-DX51D+AZ			
		General Tolerance	Scale	Format	Proj.	
		ISO 2768-1M	1:5	A3		
Dr. AOE	22.05.13	Note: All parts must be RoHS compliant				Rev.
AOE Bracket rolled profile		Part No.				AOE0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000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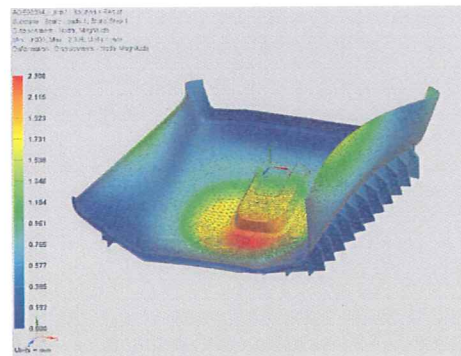


22.06.13

SPRØYTESTØP KORREKT LAST, REDO....

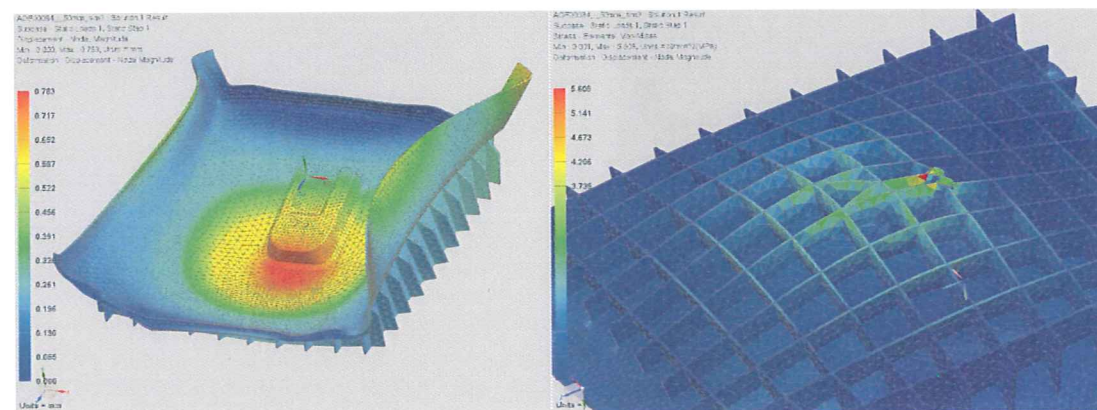
$22\text{Nm}/0,045\text{m} = 244 \times 2 \text{ N}$ , fixed i to punkter foran og bak + fixed i y-retning under leppe.

40mm ribbe



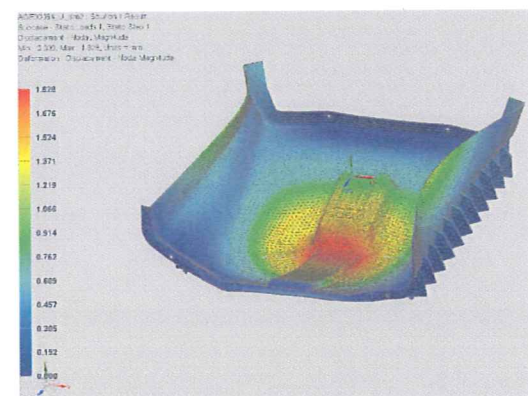
$22\text{Nm}/0,055\text{m} = 200 \times 2 \text{ N}$ , fixed i to punkter foran og bak + fixed i y-retning under leppe.

50mm ribbe



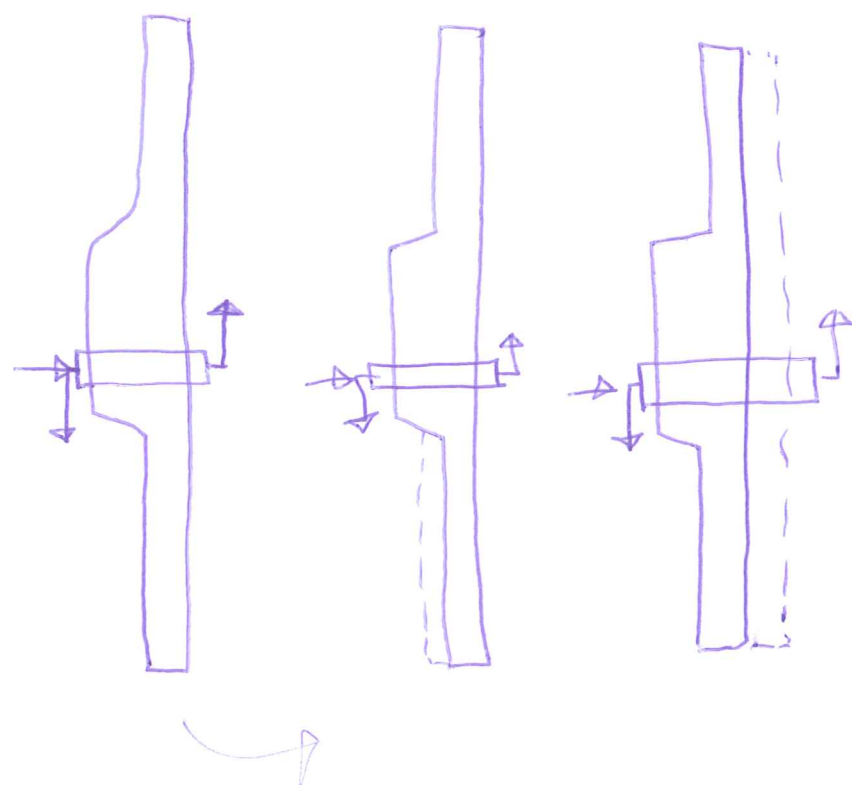
40mm ribbe, med hevet midtparti.

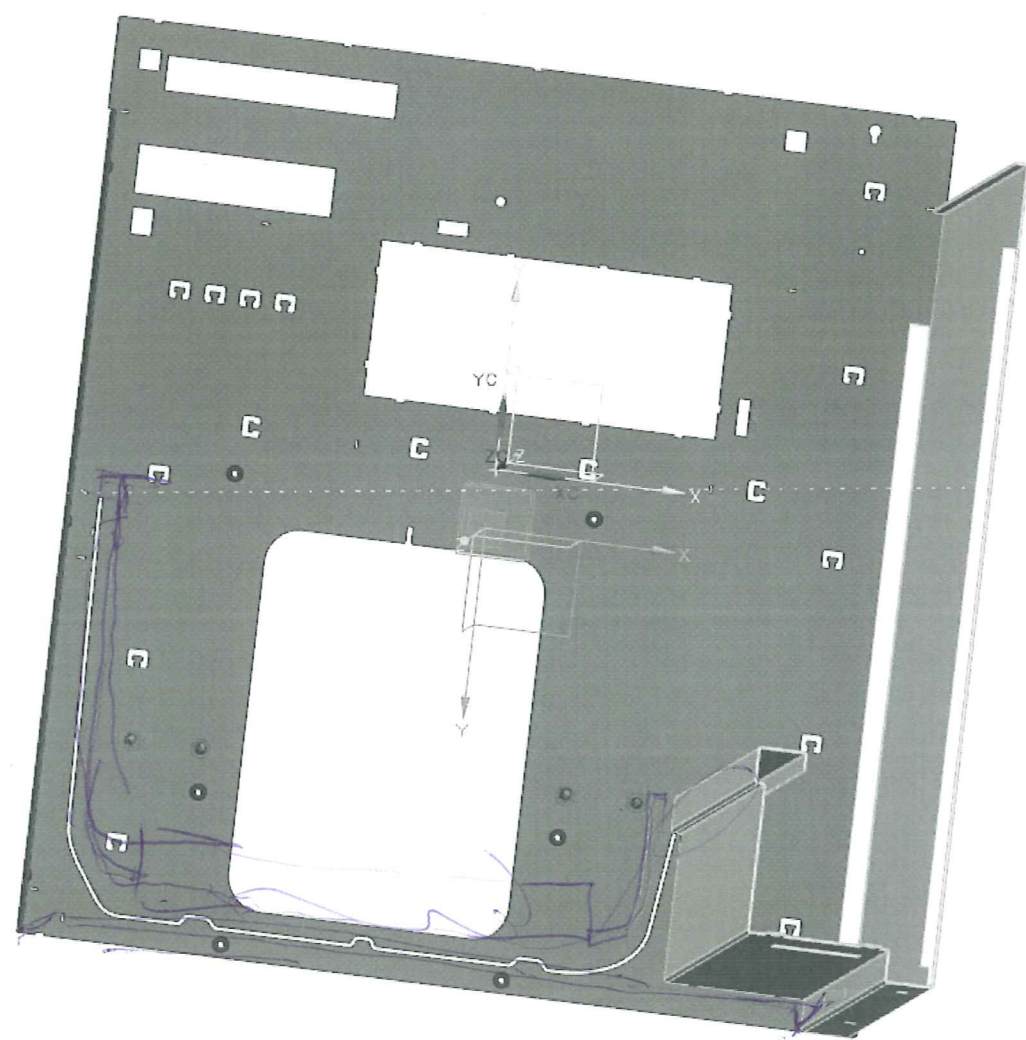
$22\text{Nm}/0,045\text{m} = 244 \times 2 \text{ N}$ , fixed i to punkter foran og bak + fixed i y-retning under leppe.











Stilles

L

Mans :  
 Georg :  
 Ved å stikke trauet  
 gjennom bakveggen vil  
 det være i veien for evt.  
 moduler monteret der.





29.05.13

Holand

Nils Olav - Prosther

63890811

Mus ikke det nok

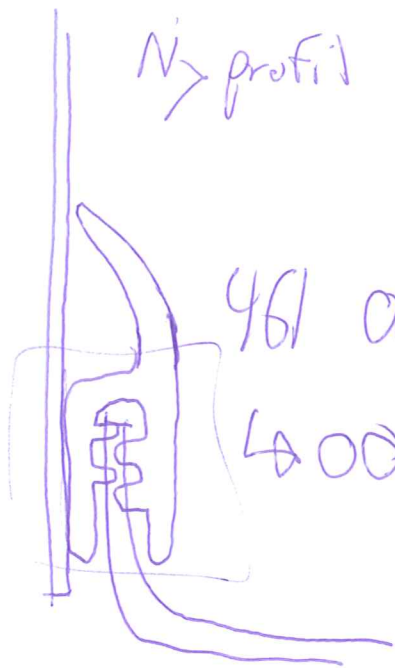
N> profil 3500-4000 hr verhten

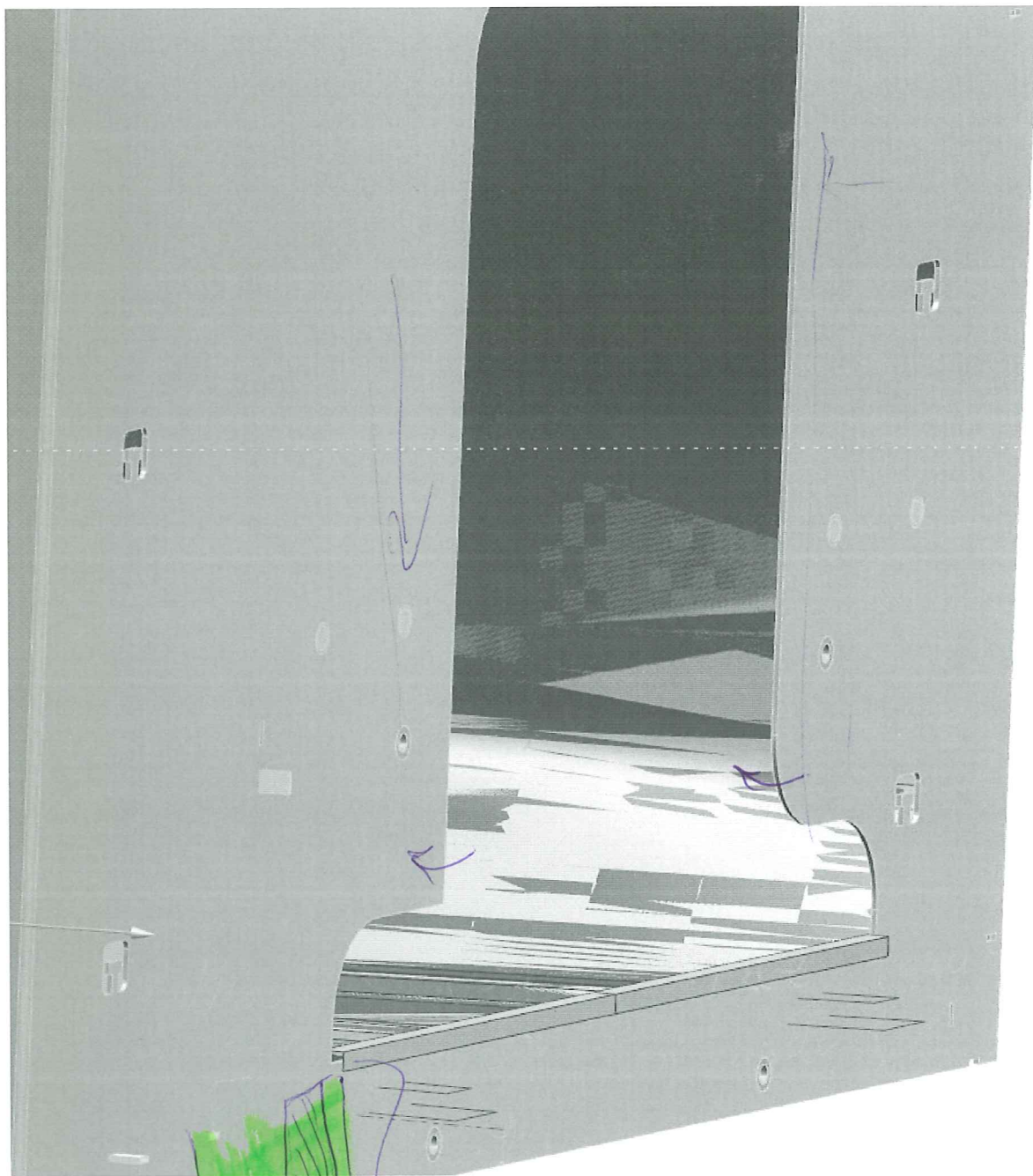
4 mylene gummi : U + dobbel  
barbore

461 0083

400<sup>ord.</sup>  
nr. 378 1014

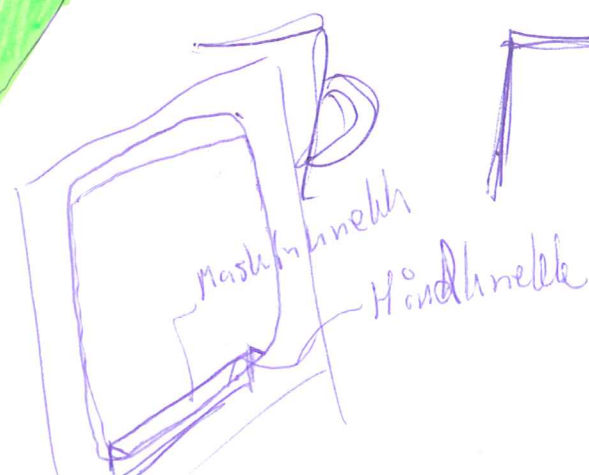
Kantlister



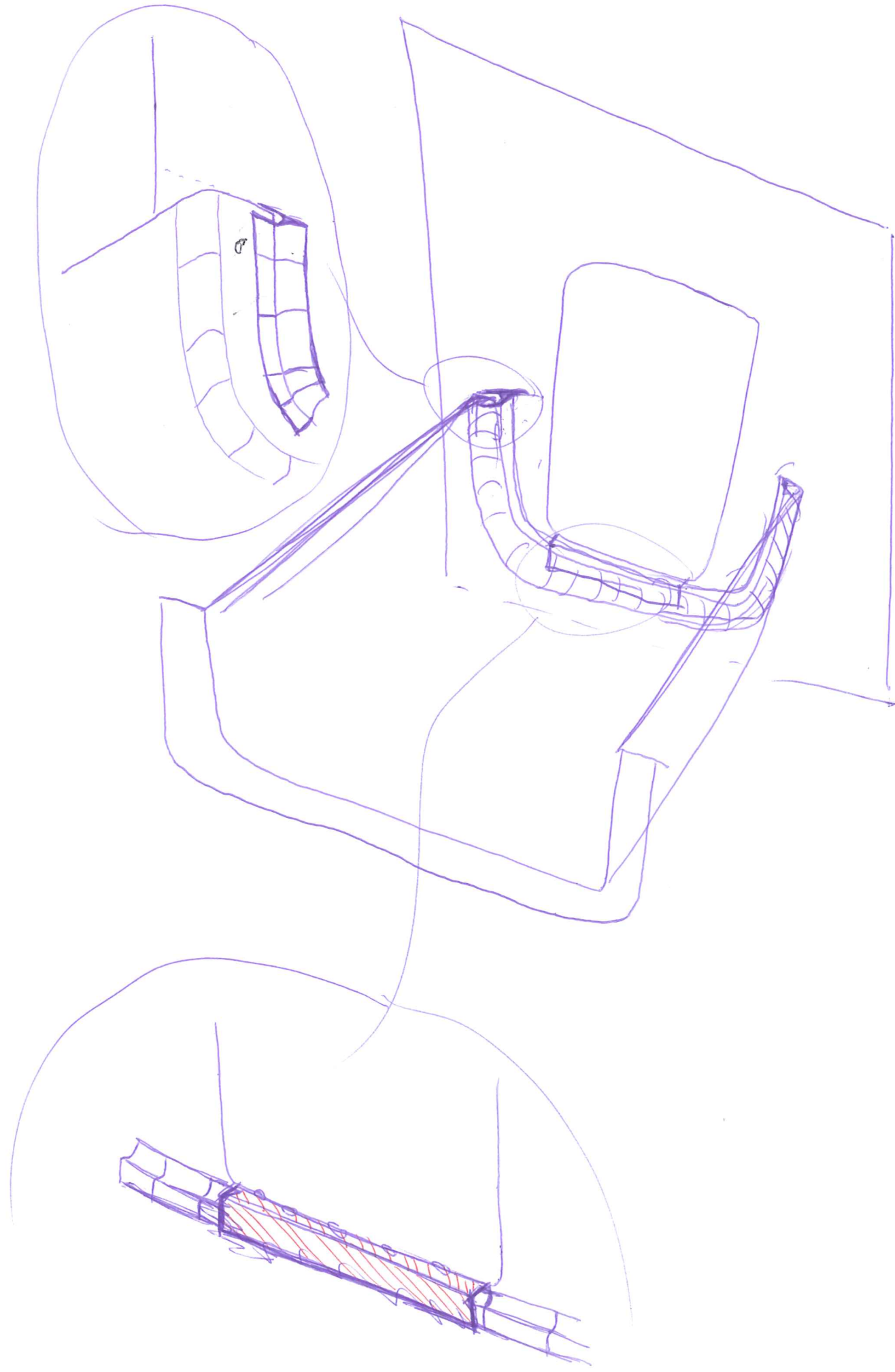


Evt. ~~Rest~~  
Knekk fra  
belyplate  
tilfører  
også belyplate  
stikket

Stikker ut



27.05.13





Arne Olav Eide (Tomra)

From: Eirik Foss  
Sent: 28. mai 2013 10:44  
To: Arne Olav Eide (Tomra)  
Subject: RE: Spørsmål om transport og lagerkostnader

Hei  
Er du her på huset i dag?  
Eirik

From: Arne Olav Eide (Tomra)  
Sent: 27. mai 2013 13:31  
To: Eirik Foss  
Subject: Spørsmål om transport og lagerkostnader

Hei Eirik

Jeg sitter borte i mekanikkavdelingen og skriver masteroppgave. I oppgaven har jeg nå kommet opp med en del alternative deler, som potensielt kan spare Tomra for penger. Men: produksjonen av de ulike delene skjer selvsagt ikke akkurat på samme sted som resten av maskinen, og jeg er gira på å finne ut hvordan dette kan påvirke kostnaden.

Slik jeg har forstått det er det Polen som skal stå for produksjon av både T-9 og Multipac i fremtiden. Mine konsepter har produksjon i Kina (gjennom Tomras avdeling), Tyskland, Østerrike og Norge. Ryktet tilsier at det stadig sendes konteinere mellom Norge og Kina, til en pris omkring 20 000 kr /kontainer. Er det riktig?

Hvordan er prisene på transport på trailer i Europa? Har dere et transport/spedisjonsfirma dere jobber med, som jeg kan forhøre meg med?

Hilsen  
Arne Olav Eide

T-9 Lær (sluttmarked)  
Anne-Carine

Kontainer - Lær - Tom Brødant - kostnad

Ingunn Lundemo - logistikk manager transport  
coordinator

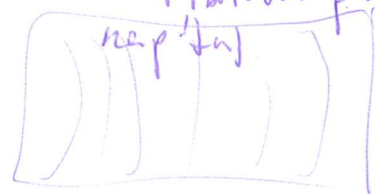
Anne Næss . Øl og et tomra produksjon

LA Nina Mathisen lager i polen vi ikke ikke

Anlägg - rentabilitet

Tonje R-stud - tall for

rentabilitet p  
kapital



PartnerTech

Montasje + 14%

(LBC - wickendal  
transport Norge-Sverige)

Østmark  
Tyskland

→ Polen

8000hr

→ Sverige

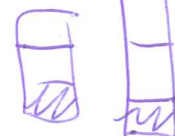
12000hr

Transportøkonomisk institutt

Lagerhold = offverdr

Lagstilt hastred (13,9%) av omsetning

14,2% → høy margin →



Kostnadsdel hastred i varebeholdende bedrifter

Internasjonalt

(Kost til ekstra administrasjon skuelider

→ PartnerTech 14%

Lagerkost

Transportkost

Kapitalkost

Forsikring

Administrasjon/system

Risiko for revisjon/ending

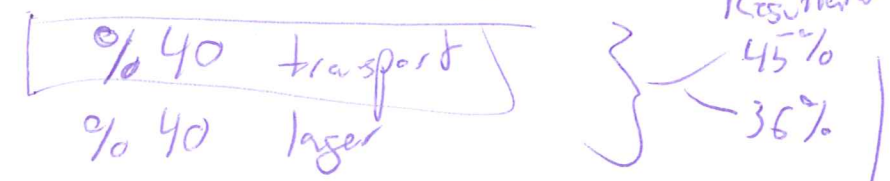
pris pr m<sup>2</sup> - hindertings pr. pall

22.05.13

TPI

3.2 Logistikkosten → umfasst Frachting, veredelt, Lager, derg.  
 6.1 Kostenkalkulation i. Logistik

Resultate S. 1052/2010



- ↳ 20% Kapitalkost
- Fürsicherung
- Administrationskosten
- Risiko
- ++
- embalasje
- svinn

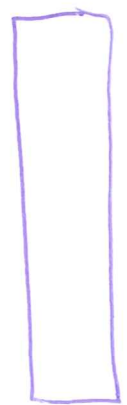
Gemittelt  
 1/500000 Lager  
 = 2 mmol / 500000 Lager

IX Kostenwert werden ist  
 Marge ist nicht nur  
 werden mit (an BNP)

↳ Transportkost (Lohnt)

↓  
 x 2,5 (= transport, Lager ++ ) = Logistikkost hat  
 Lieferant

Vor Logistik  
 Kosten = x 1,14 (14%)



Ex works  
 Delivered Duty paid  
 Cost of goods sold

Billing material  
 ↳ Större präsent

2%

Fracht = Fracht + Frachtpreis  
 Frachtpreis

1,8-2,2 Lagerhaltung

Fly → 20 → 1,9 = 2012

Ship → 1,9 = 2012

1,9% an COG's?

1,3-1,5

22.05.13



30.05.13

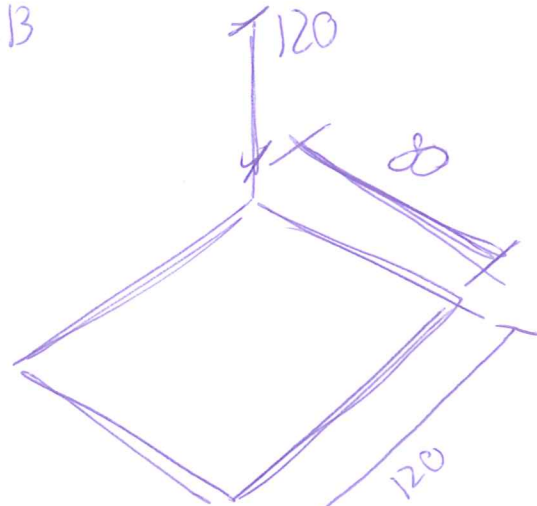
Bring Warehouse Pallpass os handling p. &

10:53 ~~130~~ 932 83 900 Lars

lars.magnus.hjerkin@bring.com

70 kr/pall/minut

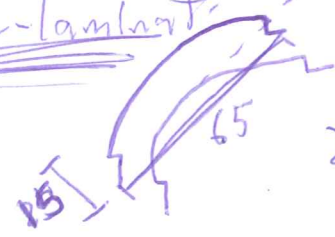
31.05.13



Ting som skal fraktes:

- ✓ - vakuumformet trau
- ✓ - sprøytestøpt trau
- ✓ - Hardtool-trau split
- ✓ - -n- hel
- ✓ - Tre laminat
- ✓ - Rim dør
- ✓ - Rot. dør
- ✓ - Rullet dør
- ✓ - Brakett laminat
- ✓ - Rullet roller,

Tre-laminat



22 pr pall  $\rightarrow 4000/22 = 181,8 \rightarrow 182$  paller  
 $182 \text{ paller} = \frac{182}{33} \text{ trailere} = 5,51 \text{ trailere}$

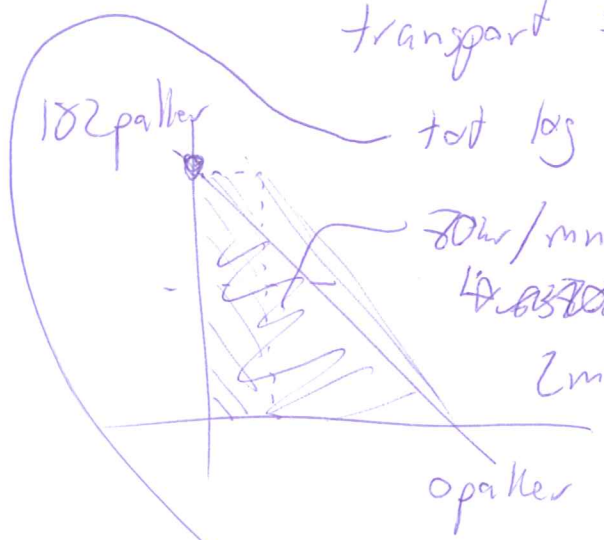
~~48000 hr = 48000 hr~~

6 trailere  $\cdot 8000 \text{ hr} = 48000 \text{ hr}$

$48000 \text{ hr} / 4000 \text{ dører} = 12 \text{ hr}$

transport = 40% av tot. log kost

tot log kost = 30 hr



70 hr/minn lagring/pall

~~48000 hr~~ 76440 hr for 182 paller

2 minn inn i 40% til lagr  $\rightarrow 76440 \rightarrow 63700$

$63700/4000 = 15,925 \text{ hr}$

$\Delta 46 \text{ hr i log kostn.}$

Rullet

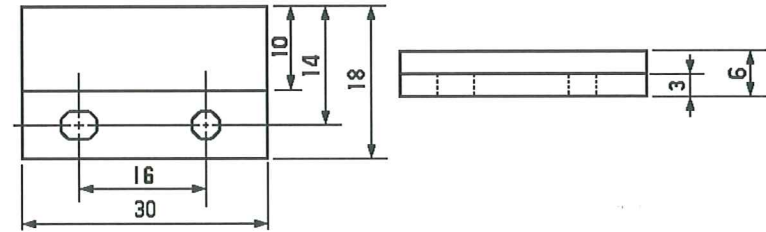
20 pr pall

RIM 13 pr/pall

ROTO 8 pr/pall

Tomra part no. 28031061 Text 1: MAGNET ACTUATOR REED SWITCH Text 2: Last issue date/sign. 29-Jan-10/ DWI

PHYSICAL DIMENSIONS:



DATA:

Housing Material: Plastic  
Minimum Operating Temperature °C: 70  
Magnetic Approach: Direct Axis, Parallel Axis

APPROVALS:

HAMLIN UL certification: E61760 (N)  
GENTECH UL certification: E153493

ACCEPTED TYPES:RoHS OK

Complete part description	Manufacturer	Distributor
57407-000	Hamlin	EG Components
PM 101	Gentech	Gylling Teknikk AS

Note: All parts must be RoHS compliant.

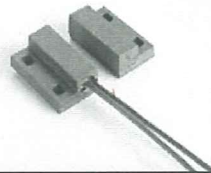
NOTES:

Date original: 11-Mar-96 Initials: PB

Revisions

Date	Initials	Description
18-Jun-01	PWJ	Added Gentech as alternative, changed part no. to 8 digit
7-Mar-06	PB	Changed name of part
8-May-06	KEN	Added RoHS information
22-May-06	KEN	Corrected RoHS information
29.JAN.10	DWI	Updated Gentech info with ROHS and UL





## Features

- Magnetically operated position sensor
- Matching actuator available
- Compact size requires only 3.2cm<sup>2</sup> board space
- Screw down or adhesive mounting
- Customer defined sensitivity
- Choice of cable length
- Leads can exit from LH or RH side

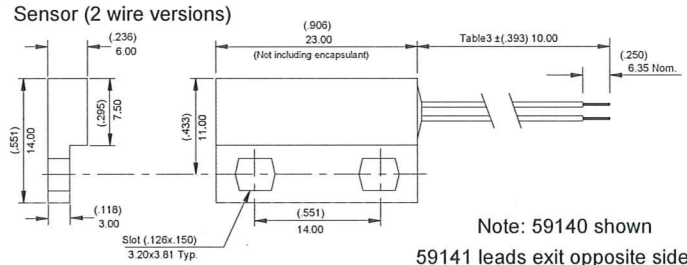
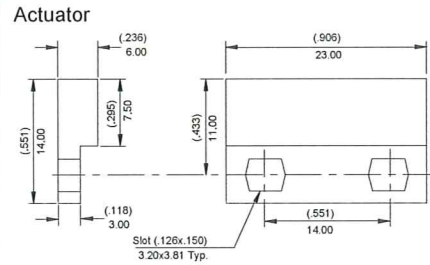
## Benefits

- No standby power requirement
- Operates through non-ferrous materials such as wood, plastic or aluminium
- Hermetically sealed, magnetically operated contacts continue to operate long after optical and other technologies fail due to contamination

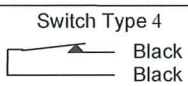
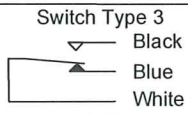
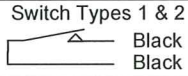
## Applications

- Position and limit sensing
- Security system switch
- Linear actuators
- Door switch

## DIMENSIONS (in) mm



## SCHEMATICS



## CUSTOMER OPTIONS - Switching Specifications

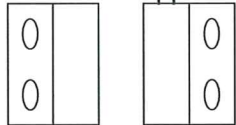
TABLE 1 Switch Type		Select Option	1	2	3	4
		Contact Type	Normally Open	Normally Open High V.	Change Over	Normally Closed
Contact Rating	Power	Watts - max	10	10	5	5
Voltage	Switching	Vdc - max.	200	300	175	175
	Breakdown	Vdc - min.	250	450	200	200
Current	Switching	A - max.	0.5	0.5	0.25	0.25
	Carry	A - max.	1.2	1.5	1.5	1.5
Resistance	Contact, Initial	Ohms - max.	0.2	0.2	0.2	0.2
	Insulation	Ohms - min.	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>9</sup>	10 <sup>9</sup>
Temperature	Operating	°C	-40 to +105	-20 to +105	-40 to +105	-40 to +105
	Storage	°C	-65 to +105	-65 to +105	-65 to +105	-65 to +105
Time	Operate	ms - max.	1.0	1.0	3.0	3.0
	Release	ms - max.	1.0	1.0	3.0	3.0
Capacitance	Contact	pF - typ.	0.3	0.2	0.3	0.3
Shock	11ms ½ sine	G - max.	100	100	50	50
Vibration	50-2000 Hz.	G - max.	30	30	30	30

## CUSTOMER OPTIONS - Sensitivity, Cable Length and Termination Specifications

### TABLE 2 Sensitivity

Activate distances (d) are approximate using Hamlin 57140-000 actuator as illustrated.

Switch AT before modification



Select Option	S		T		U		V	
Switch Type	Pull-In AT Range	Activate Distance (d) (in)mm	Pull-In AT Range	Activate Distance (d) (in)mm	Pull-In AT Range	Activate Distance (d) (in)mm	Pull-In AT Range	Activate Distance (d) (in)mm
1	12-18	(.453)	17-23	(.374)	22-28	(.315)	27-33	(.295)
2		11.5		9.5		8.0		7.5
3	15-20	(.413)	20-25	(.354)	25-30	(.295)		
4		10.5		9.0		7.5		

### TABLE 3 Cable Length

(Cable 24AWG 7/32 PVC 105°C UL1430 / UL1569)

Select Option	Length(in)mm
02	(11,81) 300
05	(39,37) 1,000

### TABLE 4 Termination (2 wire versions shown)

Select Option	Description	Diagram
A or F	Tinned or untinned	

## ORDERING INFORMATION

Series 59140/59141 — 59140/59141 — X X XX X

Switch Type — Table 1 (1, 2, 3 or 4)

Sensitivity — Table 2 (S, T, U or V)

Cable Length — Table 3 (02 or 05)

Termination — Table 4 (A or F)

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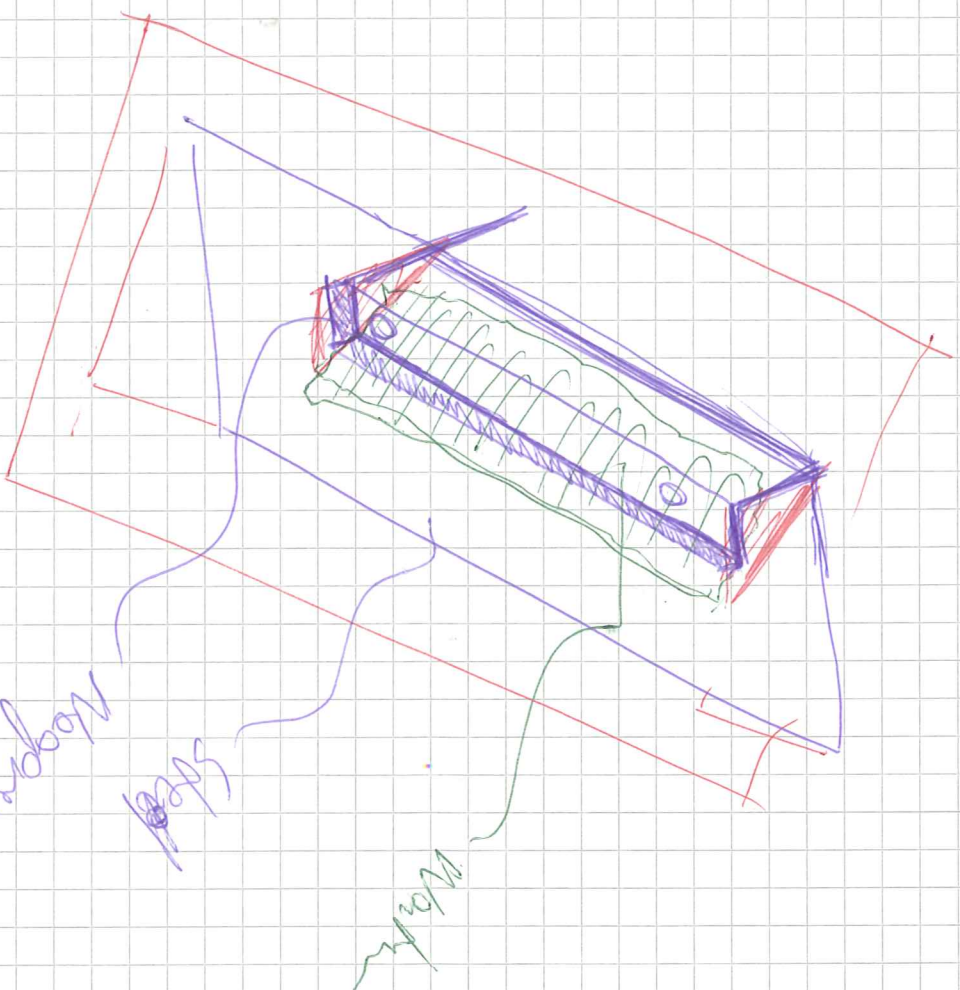
Issue:AC 13/08/09 DCR:B6359

05,06.18

0710 olsen

stepte- 15-20000h  
rollings

for palmer-5



		Her	Pris	Volume	<del>Cost of fuel</del> <del>transp</del> 20hr	Montage - 5min? + 5min?	98,5 <del>96,5</del>
1,3 usg	Vacuum						
	Trau	- Norge	- 42 hr		-		
	Baketh	- Polen	- 76 hr	50+	0		
1,065	Sprengstoff						
	Trau	- Kina	- 58,4 hr	~	55		<del>87</del> 86,5
2,3kg	Hard-split						
	Trau	- Kina	- 41 hr	5000	12		89
			50hr	1000			
3,1	Hand-alkoh						
	Trau	- Kina	- 55	5000	20		78
			65	1000			
	Potasjon						
	Trau	- Norge	- 198	5000/in	/		
	Lambert						
	Lambert	- Tyskland / Danmark			15 02		75
	Baketh	- Kina					
	RIM						
	Spant	-			52		0
	Rotations opp						
	Rotations opp	- Norge			40		0
	Rolleboret						
	Profil	- Østerrike			375		575
	Spant	- Kina			7,1		

2000 pr/ambis for Kina