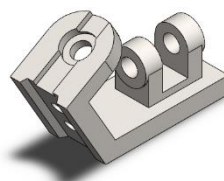
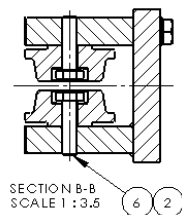
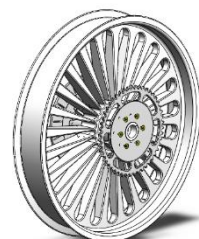
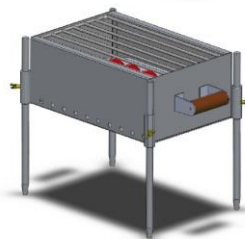
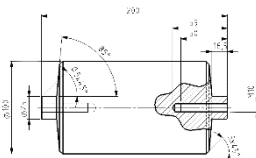
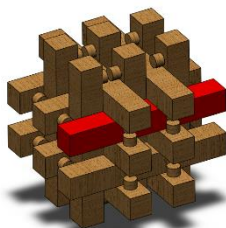
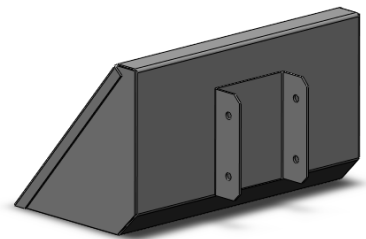
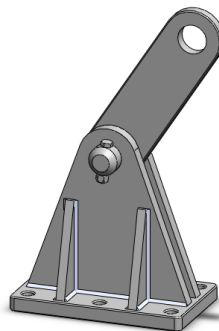
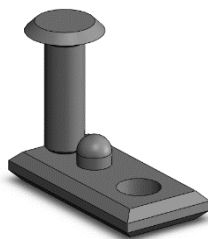
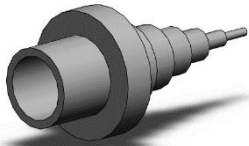


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Initiatief: Kees Kloosterboer (SOLIDWORKS Benelux)

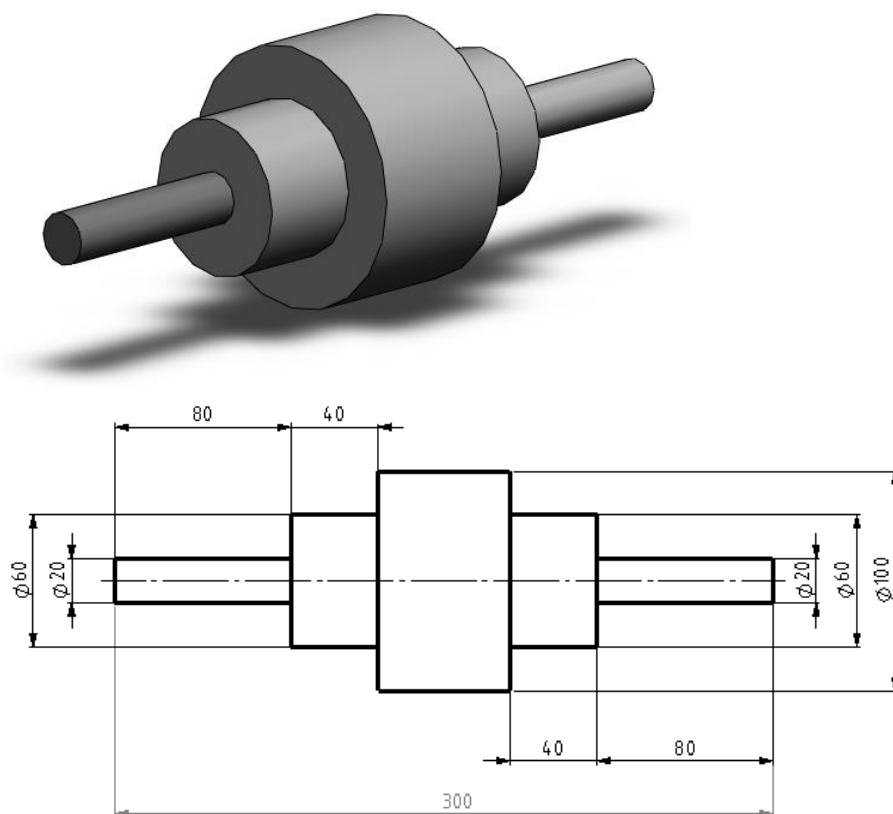
Afstemming op onderwijs: Jack van den Broek

Realisatie: Arnoud Breedveld (PAZworks)

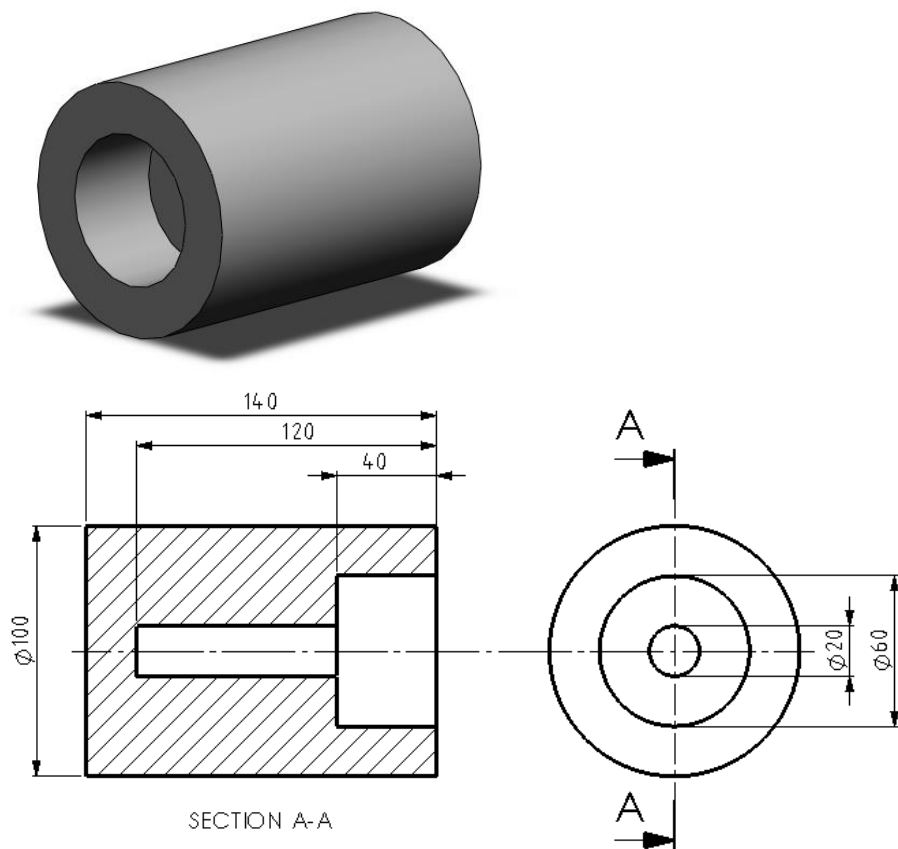
	Oefenopdrachten	
	Werkplan	Gefeliciteerd! Je hebt de eerste tutorials van SOLIDWORKS nu doorgenomen, dus je snapt al een beetje hoe SOLIDWORKS werkt. Om het programma echt te leren kennen, is het erg belangrijk dat je veel oefent! Daarvoor is deze oefenbundel bedoeld. Je hebt nu een groot aantal oefeningen om meer thuis te raken in SOLIDWORKS. Het is het beste om elke keer als je een tutorial van SOLIDWORKS gedaan hebt, uit deze bundel de oefeningen te maken die bij die tutorial horen. Je kunt wat je geleerd hebt dan meteen toepassen. Sla de bestanden (parts, assemblies en drawings) van alle oefeningen die je maakt op. Sommige onderdelen gebruik je later namelijk opnieuw om een tekening van te maken. Maak hiervoor een nieuwe map aan. Noem deze map bijvoorbeeld "SOLIDWORKS oefenopdrachten". Geef als naam van het bestand steeds de naam van de oefening (bijvoorbeeld: Oefening1-1.sldprt). Bij de meeste oefeningen staat geen uitleg. Op basis van de tekening moet je het onderdeel kunnen modelleren. Veel tekenplezier en succes!

Oefeningen bij Tutorial 1

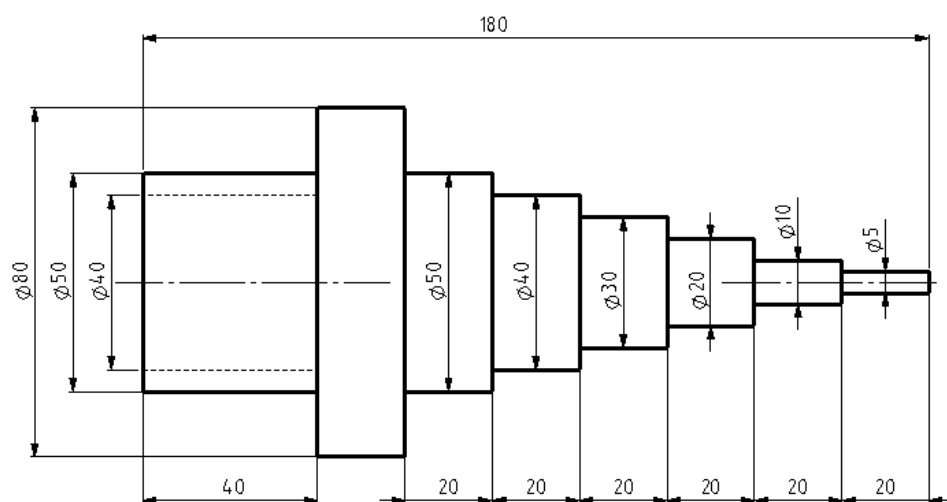
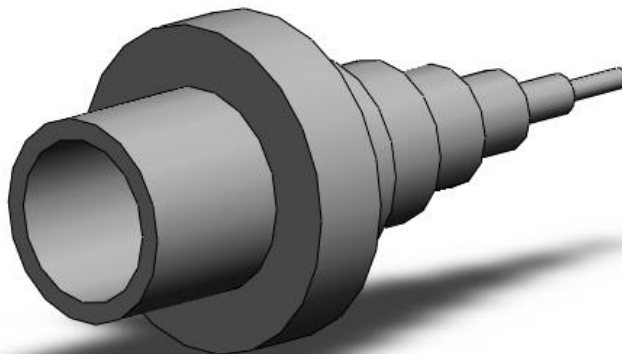
Oefening 1-1



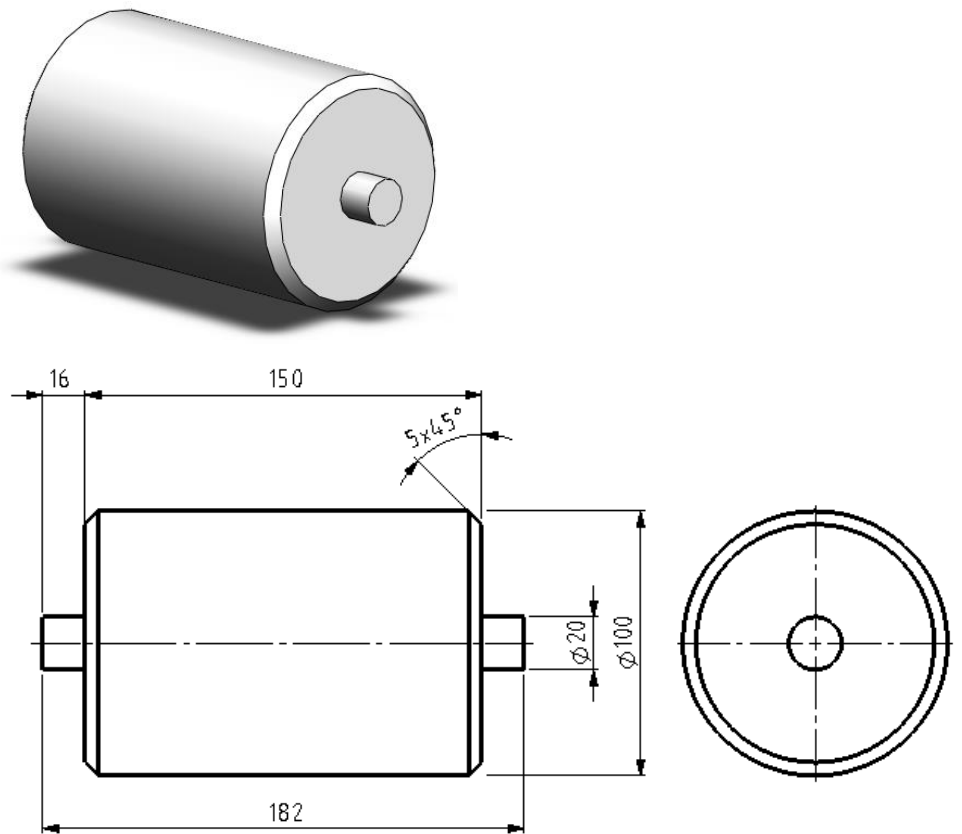
Oefening 1-2



Oefening 1-3

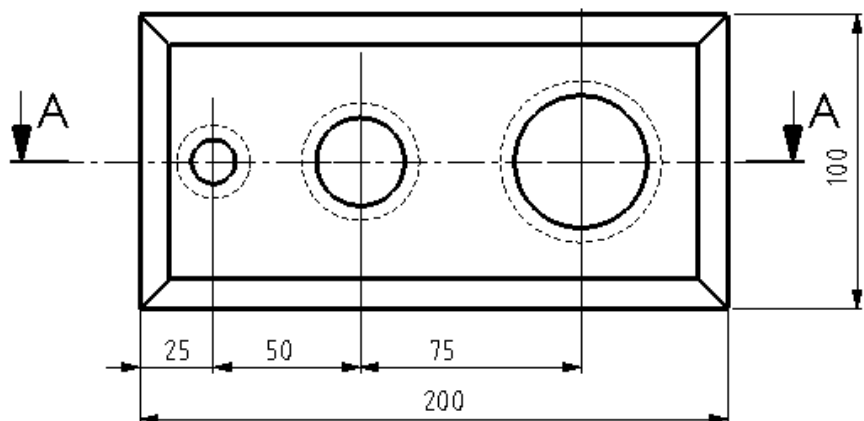
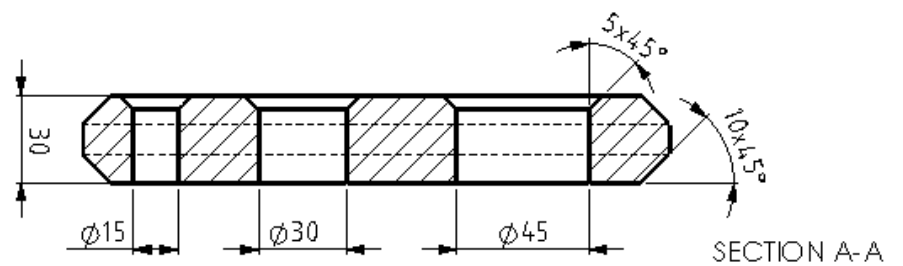
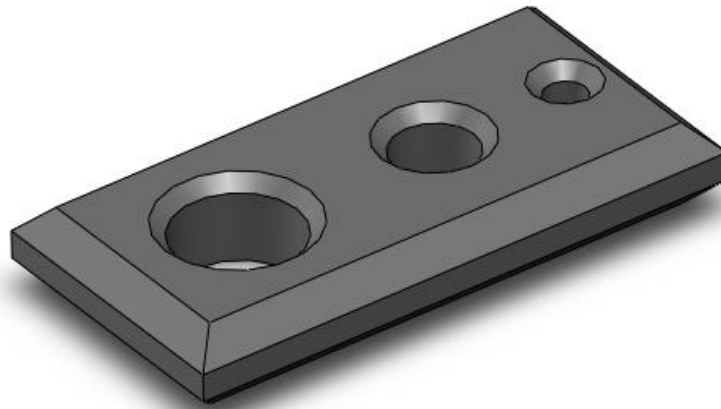


Oefening 1-4

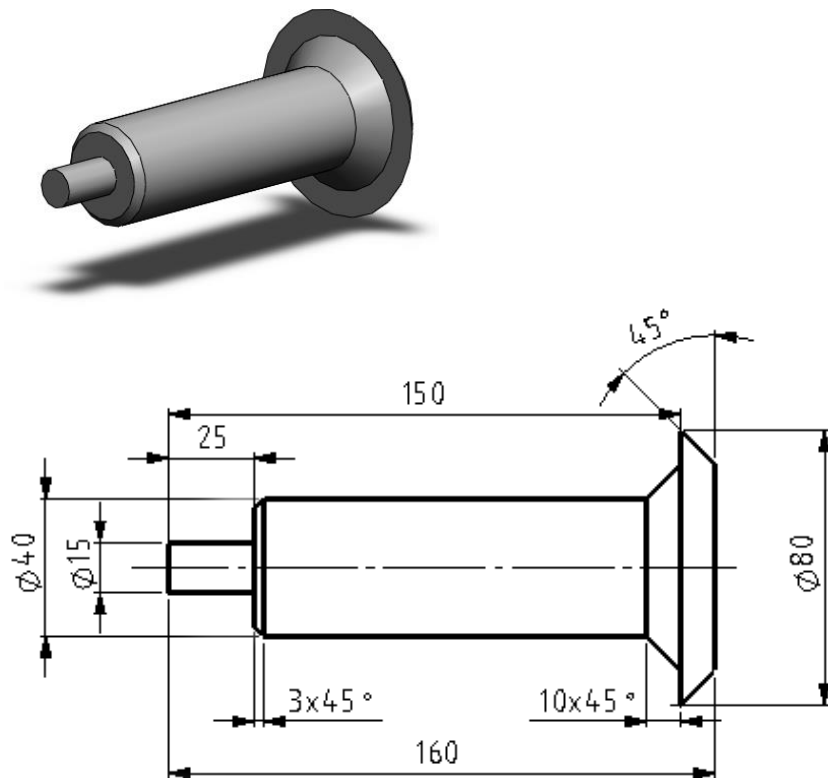


Oefeningen bij Tutorial 2

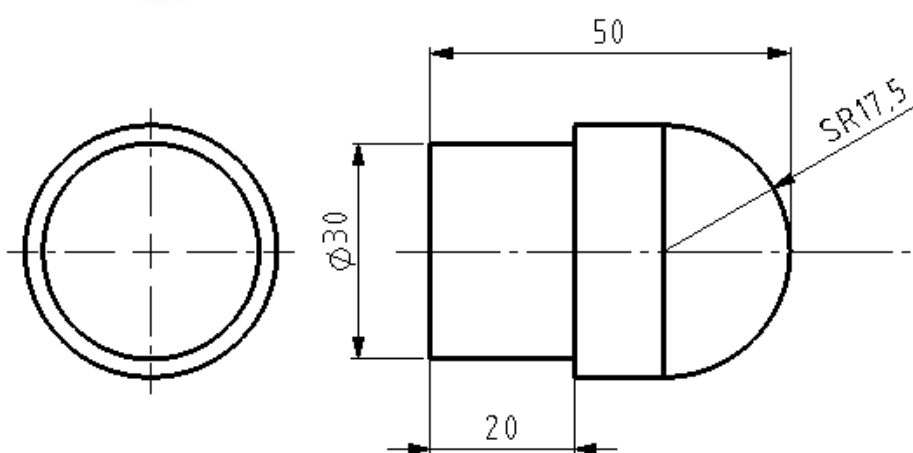
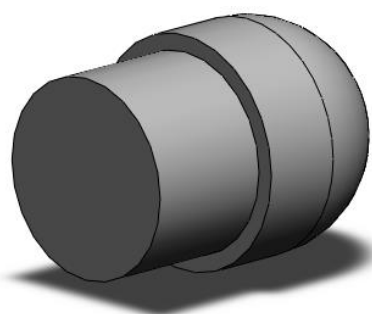
Oefening 2-1



Oefening 2-2

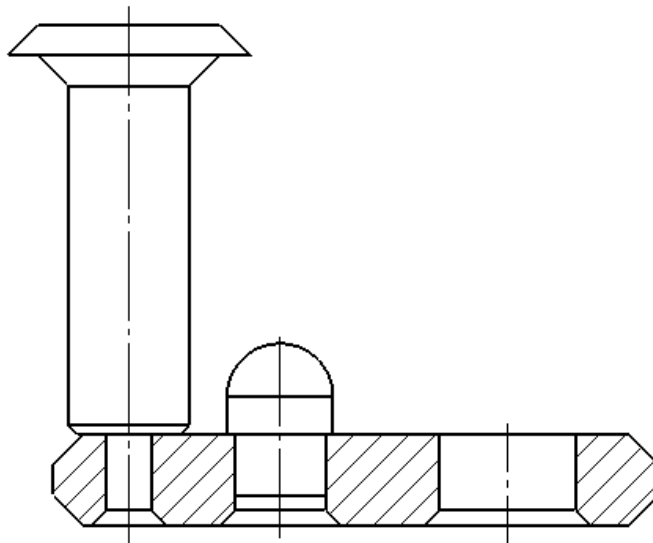
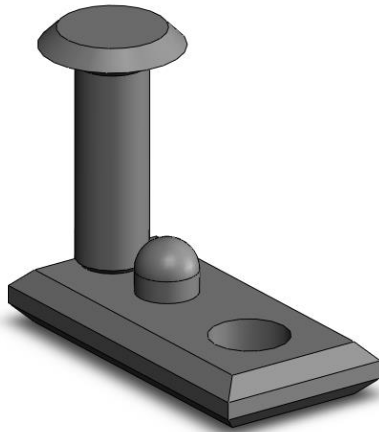


Oefening 2-3

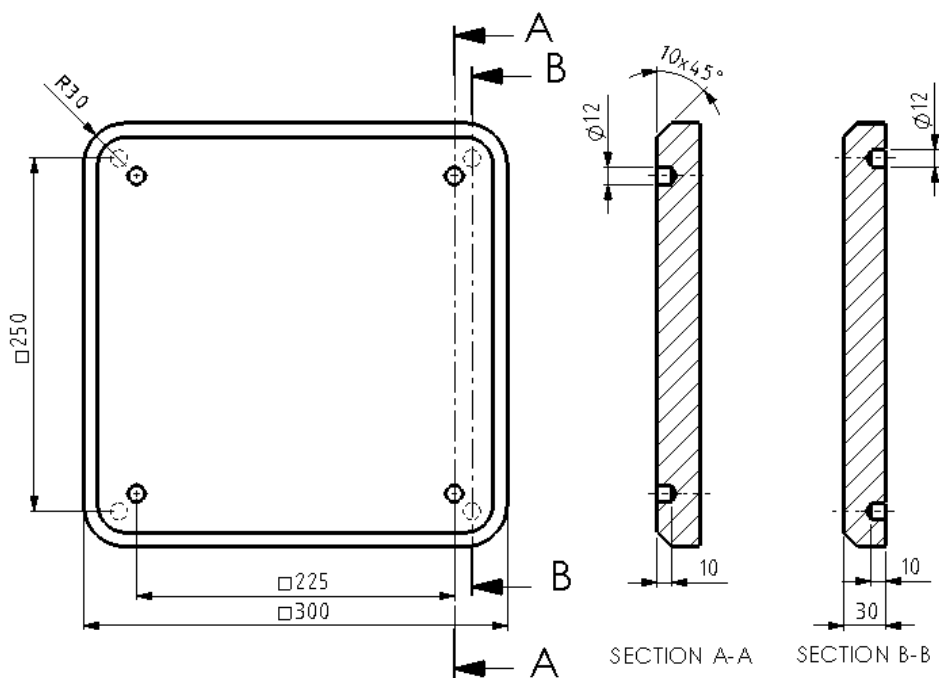
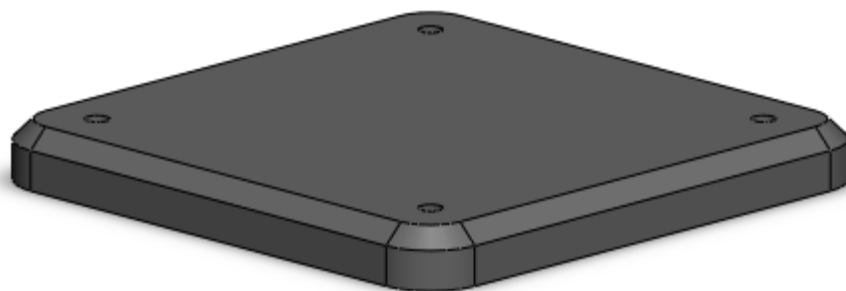


Oefening 2-4

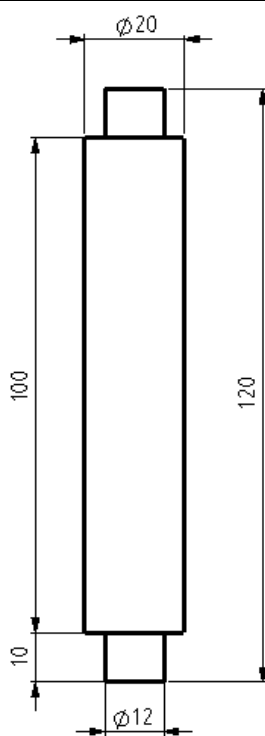
Gebruik de parts uit oefeningen 2-1 t/m 2-3 om de assembly hiernaast te maken.



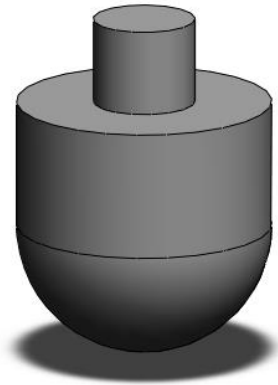
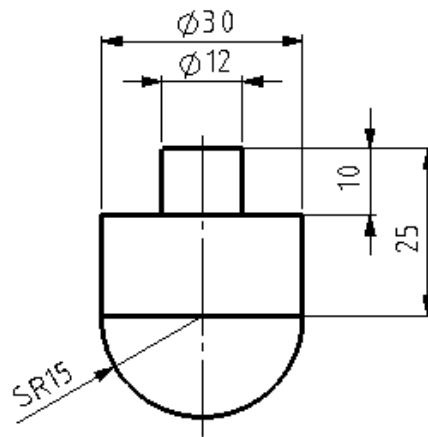
Oefening 2-5



Oefening 2-6



Oefening 2-7

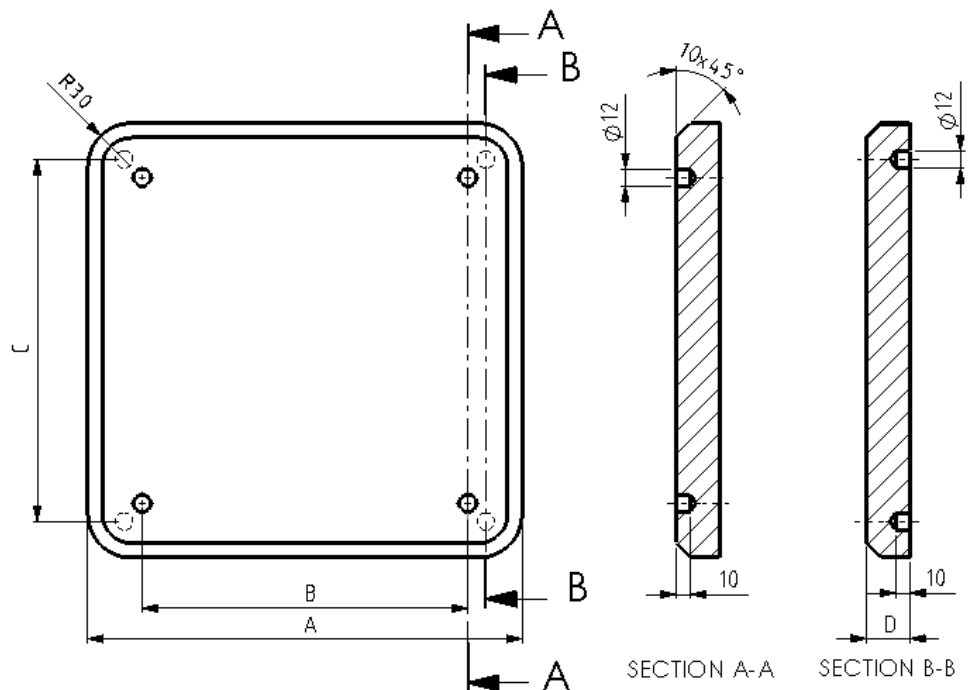


Oefeningen bij Tutorial 3

Oefening 3-1

Neem het model uit oefening2-5, en maak daarvan configuraties, met de maten volgens de tabel hiernaast.

Configuratie1 heeft dezelfde maten als het model in oefening2-5, er moeten dus 5 nieuwe configuraties gemaakt worden.



	A	B	C	D
Configuratie1	300	225	250	30
Configuratie2	275	175	225	20
Configuratie3	225	125	175	20
Configuratie4	175	75	125	20
Configuratie5	125	25	75	20
Configuratie6	75	0*	25	20

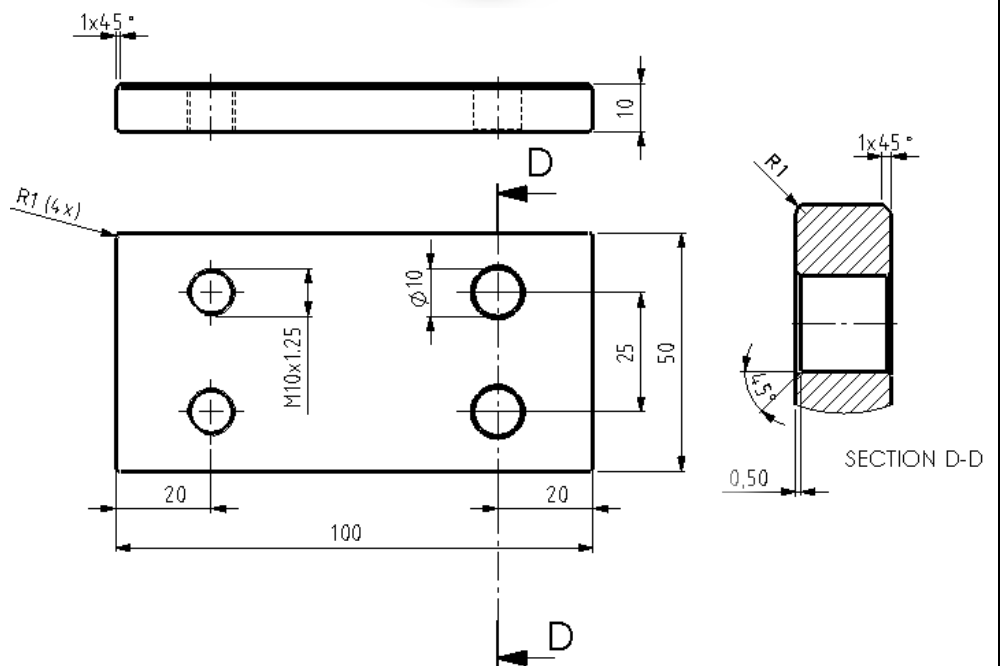
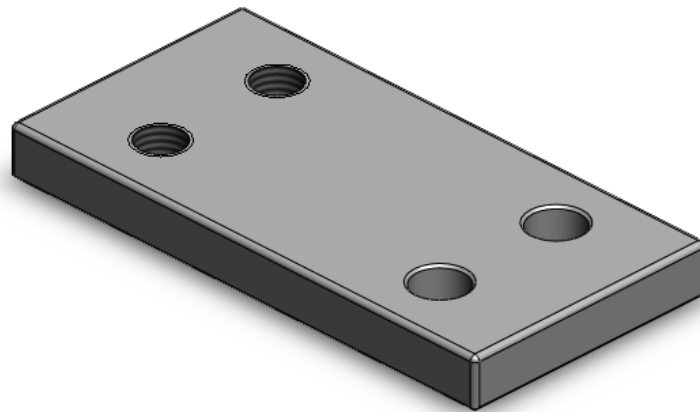
* Configuratie6 heeft in het bovenzvlak slechts één gat, in het midden van het vlak.

Oefening 3-2

Voeg de onderdelen uit oefeningen 2-5 t/m 3-1 samen tot een assembly zoals je die hiernaast ziet. Geef de verschillende onderdelen verschillende kleuren.

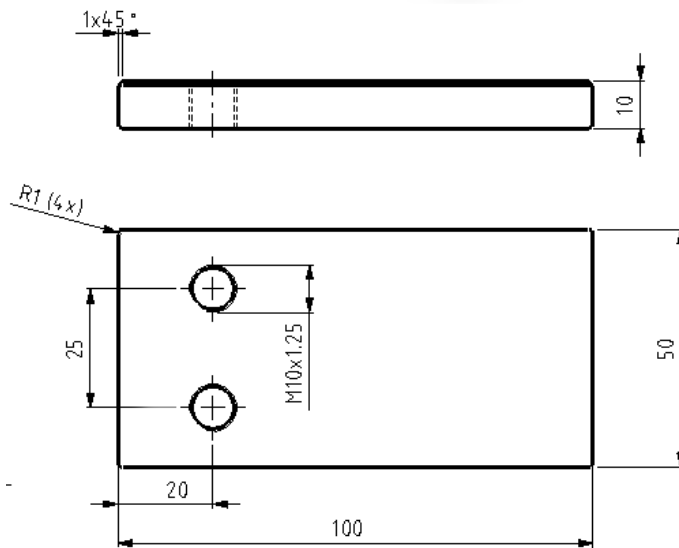
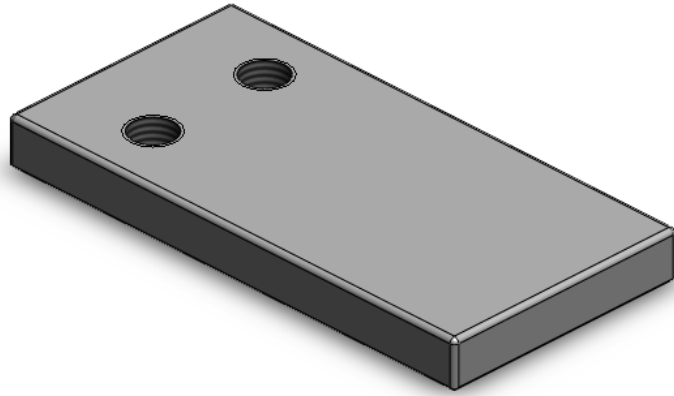


Oefening 3-3



Oefening 3-4

Neem het model uit oefening3-3, en maak daarvan een nieuwe configuratie, zoals je hiernaast ziet. Om deze configuratie te maken suppress je de twee gaten.

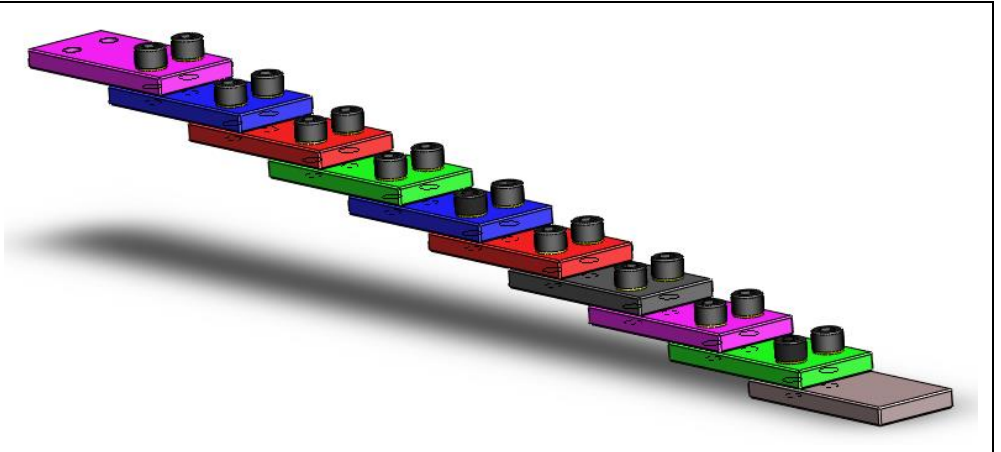


Oefening 3-5

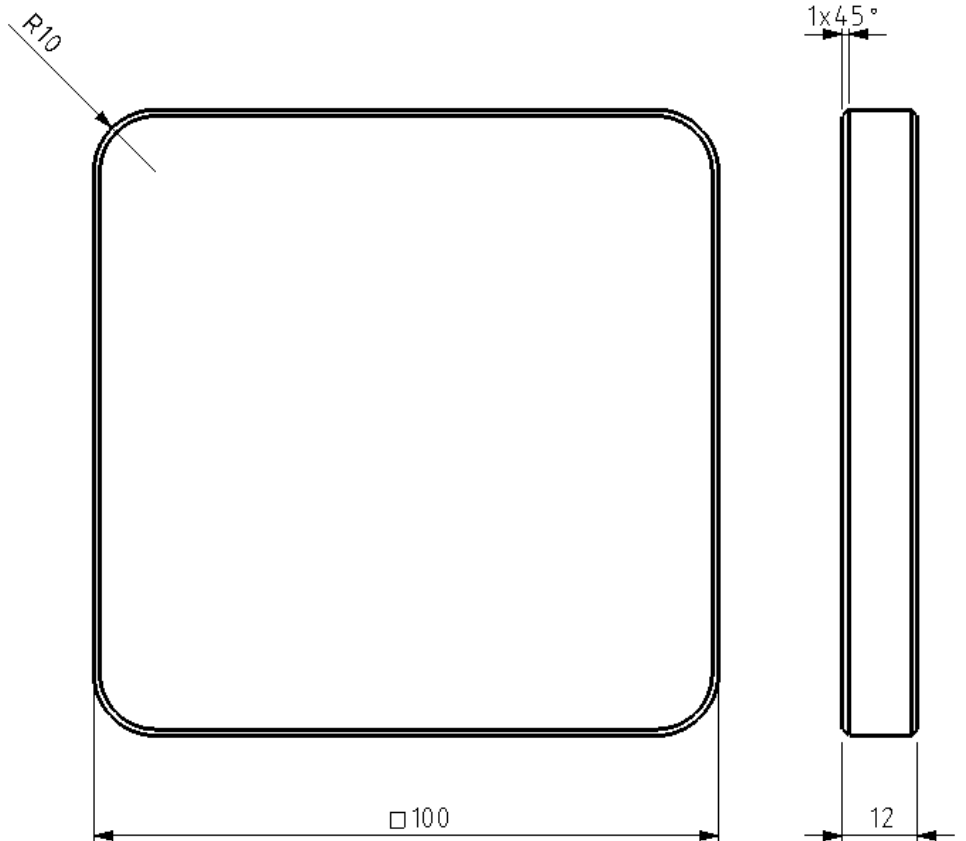
Maak een assembly zoals je hiernaast ziet. Gebruik de onderdelen uit oefening 3-3 en 3-4.

Gebruik voor de bevestiging uit Toolbox een Hex Socket Head, M12x1.25x20.

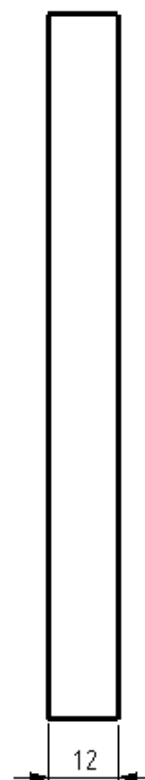
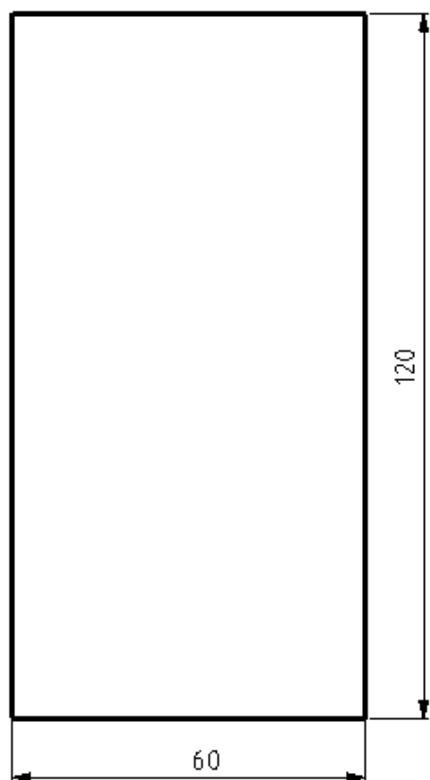
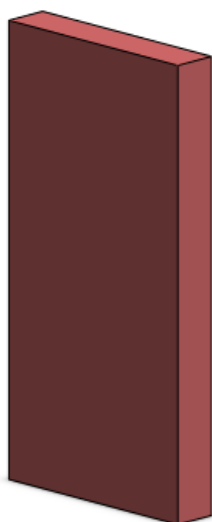
Plaats onder elke schroef een vlakke sluitring (plain washer)



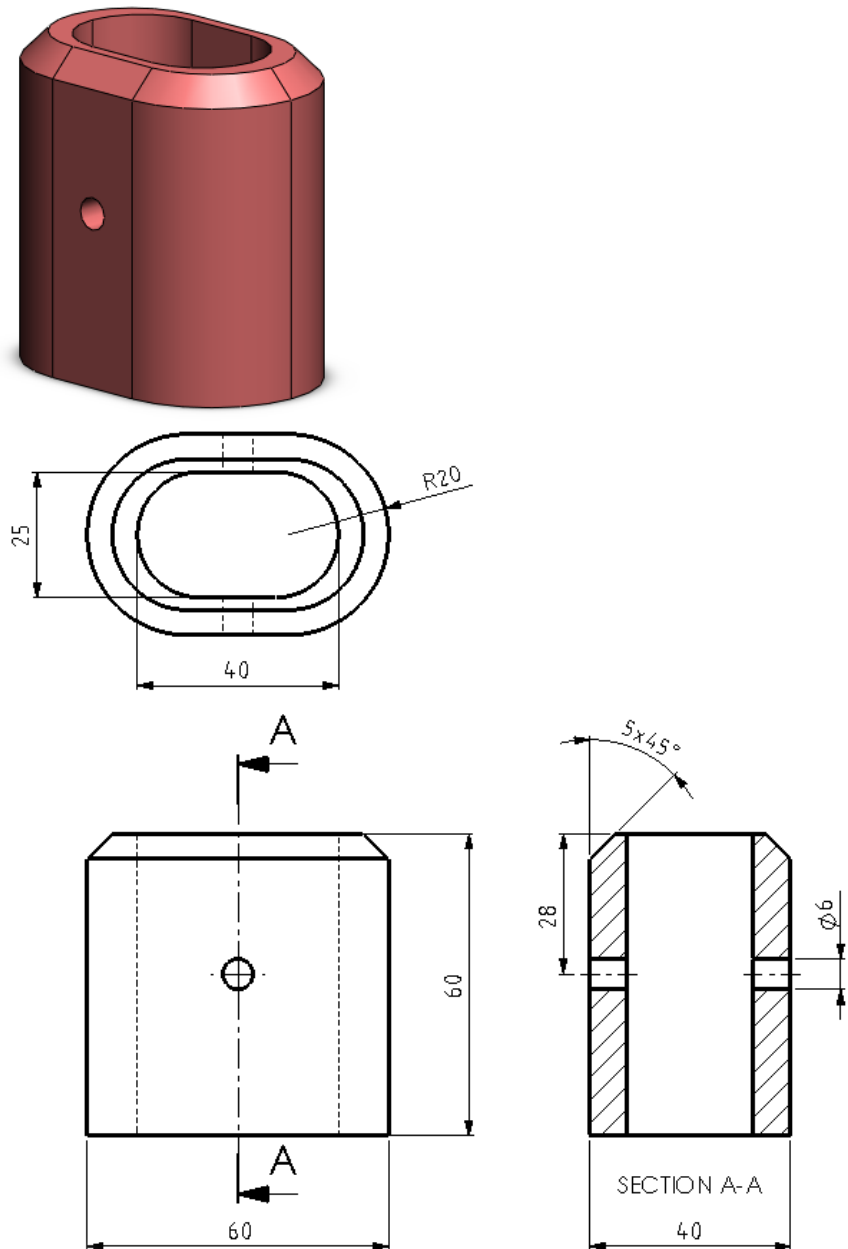
Oefening 3-6



Oefening 3-7

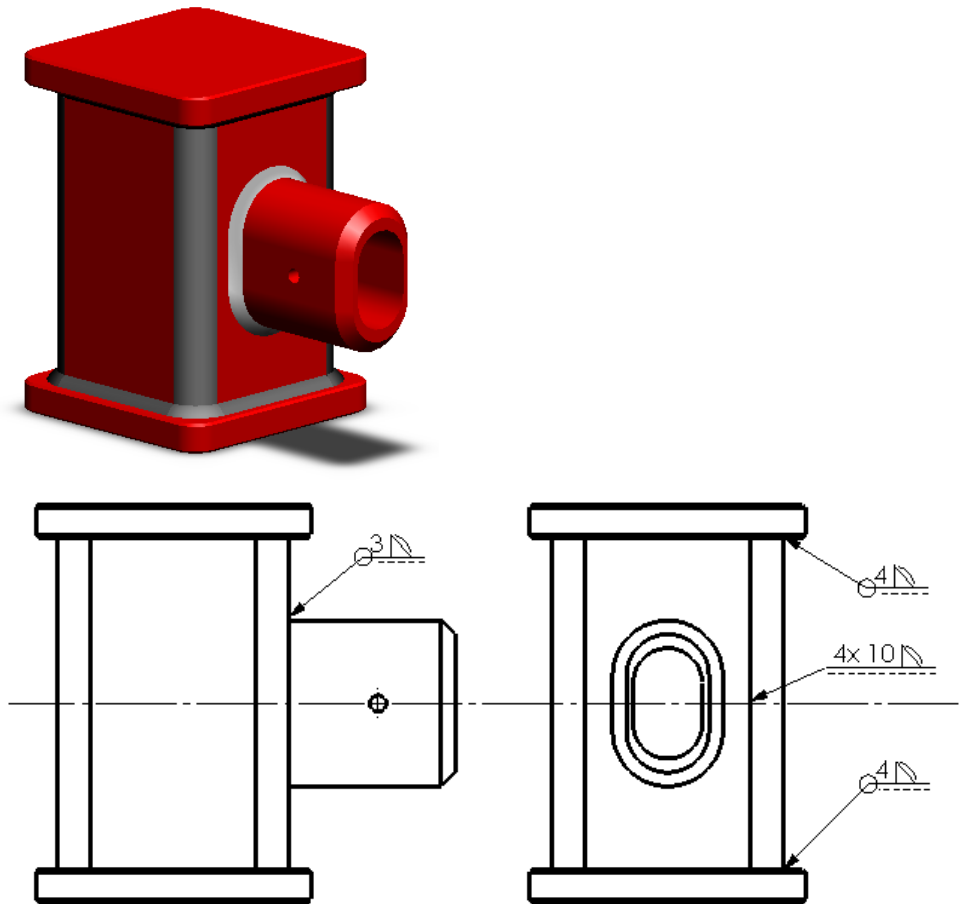


Oefening 3-8

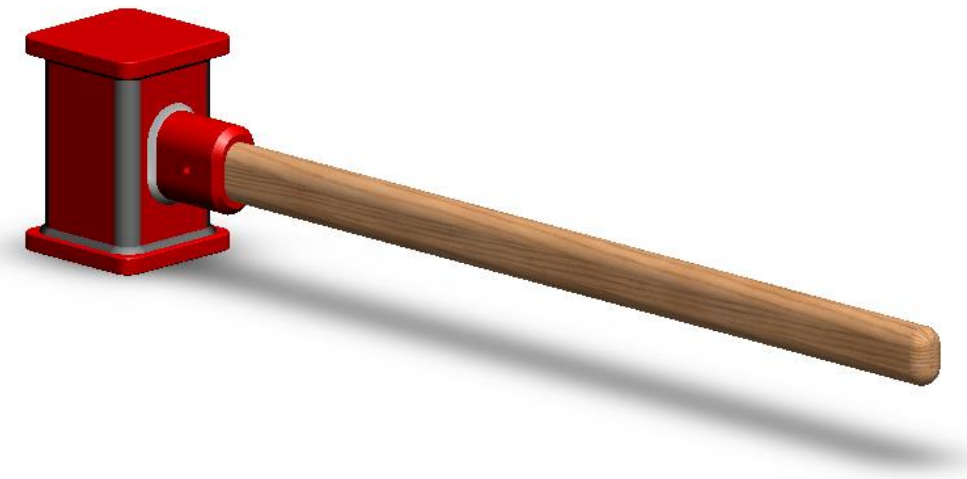


Oefening 3-9

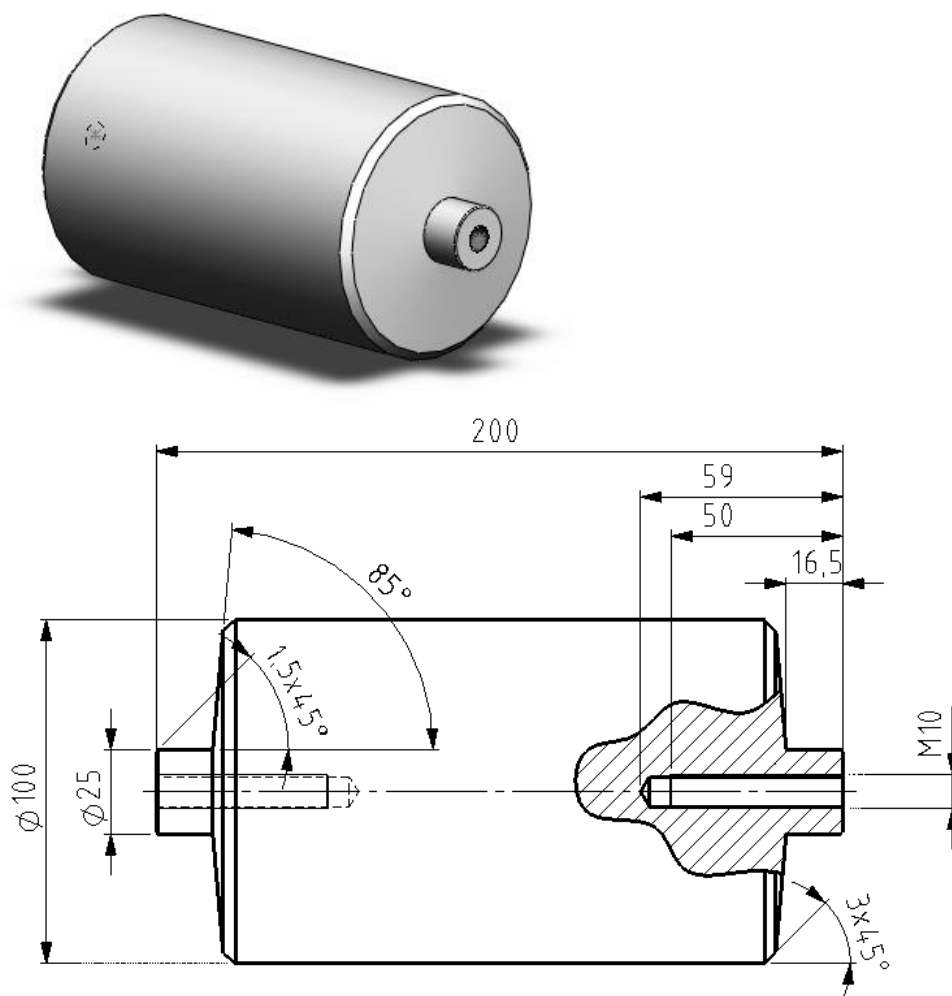
Gebruik de onderdelen uit oefeningen 3-6 t/m 3-8 om de assembly te maken. Voeg hoeklassen toe volgens de tekening hiernaast.

**Oefening 3-10**

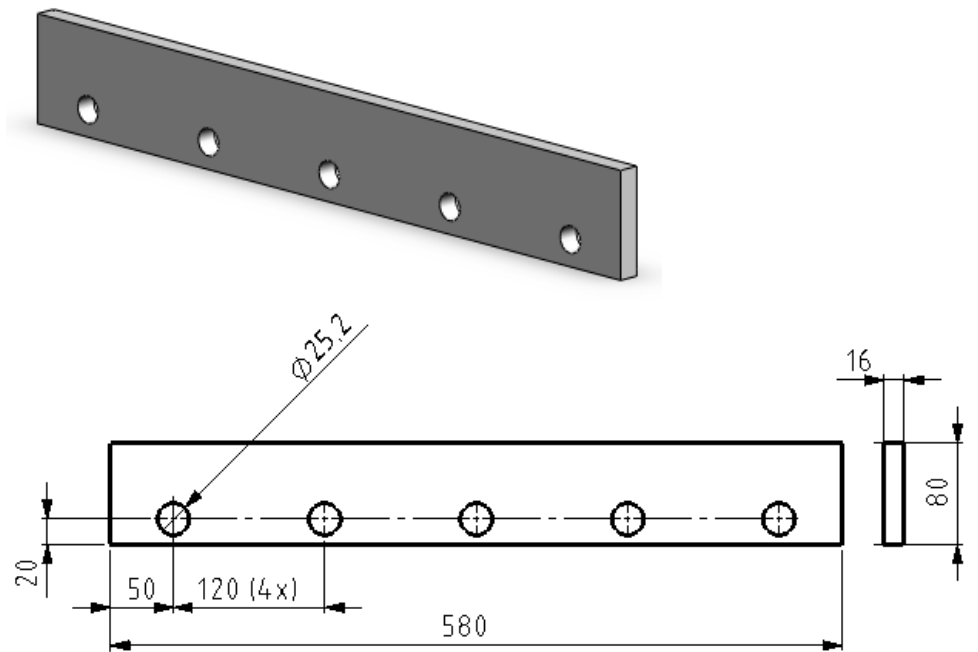
Maak nu nog een steel met een lengte van 700mm, en voeg die aan de assembly toe.



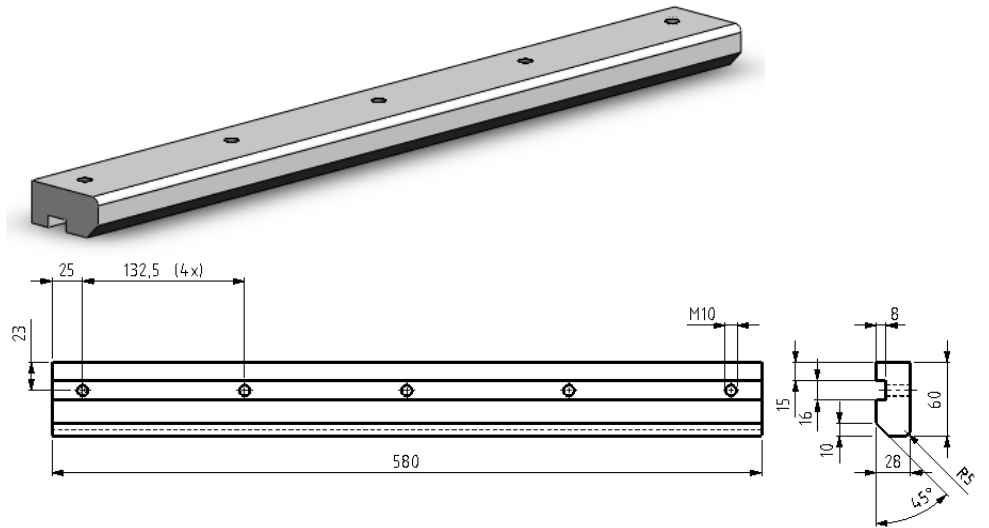
Oefening 3-11



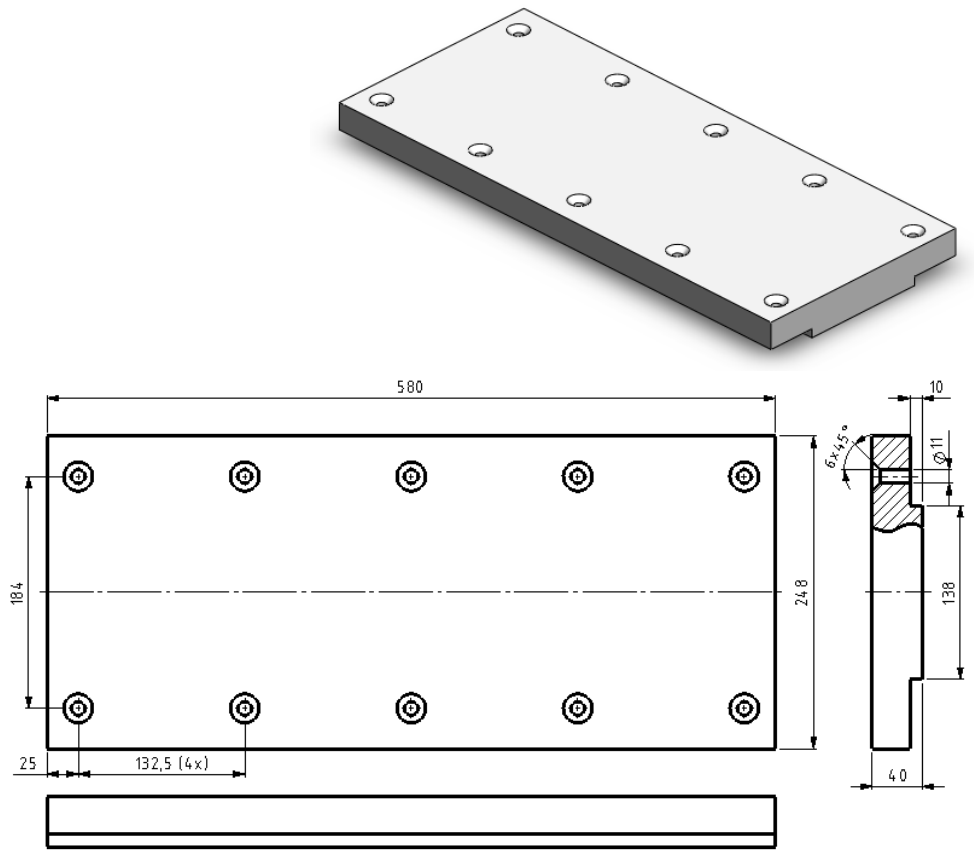
Oefening 3-12



Oefening 3-13



Oefening 3-14



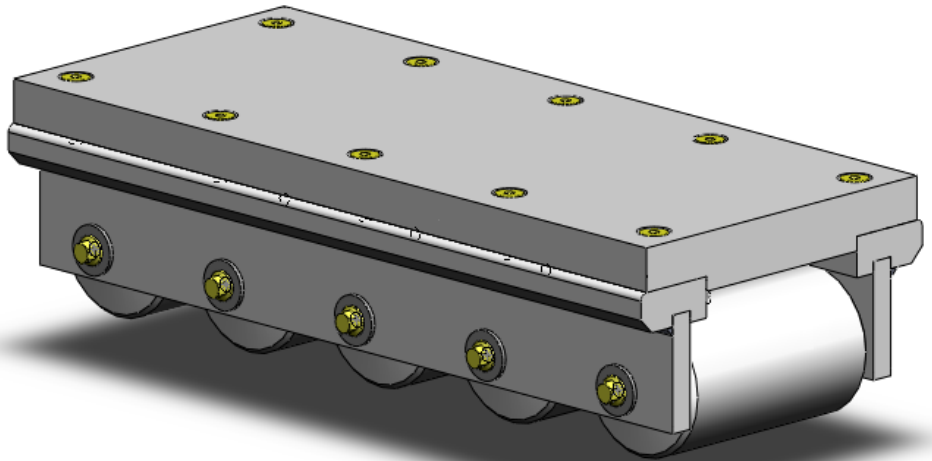
Oefening 3-15

Maak de assembly met de onderdelen 3-11 t/m 3-14.

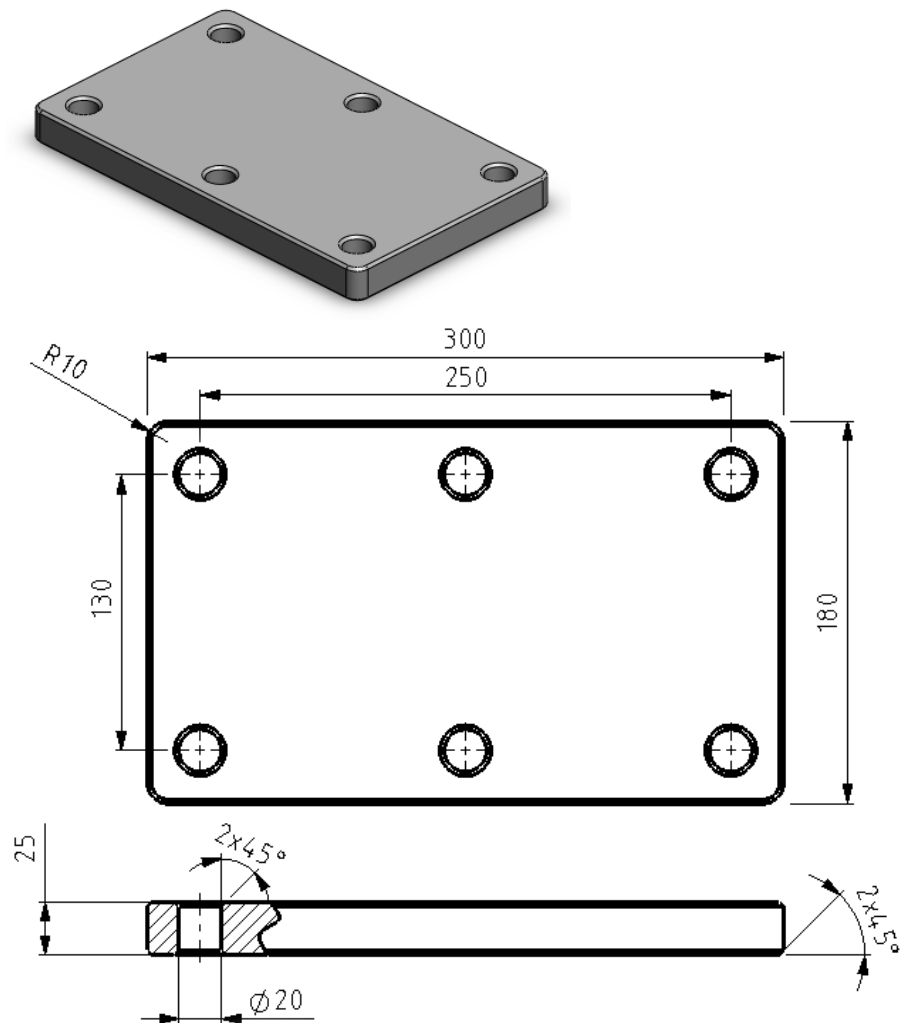
Strip 3-13 bevestig je aan bovenplaat 3-14 met 10x Socket Countersunk Head Screw (ISO 10642) M10x45

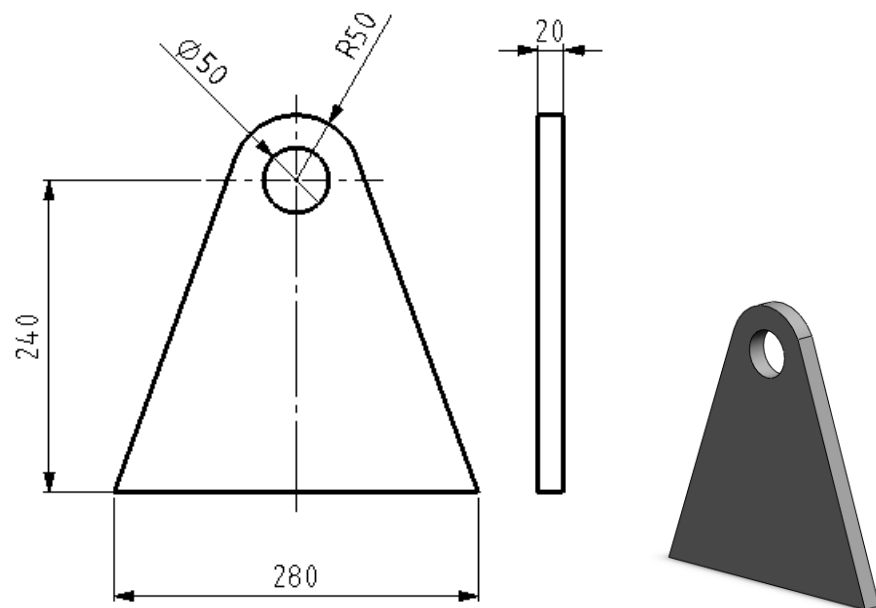
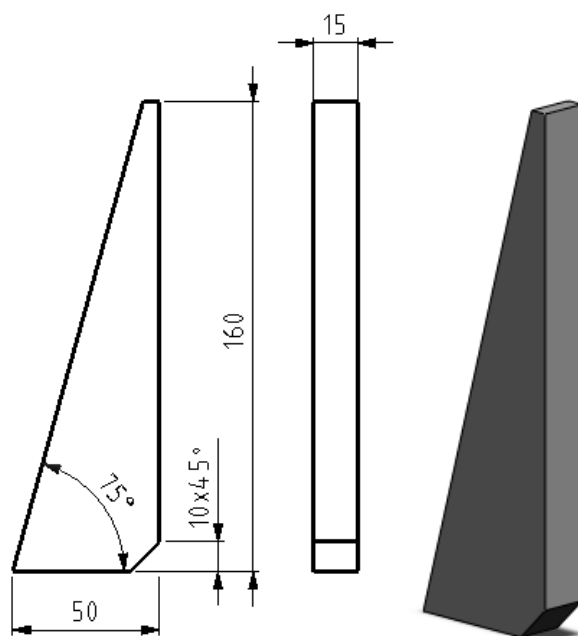
Strip 3-12 las je vast aan strip 3-13 met een hoeklas over de gehele lengte.

De rollers (3-11) zet je vast met zeskantbouten M10x30 en een carosseriering (Plain washer extra large).



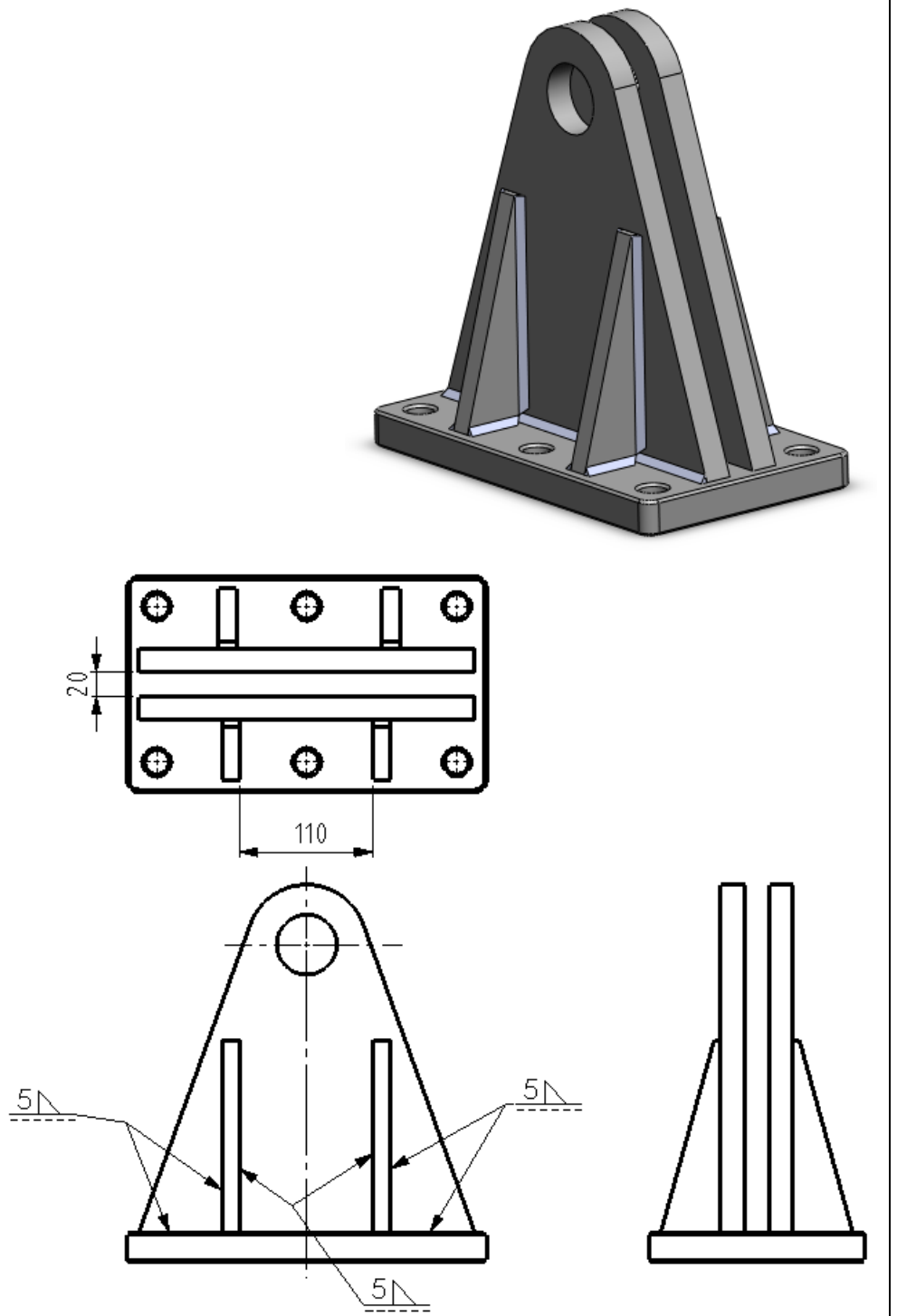
Oefening 3-16

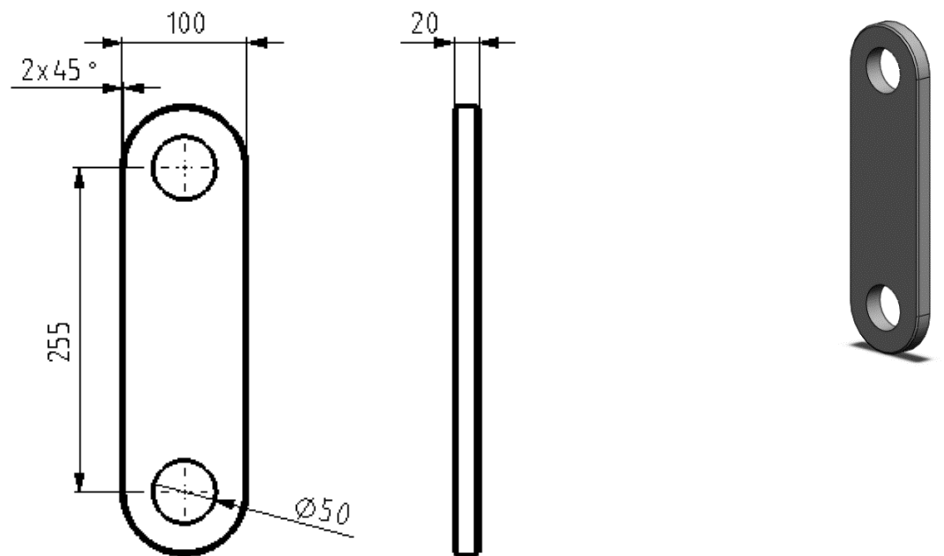
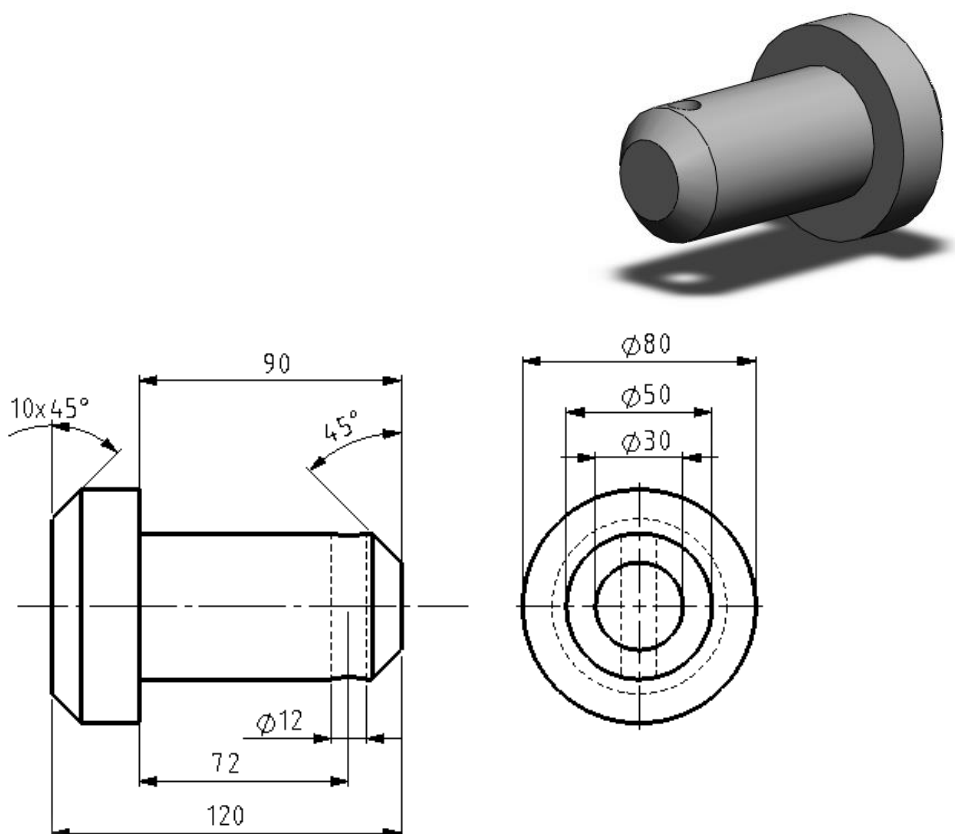


Oefening 3-17**Oefening 3-18**

Oefening 3-19

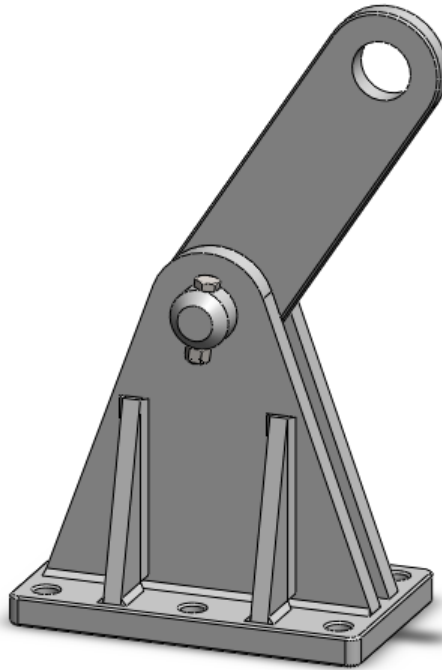
Maak een lassamenstelling, bestaande uit de onderdelen 3-16 t/m 3-18, volgens de tekening hiernaast. Breng de lassen aan in de samenstellingstekening.



Oefening 3-20**Oefening 3-21**

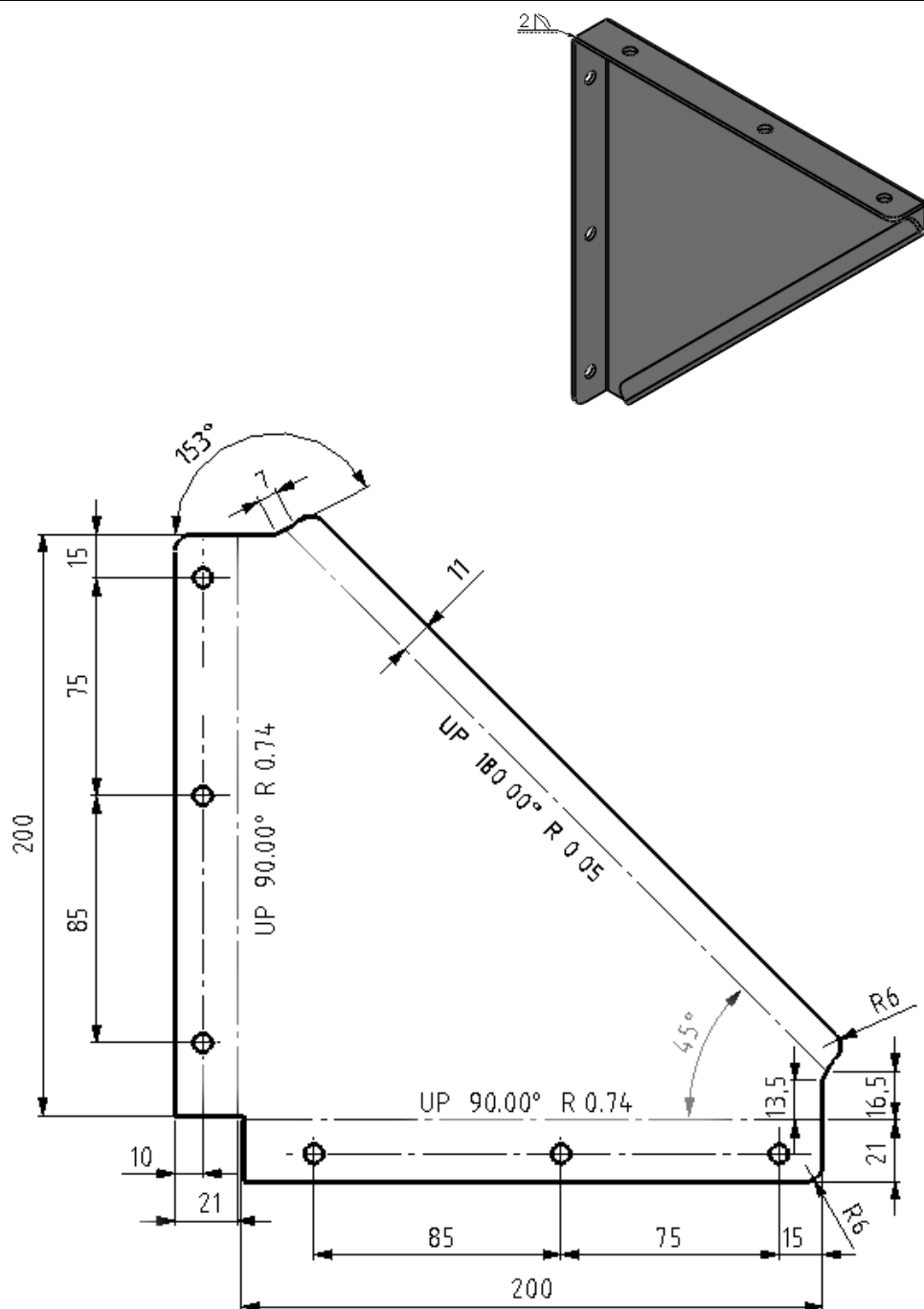
Oefening 3-22

Maak een assembly van de onderdelen 3-19 t/m 3-21. Voor de borging van de pin gebruiken we een zeskantbout (ISO 4014) M12x65, en een zeskantmoer (ISO 4034).

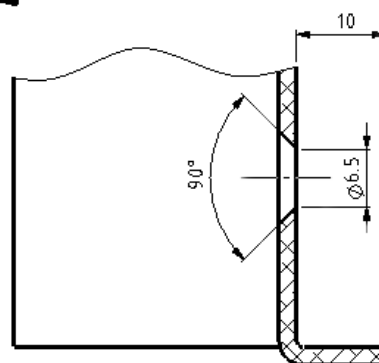
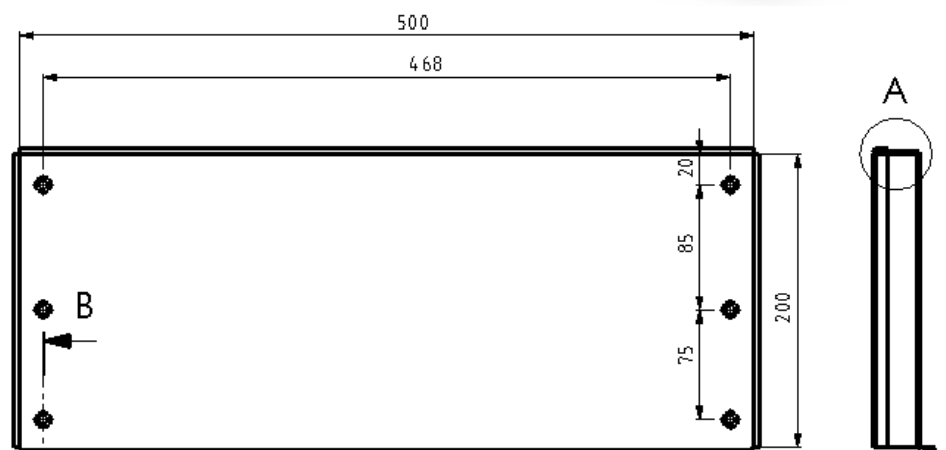
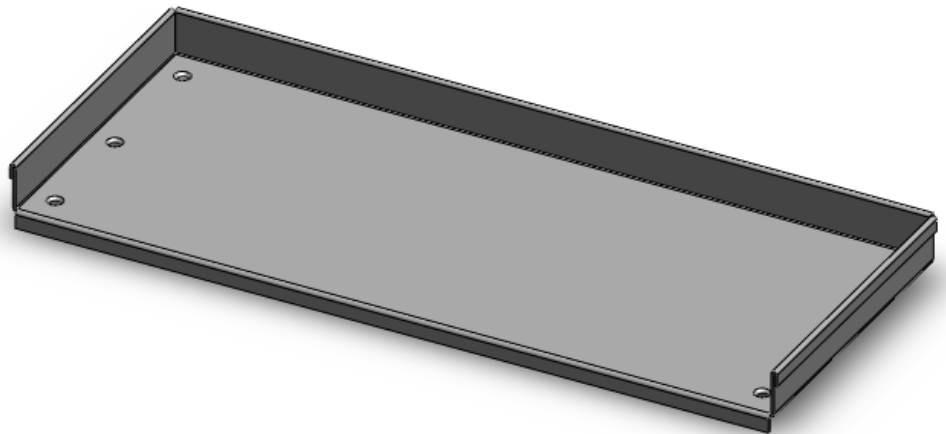


Oefeningen bij Tutorial 4

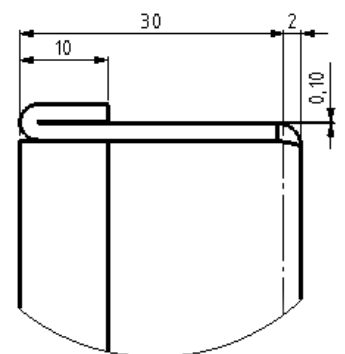
Oefening 4-1



Oefening 4-2

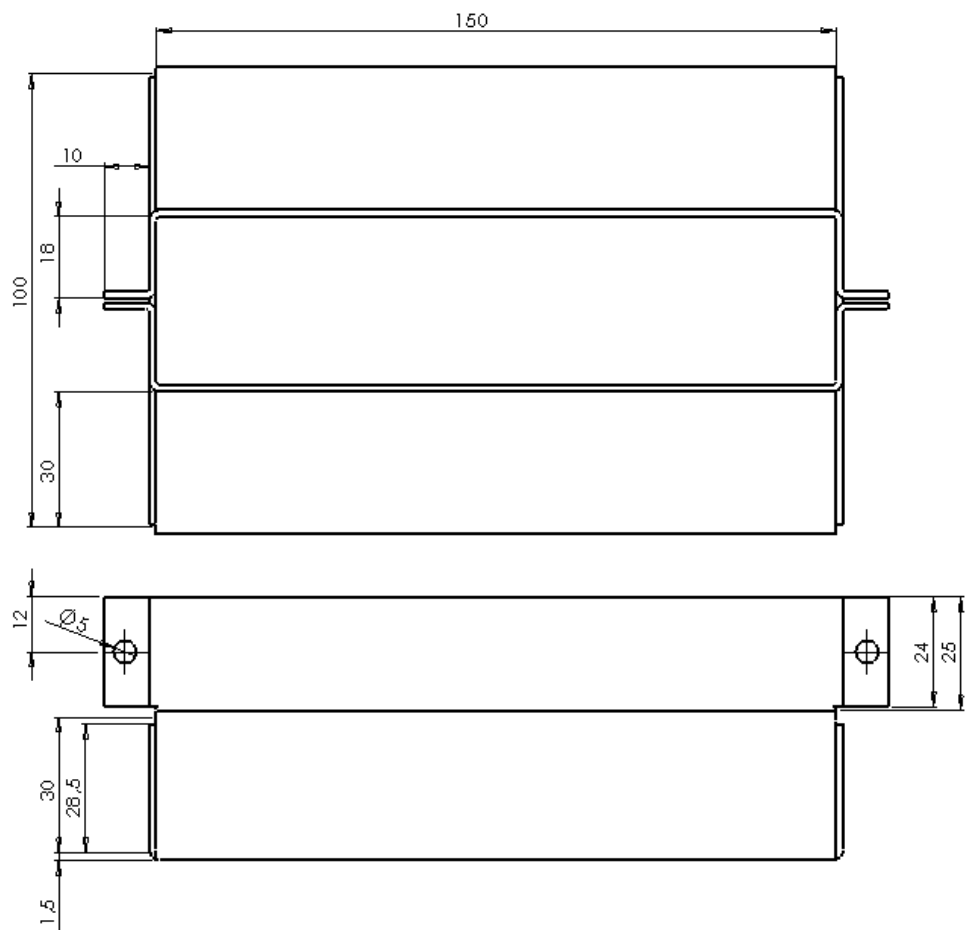
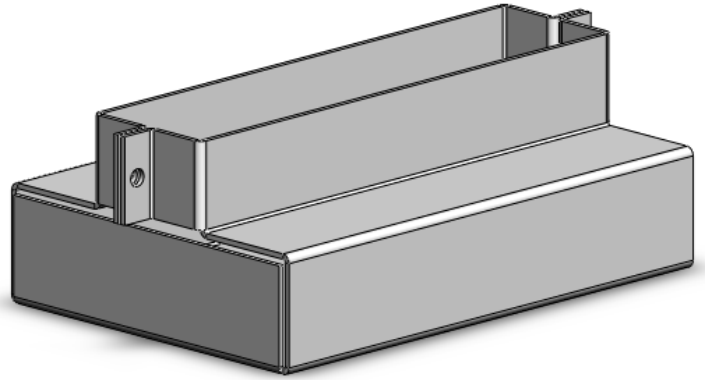


SECTION B-B
SCALE 2 : 1

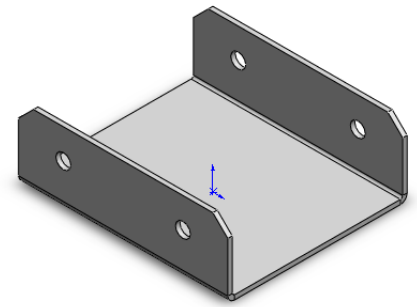
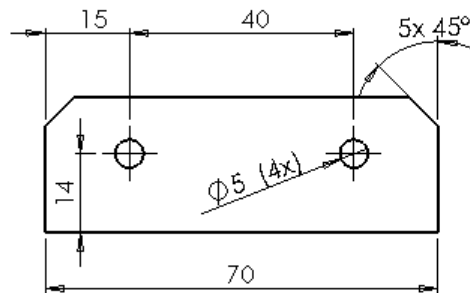


DETAIL A
SCALE 2 : 1

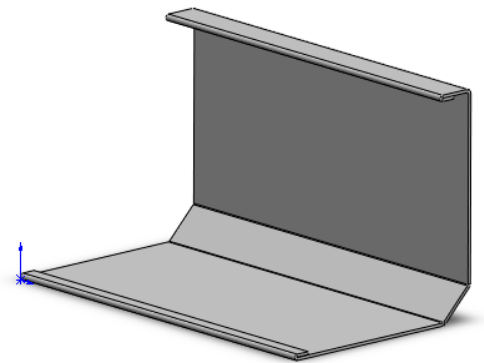
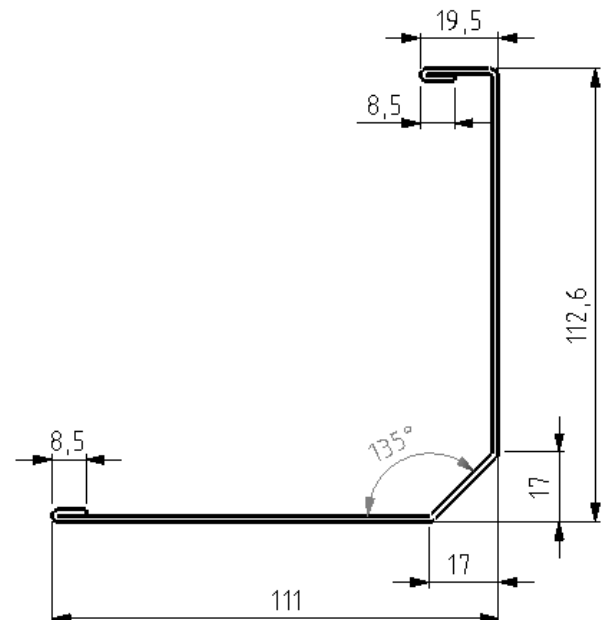
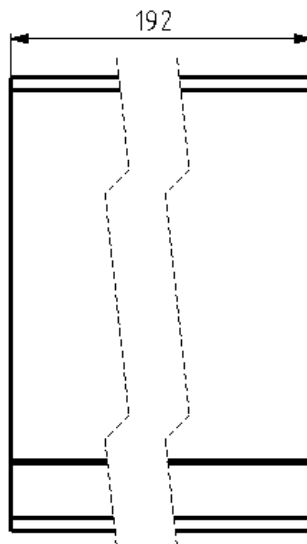
Oefening 4-3



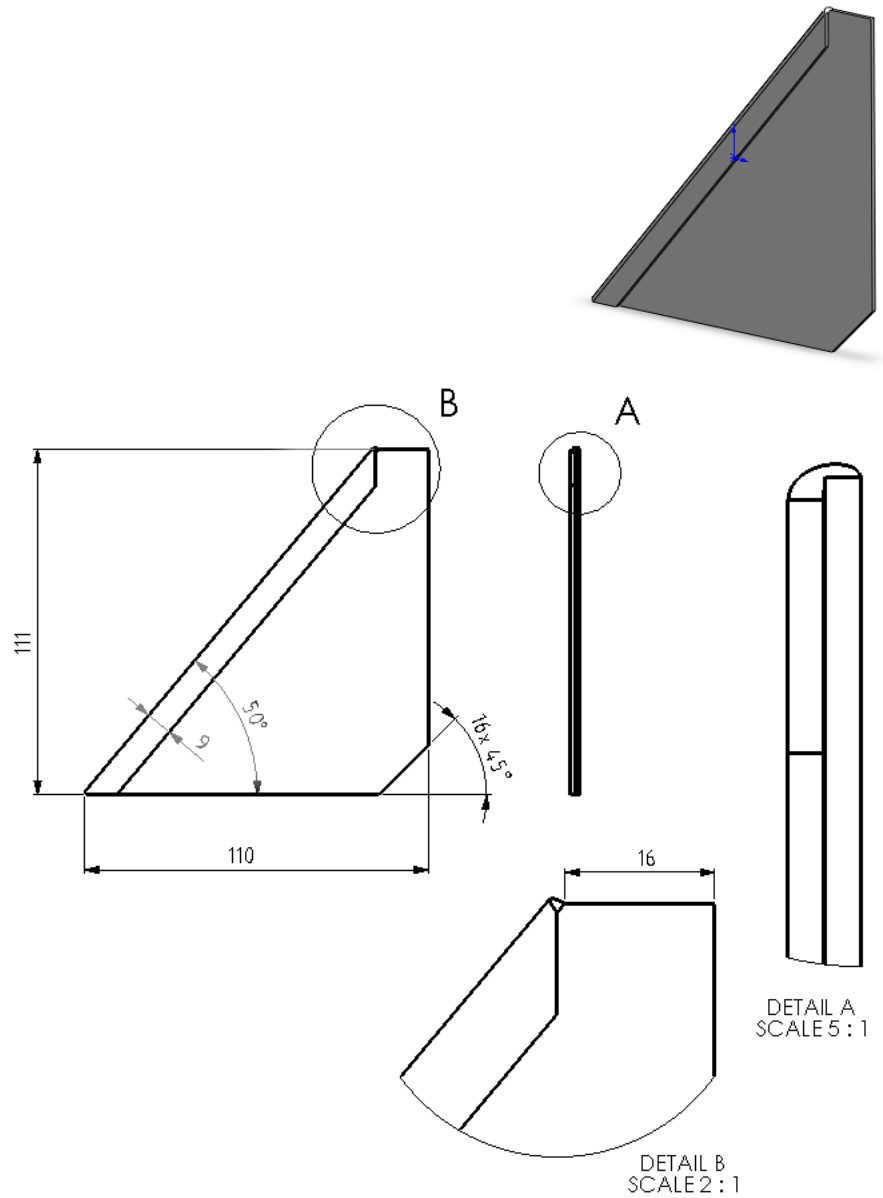
Oefening 4-4



Oefening 4-5

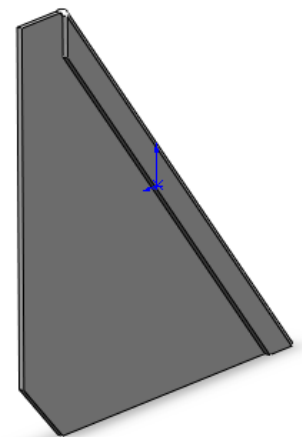


Oefening 4-6a



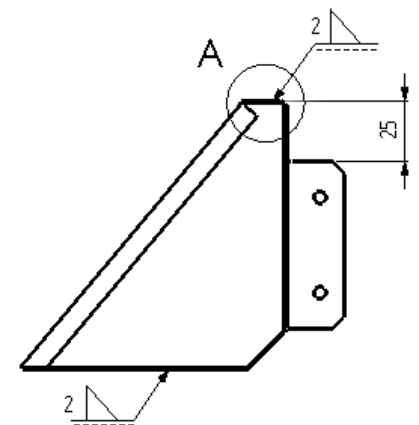
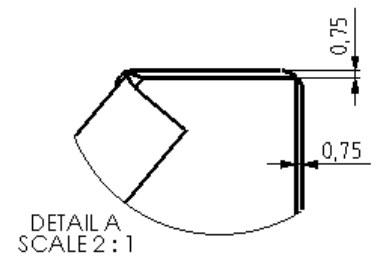
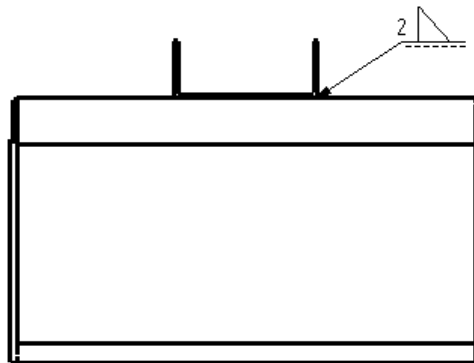
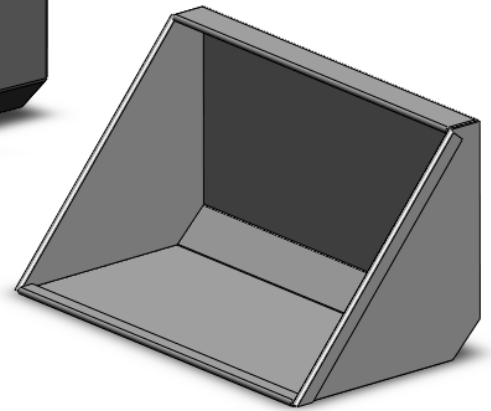
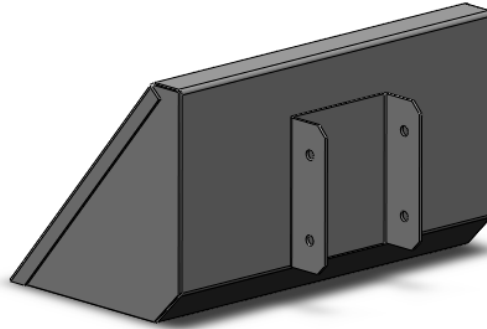
Oefening 4-6b

Maak van onderdeel 6a een gespiegelde versie. De omgefelsde rand zit nu aan de andere kant.



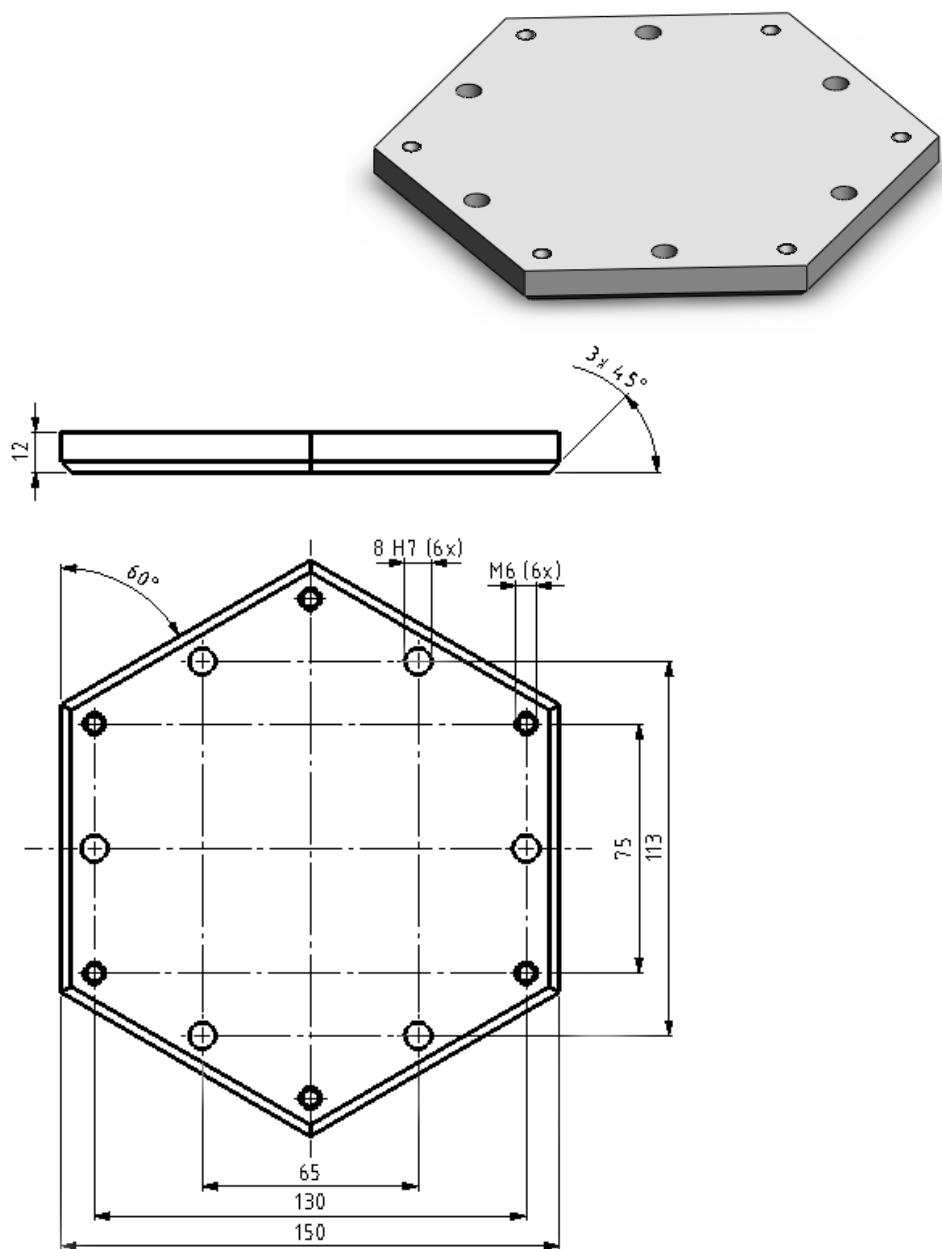
Oefening 4-7

Gebruik de onderdelen 4-4, 4-5, 4-6a en 4-6b om de assembly op te bouwen zoals je hiernaast ziet.

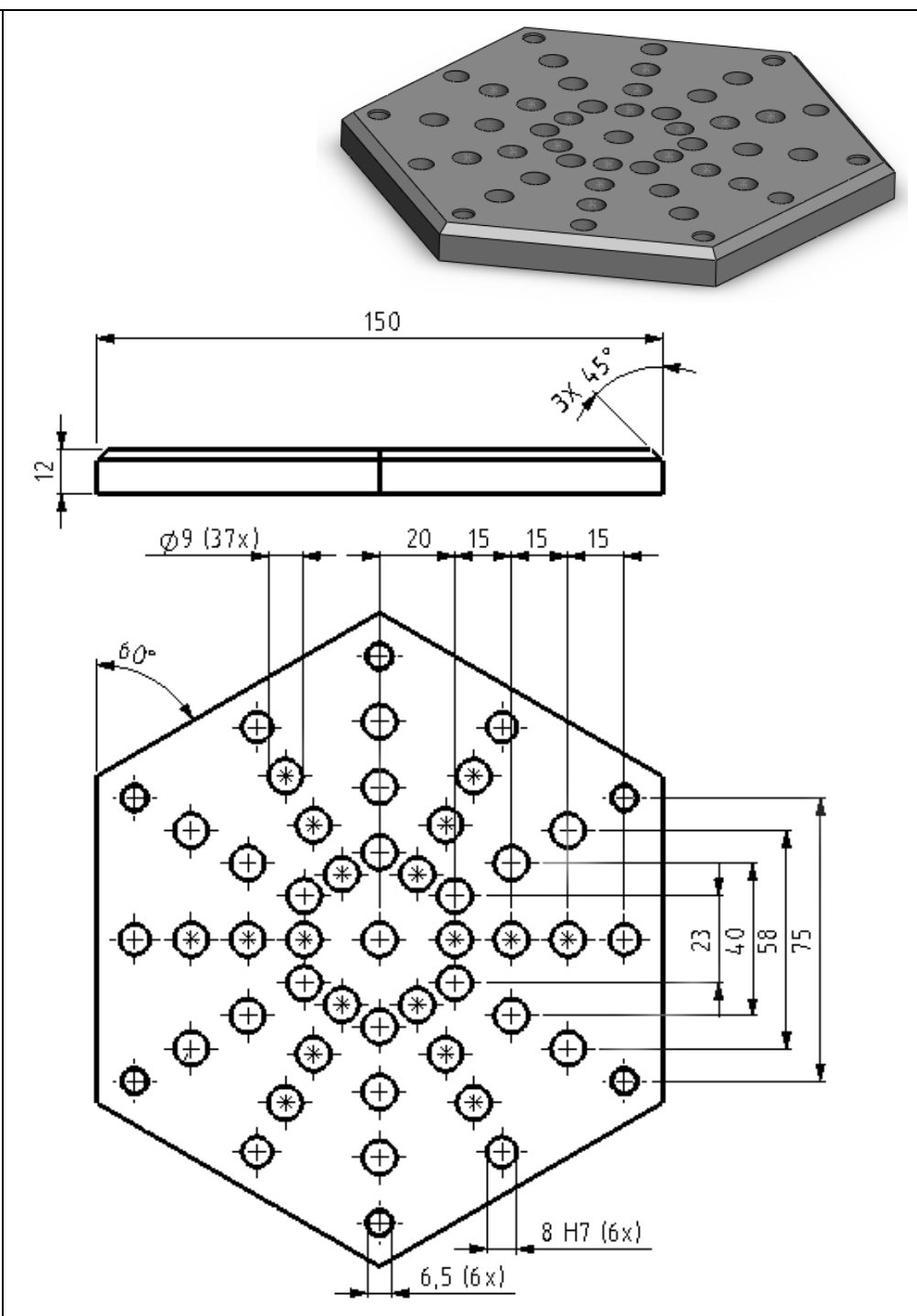


Oefeningen bij Tutorial 5

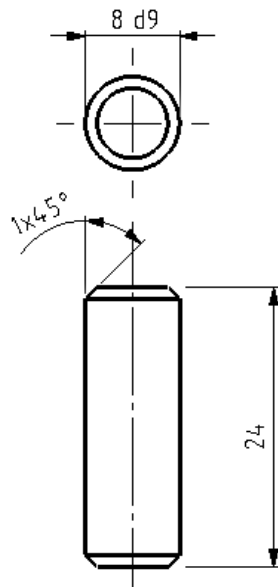
Oefening 5-1



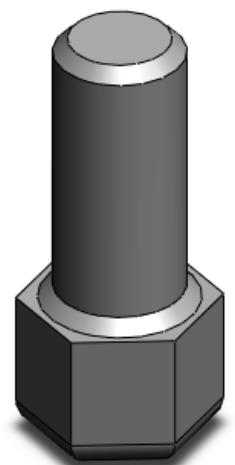
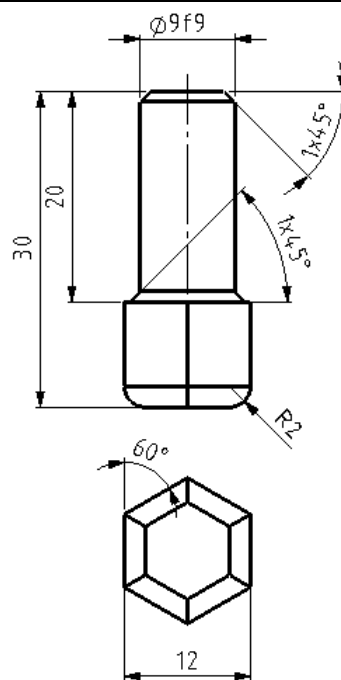
Oefening 5-2



Oefening 5-3



Oefening 5-4



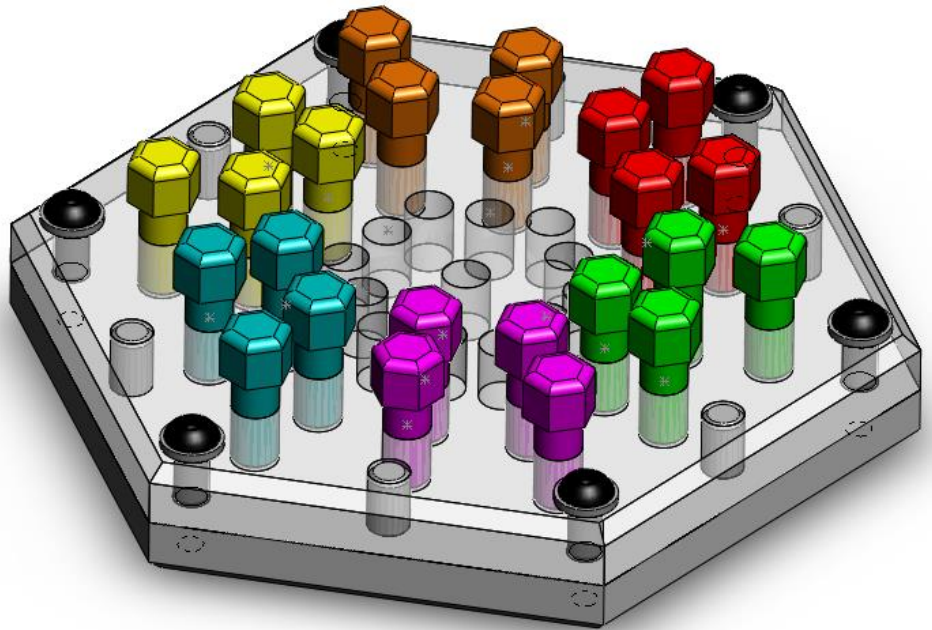
Oefening 5-5

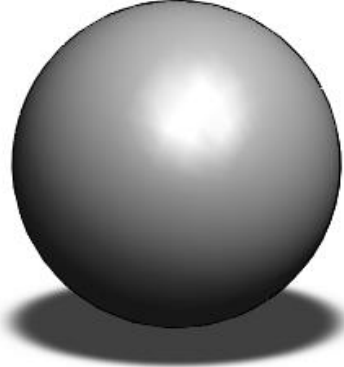
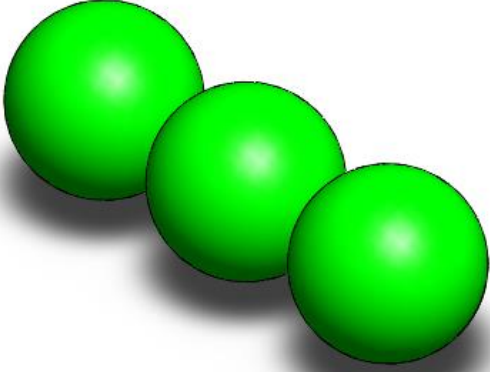
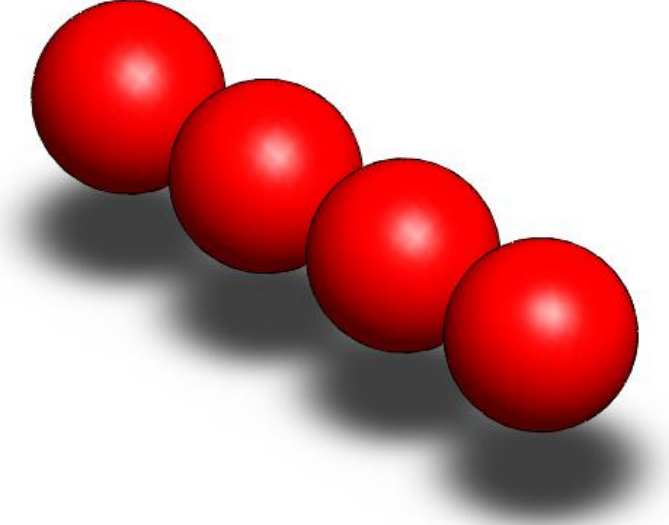
Maak met de onderdelen 5-1 t/m 5-4 de assembly die je hiernaast ziet.

De twee platen worden met paspennen (5-3) gepositioneerd, en daarna bevestigd met:

- Plain washer Normal Grade A ISO 7089-6 (M6)
- Socket Button Head Screw ISO 7380 – M6x25

Beide onderdelen vind je in de Toolbox



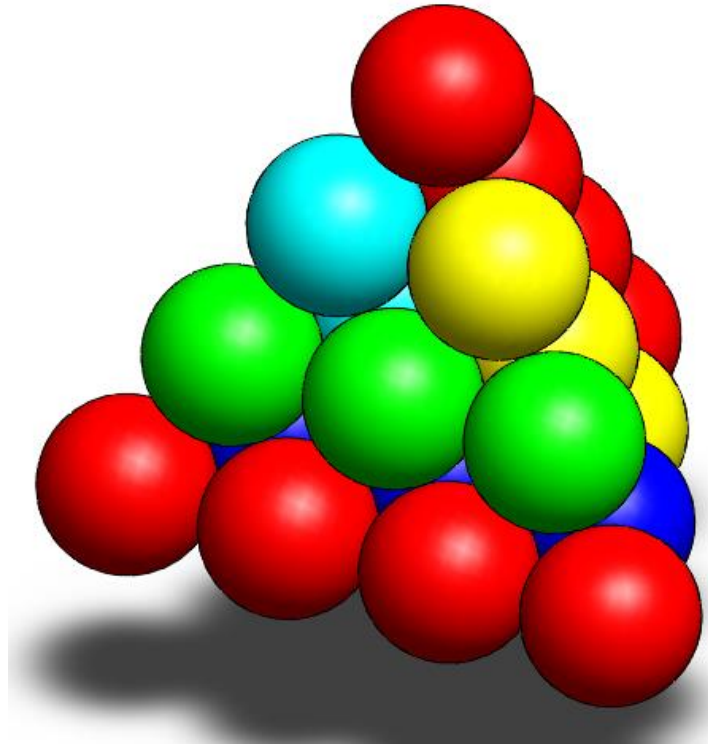
Oefening 5-6a Modelleer een bol met een diameter van 60mm.	
Oefening 5-6b Maak een assembly met drie keer de bol uit oefening 5-6a. De bollen liggen op één lijn, en raken aan elkaar.	
Oefening 5-6c Maak een assembly met vier keer de bol uit oefening 5-6a. De bollen liggen op één lijn, en raken aan elkaar.	

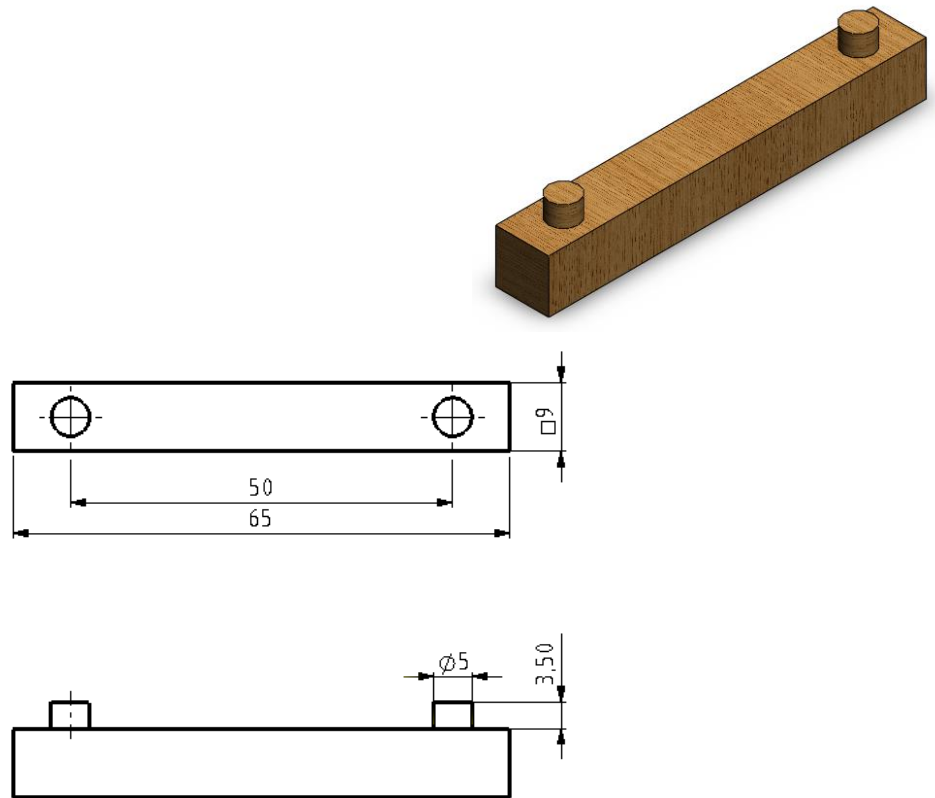
Oefening 5-7

Maak nu de assembly die je hiernaast ziet. Gebruik:

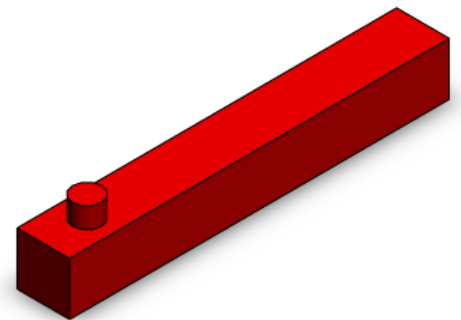
- 4x assembly 5-6b
- 2x assembly 5-6c

In de afbeelding hiernaast is voor de duidelijkheid steeds een andere kleur gebruikt voor assembly 5-6b.



Oefening 5-8**Oefening 5-9**

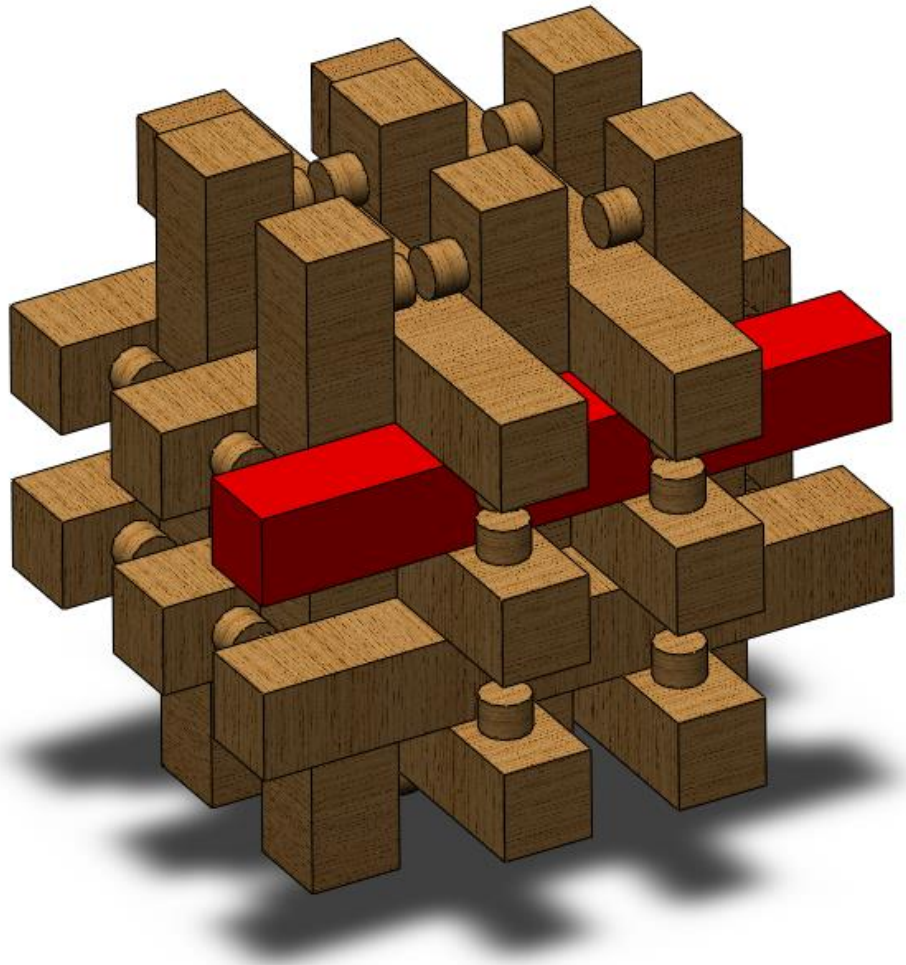
Maak een nieuwe configuratie van oefening 5-8, met slechts één pin.



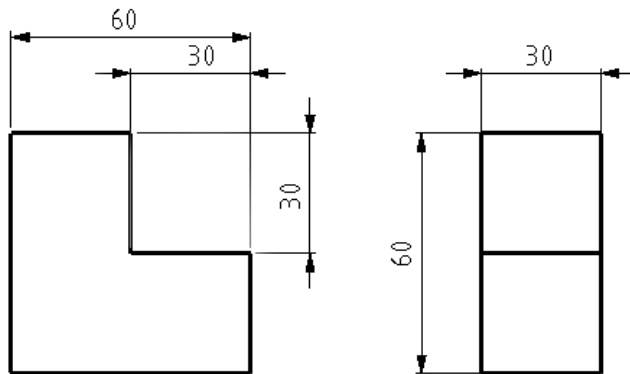
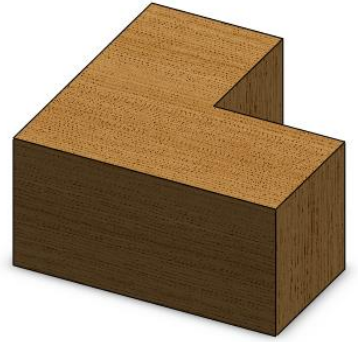
Oefening 5-10

Maak de assembly. Gebruik:

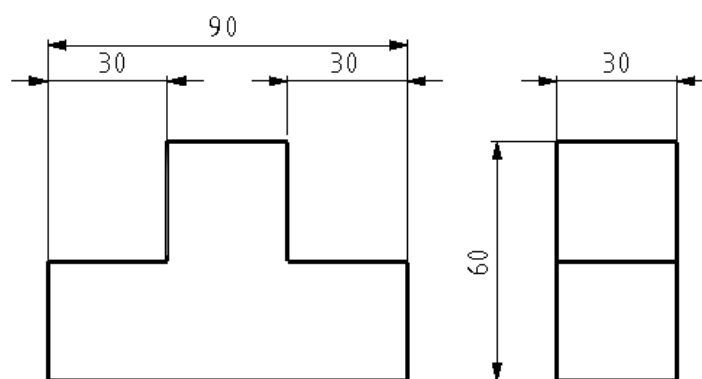
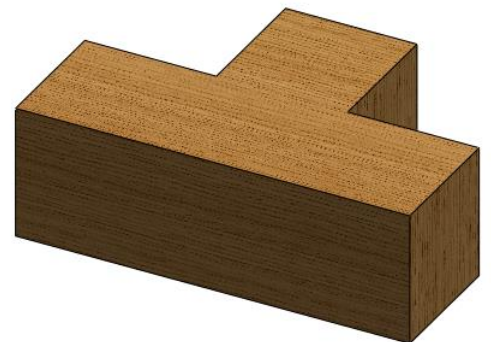
- 17x oefening 5-8
- 1x oefening 5-9



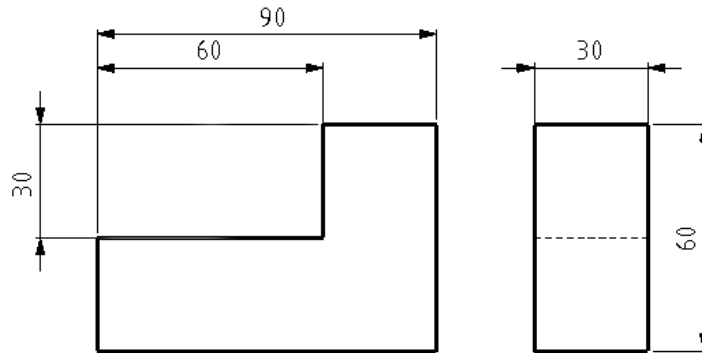
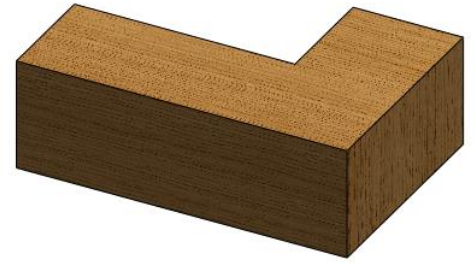
Oefening 5-11



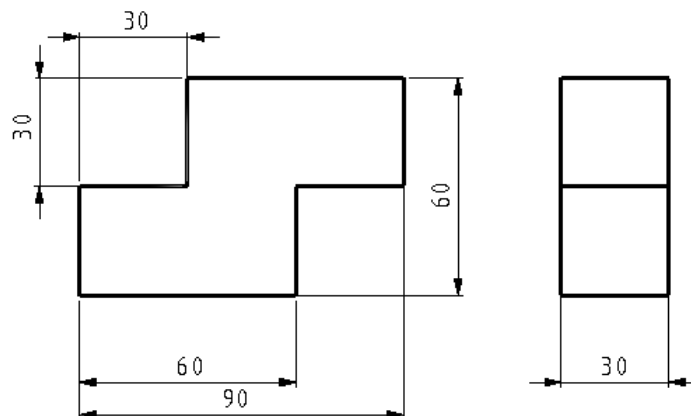
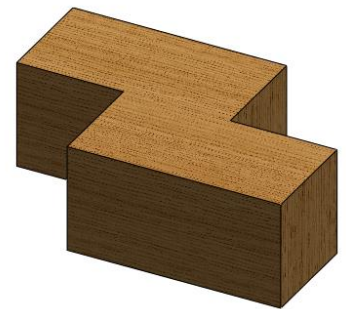
Oefening 5-12



Oefening 5-13



Oefening 5-14

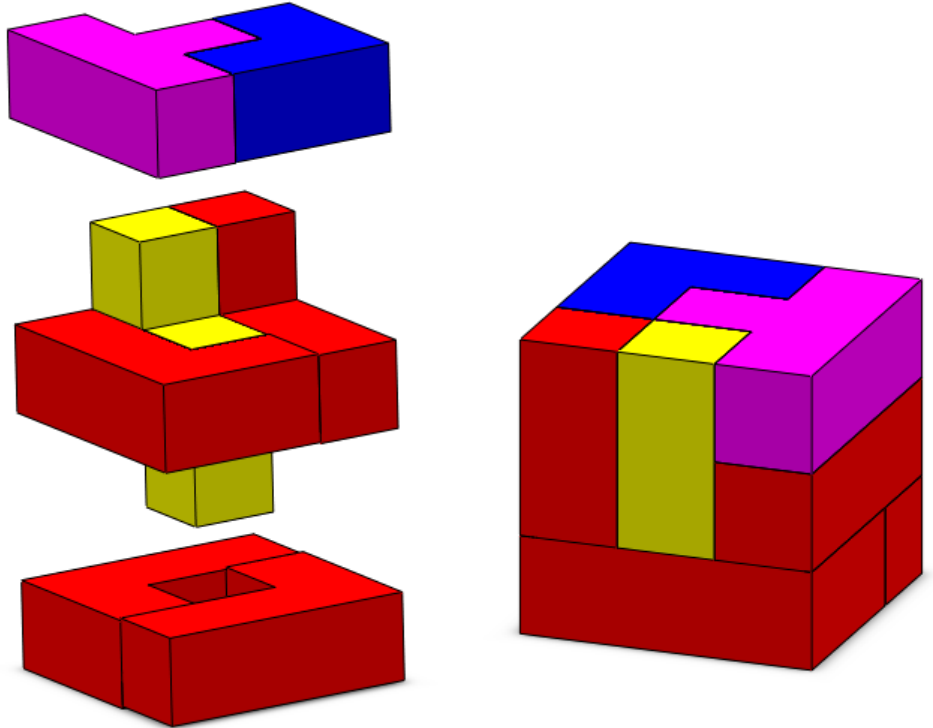


Oefening 5-15

Maak de assembly zoals je hiernaast ziet. Gebruik:

- 1x oefening 5-11
- 1x oefening 5-12
- 4x oefening 5-13
- 1x oefening 5-14

Voor de duidelijkheid hebben de verschillende componenten hiernaast een verschillende kleur gekregen.



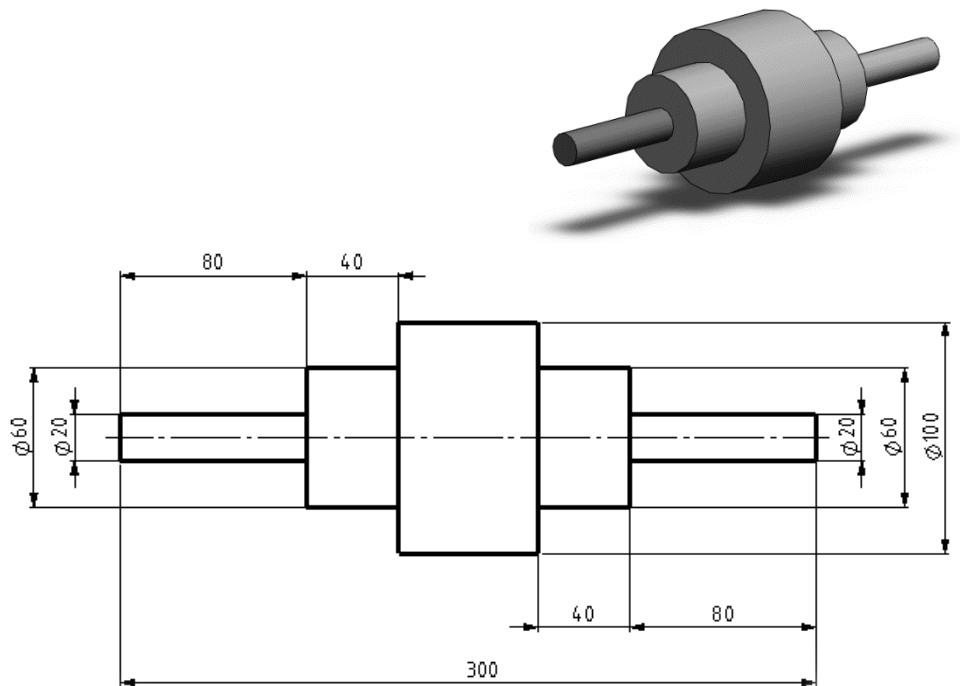
Oefeningen bij Tutorial 6

Maak bij deze oefeningen steeds een technische tekening van een part of assembly die je in een van de eerdere tutorials gemaakt hebt. Let op de volgende punten:

- Gebruik de tekening die hier gegeven is als voorbeeld. Probeer deze zo nauwkeurig mogelijk te benaderen.
- Plaats de tekening in een kader, kies zelf een geschikt papierformaat. Vul in het tekeninghoofd je naam in.
- Plaats ook een isometrische afbeelding op het tekenvel.
- Plaats bij tekeningen van plaatwerk ook een uitslag op het tekenvel.

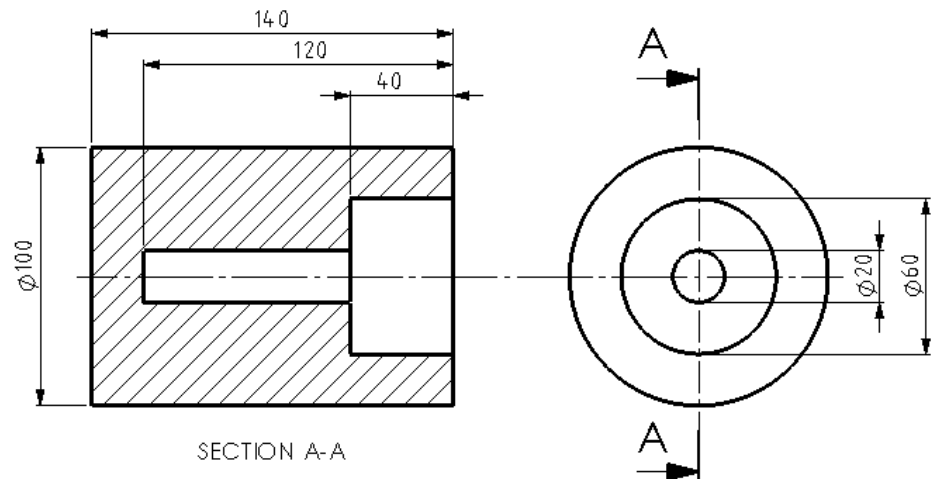
Oefening 6-1

Gebruik het model uit oefening 1-1.

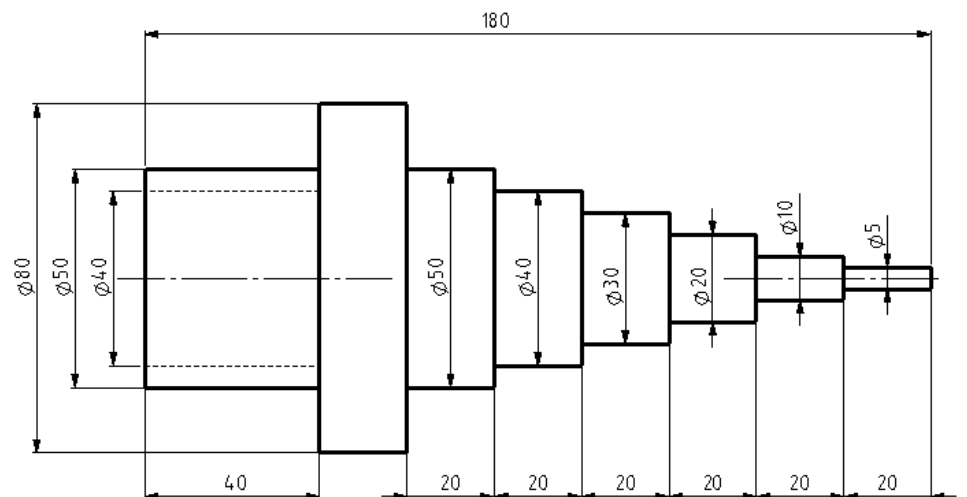


Oefening 6-2

Gebruik het model uit oefening 1-2.

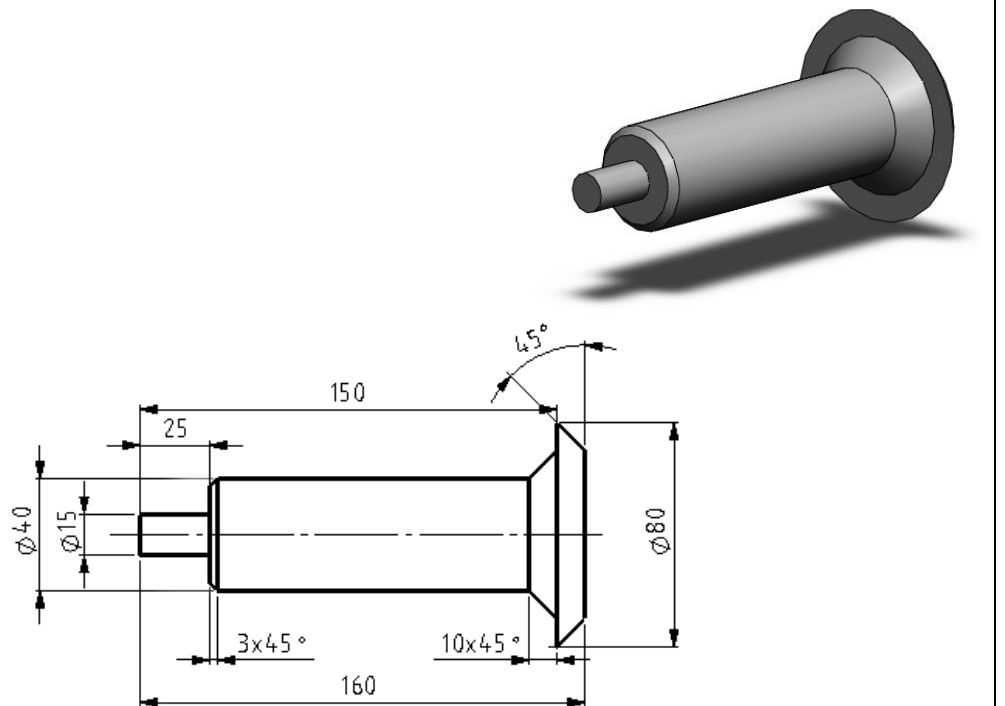
**Oefening 6-3**

Gebruik het model uit oefening 1-3.

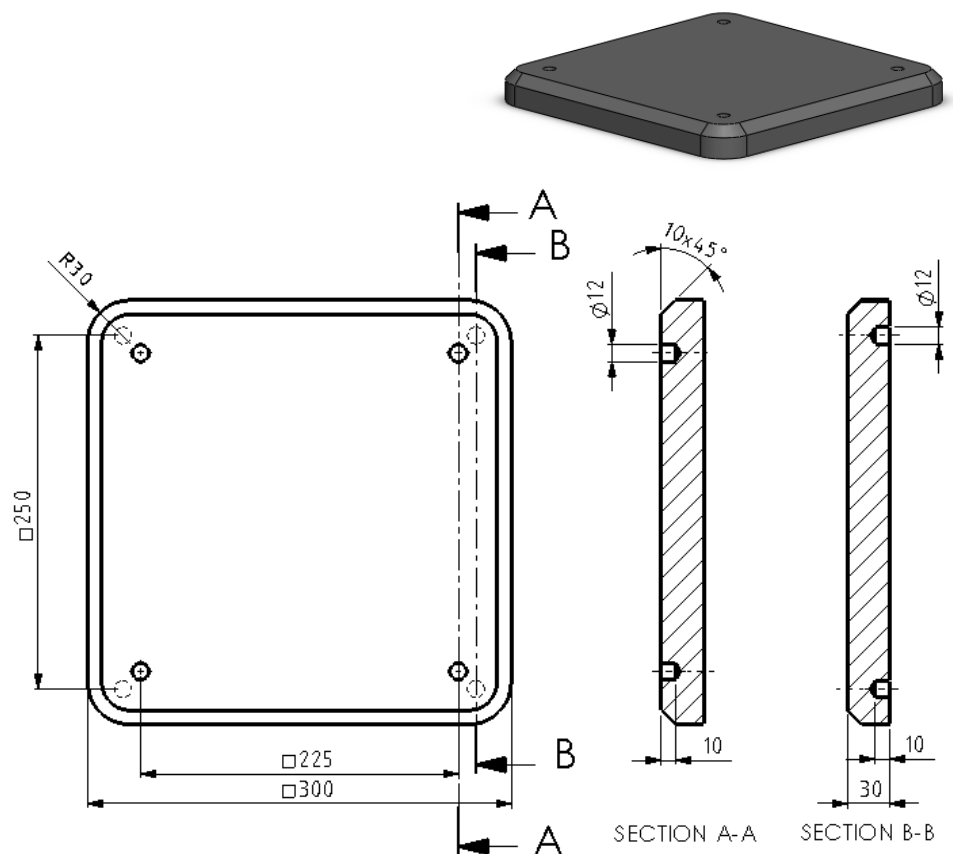


Oefening 6-4

Gebruik het model uit oefening 2-2.

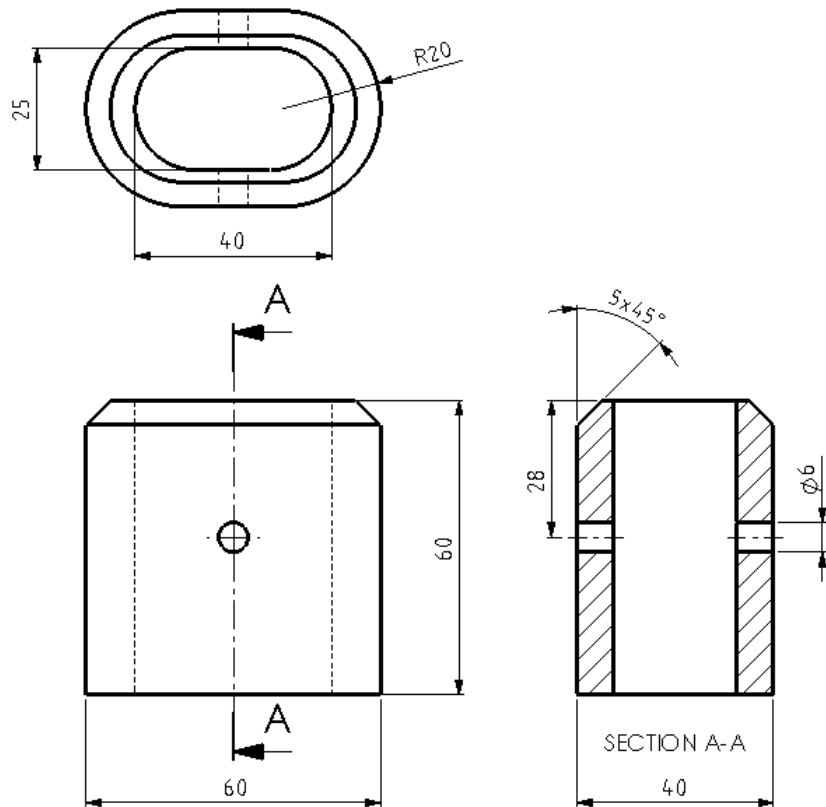
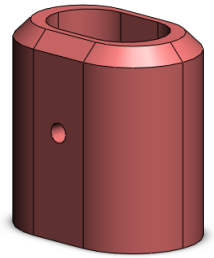
**Oefening 6-5**

Gebruik het model uit oefening 2-5.

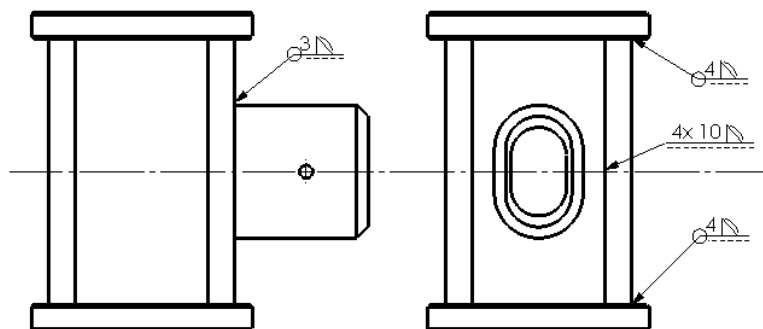


Oefening 6-6

Gebruik het model uit oefening 3-8.

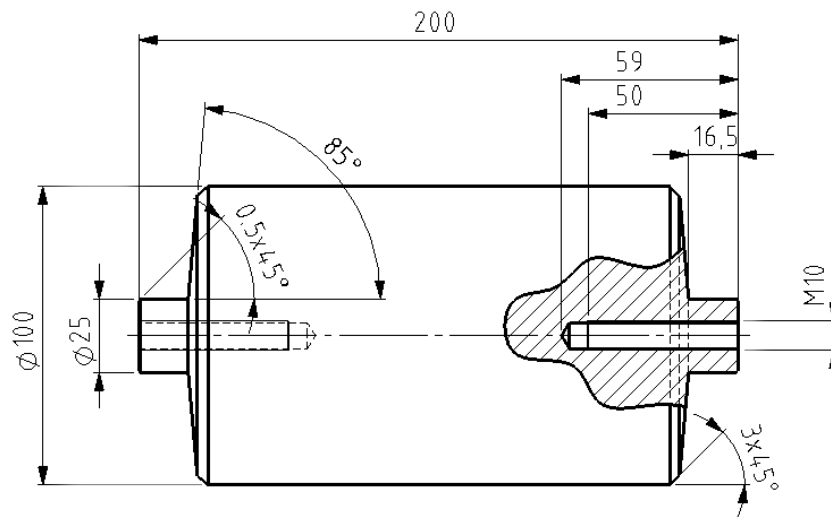
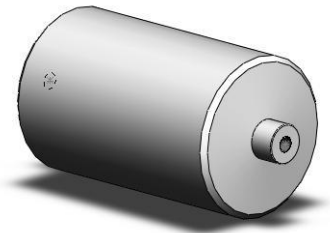
**Oefening 6-7**

Gebruik het model uit oefening 3-9.

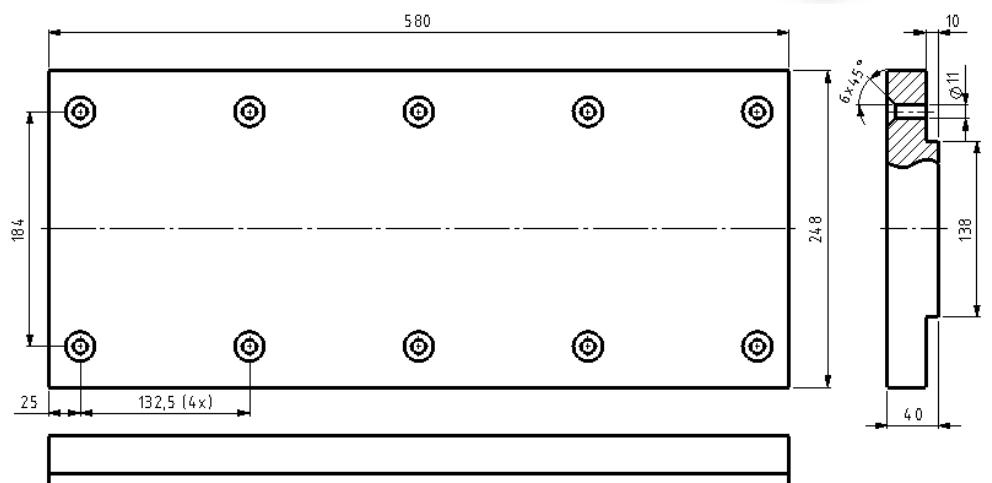
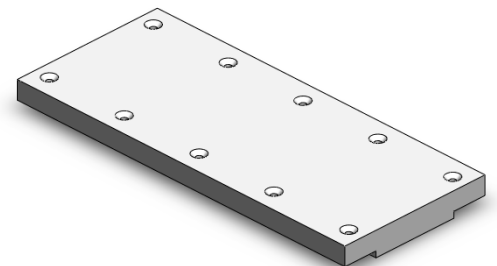


Oefening 6-8

Gebruik het model uit oefening 3-11.

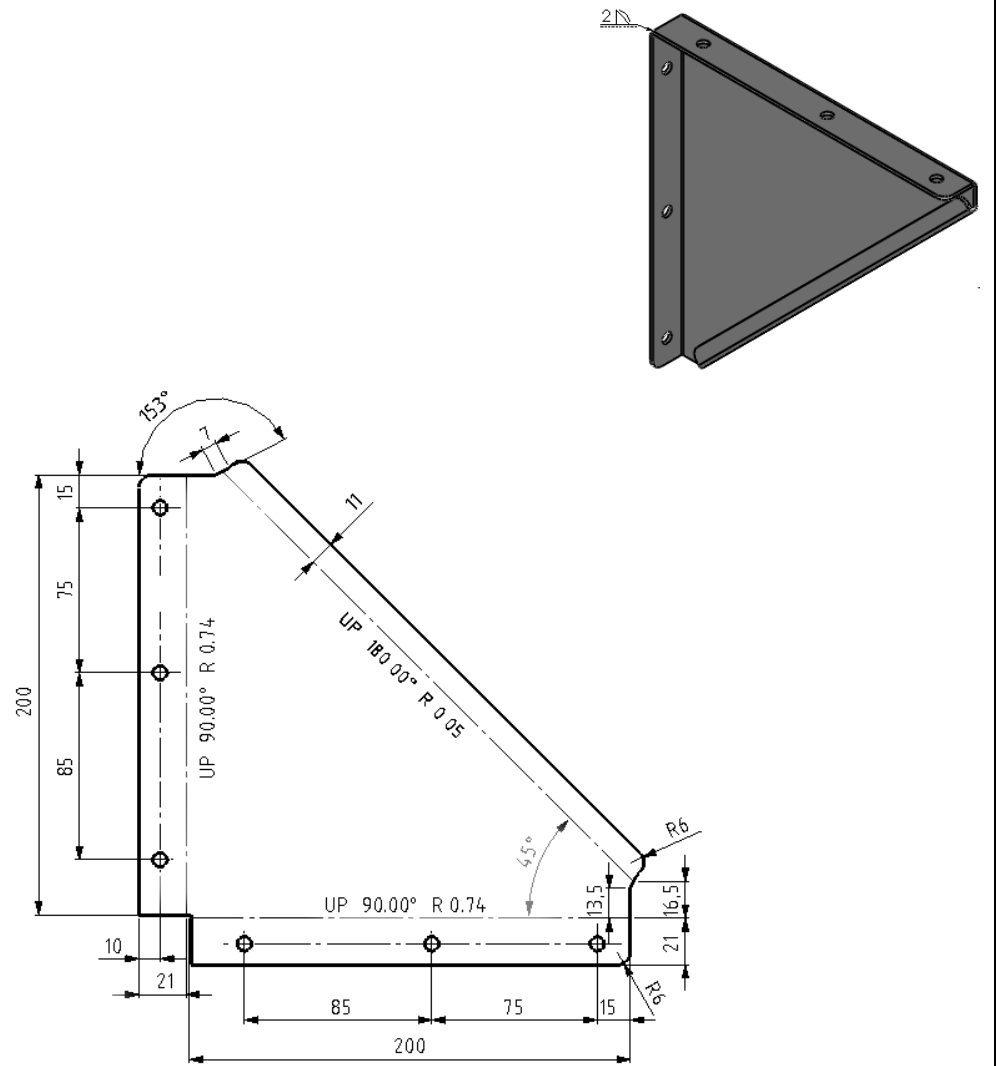
**Oefening 6-9**

Gebruik het model uit oefening 3-14.



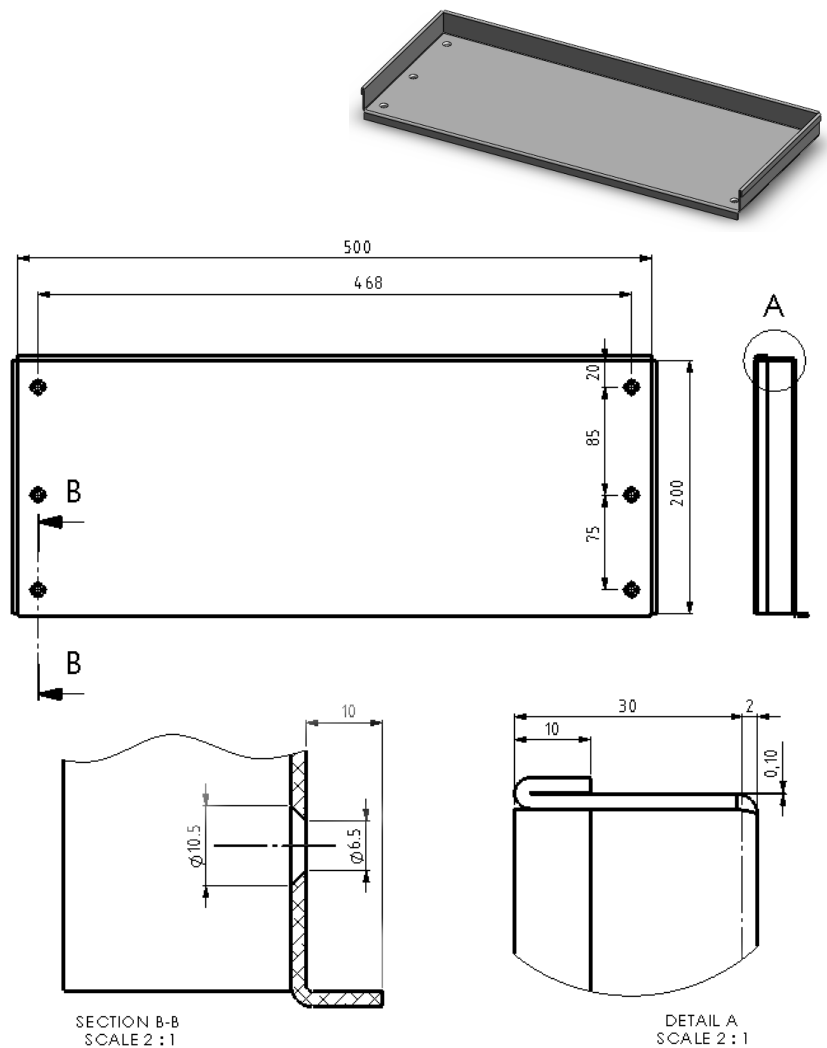
Oefening 6-10

Gebruik het model uit oefening 4-1.

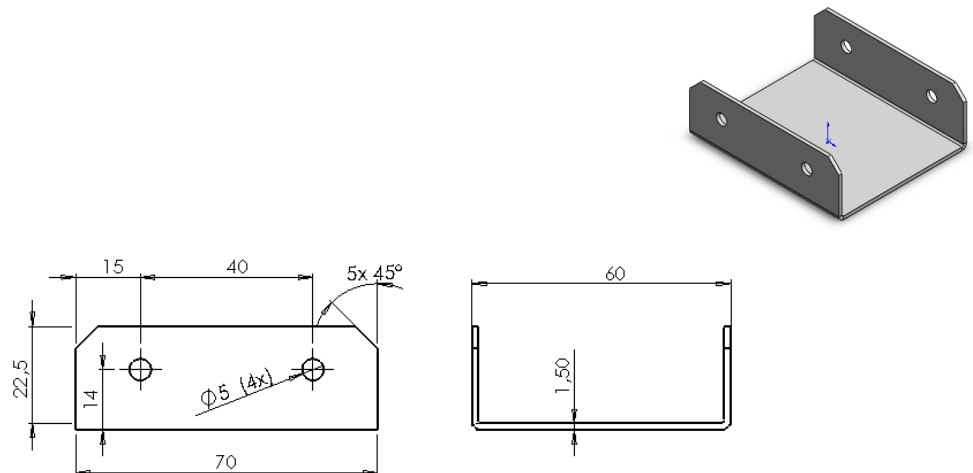


Oefening 6-11

Gebruik het model uit oefening 4-2.

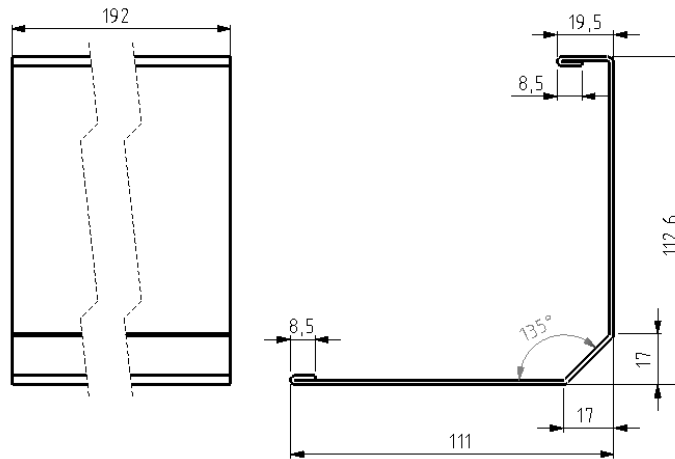
**Oefening 6-12**

Gebruik het model uit oefening 4-4.

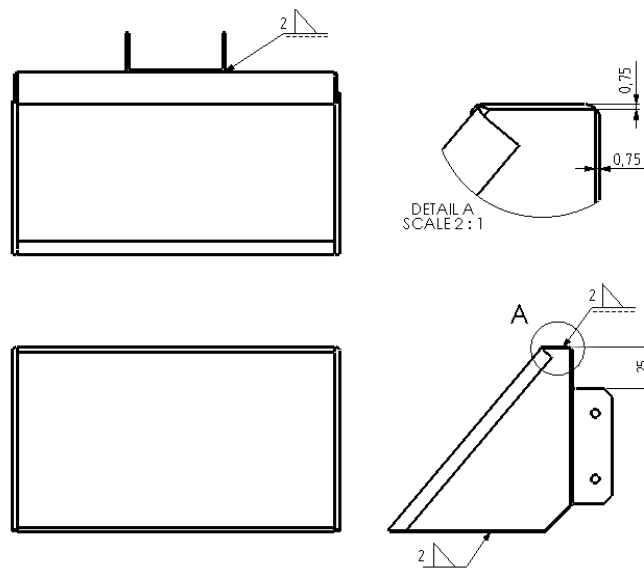


Oefening 6-13

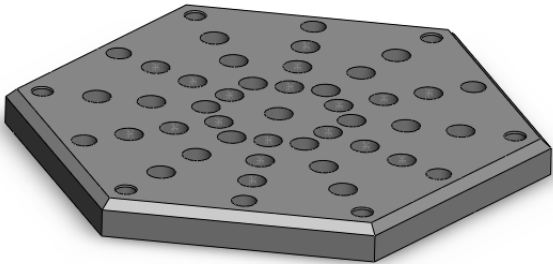
Gebruik het model uit oefening 4-5.

**Oefening 6-14**

Gebruik het model uit oefening 4-7.



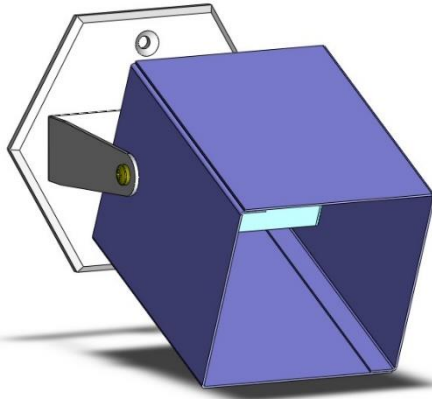
Gebruik het model uit oefening 5-2.



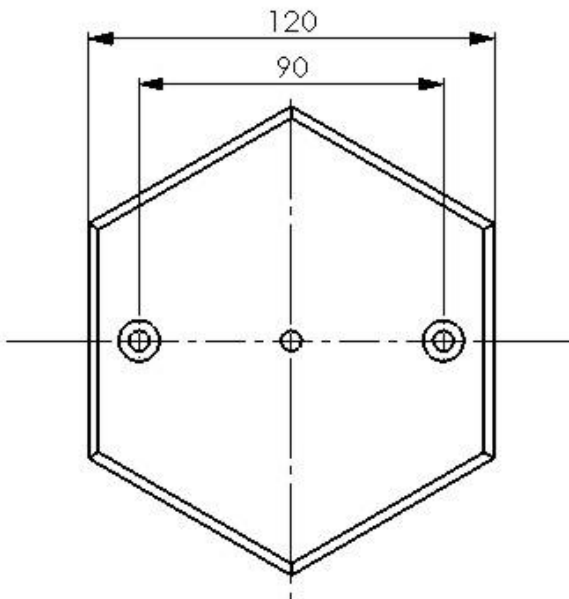
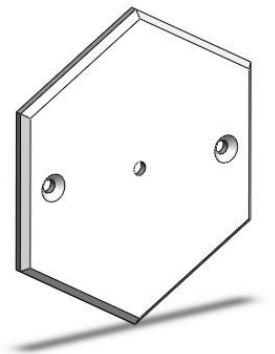
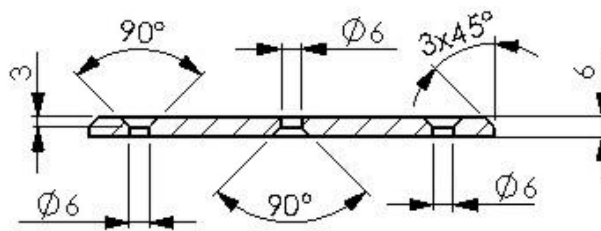
Oefeningen bij Tutorial 7

Spot

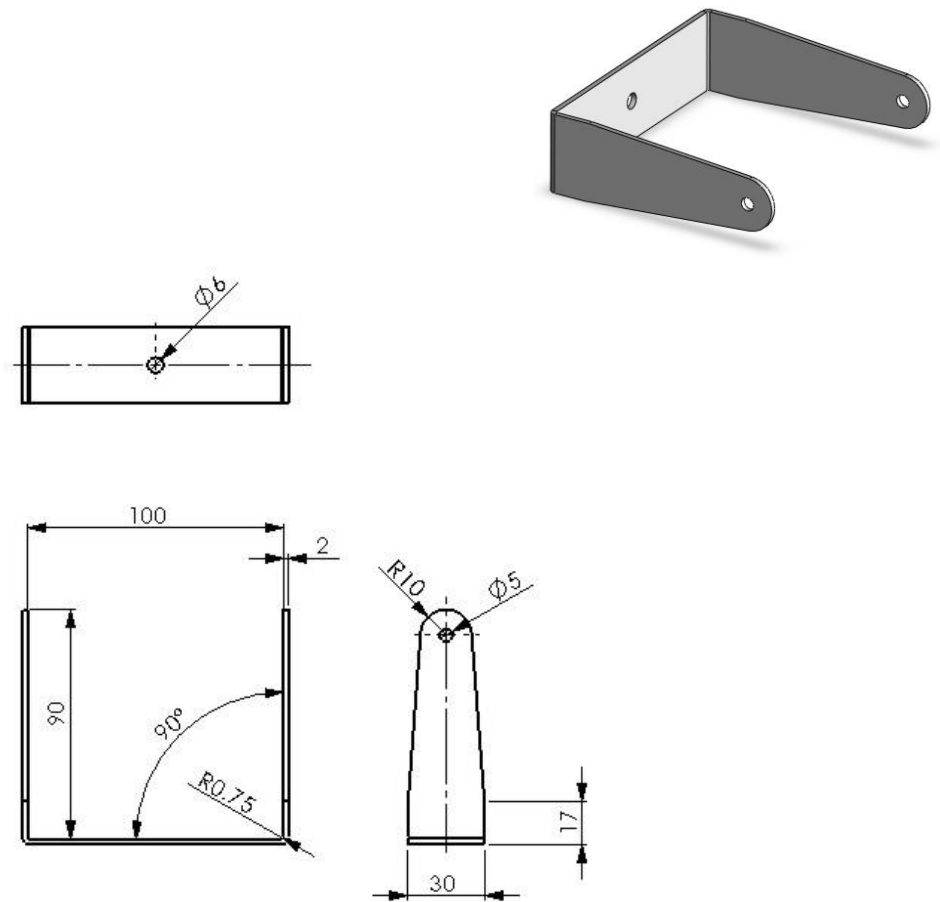
In de volgende oefeningen maken we een spotje van plaatijzer.



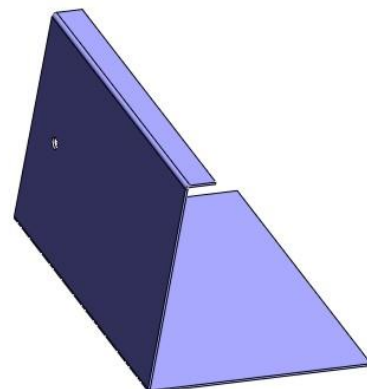
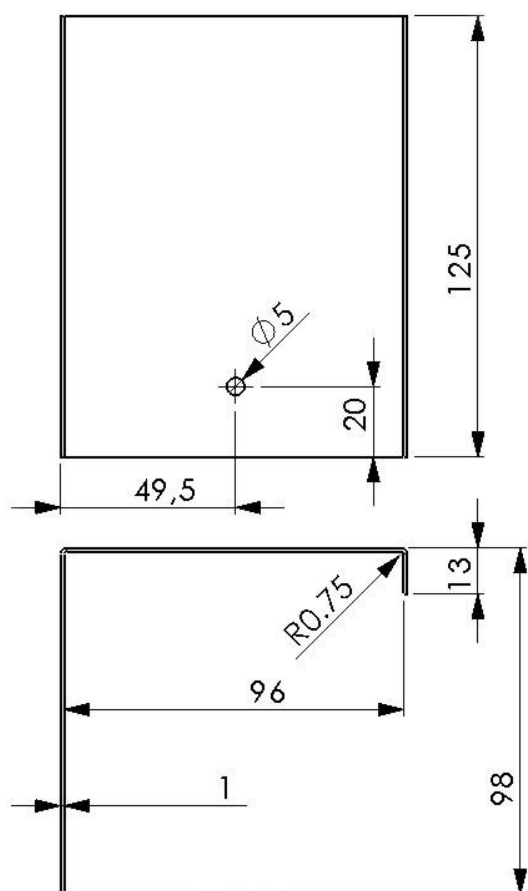
Oefening 7-1



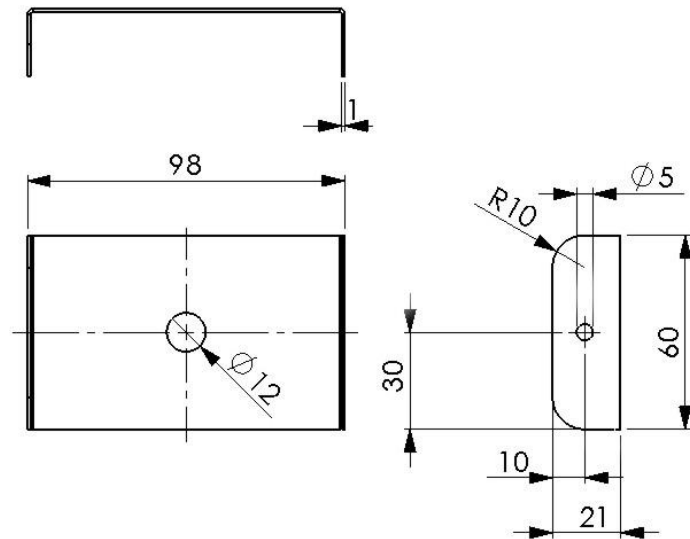
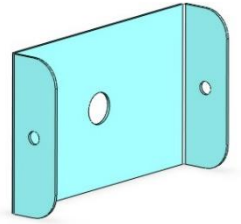
Oefening 7-2



Oefening 7-3

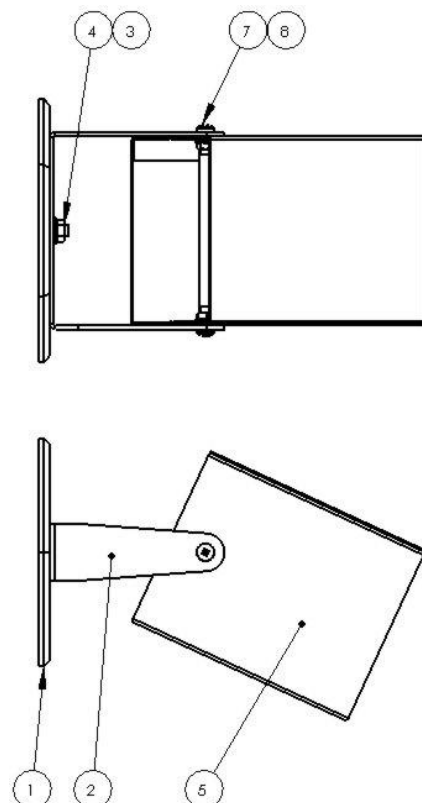


Oefening 7-4

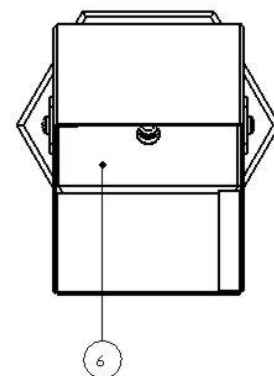


Oefening 7-5

Maak de assembly met de onderdelen die je in oefening 7-1 t/m 7-4 gemaakt hebt. Gebruik stuknummers 3, 4, 7 en 8 uit Toolbox (zie de omschrijving in de stuklijst).

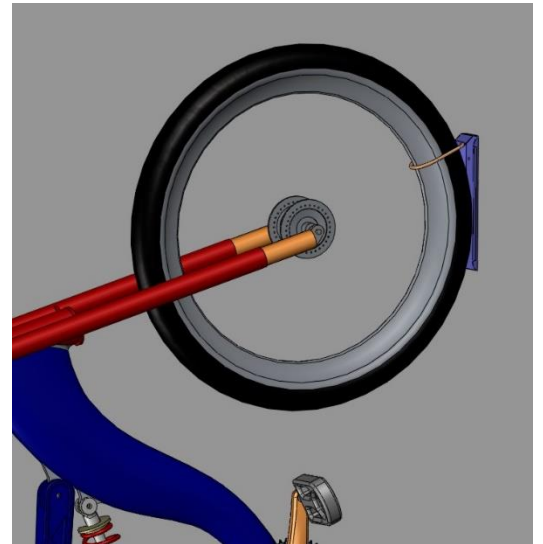
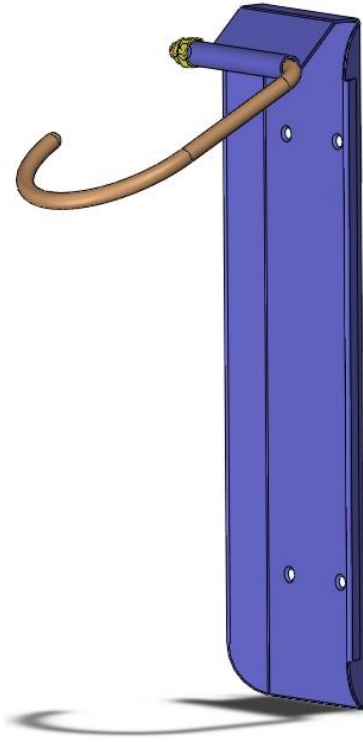


1	7-1	1
2	7-2	1
3	ISO 7046-1 - M6 x 16 - Z --- 16C	1
4	Hexagon Flange Nut ISO - 4161 - M6 - C	1
5	7-3	2
6	7-4	1
7	ISO 7045 - M5 x 12 - Z --- 12C	2
8	Hexagon Flange Nut ISO - 4161 - M5 - C	2

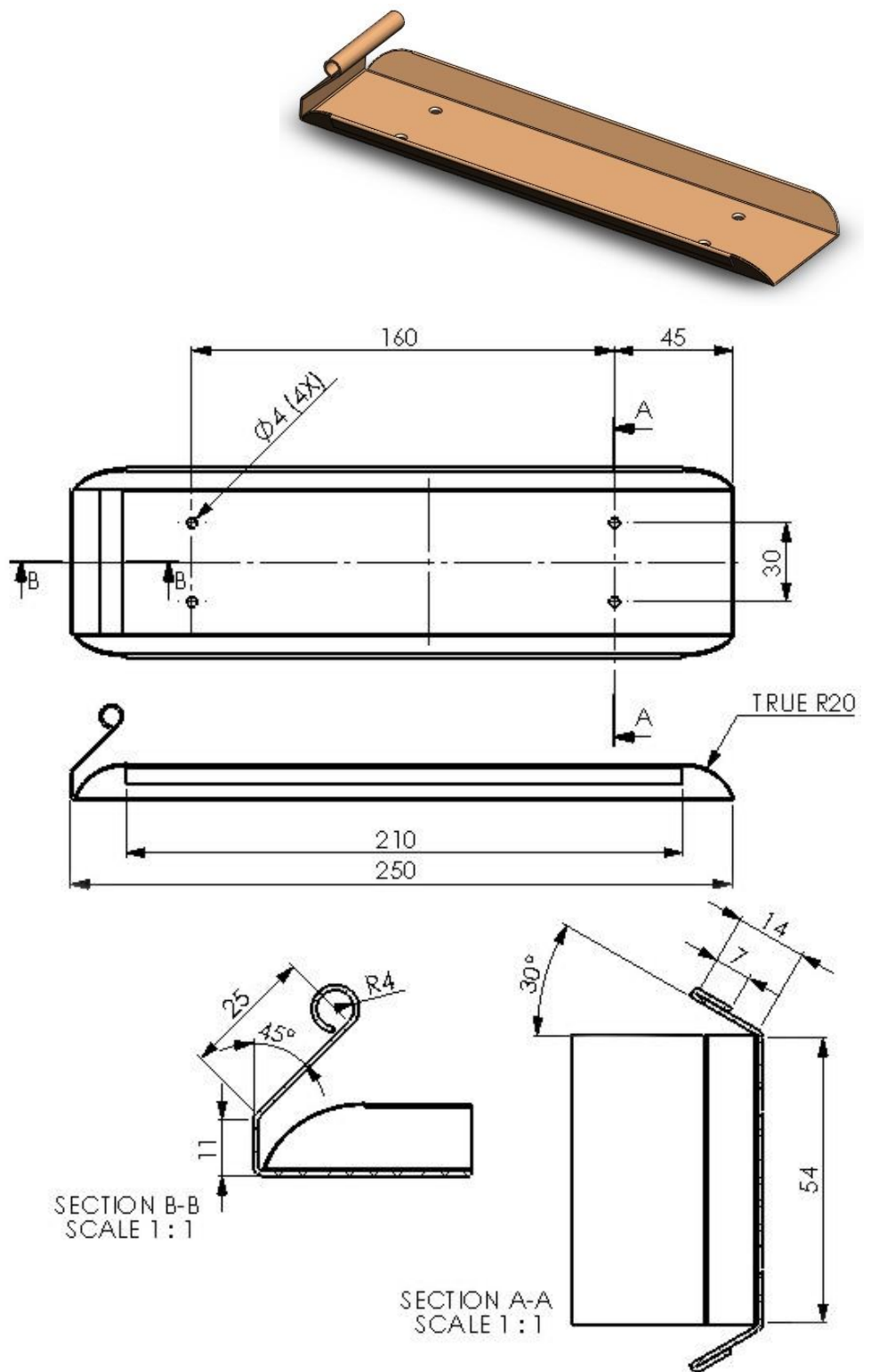


Fietsshaak

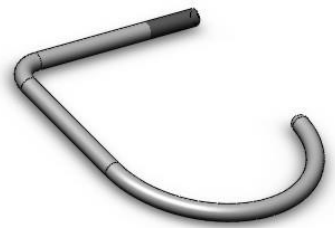
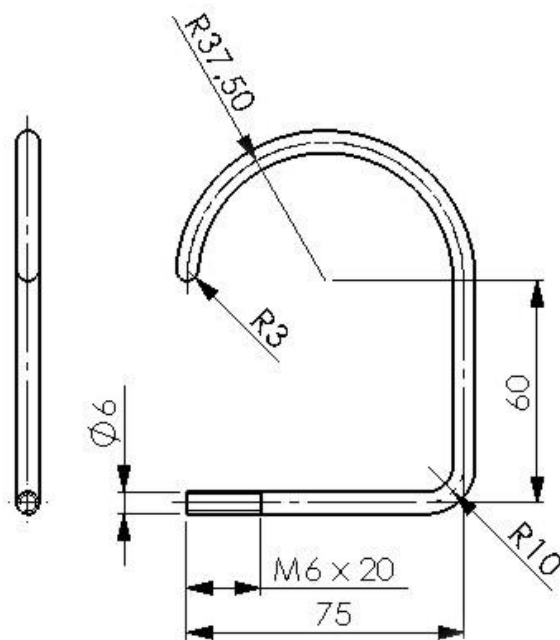
In de volgende oefeningen maken we een haak, waarmee een fiets met het voorwiel aan de muur gehangen kan worden.



Oefening 7-6

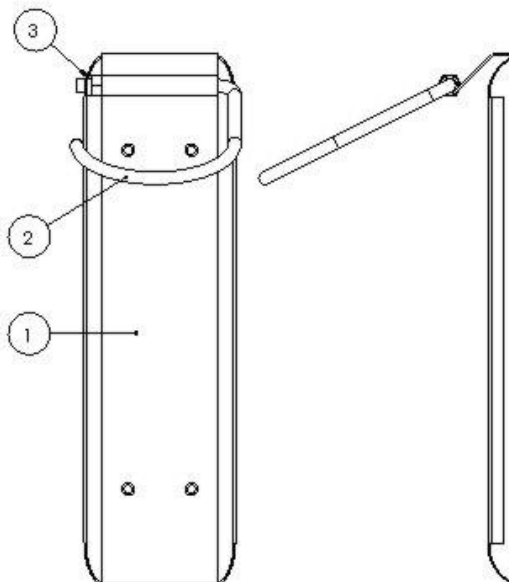


Oefening 7-7



Oefening 7-8

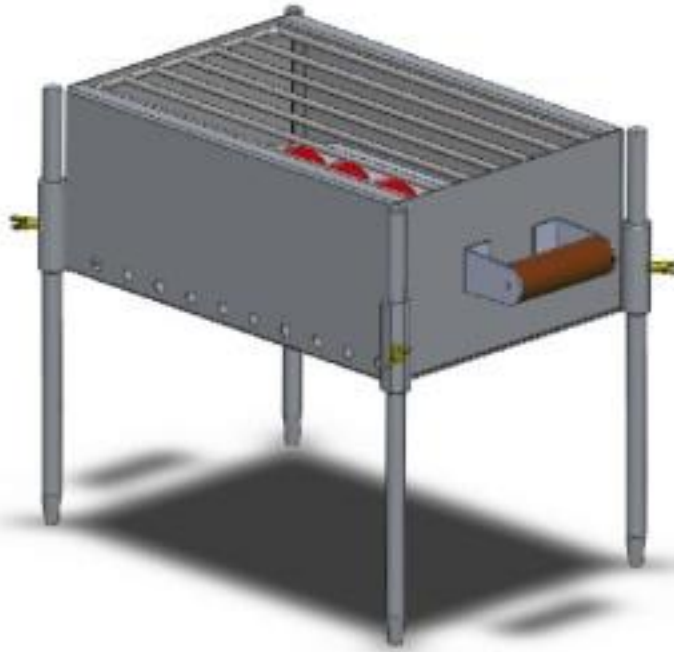
Maak de assembly van de haak met de onderdelen die je in oefening 7-6 en 7-7 gemaakt hebt. Gebruik een moertje uit Toolbox.



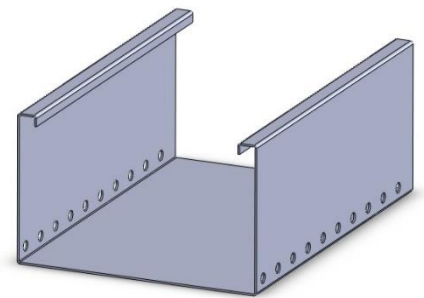
ITEM NO.	PART NUMBER	QTY.
1	7-6	1
2	7-7	1
3	ISO 7040-M6-C	1

Barbecue

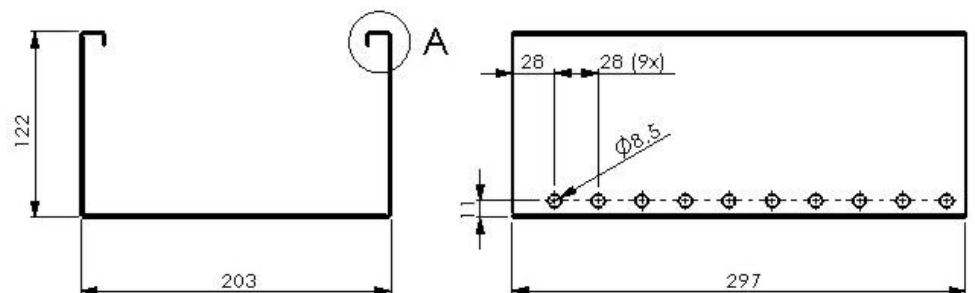
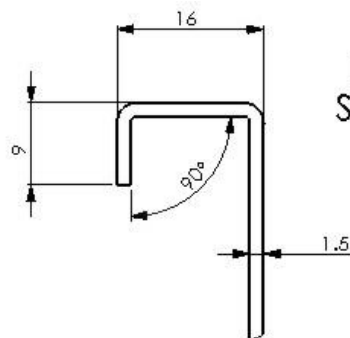
In de volgende oefeningen maken we een barbecue uit plaatijzer.



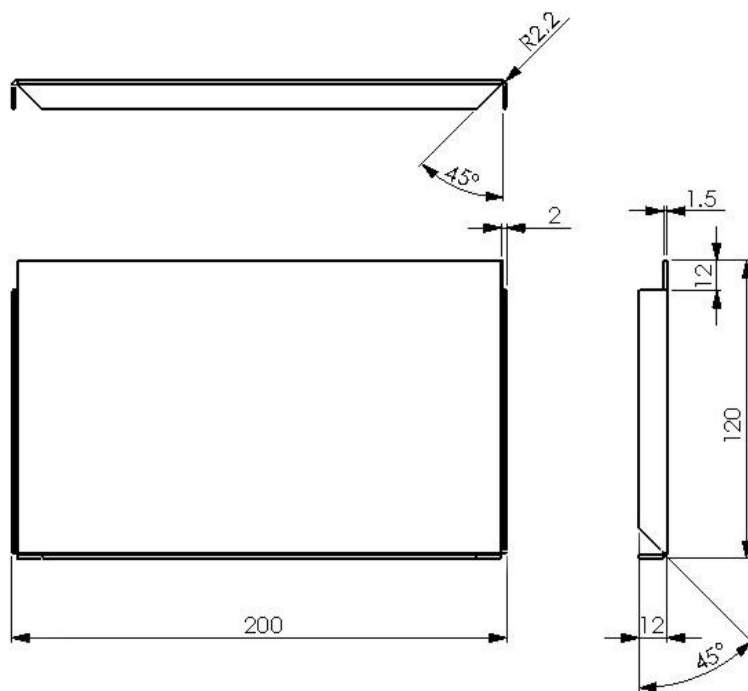
Oefening 7-9



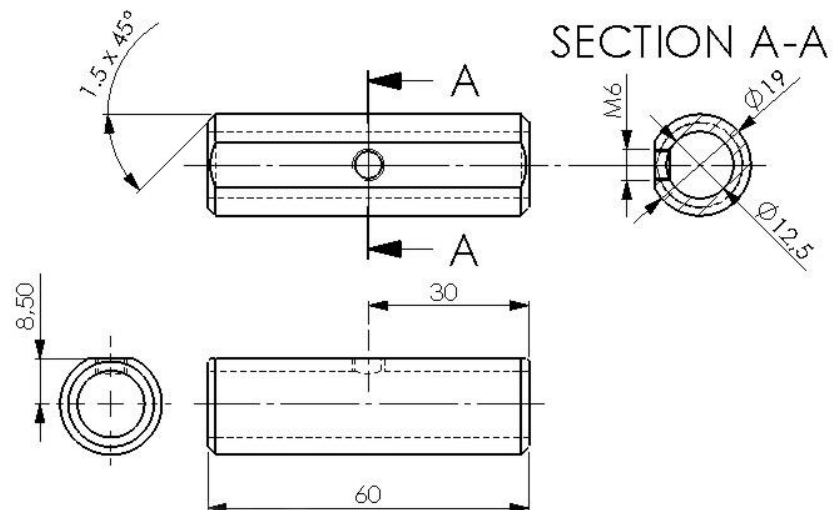
DETAIL A
SCALE 2 : 1



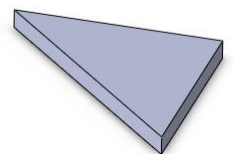
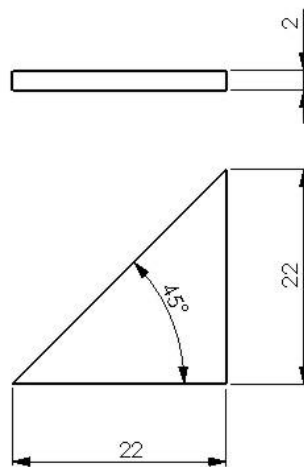
Oefening 7-10



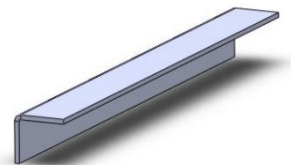
Oefening 7-11

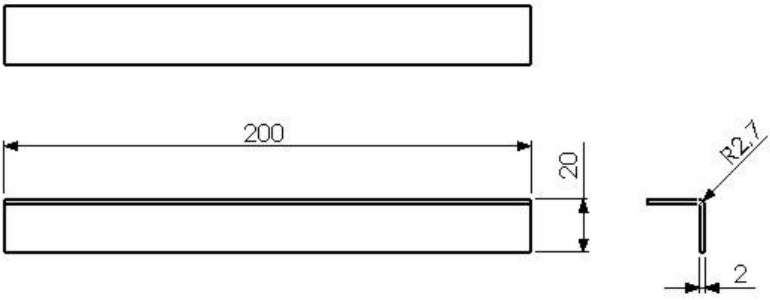
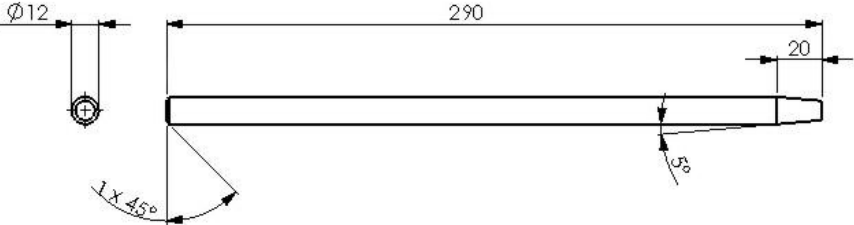


Oefening 7-12

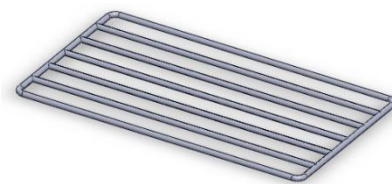
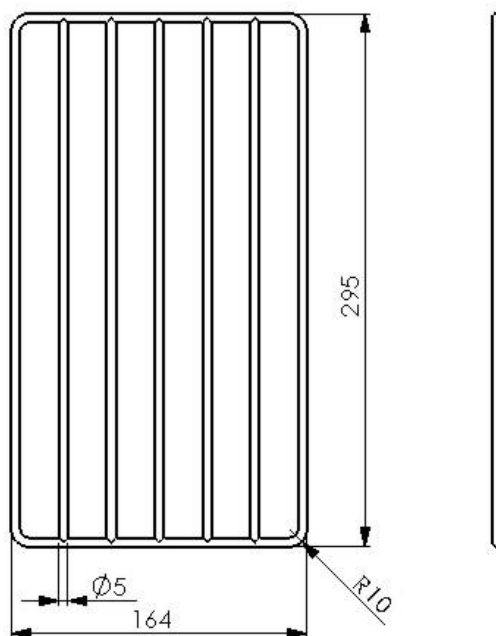


Oefening 7-13

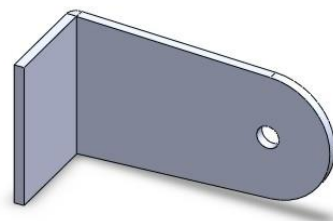
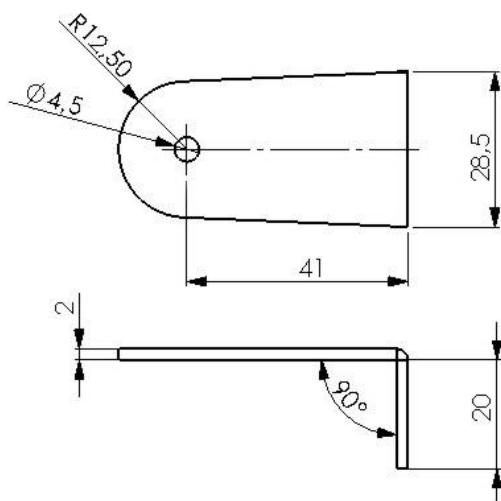


	
Oefening 7-14	

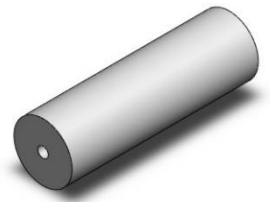
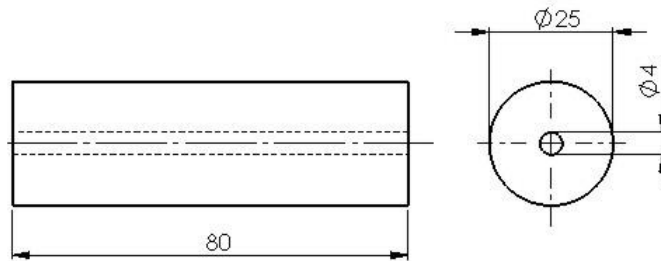
Oefening 7-15



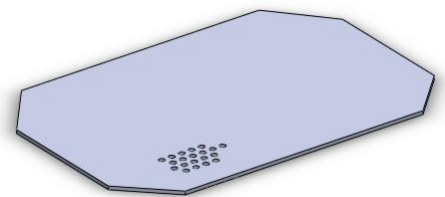
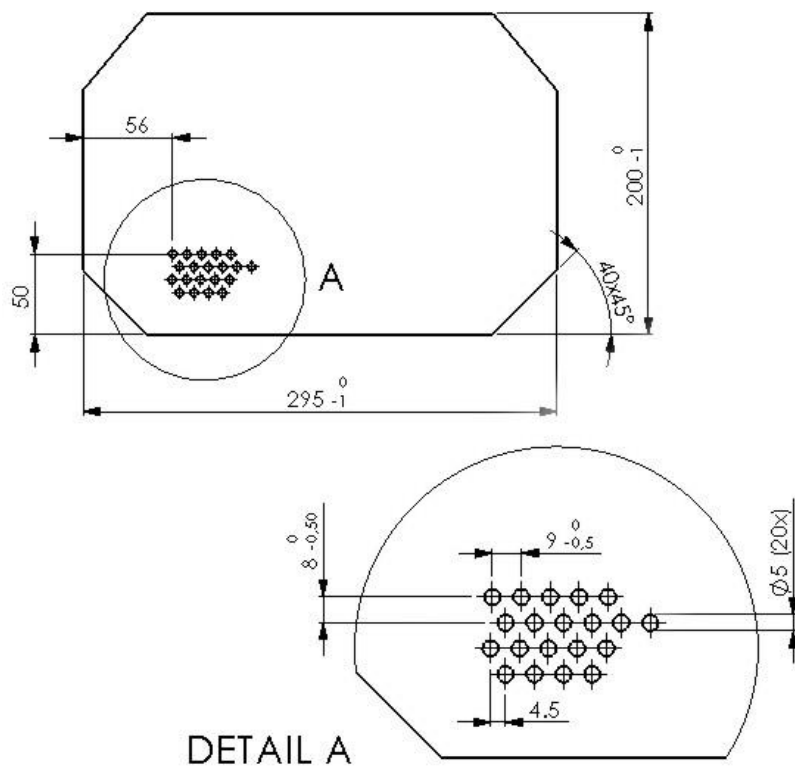
Oefening 7-16



Oefening 7-17

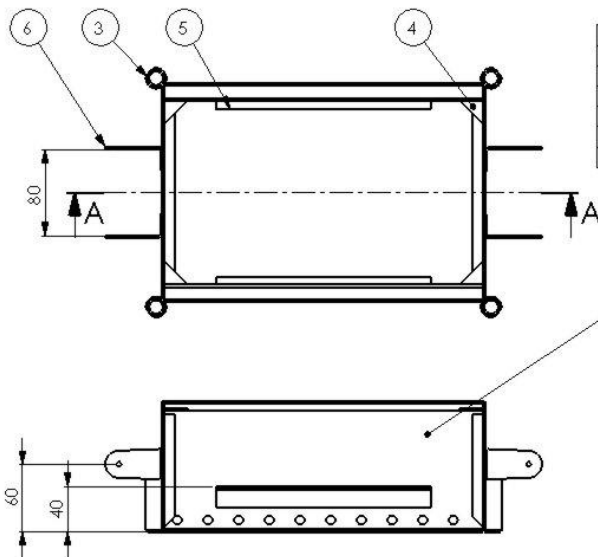
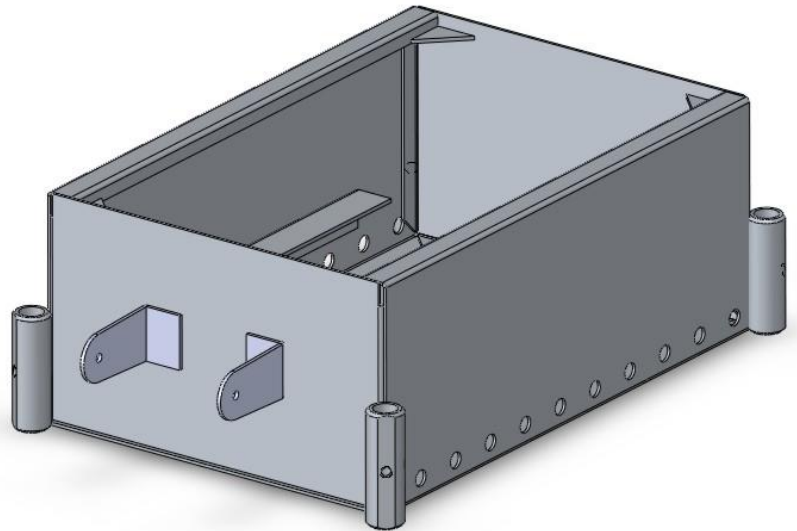


Oefening 7-18



Oefening 7-19

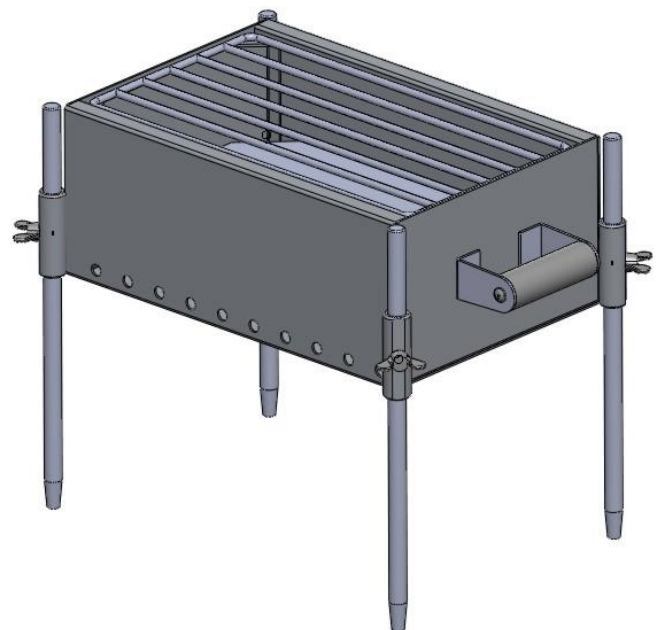
Maak een las-samenstelling.
In de stuklijst hiernaast zie je welke onderdelen gebruikt zijn.

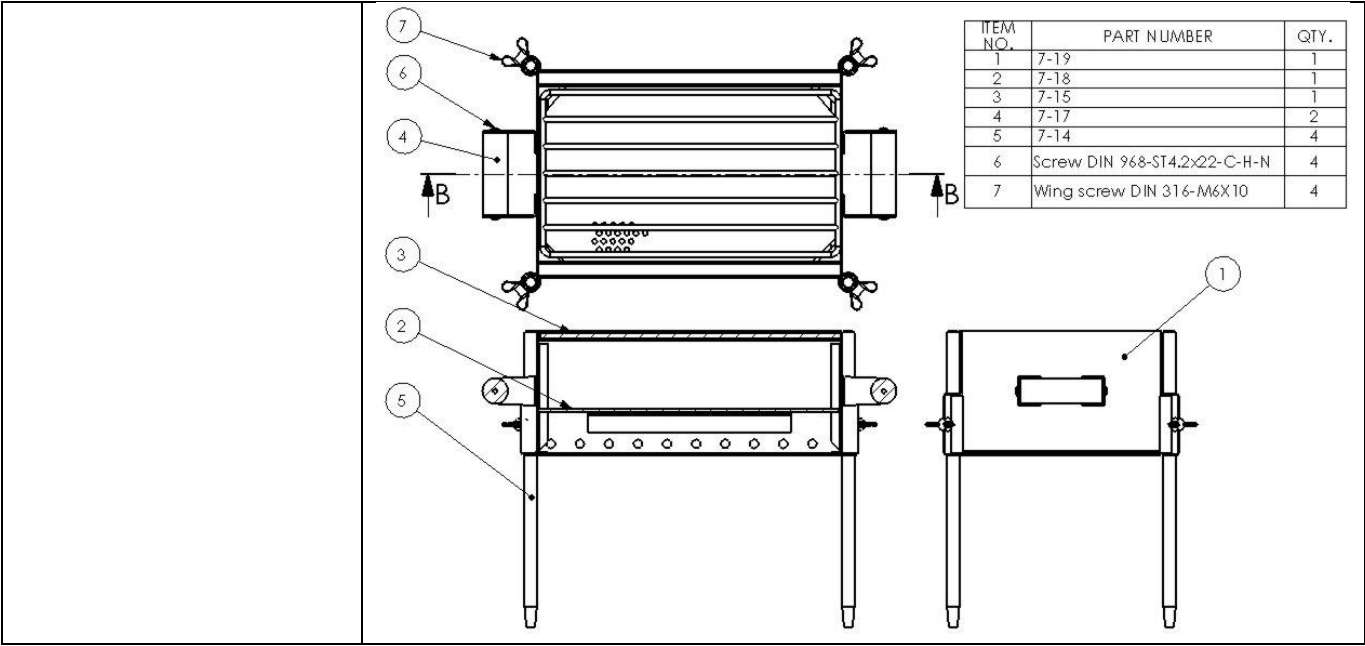


ITEM NO.	PART NUMBER	QTY.
1	7-9	1
2	7-10	2
3	7-11	4
4	7-12	4
5	7-13	2
6	7-16	4

Oefening 7-20

Maak nu de volledige samenstelling. Er zijn enkele onderdelen uit Toolbox gebruikt. In de stuklijst hiernaast zie je welke dat zijn.

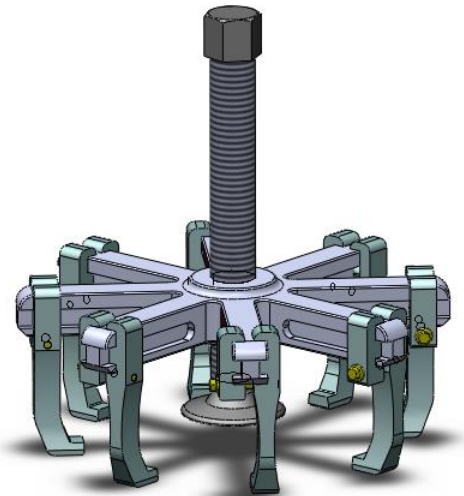




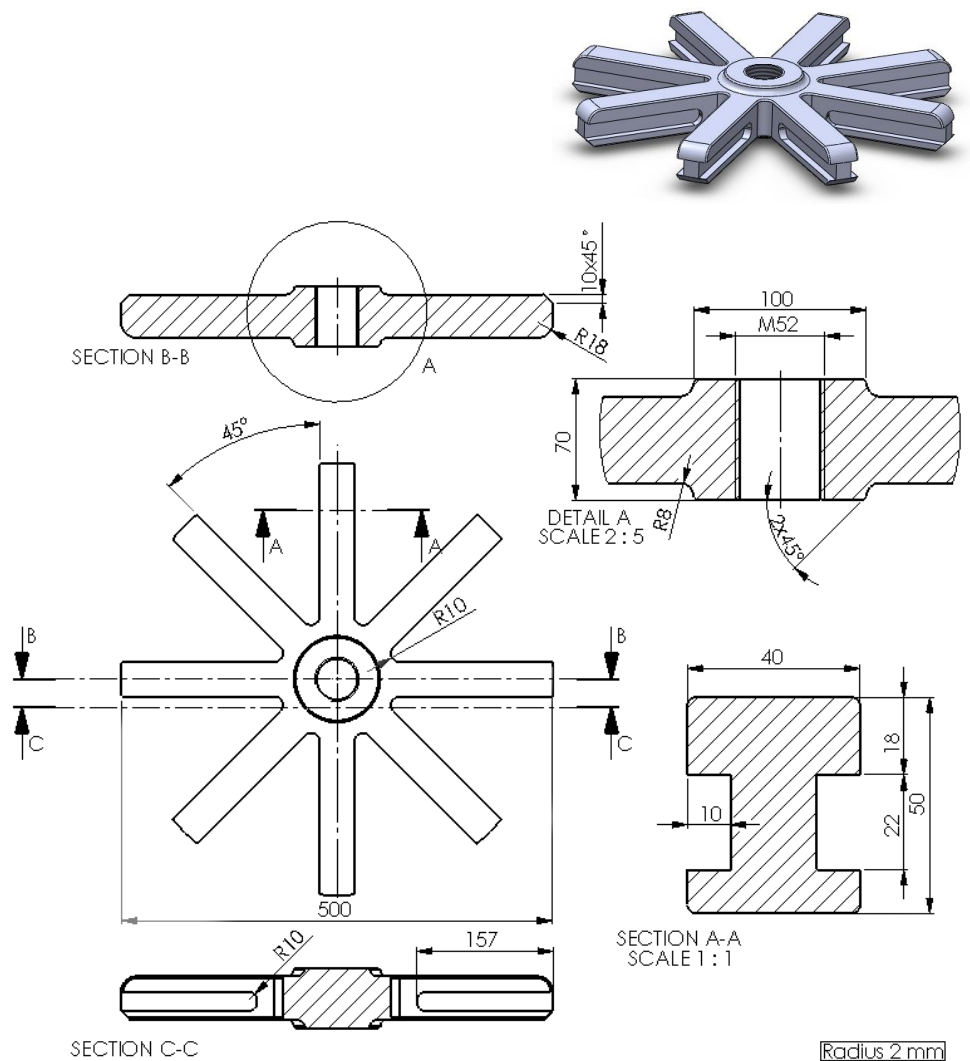
Oefeningen bij Tutorial 8

Zware lagertrekker

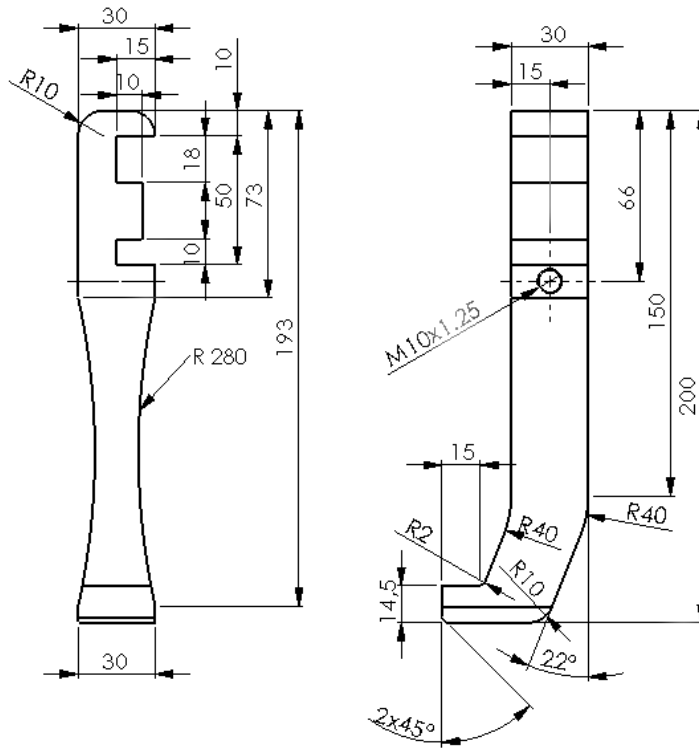
In de volgende oefeningen maken we een zware lagertrekker met acht armen.



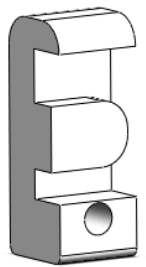
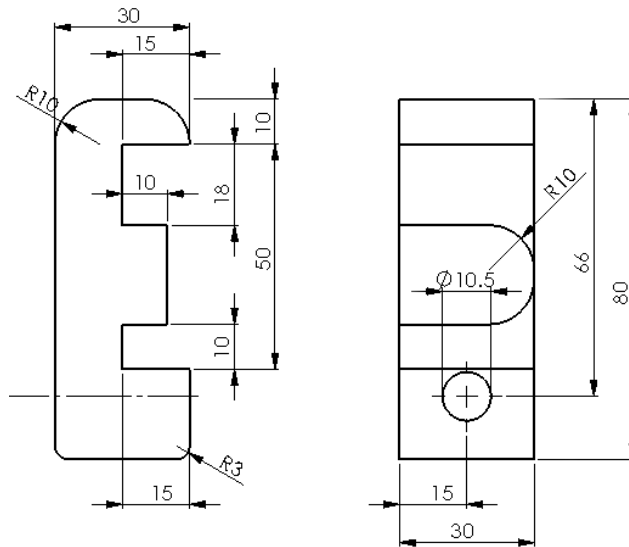
Oefening 8-1



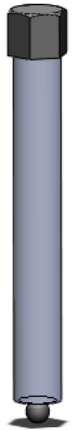
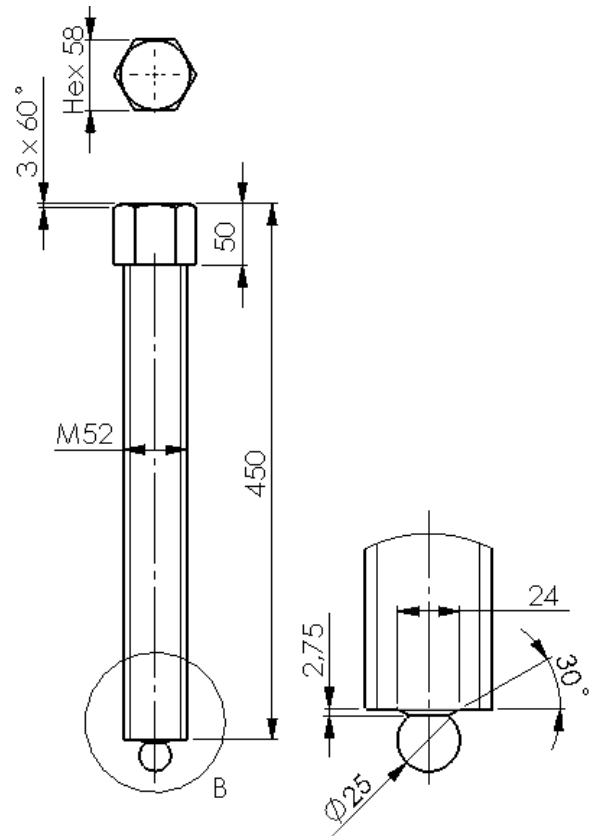
Oefening 8-2



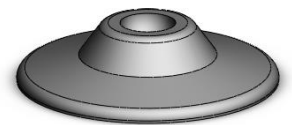
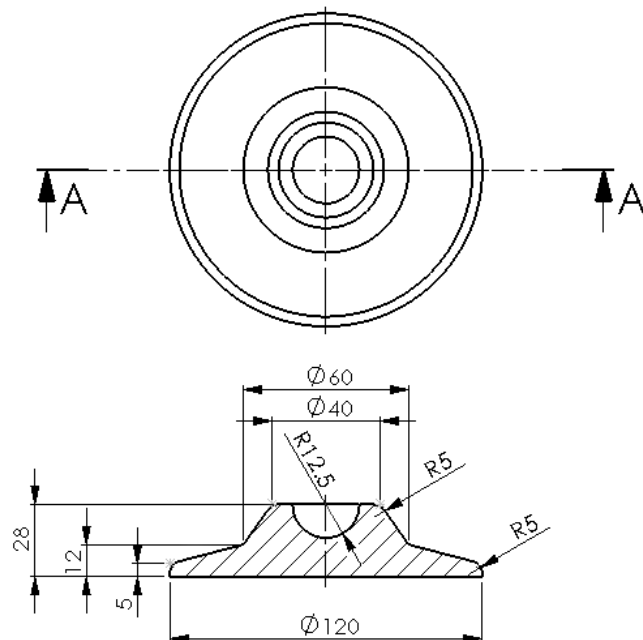
Oefening 8-3



Oefening 8-4

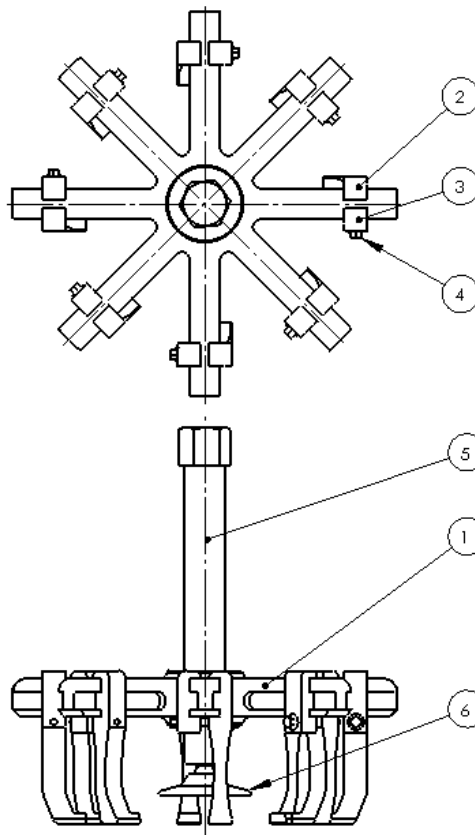
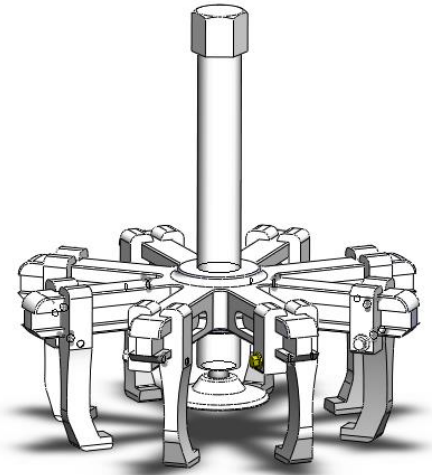


Oefening 8-5



Oefening 8-6

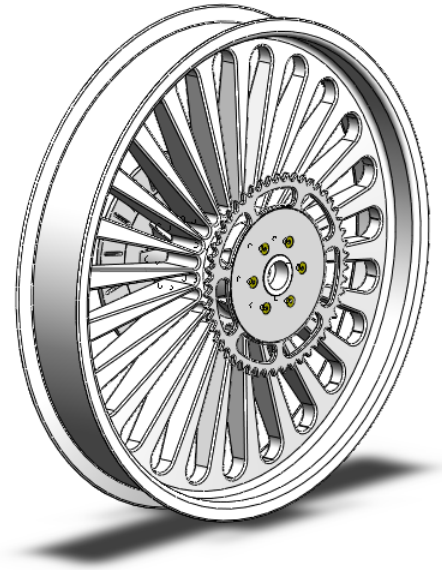
Maak nu de samenstelling van de lagertrekker. Er wordt een bout uit toolbox gebruikt. In de stuklijst hier-naast zie je welke dat is.



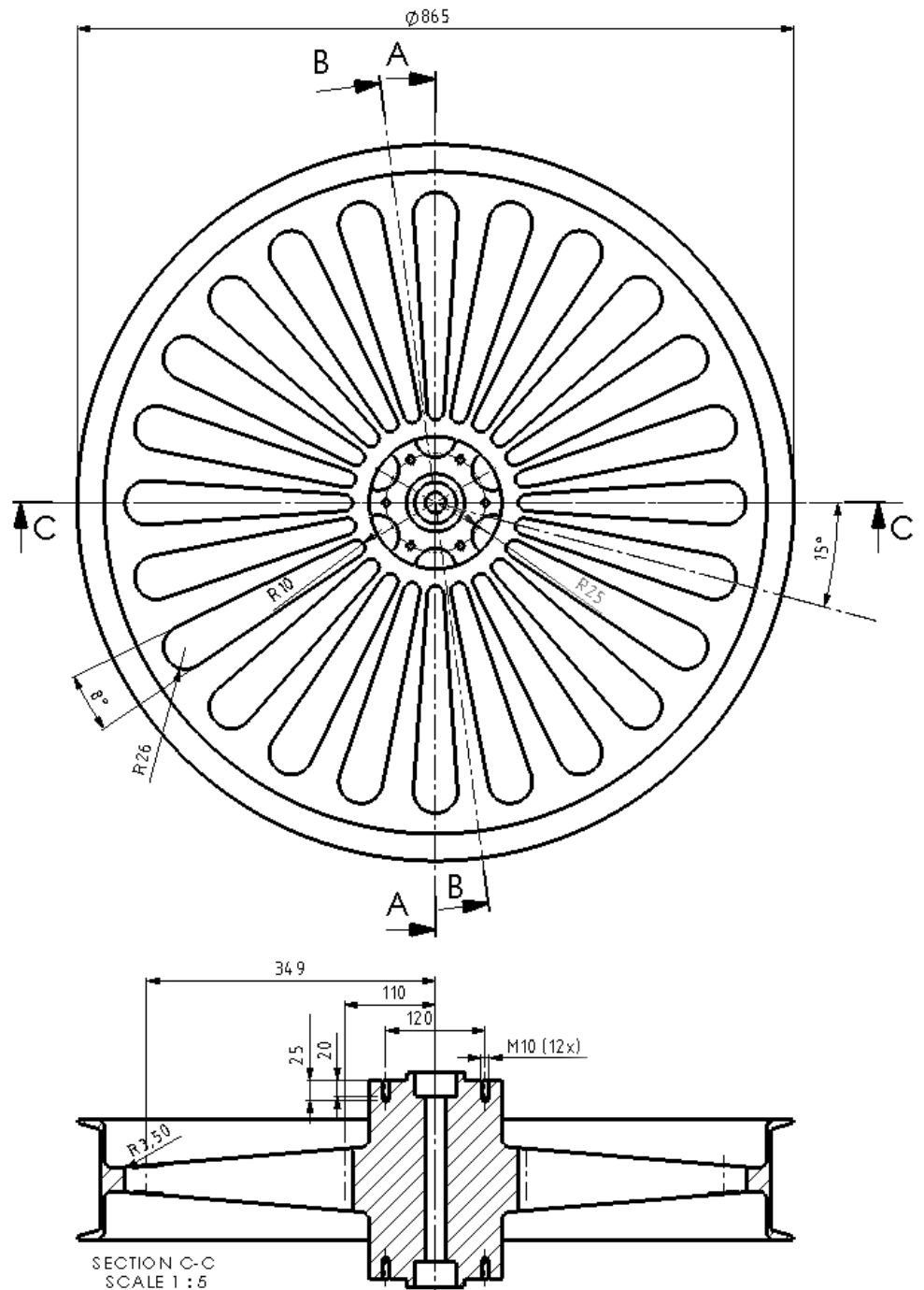
ITEM NO.	PART NUMBER	QTY.
1	B-1	1
2	B-2	8
3	B-3	8
4	ISO 4162 - M10 x 70 x 26-C	8
5	B-4	1
6	B-5	1

Motor-achterwiel

In de volgende oefeningen maken we een achterwiel voor een motor, met een tandwiel en een schijfrem.

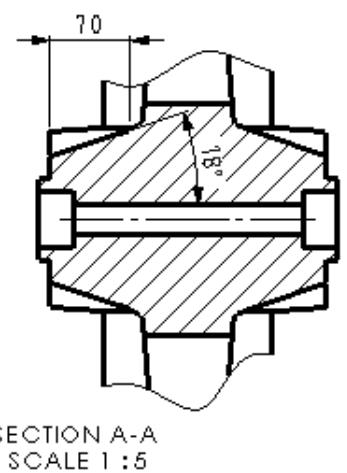
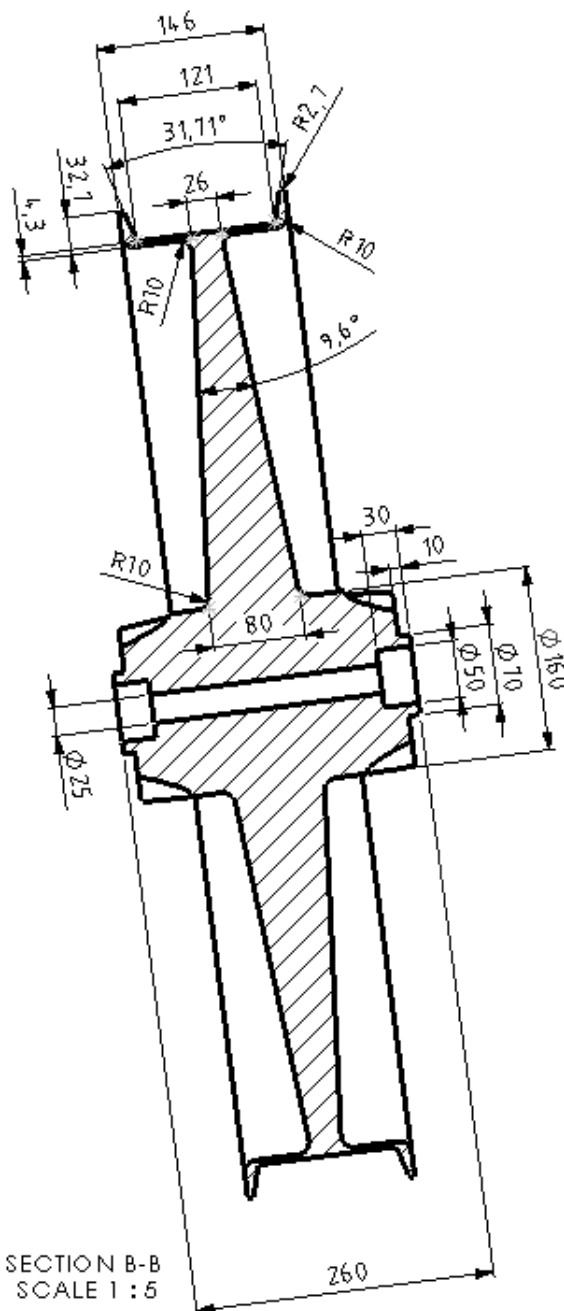


Oefening 8-7, deel 1
Zie ook volgende pagina

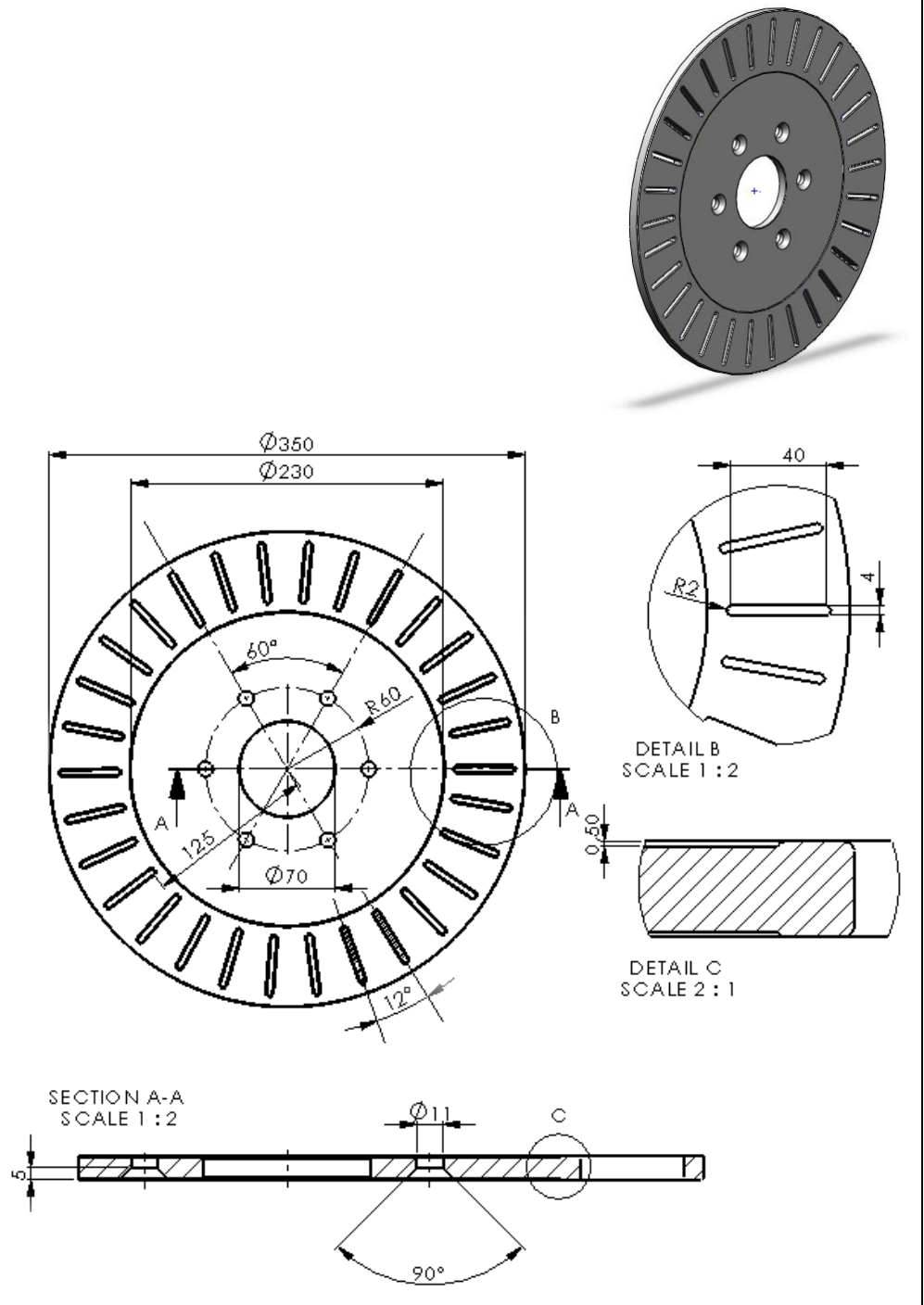


Oefening 8-7, deel 2

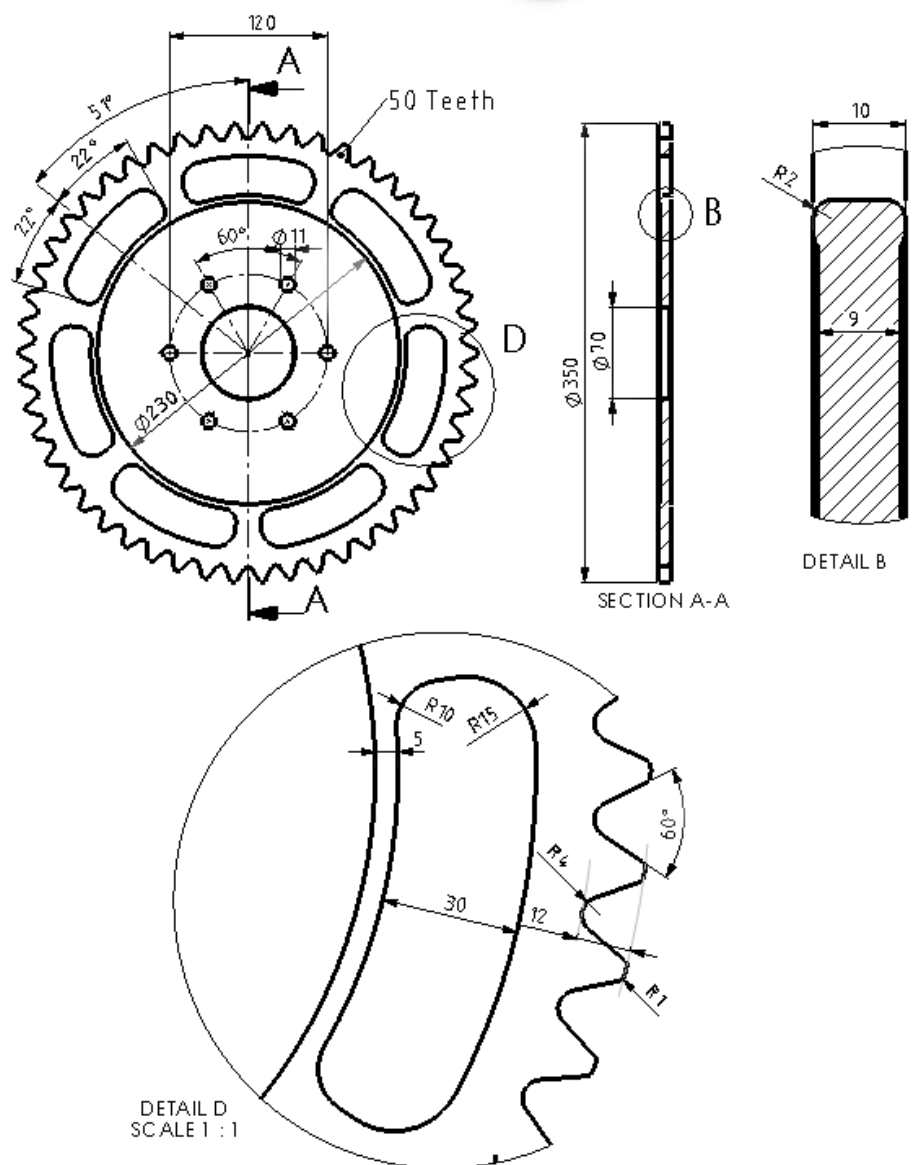
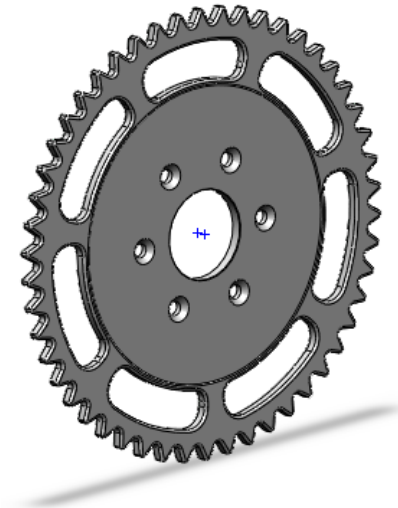
Zie ook vorige pagina



Oefening 8-8

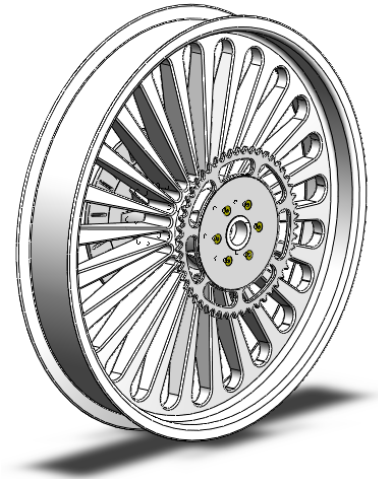


Oefening 8-9

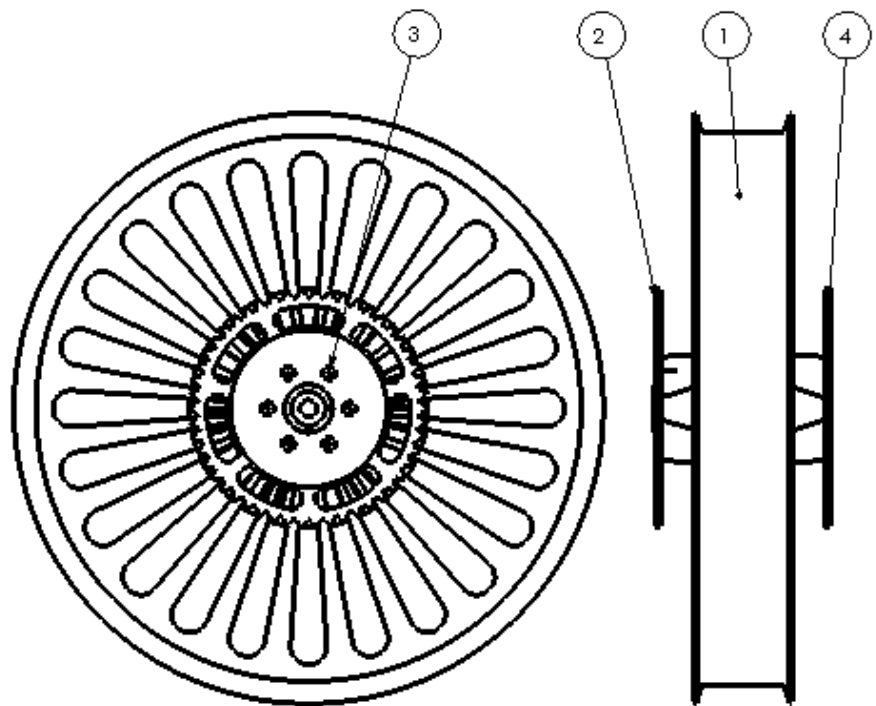


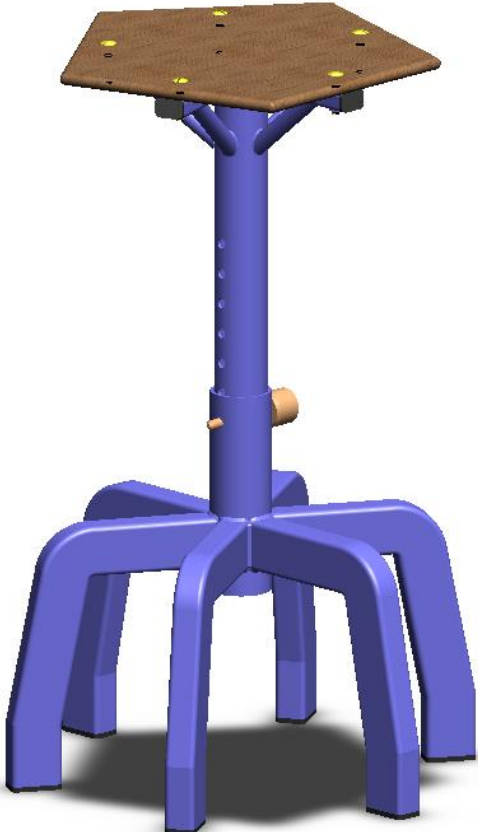
Oefening 8-10

Maak nu de samenstelling van het achterwiel. Er wordt een schroef uit toolbox gebruikt. In de stuklijst hier naast zie je welke dat is.

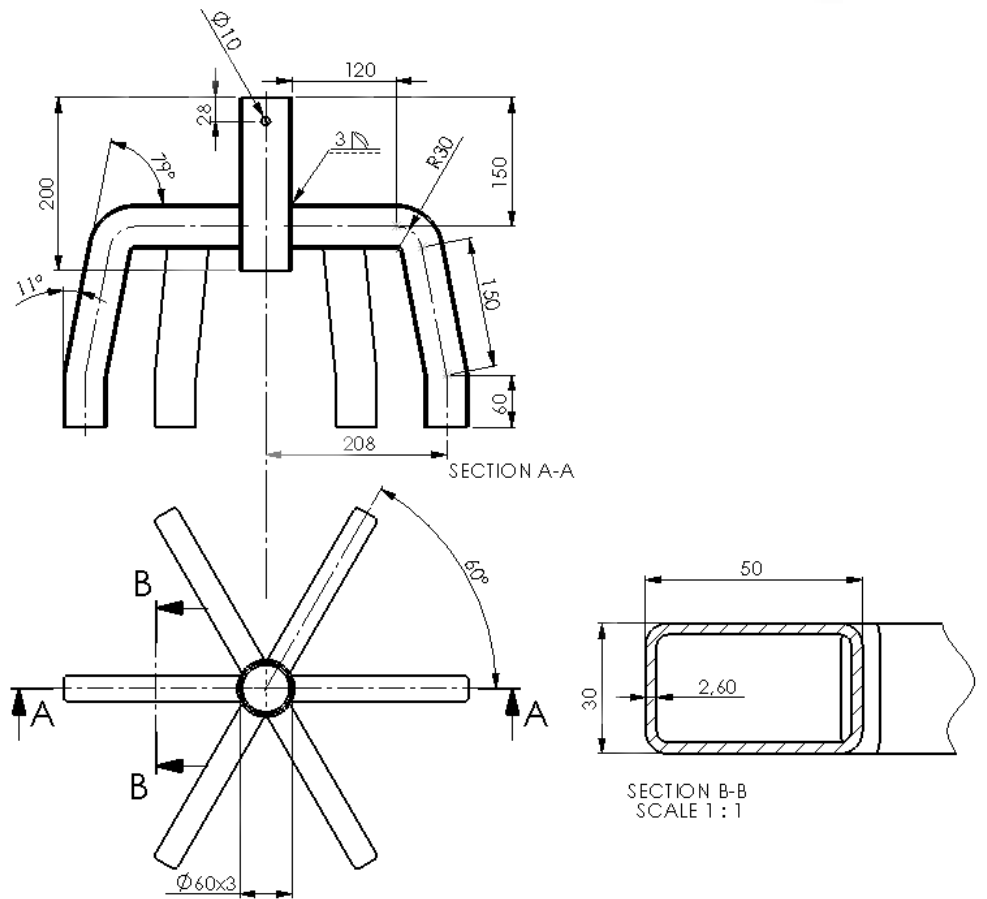


ITEM NO.	PART NUMBER	QTY.
1	8-7	1
2	8-9	1
3	ISO 10642 - M10 x 30	12
4	8-8	1

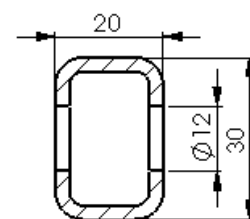
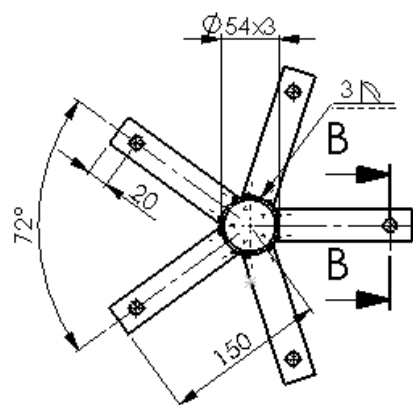
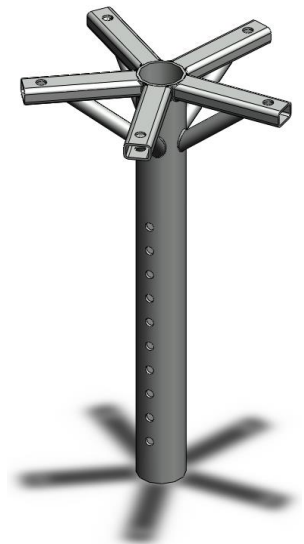


	Oefeningen bij Tutorial 9
Werkplaatskruk In de volgende oefeningen modelleren we een werkplaatskruk.	 A 3D CAD model of a workbench stool. It features a central vertical column with a blue finish, a brown rectangular top plate, and six blue legs. The top plate has several yellow circular markers. The legs are arranged in a hexagonal pattern around the base of the column. The column has a small orange adjustment knob.

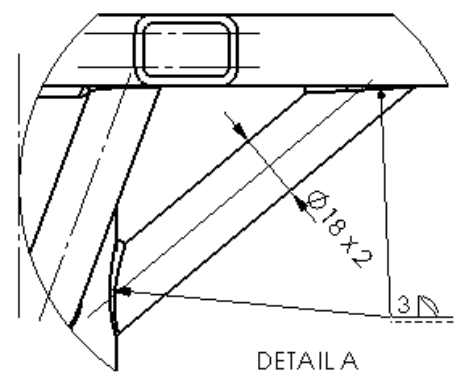
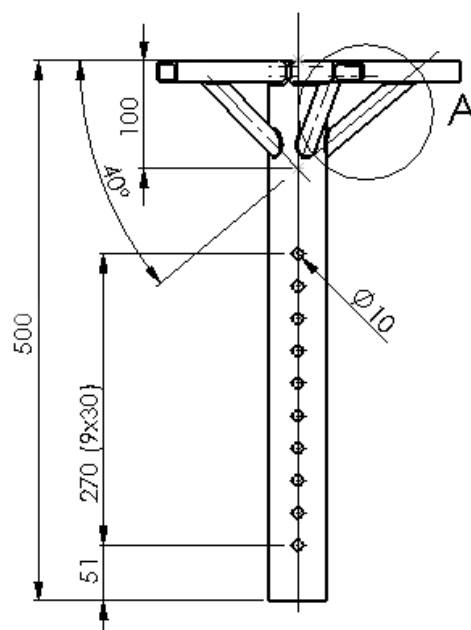
Oefening 9-1



Oefening 9-2

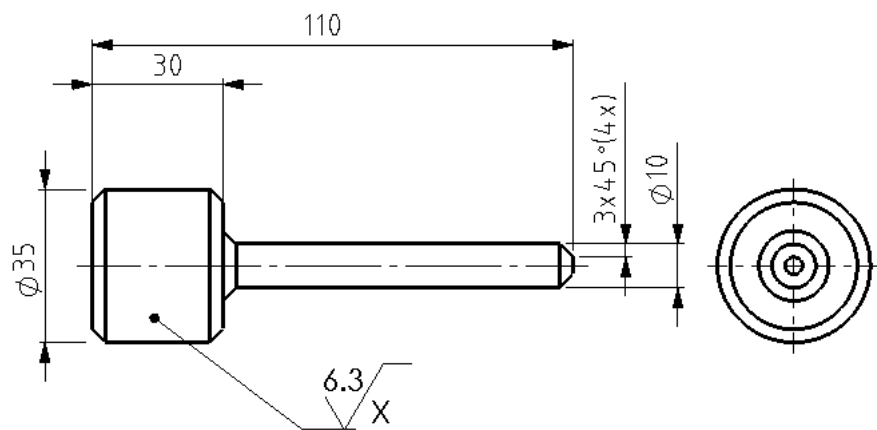


SECTION B-B

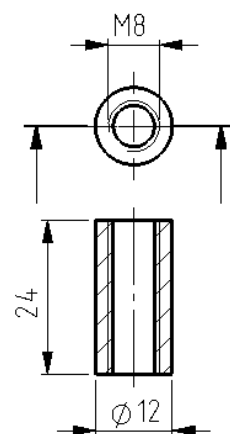


DETAIL A

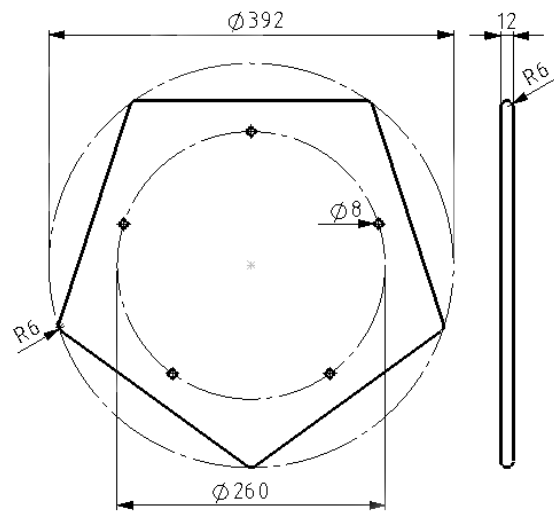
Oefening 9-3



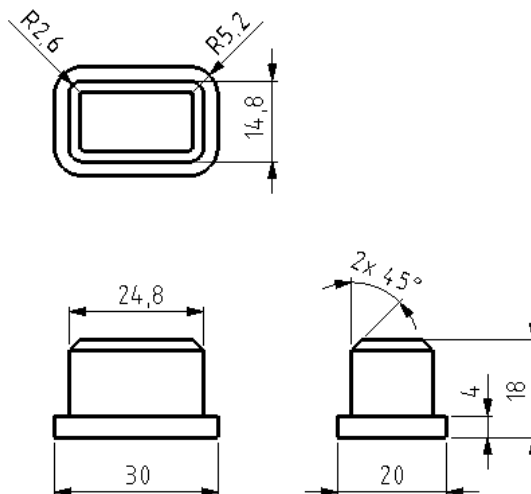
Oefening 9-4



Oefening 9-5

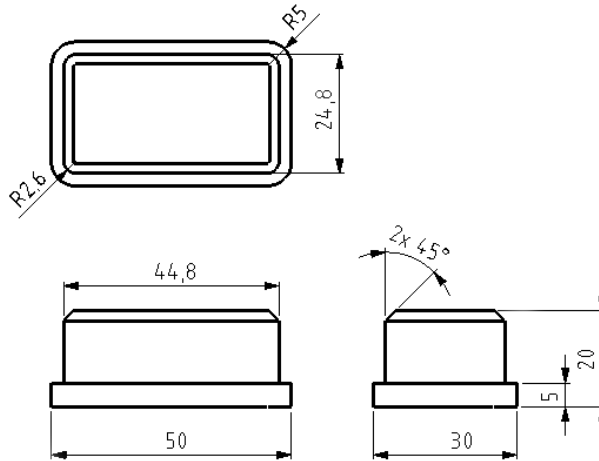
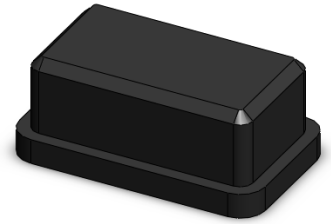


Oefening 9-6



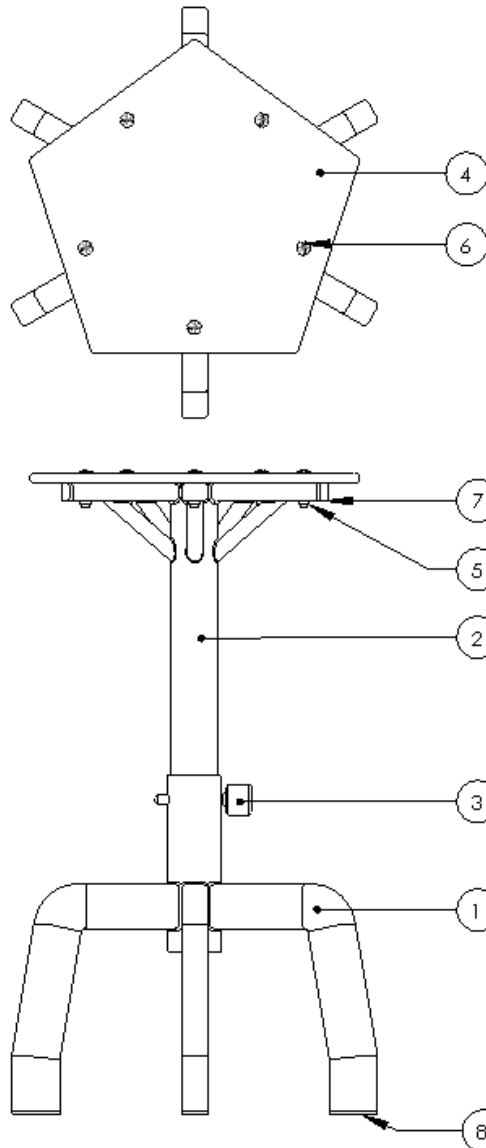
Oefening 9-7

Maak dit onderdeel als een configuratie van het onderdeel uit oefening 9-6



Oefening 9-8

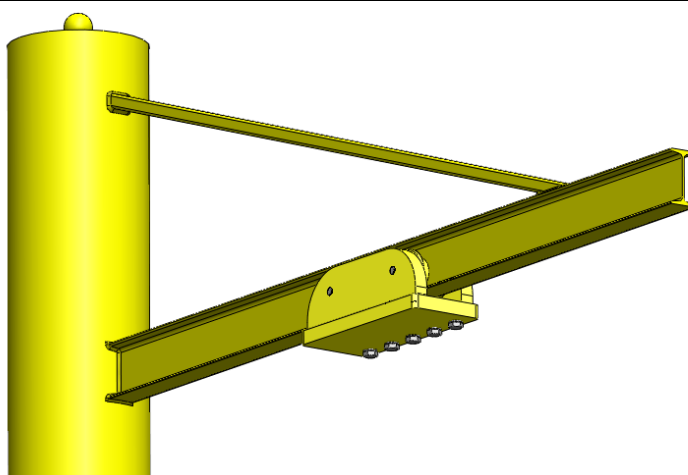
Maak nu de samenstelling van de kruk. Er wordt een schroef uit toolbox gebruikt. In de stuklijst hiernaast zie je welke dat is.



ITEM NO.	PART NUMBER	QTY.
1	9-1	1
2	9-2	1
3	9-3	1
4	9-5	1
5	9-4	5
6	ISO 2010 - M8 x 40 -- - 40C	5
7	9-6	5
8	9-7	6

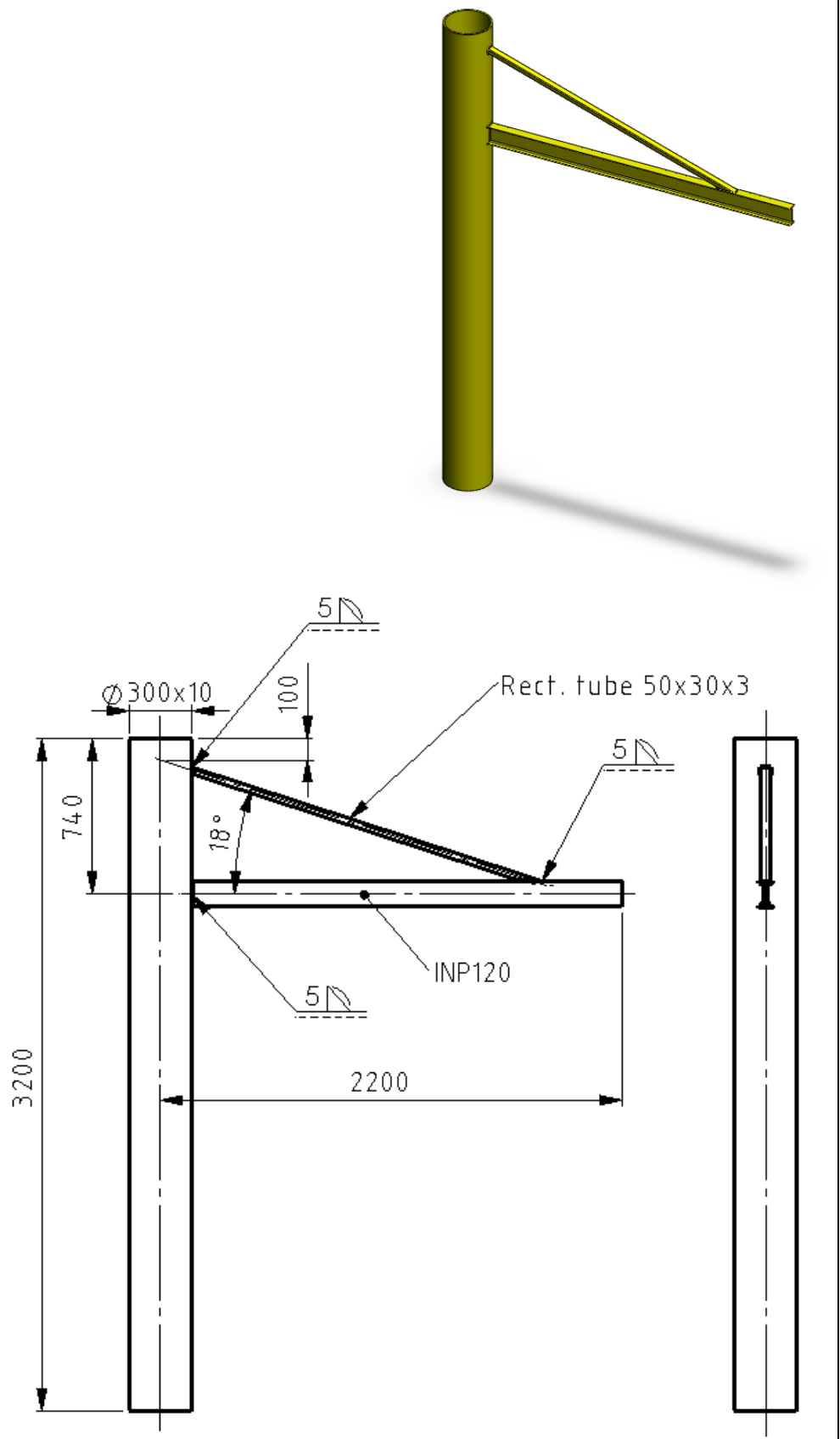
Hijsmast

In deze oefening maken we een hijsmast met een loopkat.

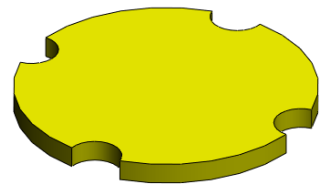
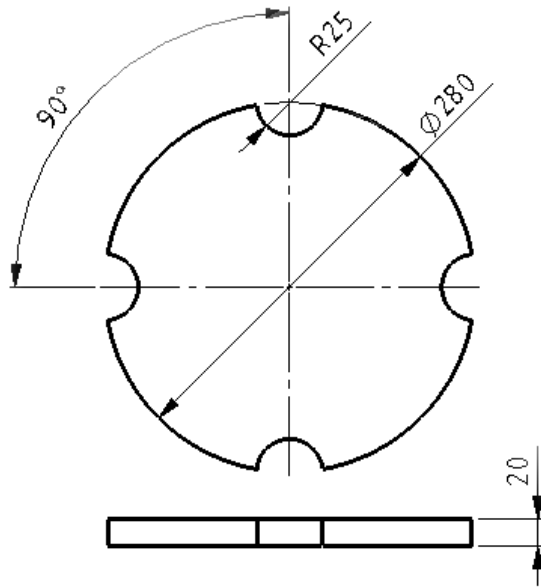


Oefening 9-9

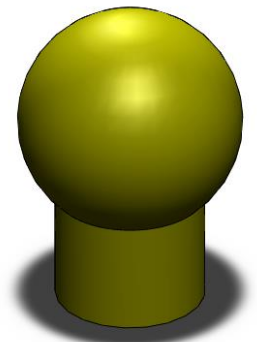
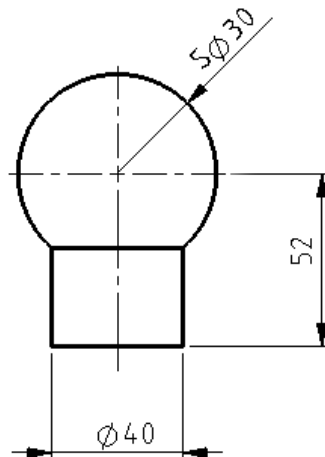
Maak dit onderdeel met
Structural Members



Oefening 9-10

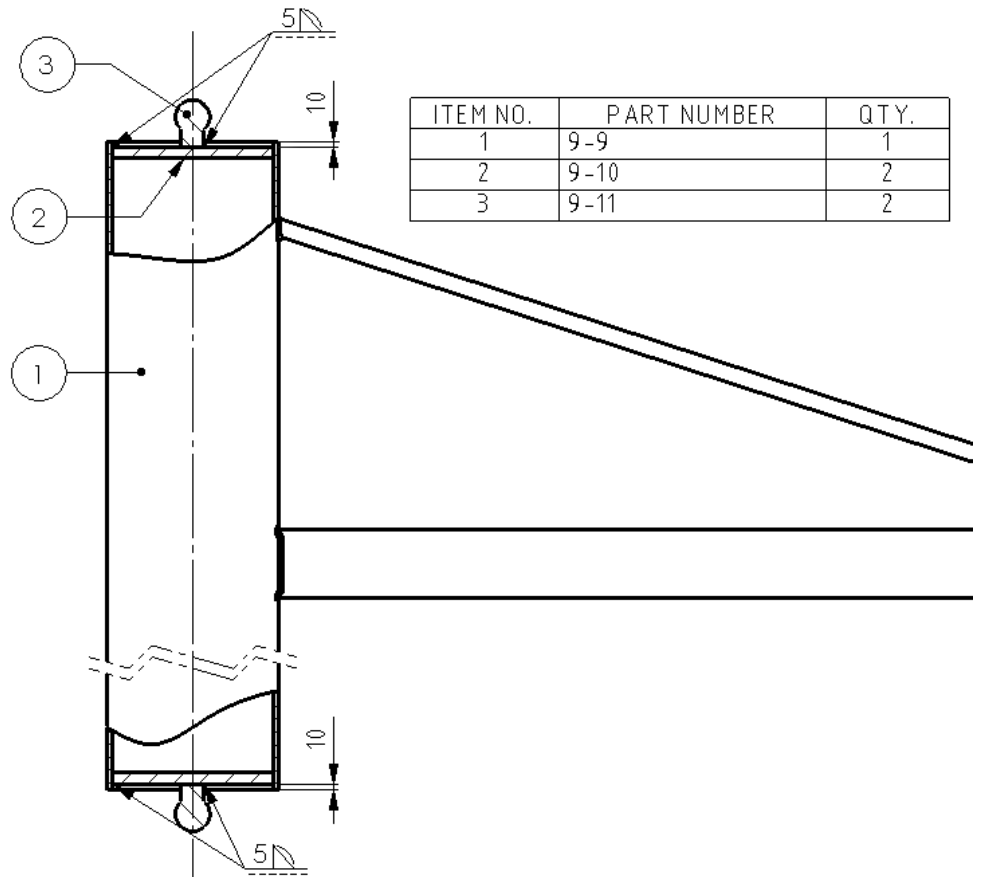
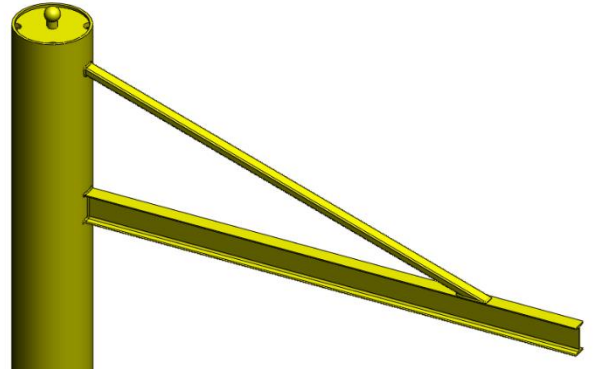


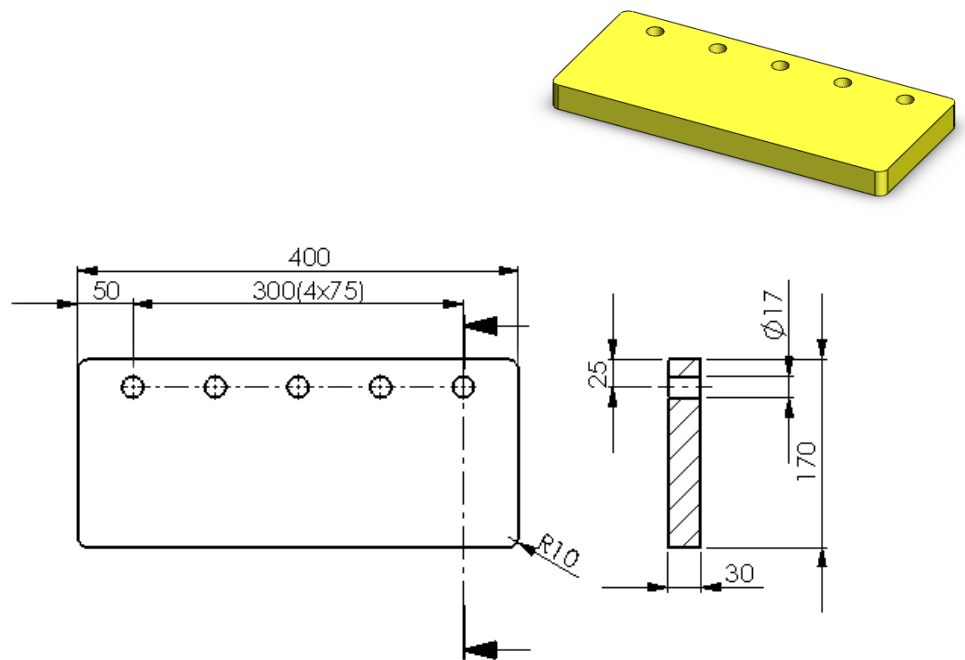
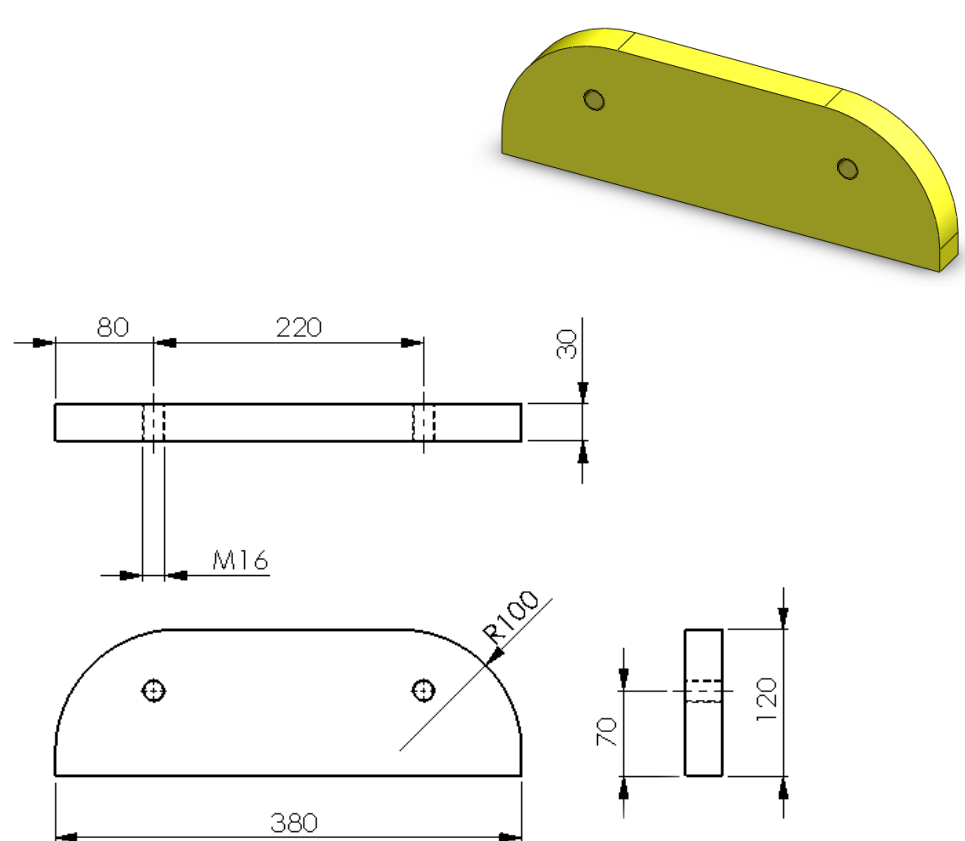
Oefening 9-11



Oefening 9-12

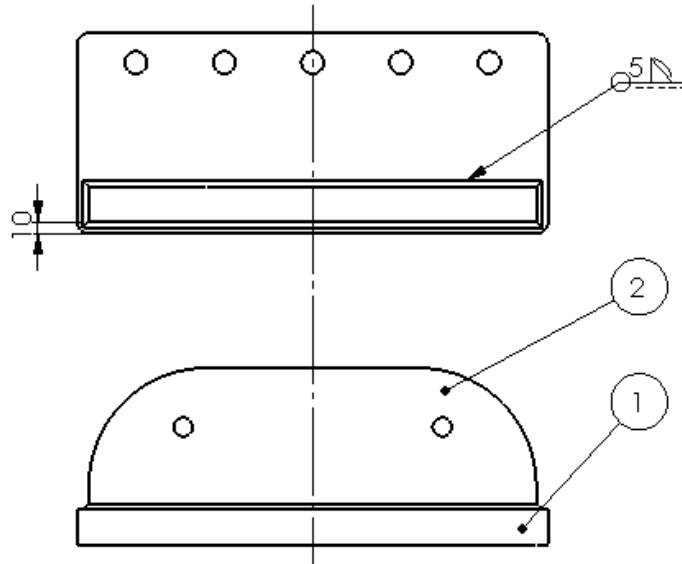
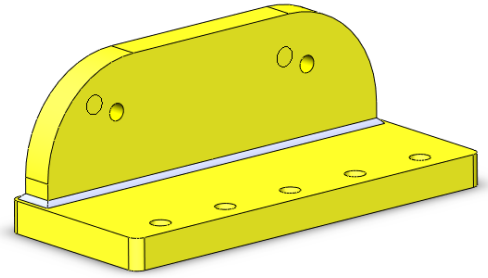
Maak een assembly van de onderdelen uit oefeningen 9-9 tot en met 9-11, en breng de lasen aan zoals hiernaast is aangegeven.



Oefening 9-13**Oefening 9-14**

Oefening 9-15

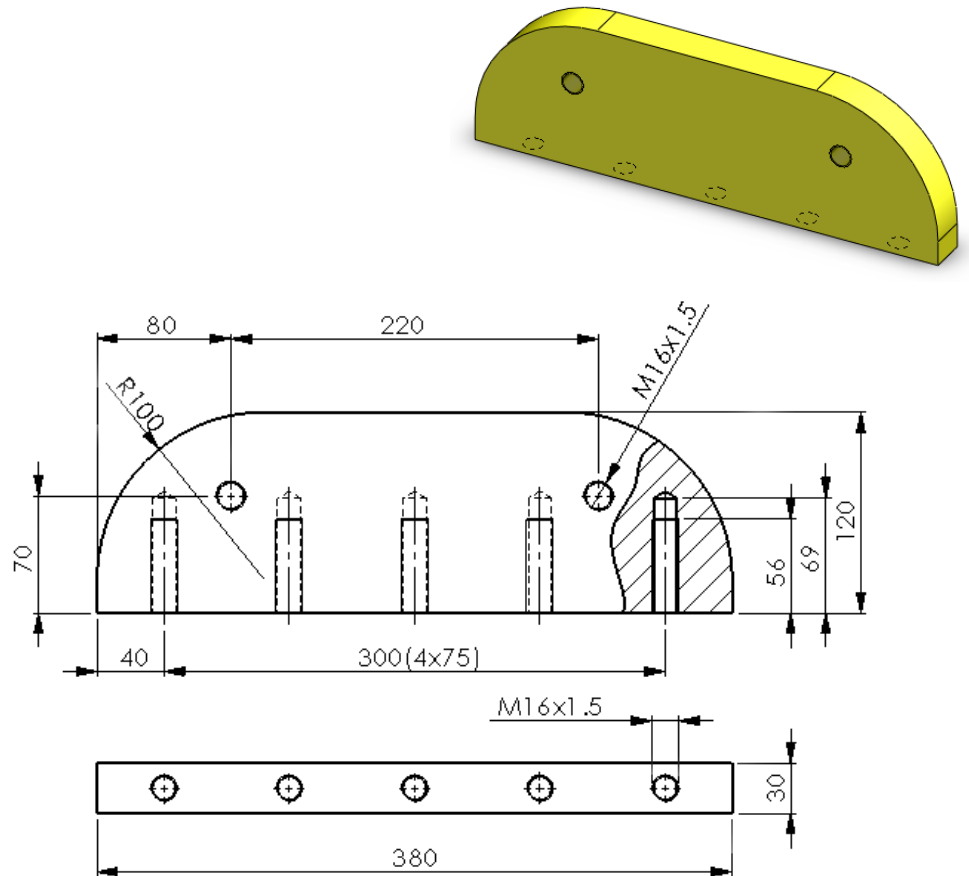
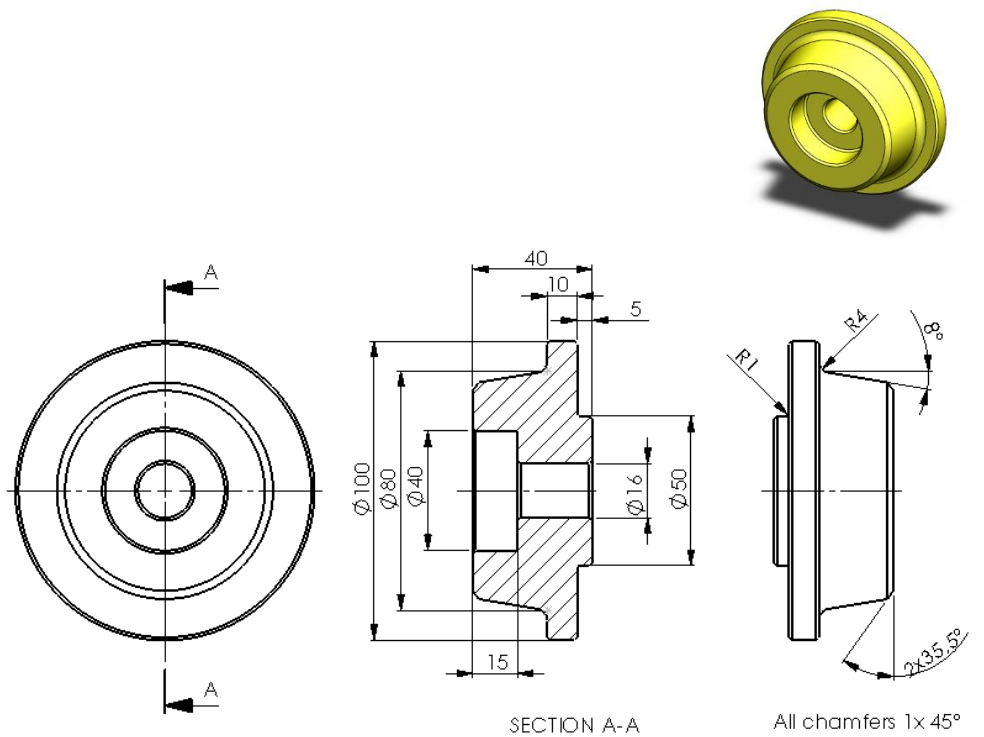
Maak een assembly van de onderdelen uit oefeningen 9-13 en 9-14, en breng de lassen aan zoals hiernaast is aangegeven.



ITEM NO.	PART NUMBER	QTY.
1	9-13	1
2	9-14	1

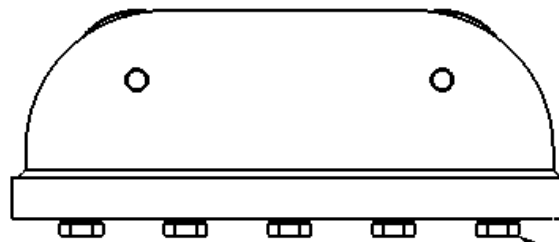
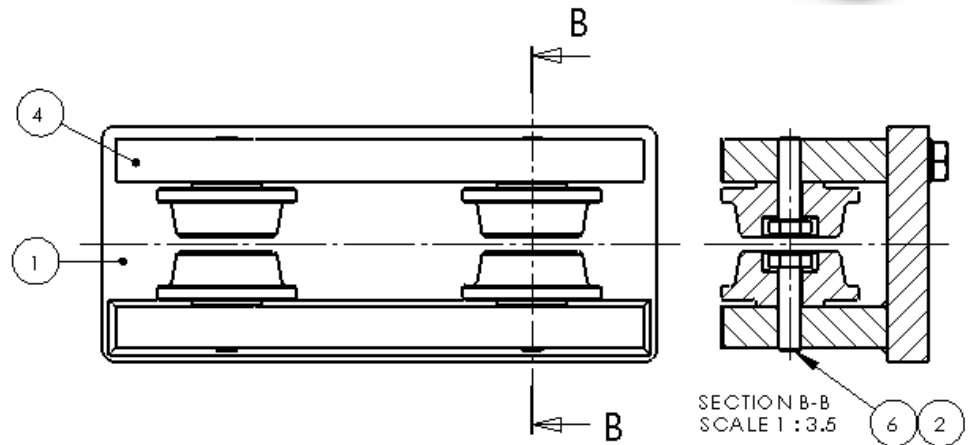
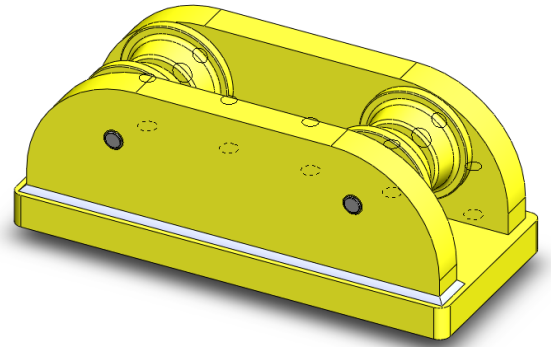
Oefening 9-16

Maak dit onderdeel als een configuratie van het onderdeel uit oefening 9-14.

**Oefening 9-17**

Oefening 9-18

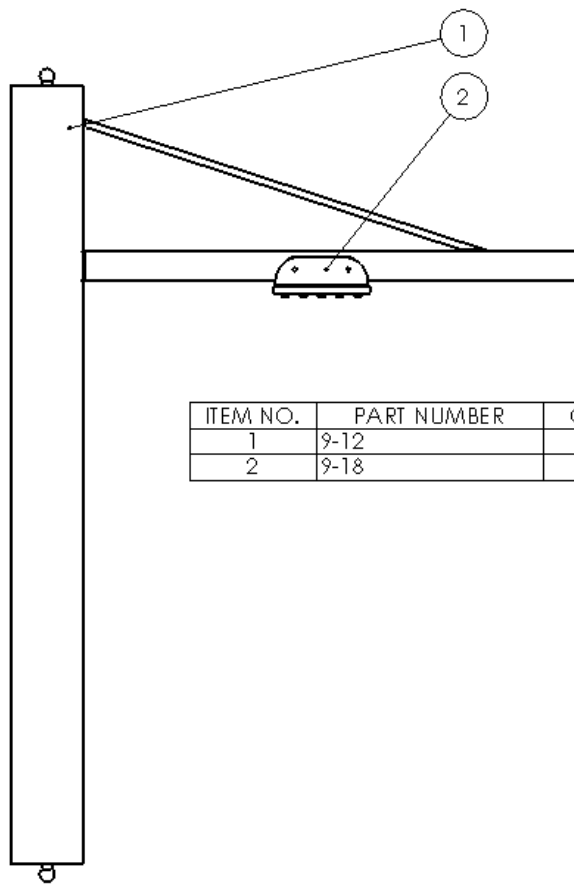
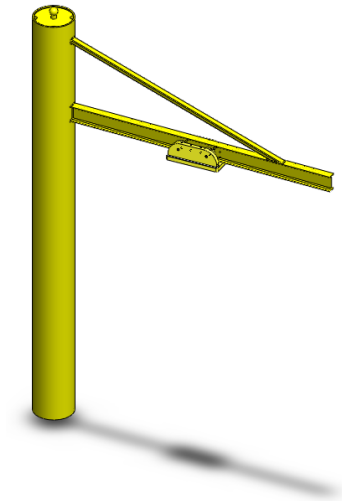
Maak de assembly van de loopkat. Gebruik de ringen bouten uit Toolbox. In de stuklijst zie je welke onderdelen gebruikt zijn.



ITEM NO.	PART NUMBER	QTY.
1	9-15	1
2	Washer ISO 7090 - 16	9
3	DIN 6914 - M16 x 80 x 28-C	5
4	9-16	1
5	9-17	4
6	ISO 7411 - M16 x 60 --- 60-WC	4

Oefening 9-19

Voeg in een assembly de hijsmast (9-12) en de loopkat (9-18) samen. Zorg dat de loopkat over de IPE-balk heen en weer kan bewegen.



ITEM NO.	PART NUMBER	QTY.
1	9-12	1
2	9-18	1

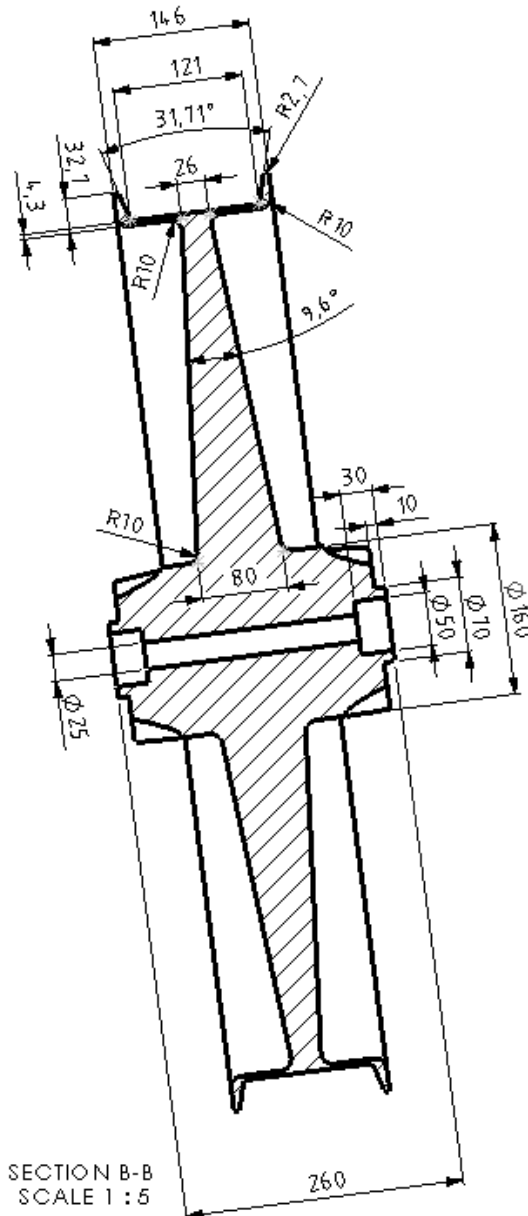
Oefeningen bij Tutorial 10

Maak bij deze oefeningen steeds een technische tekening van een part of assembly die je in een van de eerdere tutorials gemaakt hebt. Let op de volgende punten:

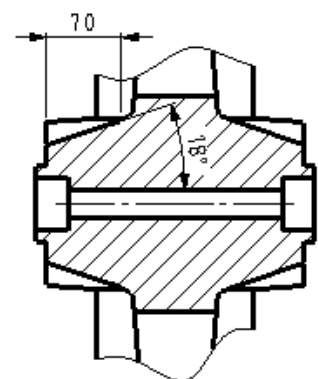
- Gebruik de tekening die hier gegeven is als voorbeeld. Probeer deze zo nauwkeurig mogelijk te benaderen. De schaal mag je echter veranderen.
- Plaats de tekening in een kader, kies zelf een geschikt papierformaat. Vul in het tekeninghoofd je naam in.
- Kies een geschikte schaal voor de tekening, zodat het gekozen papierformaat goed benut wordt.
- Plaats ook een isometrische afbeelding op het tekenvel.

Oefening 10-1

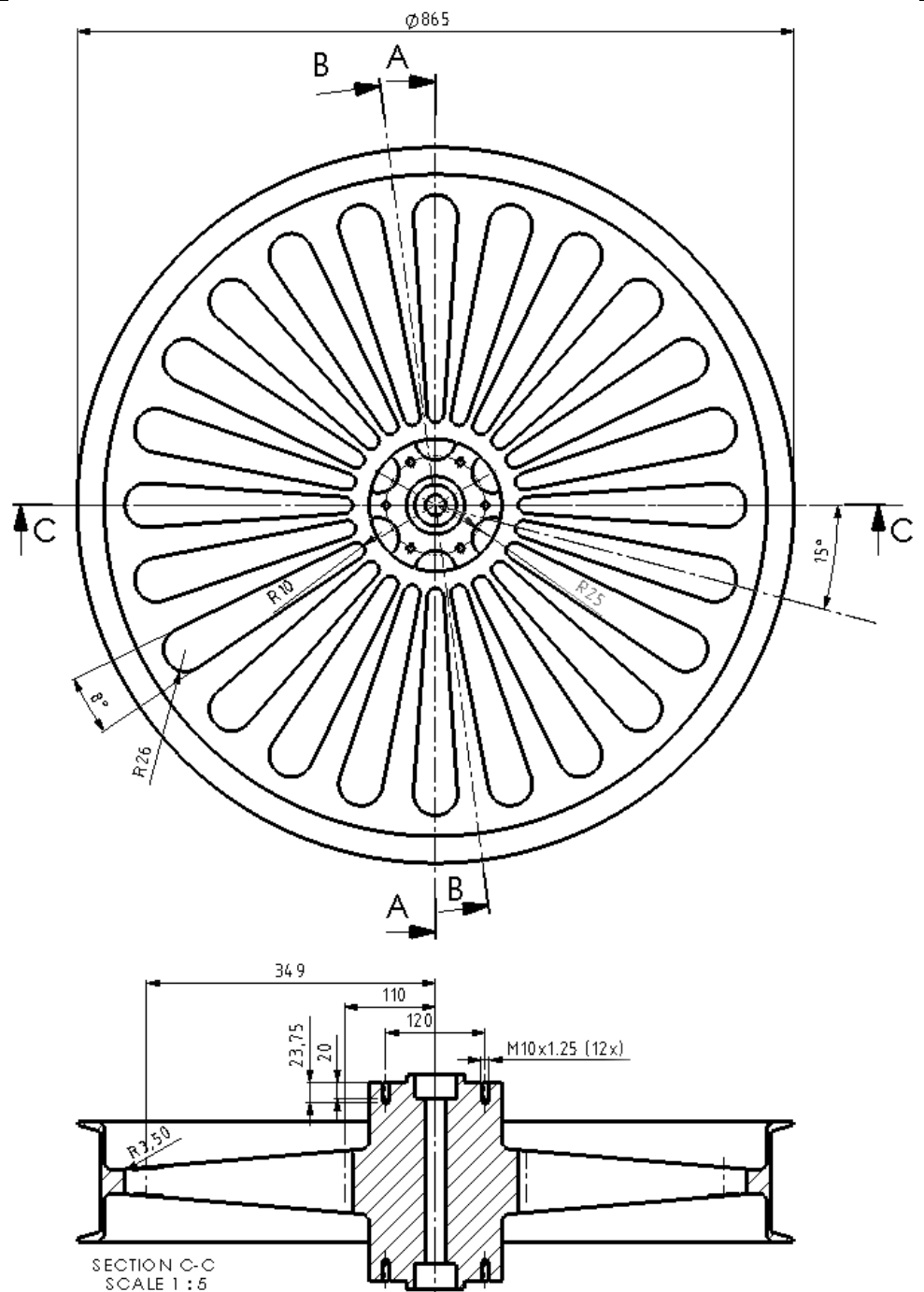
Gebruik het model uit oefening 8-7. Verdeel de tekening eventueel over twee vellen.



SECTION B-B
SCALE 1 : 5

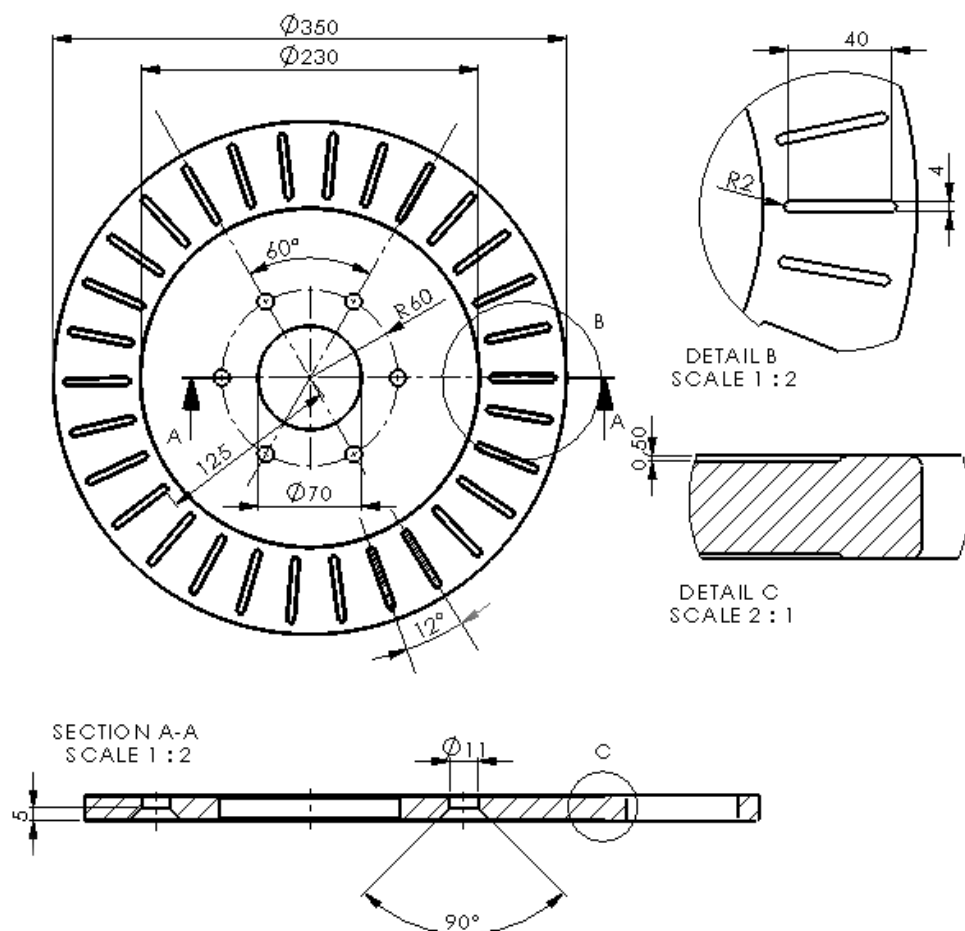


SECTION A-A
SCALE 1 : 5



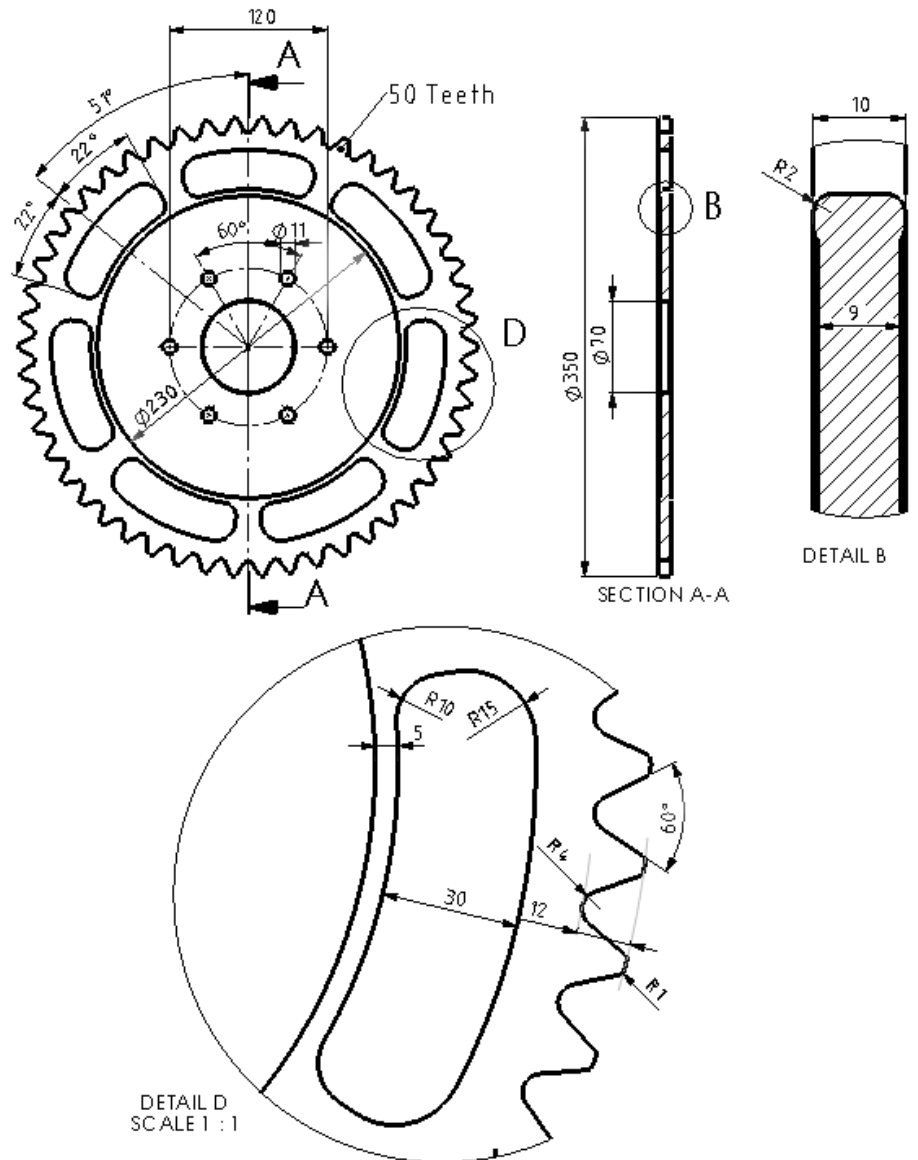
Oefening 10-2

Gebruik het model uit oefening 8-8.



Oefening 10-3

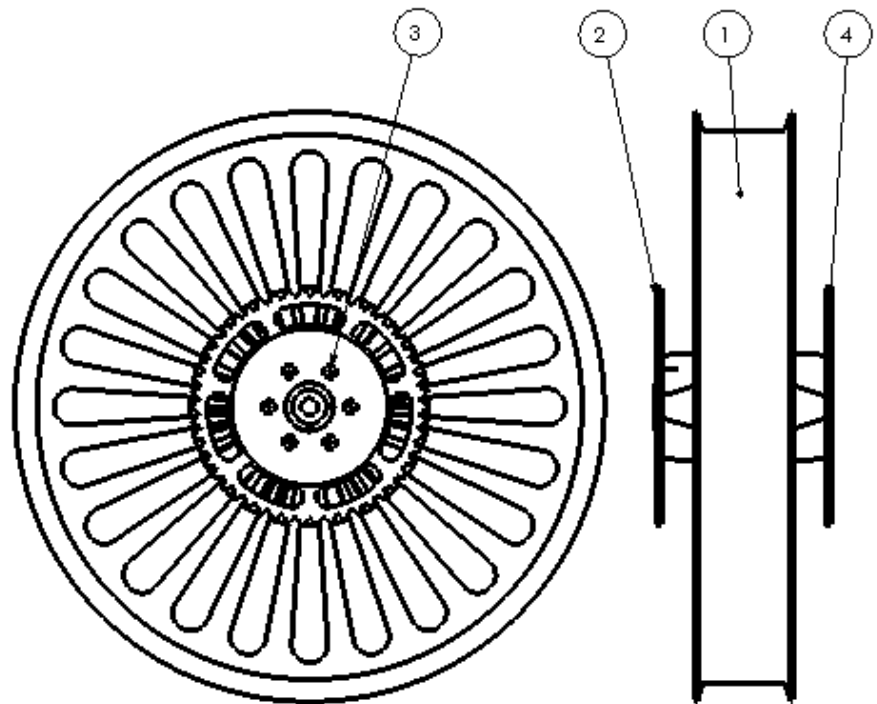
Gebruik het model uit oefening 8-9.



Oefening 10-4

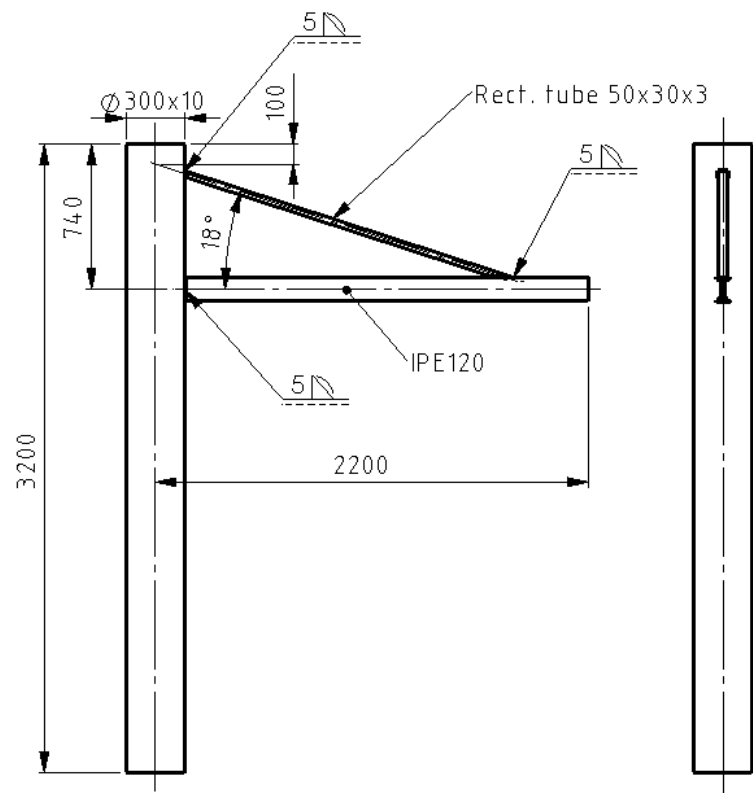
Gebruik de assembly uit oefening 8-10 voor het maken van de samenstellingstekening

ITEM NO.	PART NUMBER	QTY.
1	8-7	1
2	8-9	1
3	ISO 10642 - M10 x 35 --- 35C	12
4	8-8	1



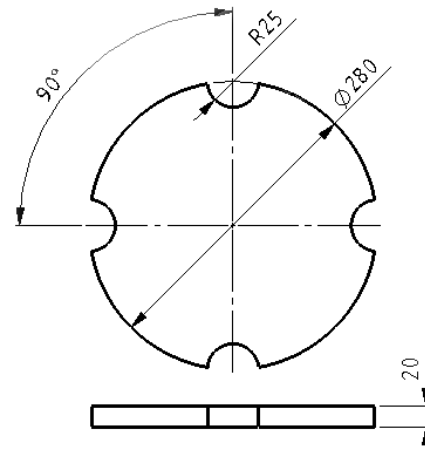
Oefening 10-5

Gebruik het model uit oefening 9-9.

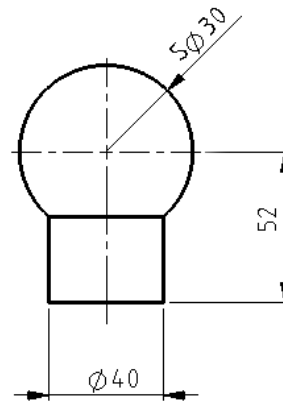


Oefening 10-6

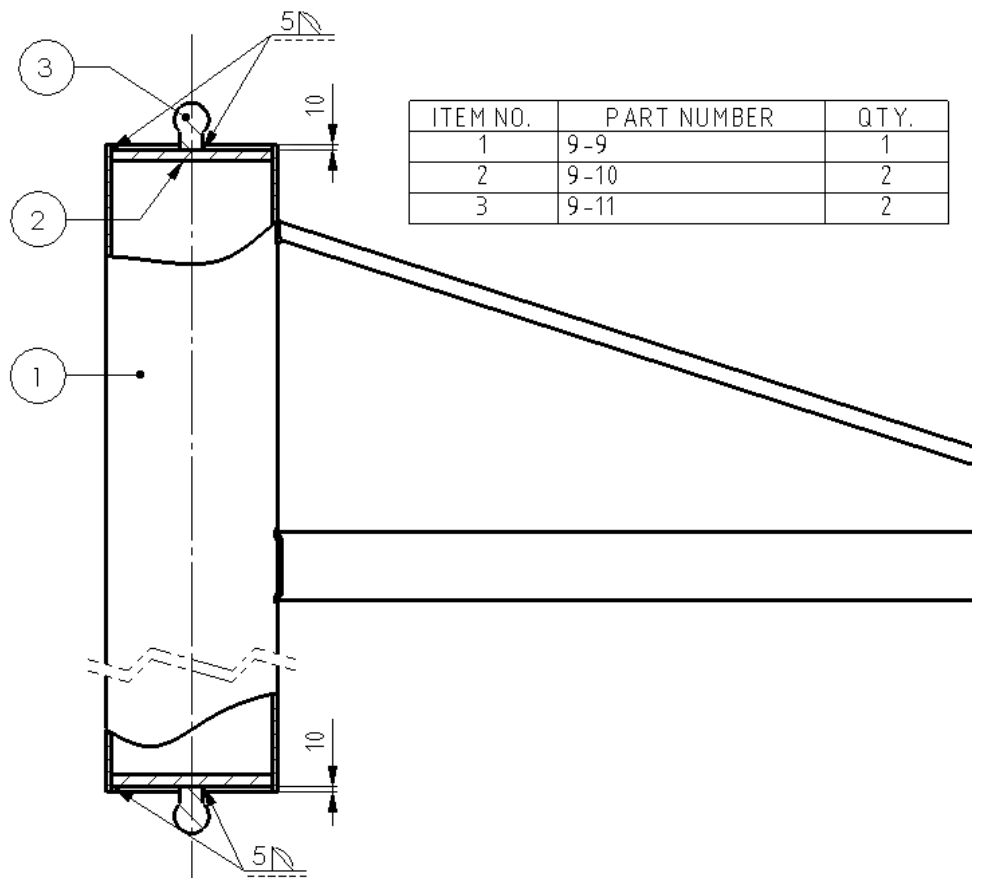
Gebruik het model uit oefening 9-10.

**Oefening 10-7**

Gebruik het model uit oefening 9-11.

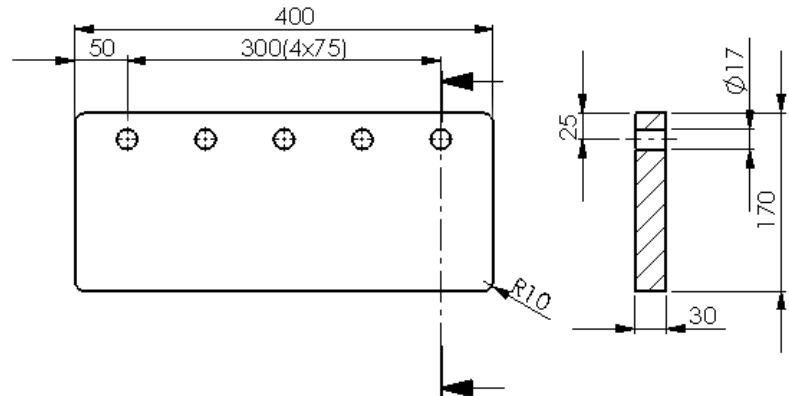
**Oefening 10-8**

Gebruik het model uit oefening 9-12.

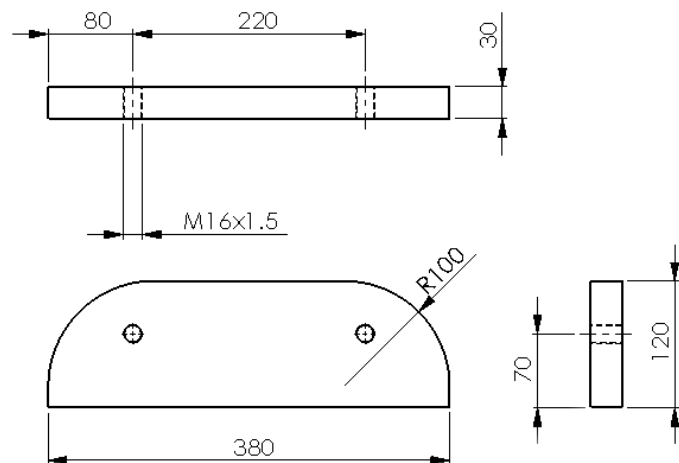


Oefening 10-9

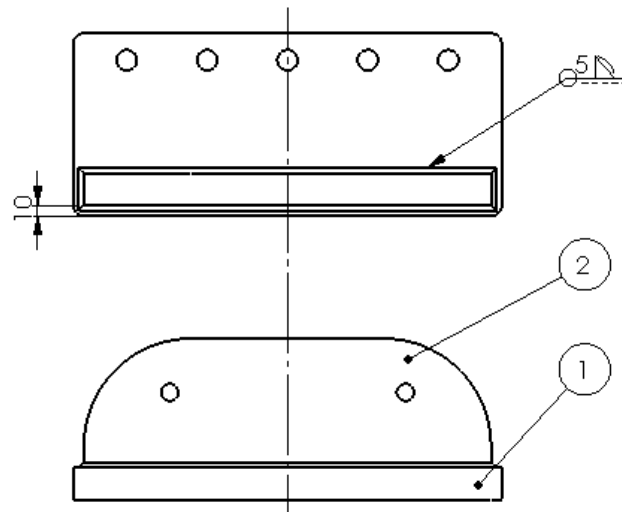
Gebruik het model uit oefening 9-13.

**Oefening 10-10**

Gebruik het model uit oefening 9-14.

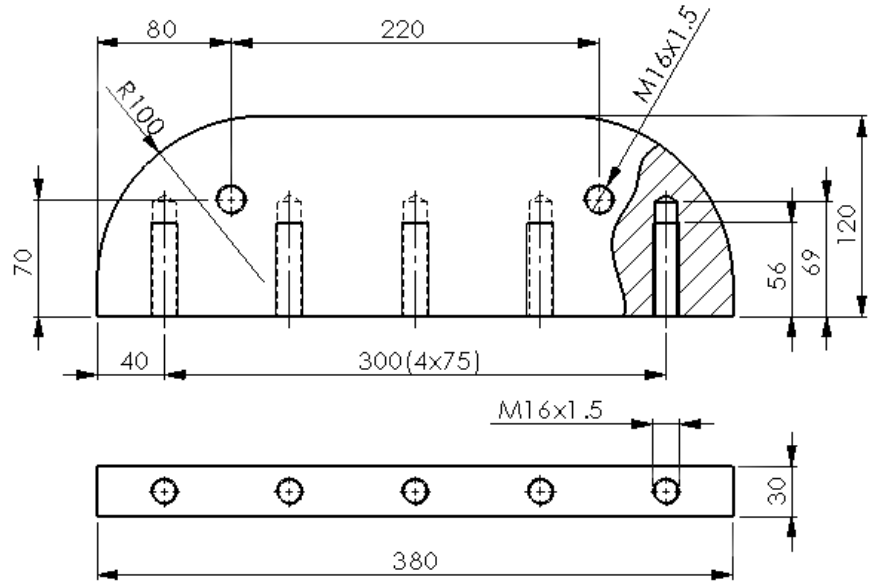
**Oefening 10-11**

Gebruik het model uit oefening 9-15.

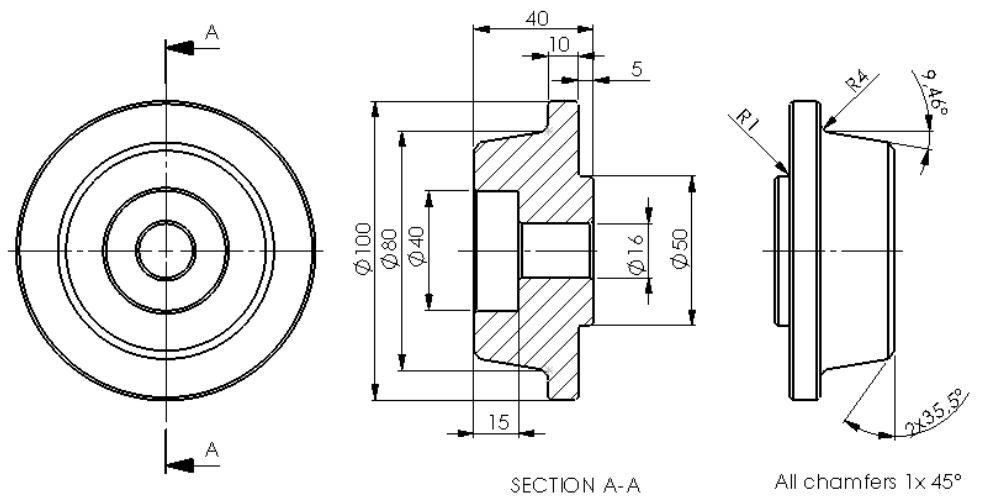


ITEM NO.	PART NUMBER	QTY.
1	9-13	1
2	9-14	1

Gebruik het model uit oefening 9-16.

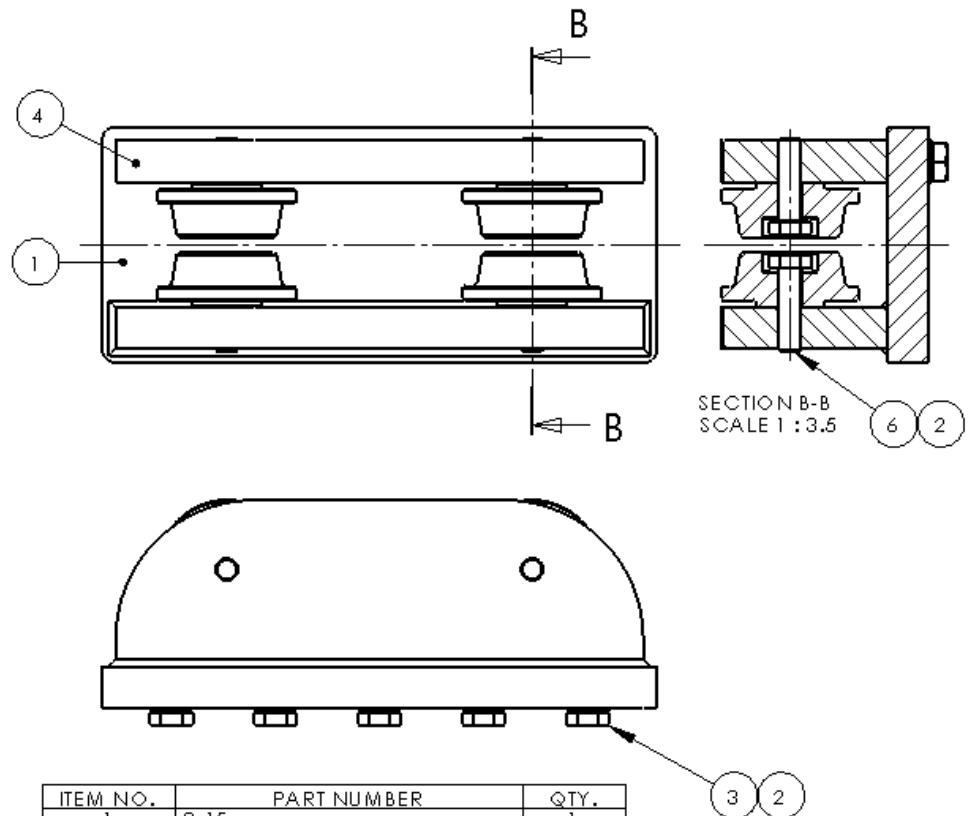


Gebruik het model uit oefening 9-17.



Oefening 10-14

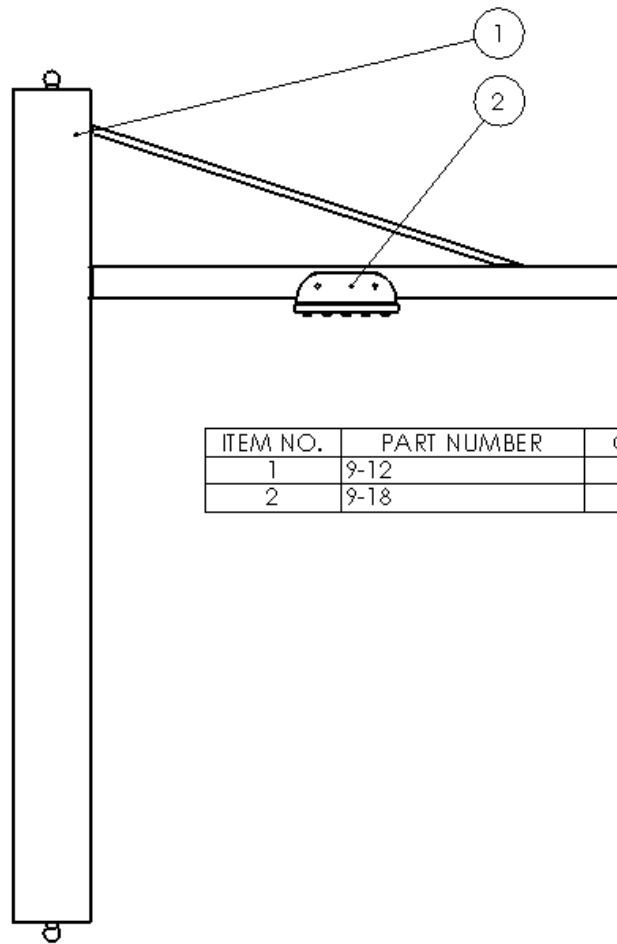
Gebruik het model uit oefening 9-18.



ITEM NO.	PART NUMBER	QTY.
1	9-15	1
2	Washer ISO 7090 - 16	9
3	DIN 6914 - M16 x 80 x 28-C	5
4	9-16	1
5	9-17	4
6	ISO 7411 - M16 x 60 --- 60-WC	4

Oefening 10-15

Gebruik het model uit oefening 9-19.

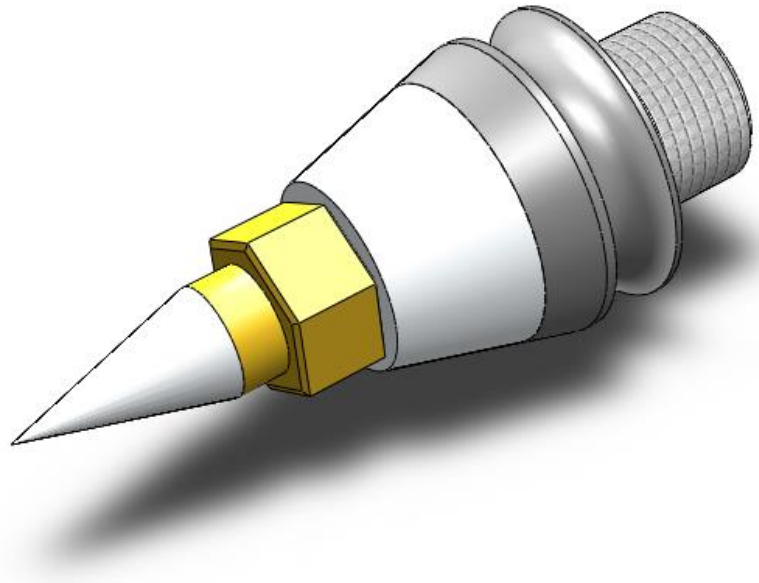


ITEM NO.	PART NUMBER	QTY.
1	9-12	1
2	9-18	1

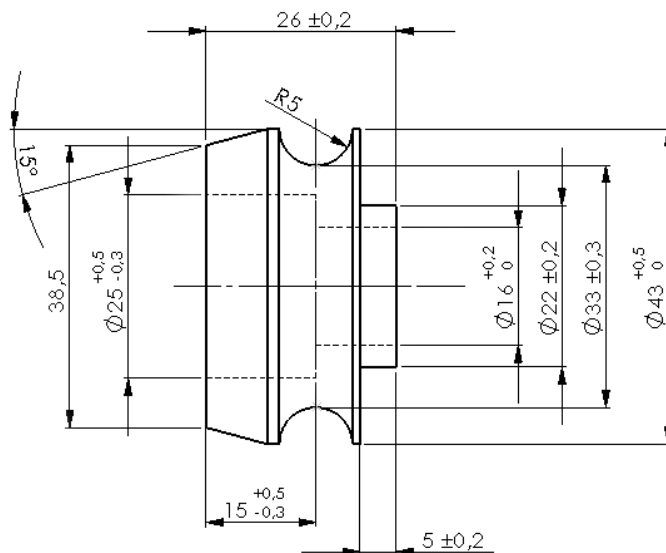
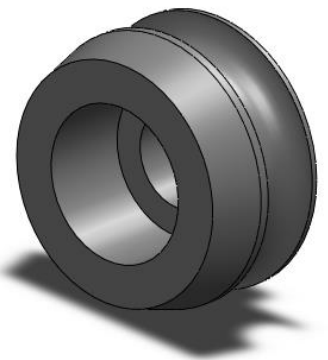
Oefeningen bij Tutorial 11

Schietlood

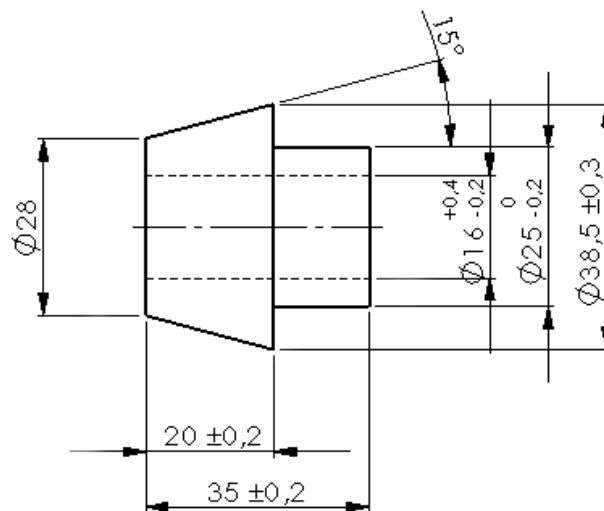
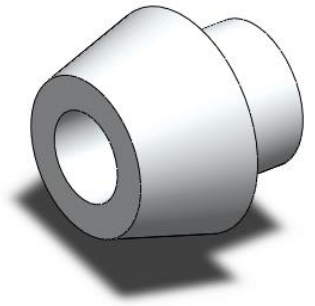
In deze oefening modelleren we het schietlood dat je hiernaast ziet.



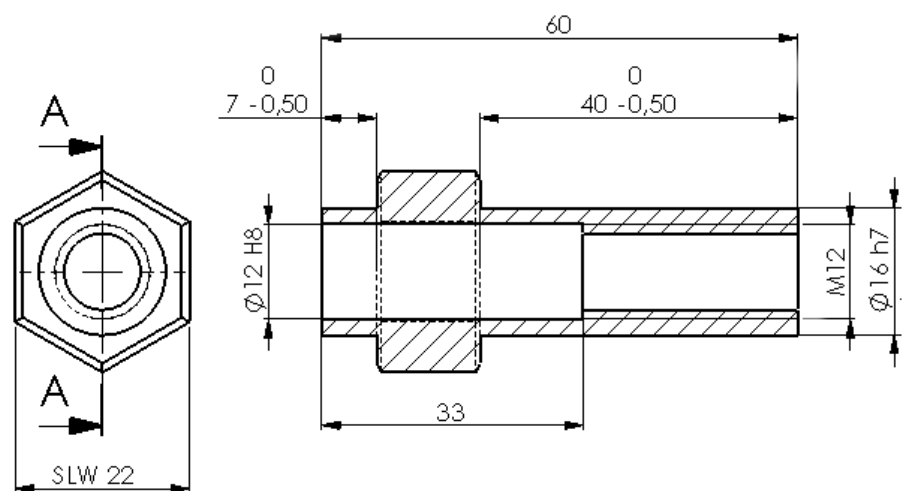
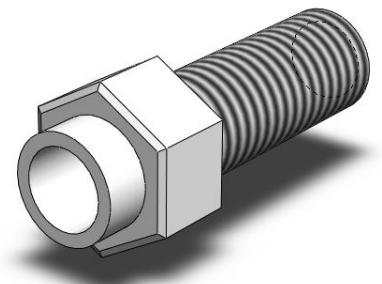
Oefening 11-1-1

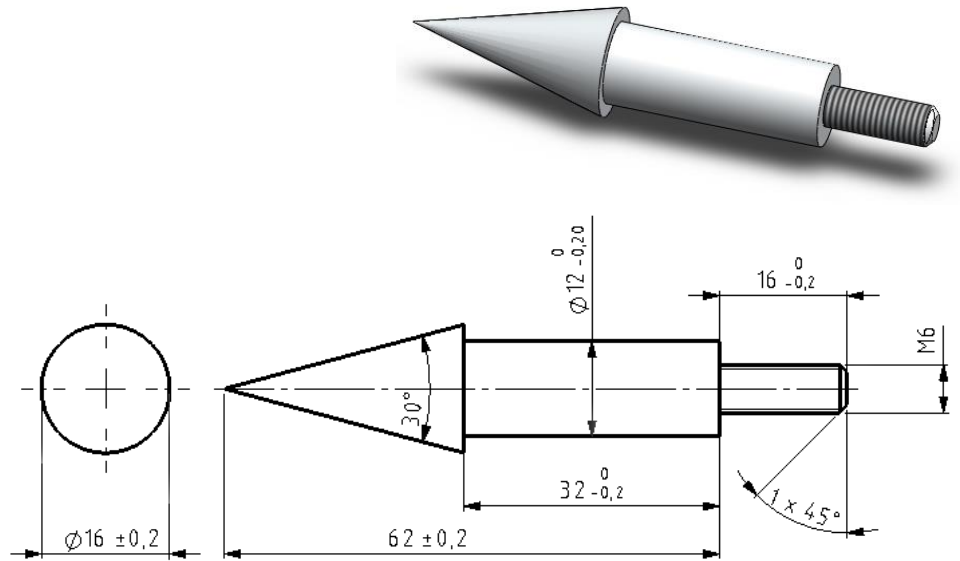


Oefening 11-1-2

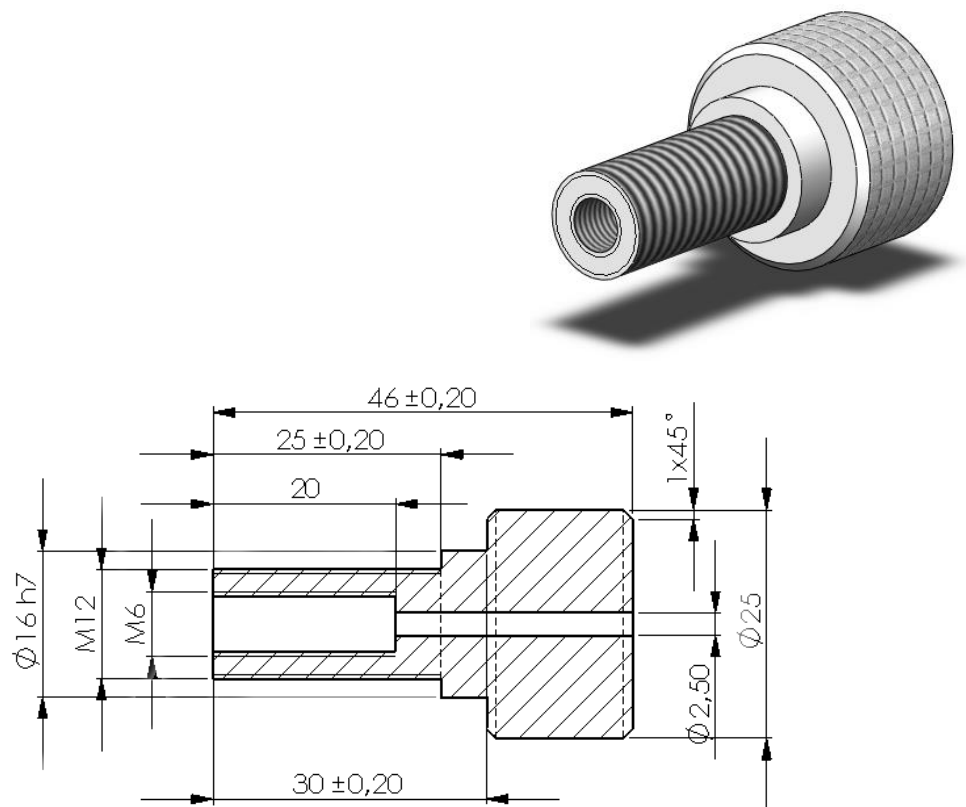


Oefening 11-1-3



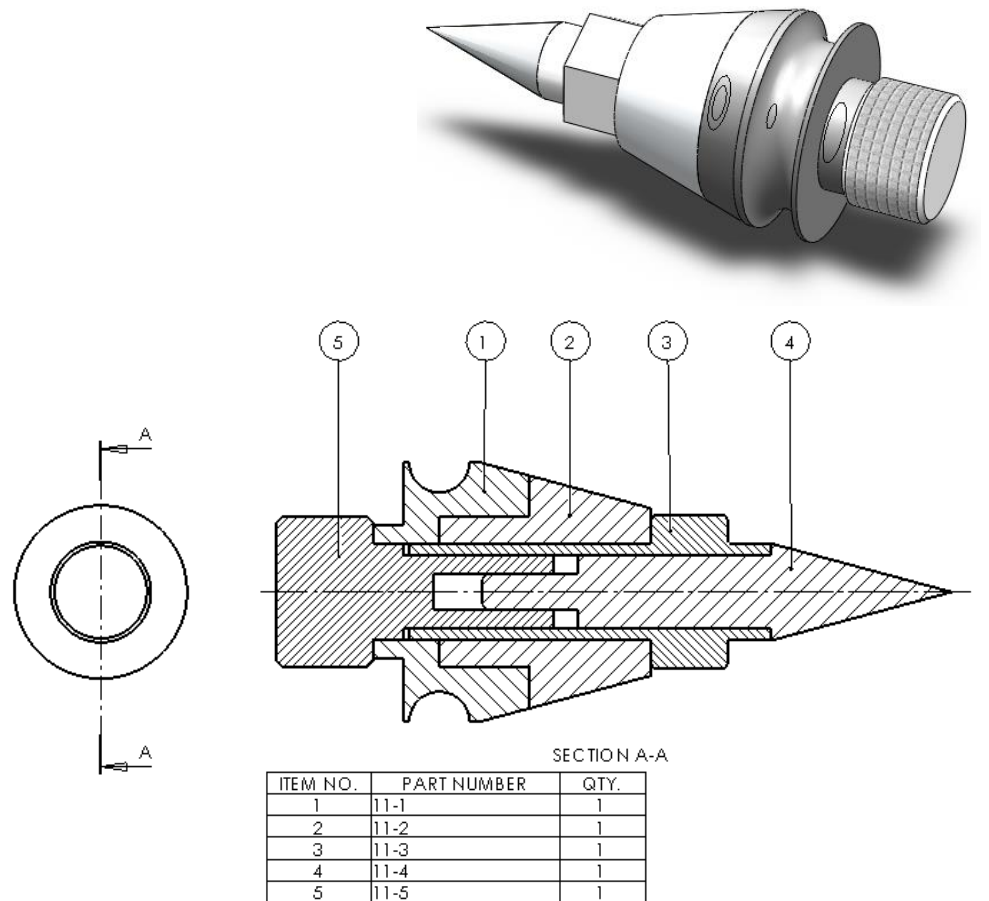
Oefening 11-1-4**Oefening 11-1-5**

Breng de kruiskarteling aan op het vlak, zoals je hier-naast ziet.

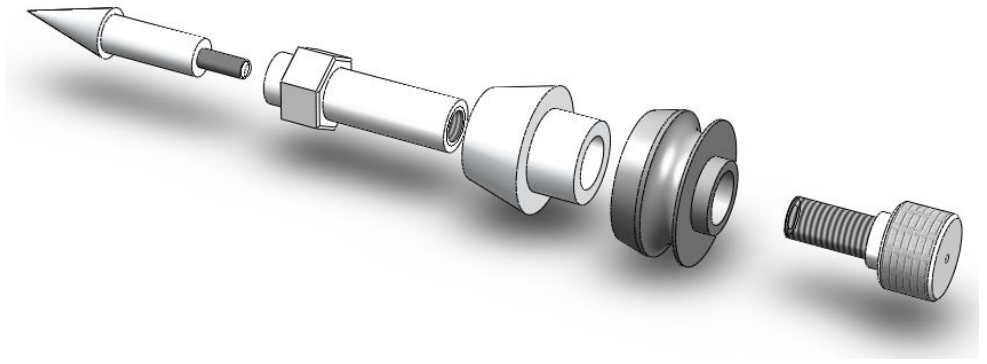


Oefening 11-1-6

Maak de assembly van het schietlood.

**Oefening 11-1-7**

Maak een exploded view van de assembly.

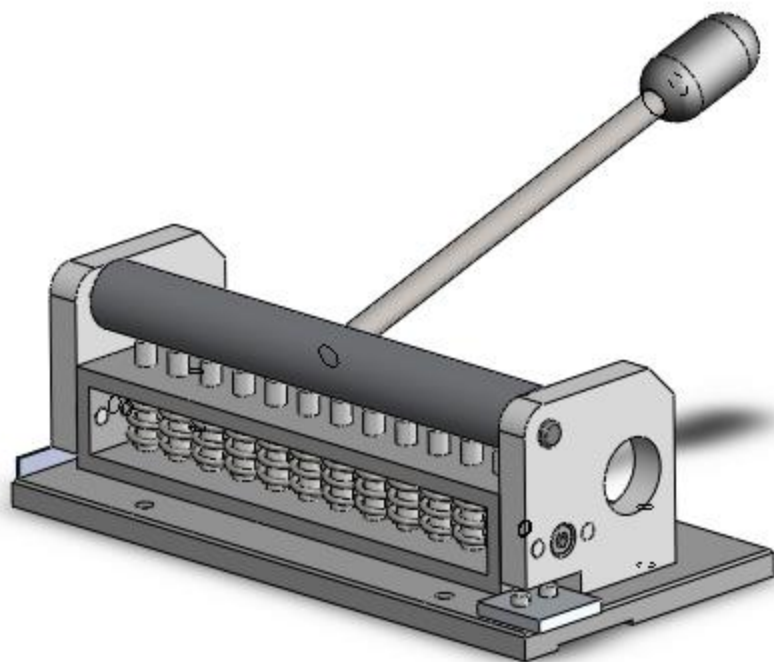


Oefening 11-1-8

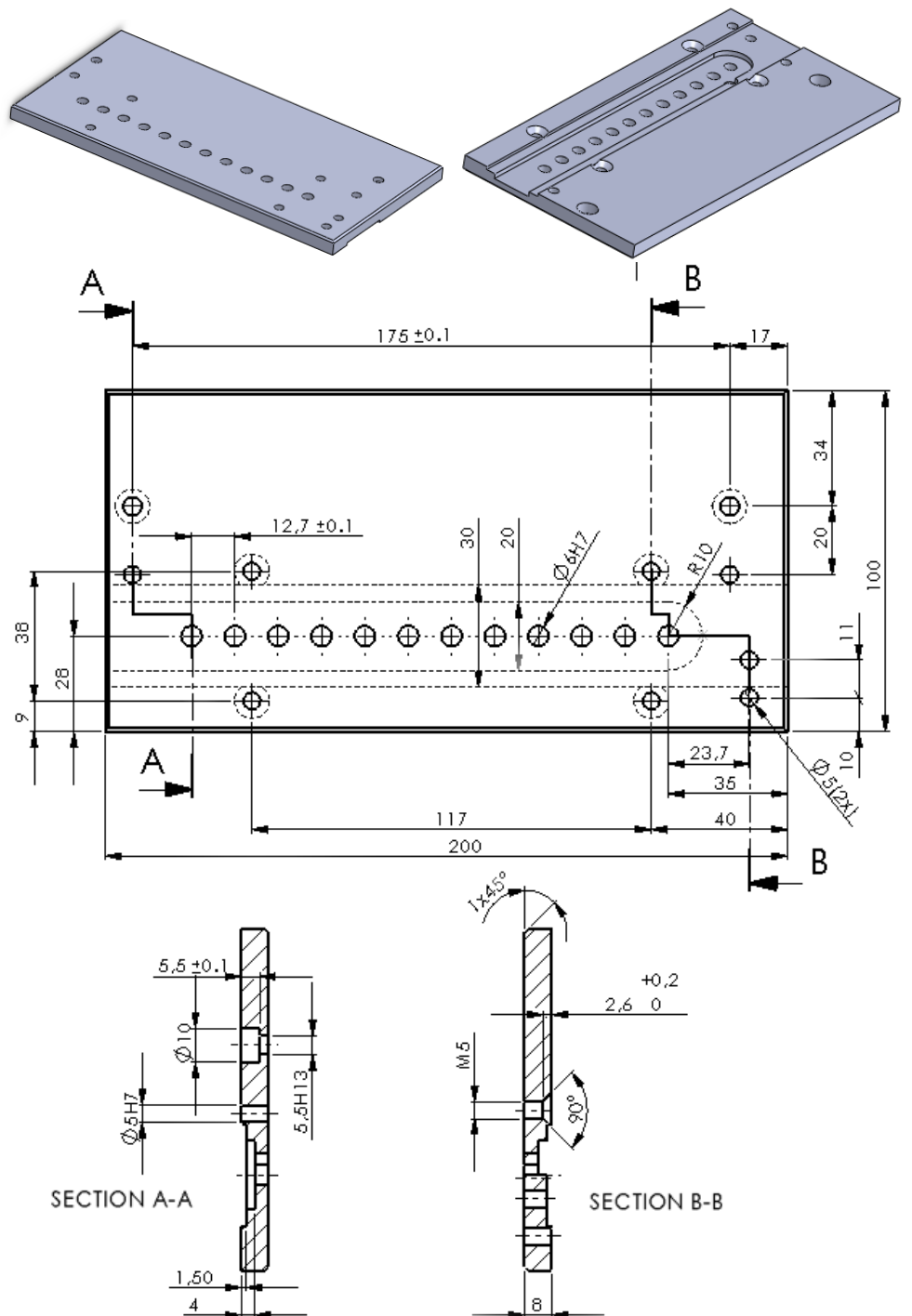
Maak een rendering van het schietlood. Probeer het beeld zoals je dat hiernaast ziet te benaderen.



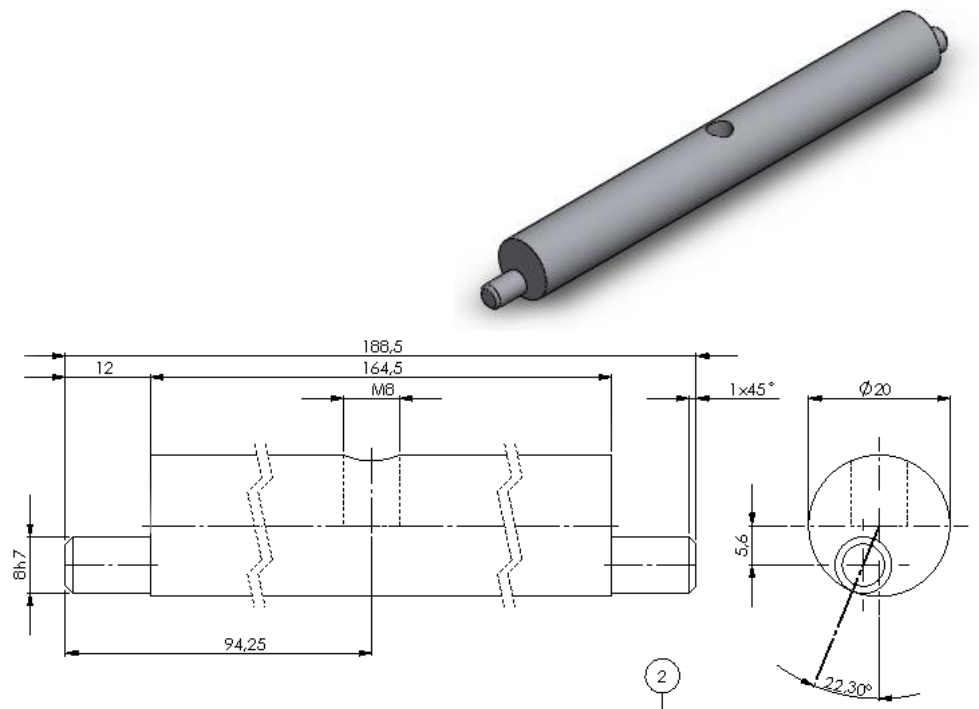
Oefening 11-2
Perforator



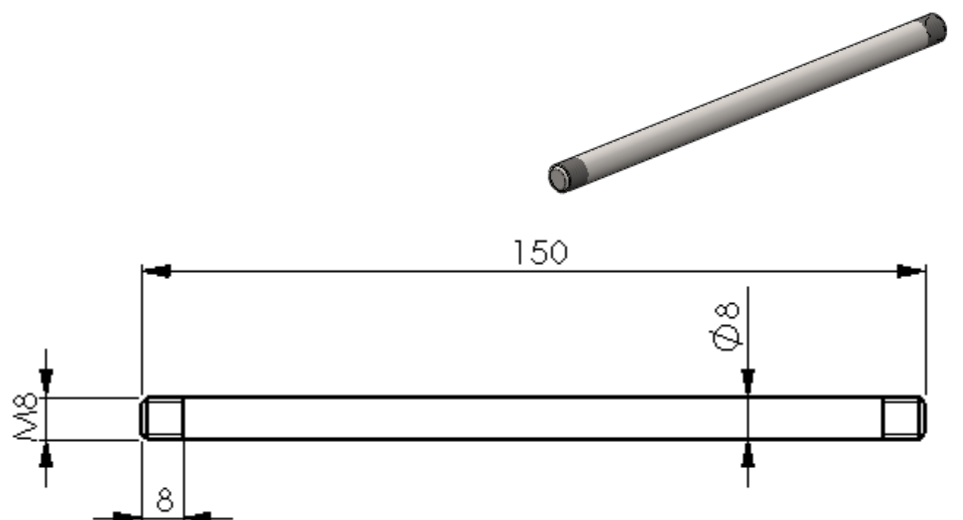
Oefening 11-2-1



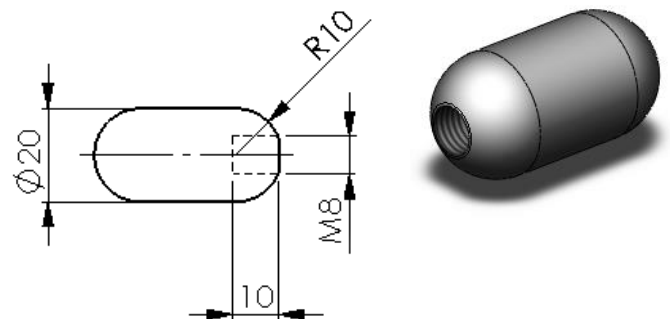
Oefening 11-2-2



Oefening 11-2-3

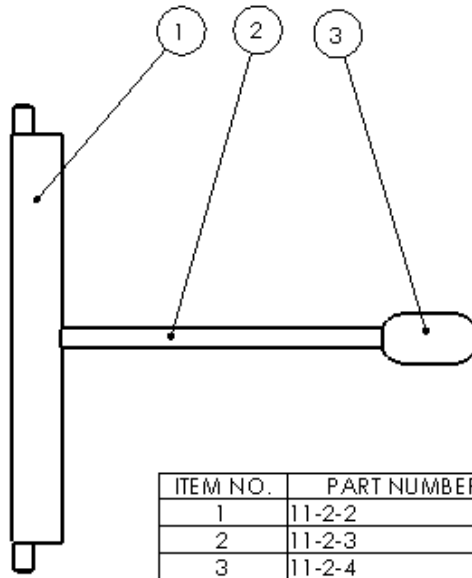


Oefening 11-2-4



Oefening 11-2-5

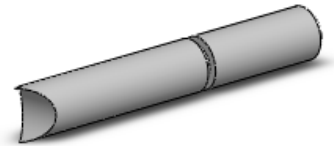
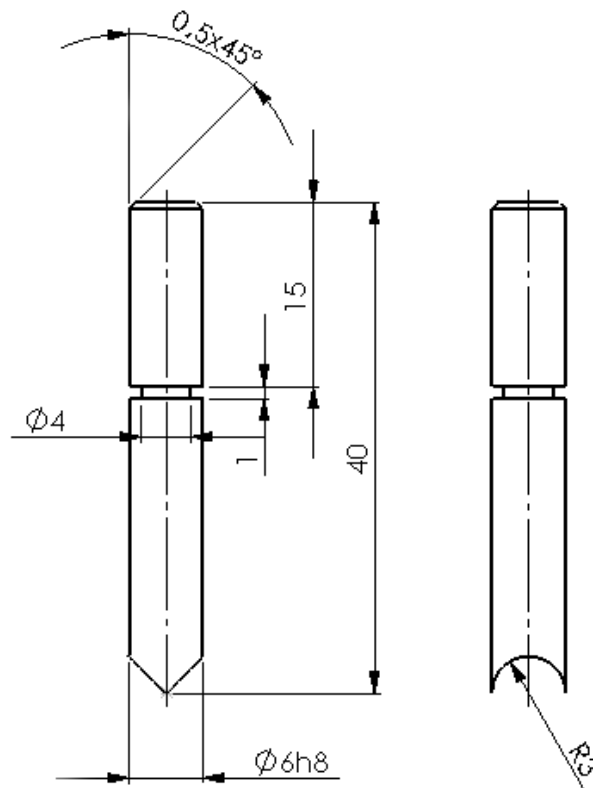
Maak een assembly van de onderdelen 11-2-2 tot en met 11-2-4



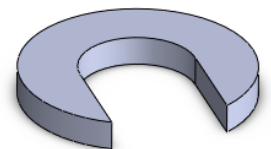
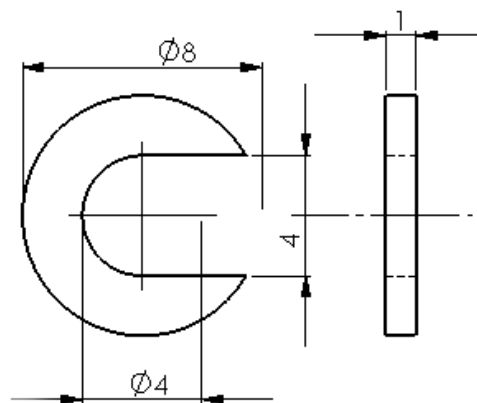
ITEM NO.	PART NUMBER	QTY.
1	11-2-2	1
2	11-2-3	1
3	11-2-4	1



Oefening 11-2-6

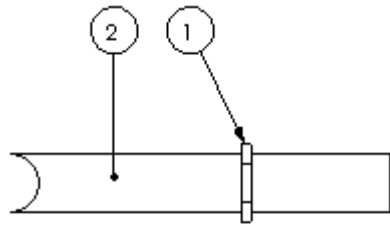


Oefening 11-2-7

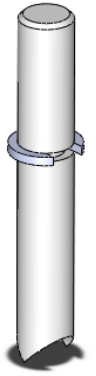
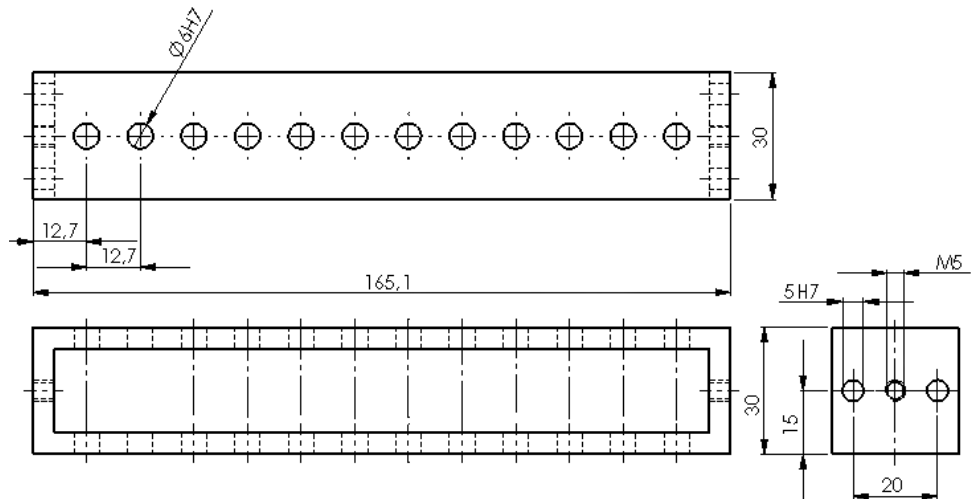
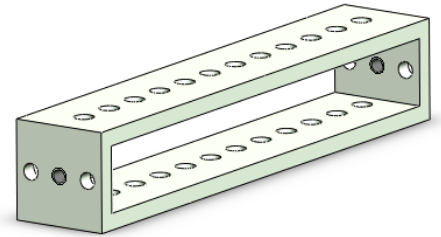


Oefening 11-2-8

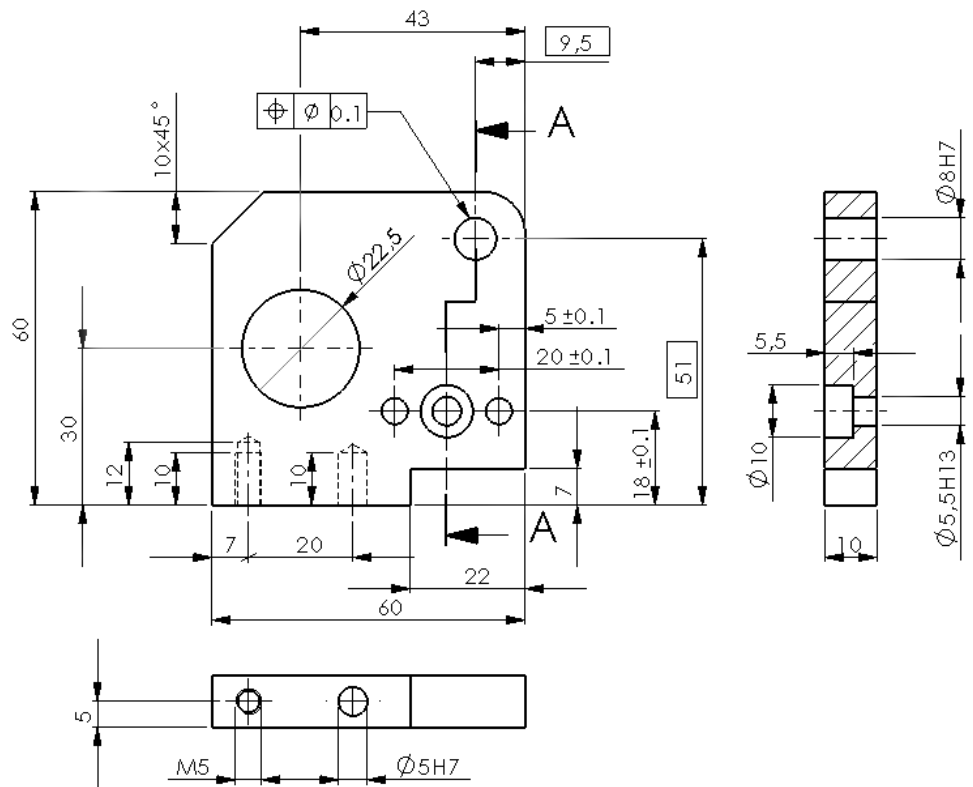
Maak een assembly van de onderdelen 11-2-6 en 11-2-7



ITEM NO.	PART NUMBER	QTY.
1	11-2-6	1
2	11-2-7	1

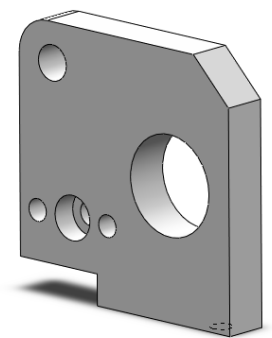
**Oefening 11-2-9**

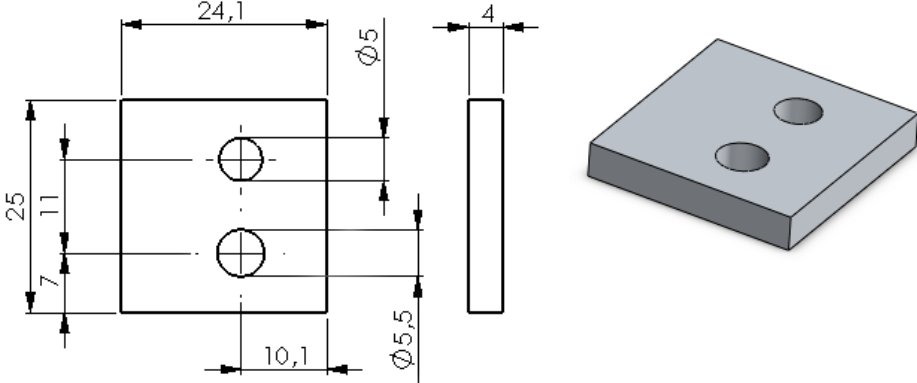
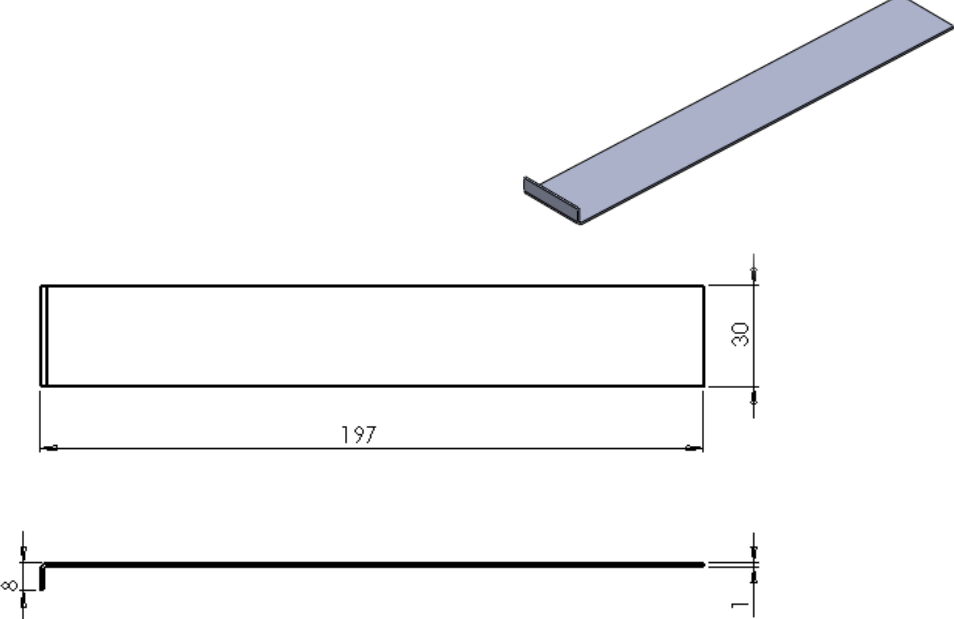
Oefening 11-2-10



Oefening 11-2-11

Maak van onderdeel 11-2-10 een tweede configuratie aan, waarin het verzonken gat aan de andere zijde van de plaat zit.

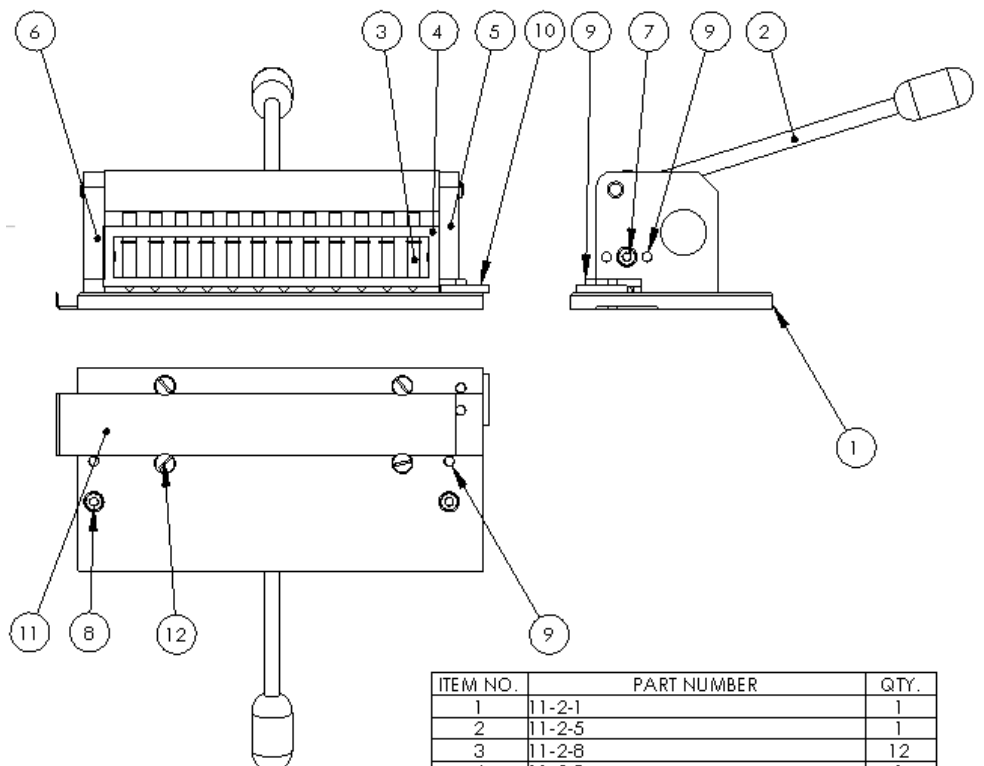


Oefening 11-2-12	
Oefening 11-2-13	
Oefening 11-2-14 Maak dit onderdeel als een Sheet Metal onderdeel.	

Oefening 11-2-15

Maak nu een assembly. In de stuklijst hiernaast zie je welke onderdelen gebruikt zijn, en welke onderdelen je uit Toolbox moet kiezen.

Maak de assembly zo dat wanneer je de handel heen en weer beweegt, de pinnen op en neer zullen bewegen



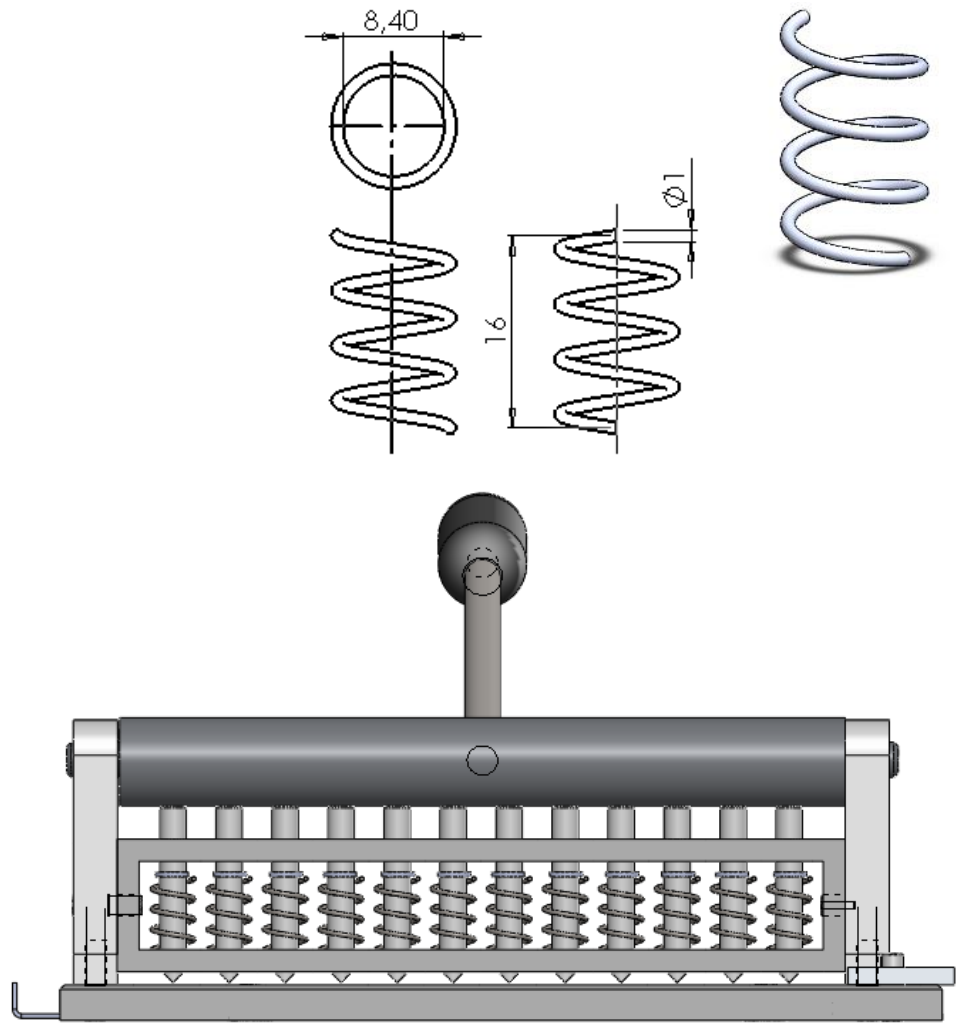
ITEM NO.	PART NUMBER	QTY.
1	11-2-1	1
2	11-2-5	1
3	11-2-8	12
4	11-2-9	1
5	11-2-11	1
6	11-2-10	1
7	Socket Head Cap Screw ISO4762 M5 x 10	2
8	Socket Head Cap Screw ISO 4762 M5 x 20	2
9	11-2-12	8
10	11-2-13	2
11	11-2-14	1
12	ISO 2009 - M5 x 8	4

Oefening 11-2-16

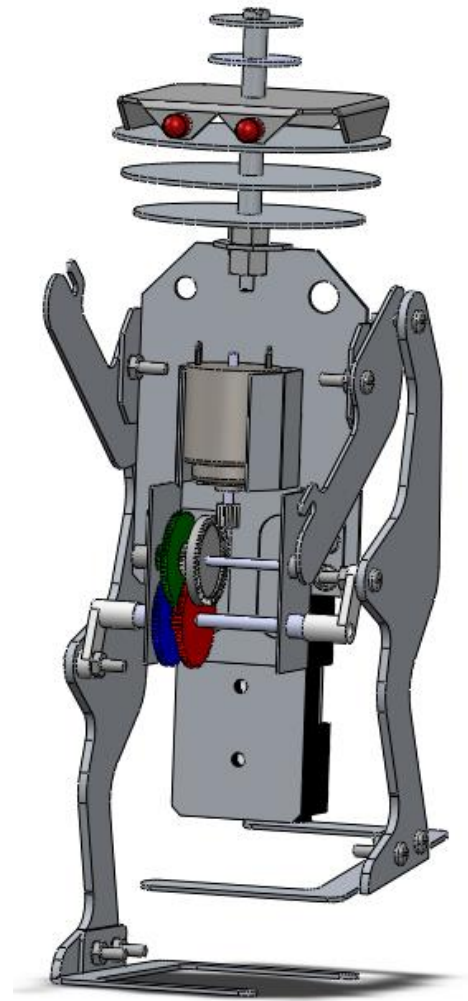
Tot slot moet een veer gemaakt worden en aan de assembly toegevoegd worden.

Het maken van veren is in de tutorials niet behandeld. Probeer zelf een oplossing te vinden!

In de tekening hiernaast zie je de maten. De hoogte moet echter zo zijn dat die verandert bij het bewegen van de arm van de perforator.



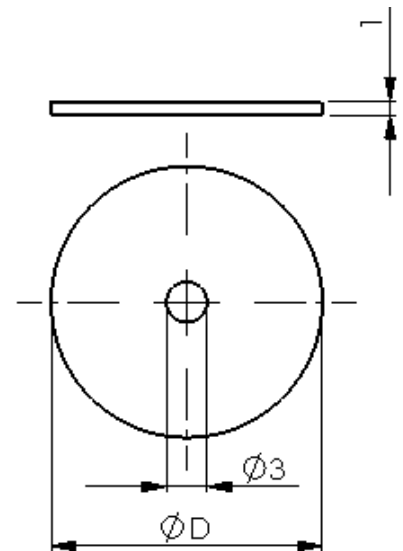
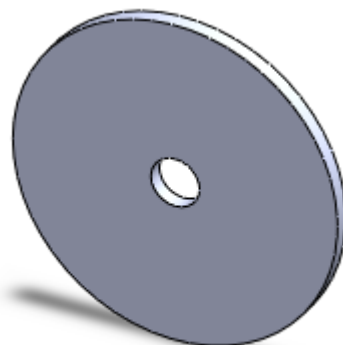
Oefening 11-3 Robot



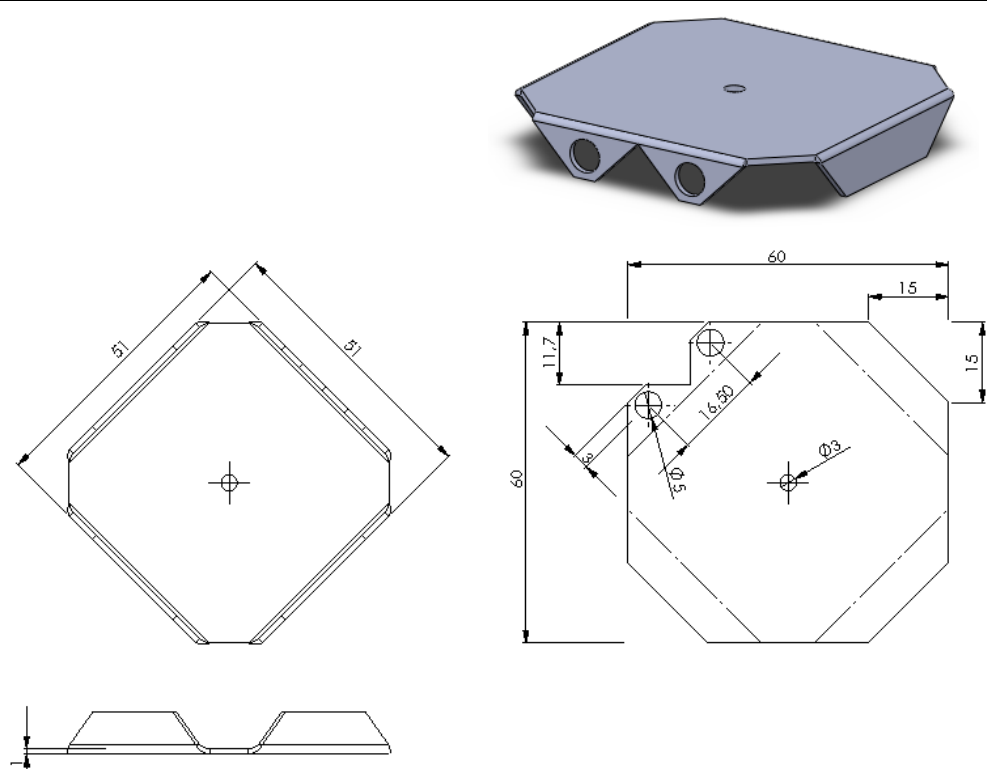
Oefening 11-3-1

Maak drie ringen, waarbij de maat D varieert:

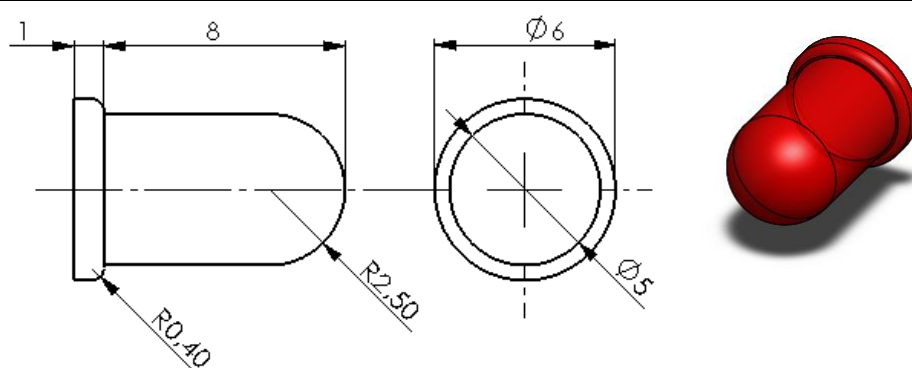
- a: $D=20$
- b: $D=60$
- c: $D=56$
- d: $D=50$



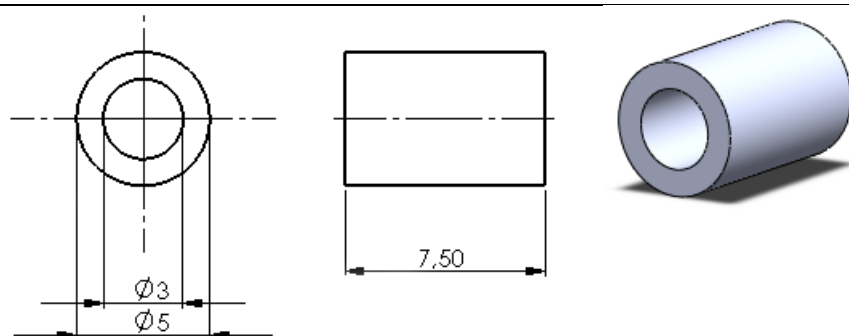
Oefening 11-3-2



Oefening 11-3-3



Oefening 11-3-4

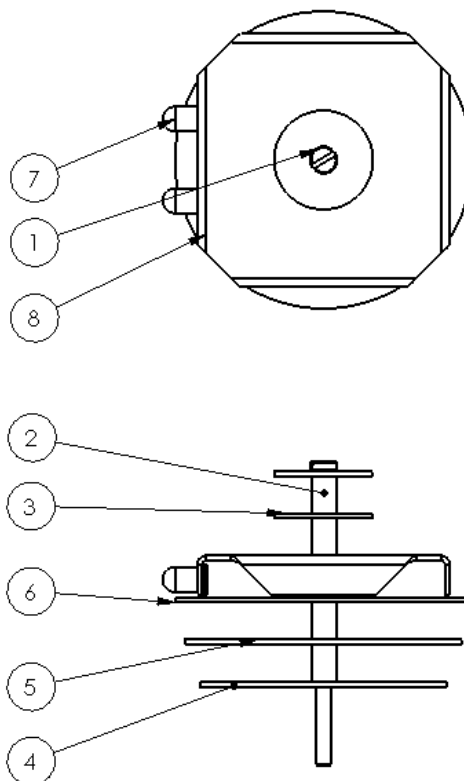
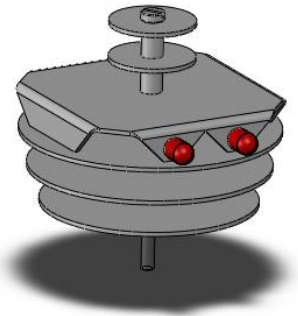


Oefening 11-3-5

Maak deze schroef. Gebruik hiervoor uit Toolbox een Slotted Cheese Head Screw ISO 1207, M3x30. 30 is de grootste beschikbare lengte. Verleng daarna de schroef tot 60mm.

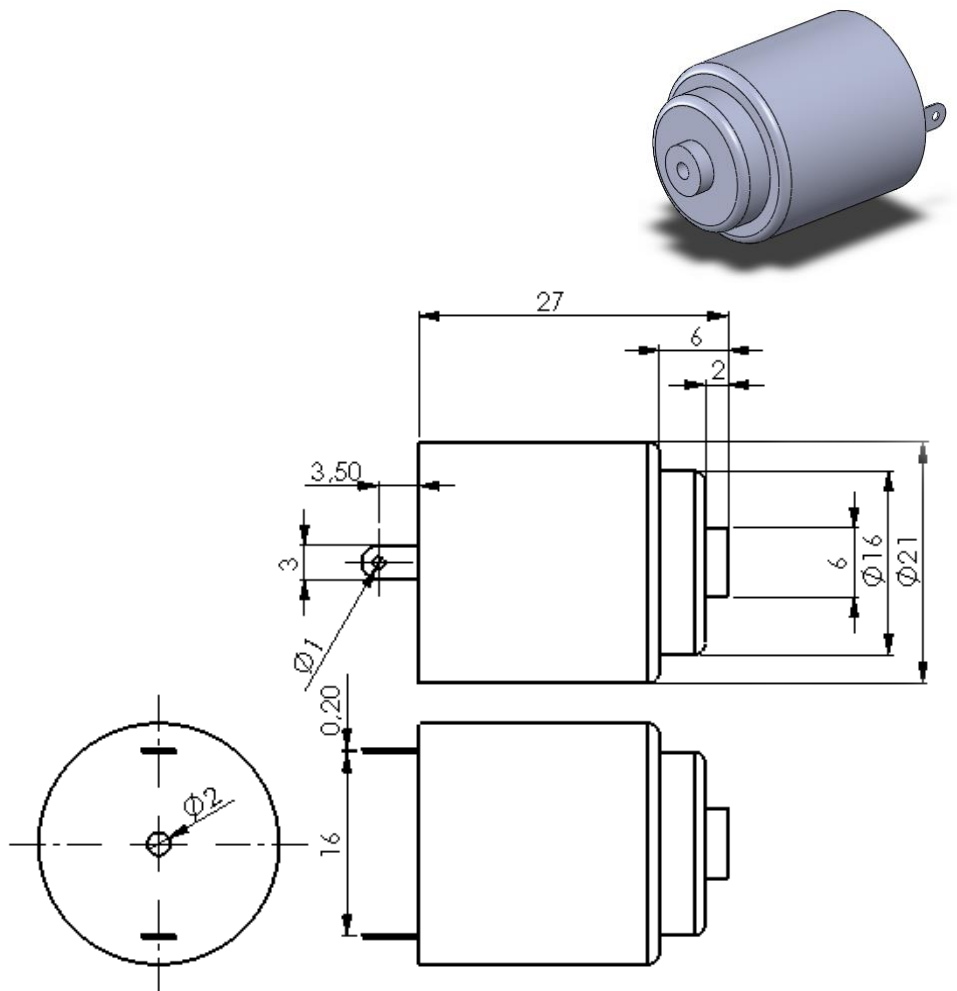
**Oefening 11-3-6**

Maak een assembly. In de stuklijst zie je welke onderdelen gebruikt zijn.

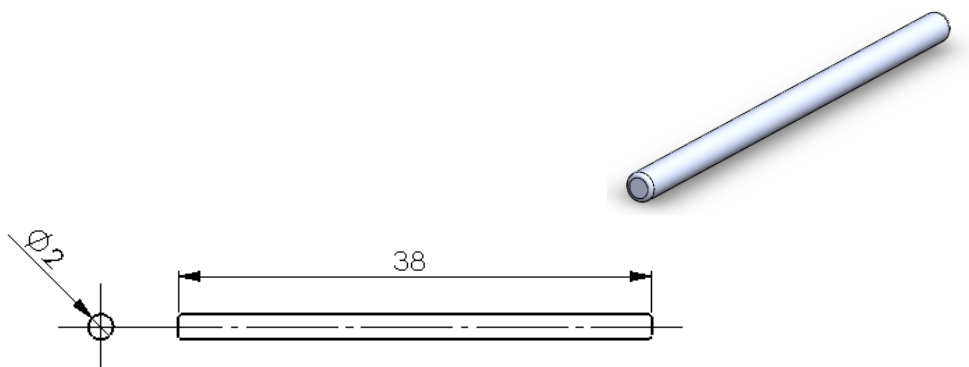


ITEM NO.	PART NUMBER	QTY.
1	12-3-5	1
2	12-3-4	5
3	12-3-1a	2
4	12-3-1d	1
5	12-3-1c	1
6	12-3-1b	1
7	12-3-3	2
8	12-3-2	1

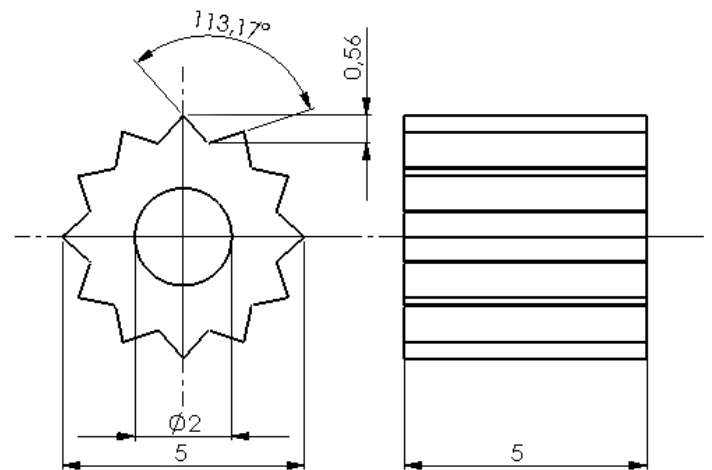
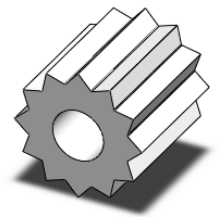
Oefening 11-3-7



Oefening 11-3-8

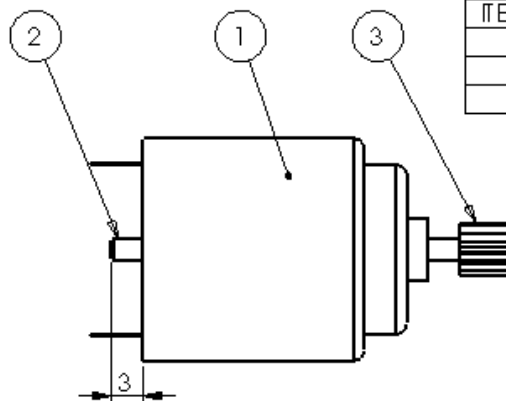
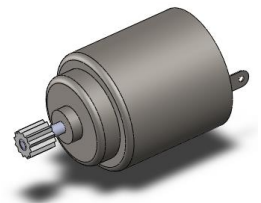


Oefening 11-3-9



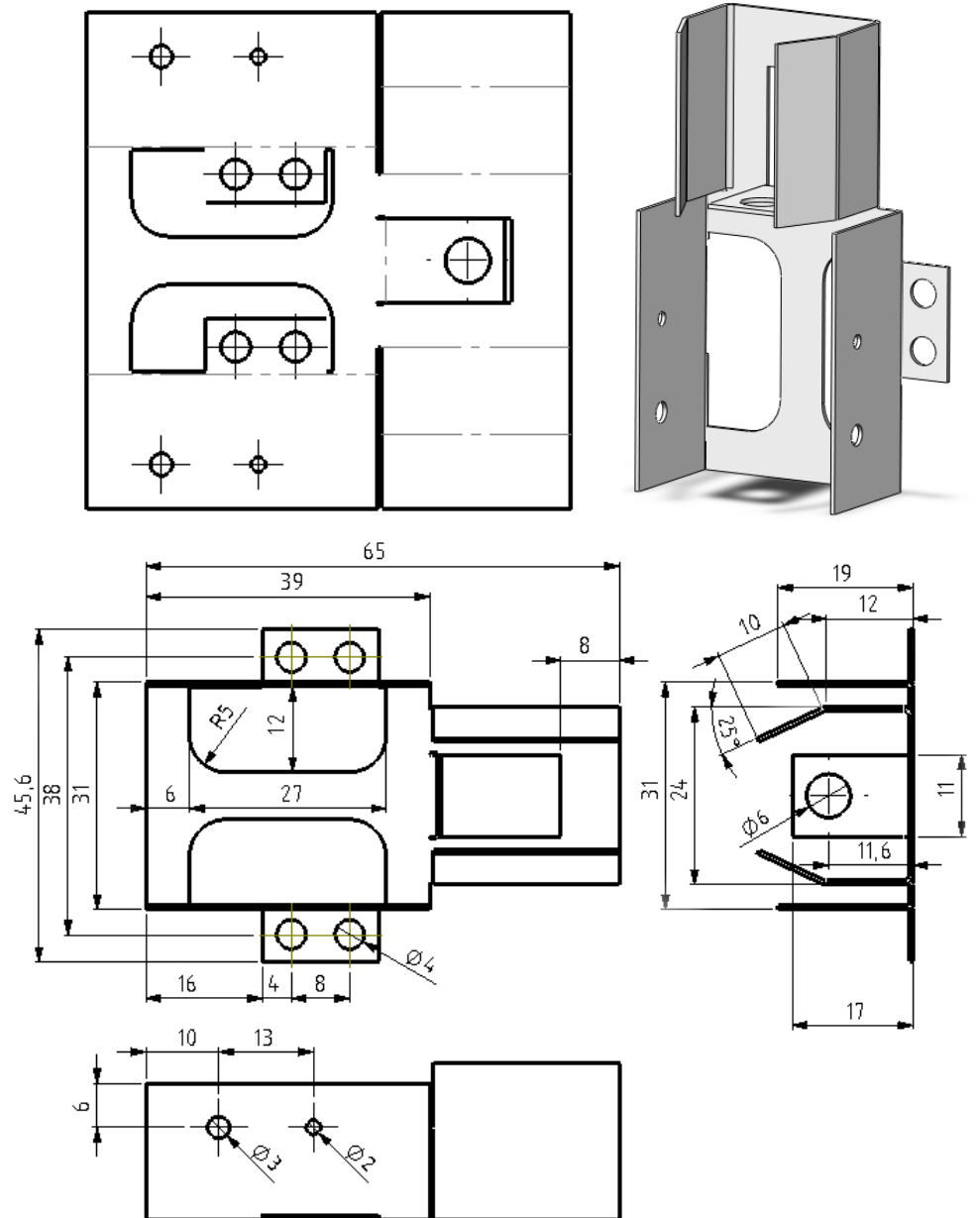
Oefening 11-3-10

Maak een assembly. In de stuklijst zie je welke onderdelen gebruikt zijn.

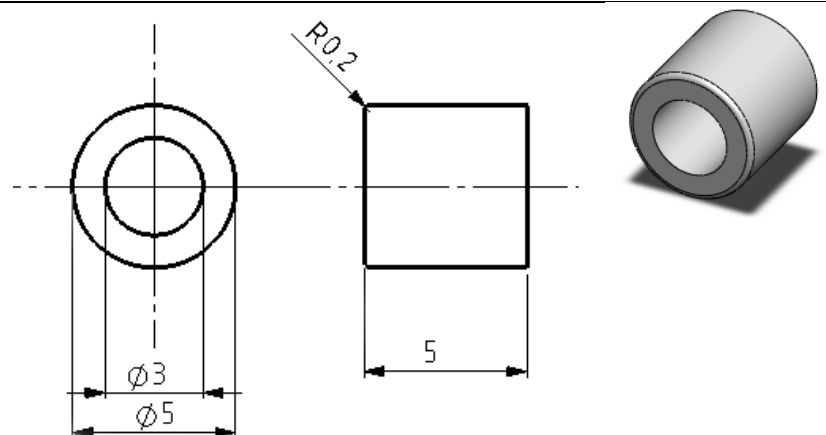


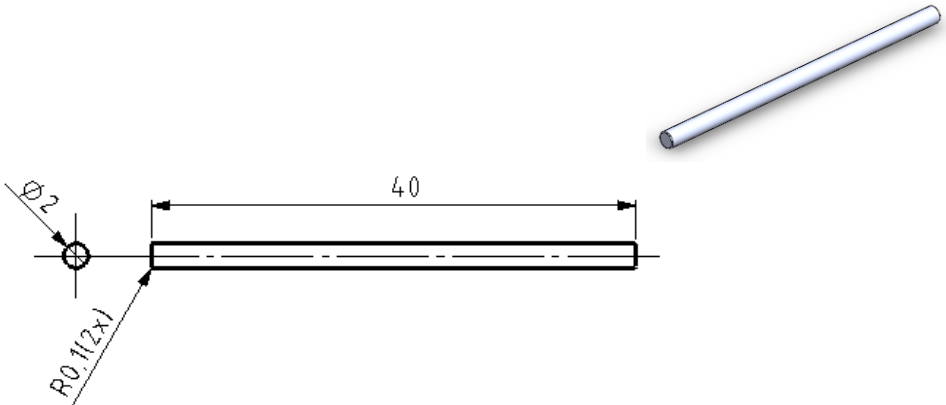
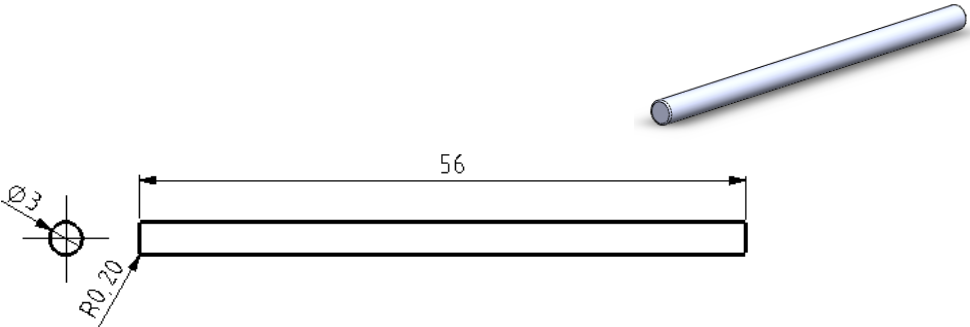
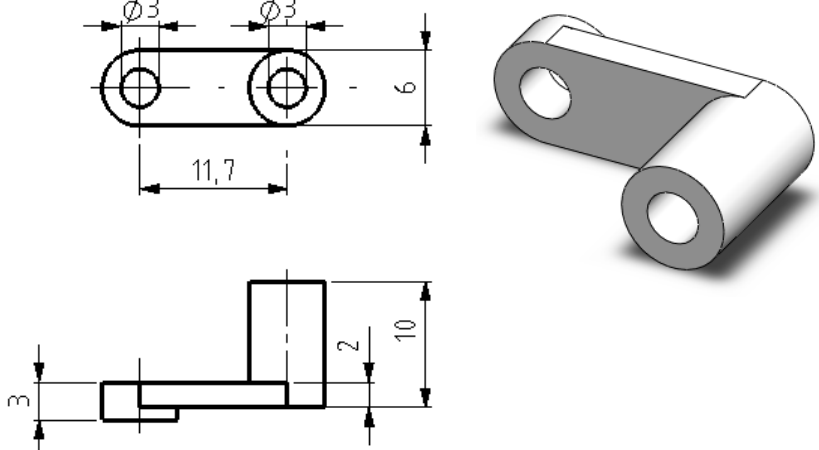
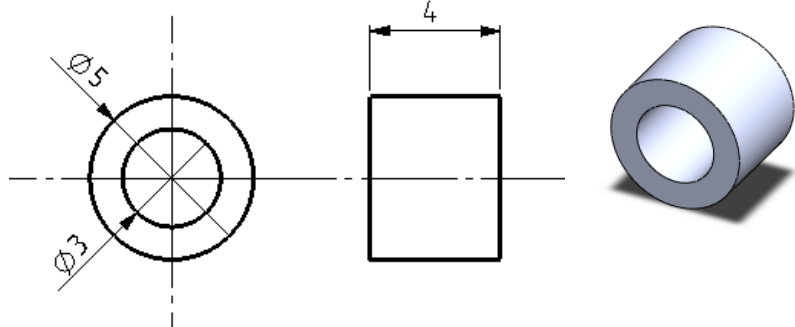
ITEM NO.	PART NUMBER	QTY.
1	12-3-7	1
2	12-3-8	1
3	12-3-9	1

Oefening 11-3-11



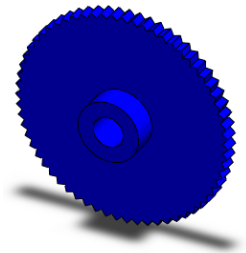
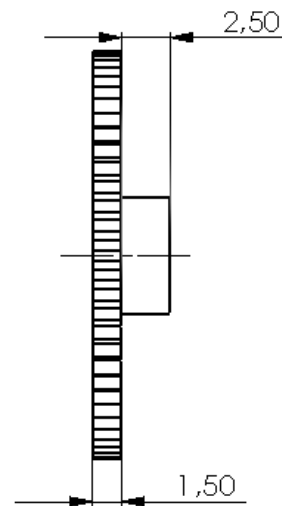
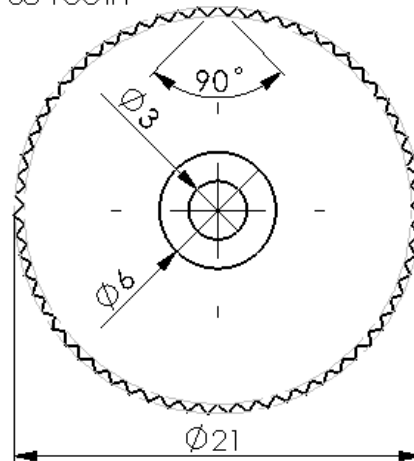
Oefening 11-3-12



Oefening 11-3-13	
Oefening 11-3-14	
Oefening 11-3-15	
Oefening 11-3-16	

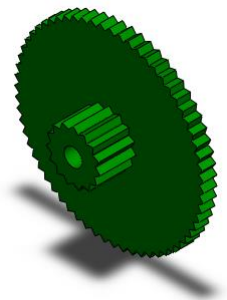
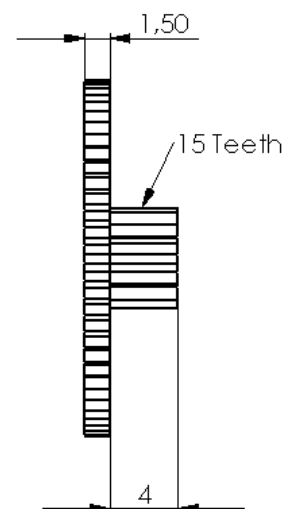
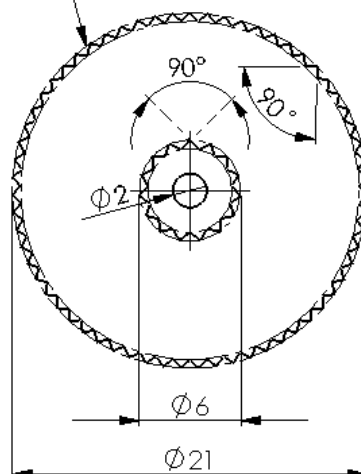
Oefening 11-3-17

63 Teeth

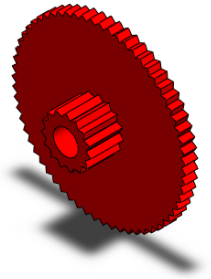
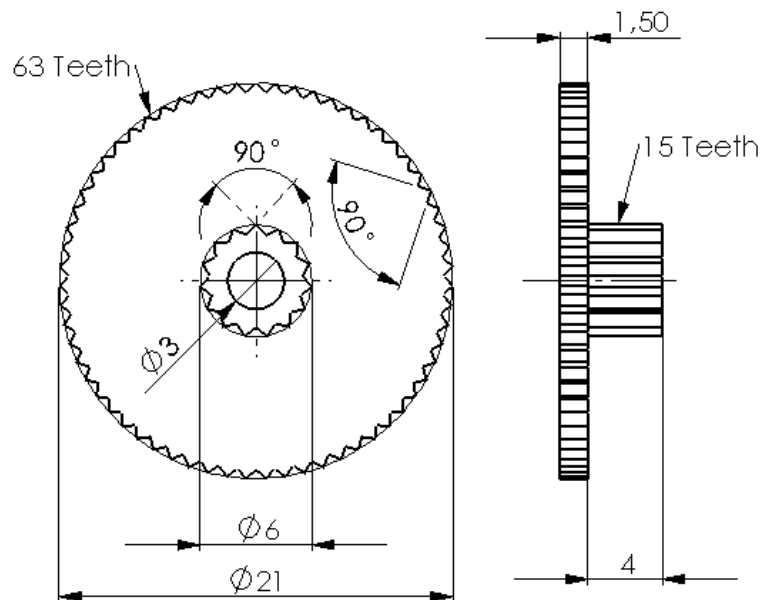


Oefening 11-3-18

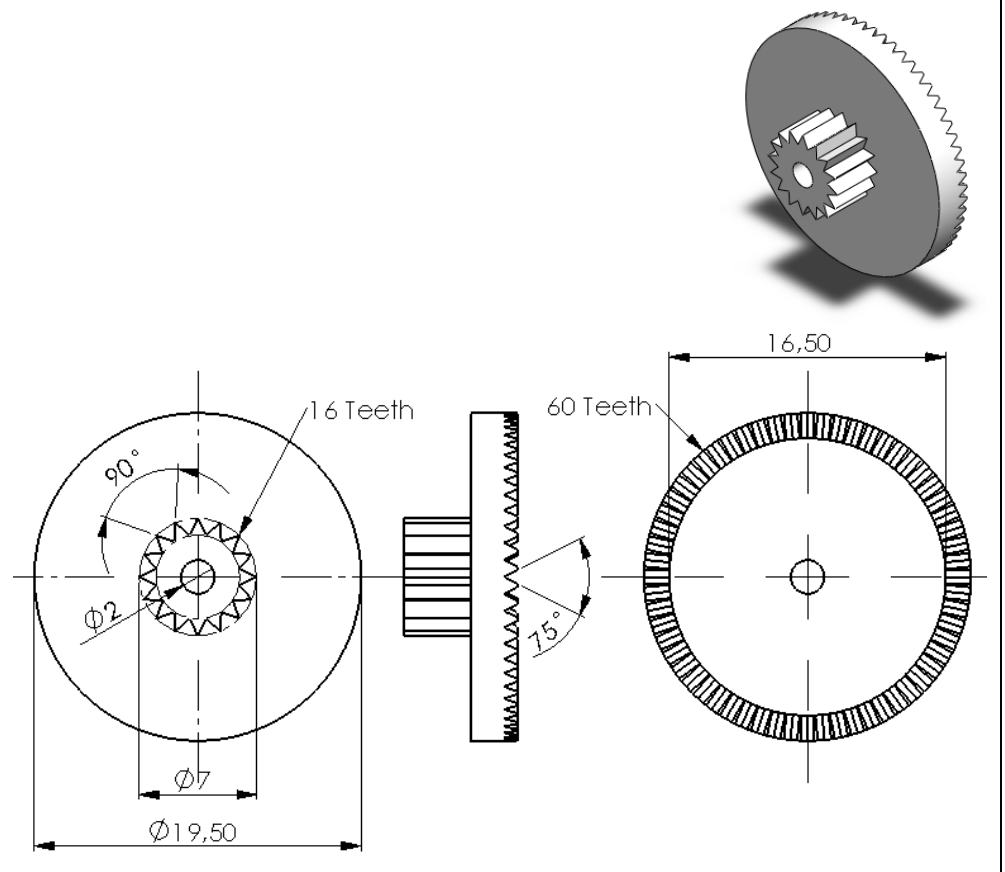
63 Teeth



Oefening 11-3-19

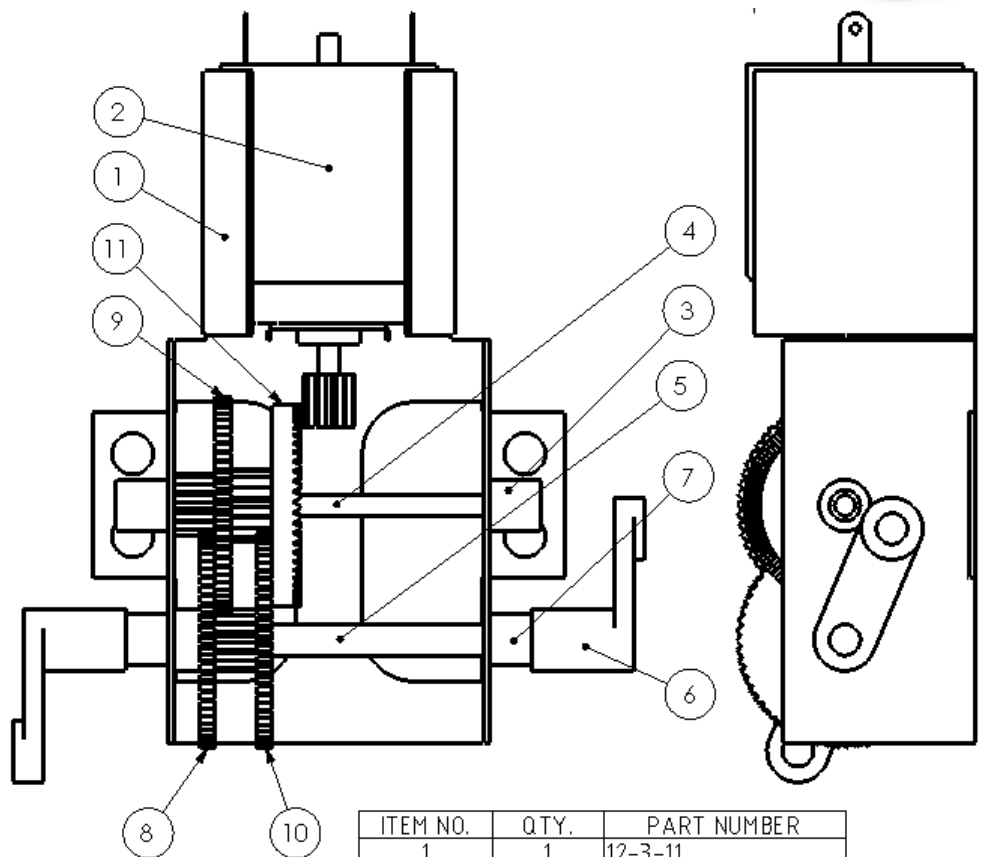
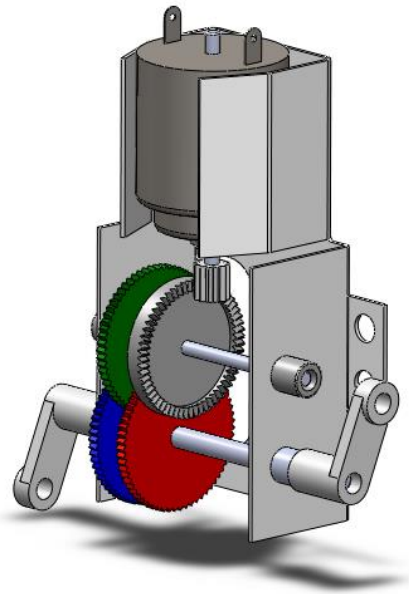


Oefening 11-3-20



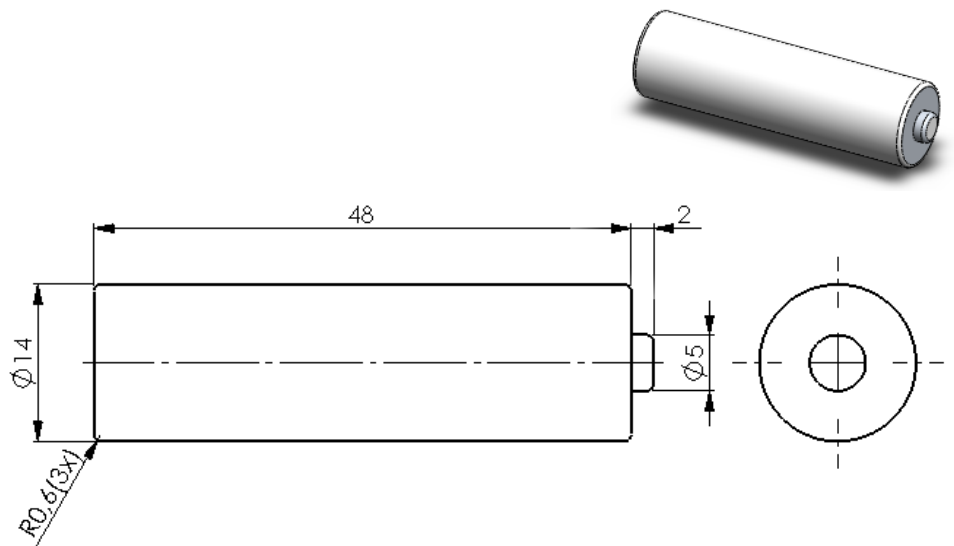
Oefening 11-3-21

Maak een assembly. In de stuklijst zie je welke onderdelen gebruikt zijn.

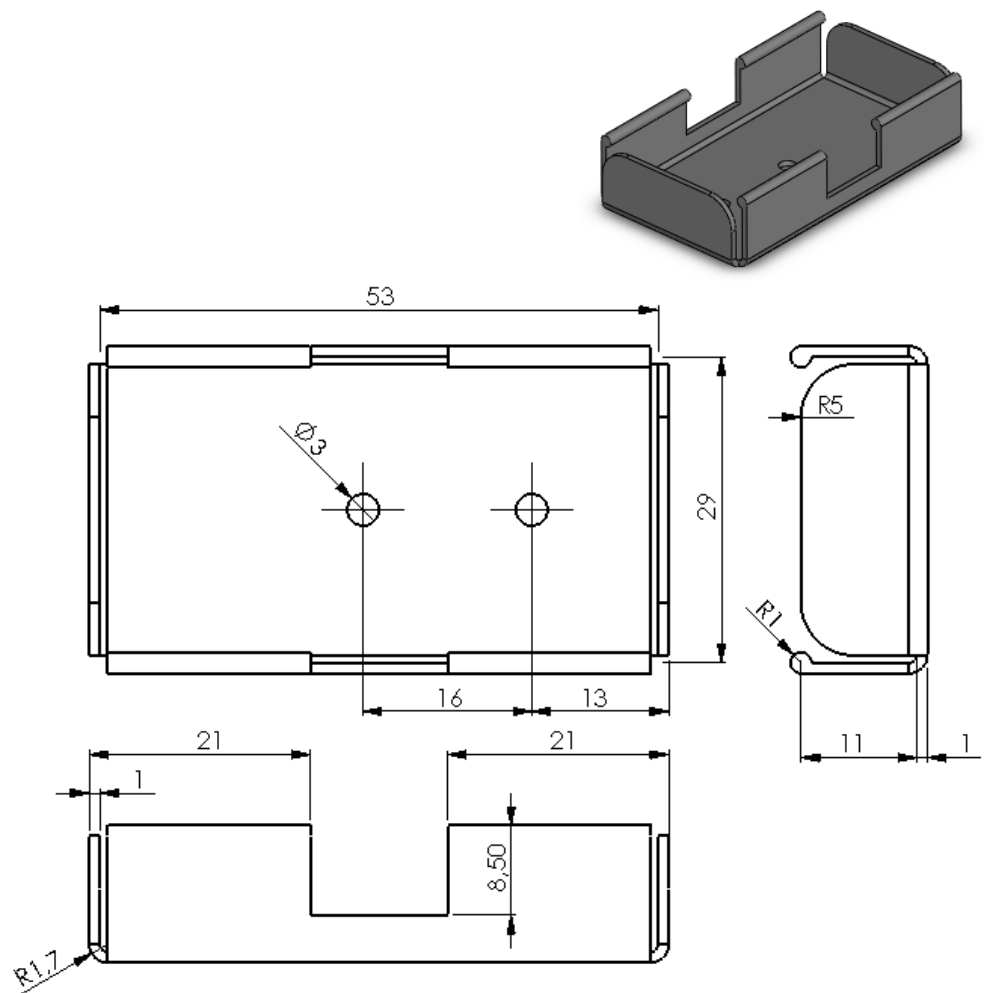


ITEM NO.	QTY.	PART NUMBER
1	1	12-3-11
2	1	12-3-10
3	2	12-3-12
4	1	12-3-13
5	1	12-3-14
6	2	12-3-15
7	2	12-3-16
8	1	12-3-17
9	1	12-3-18
10	1	12-3-19
11	1	12-3-20

Oefening 11-3-22

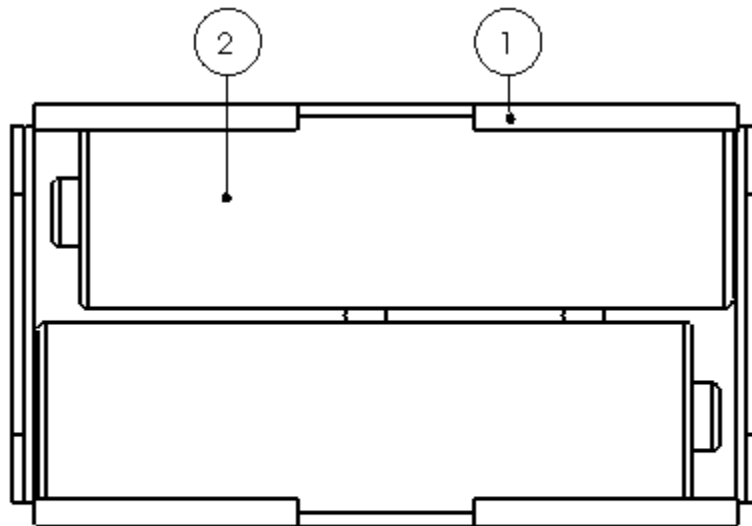
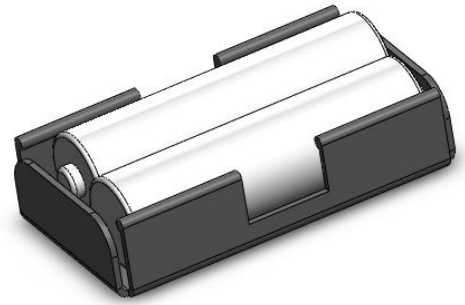


Oefening 11-3-23



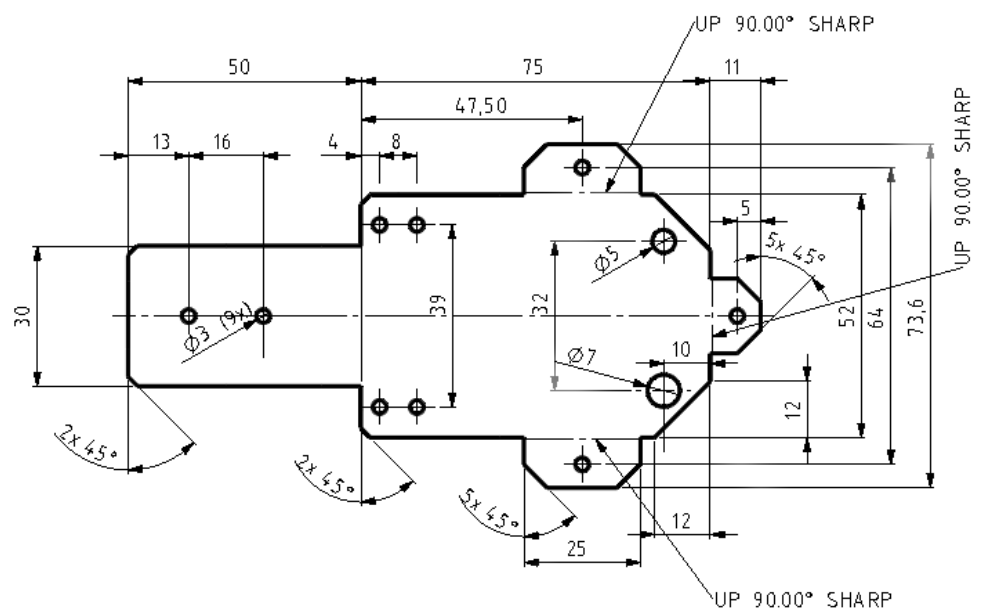
Oefening 11-3-24

Maak een assembly. In de stuklijst zie je welke onderdelen gebruikt zijn.

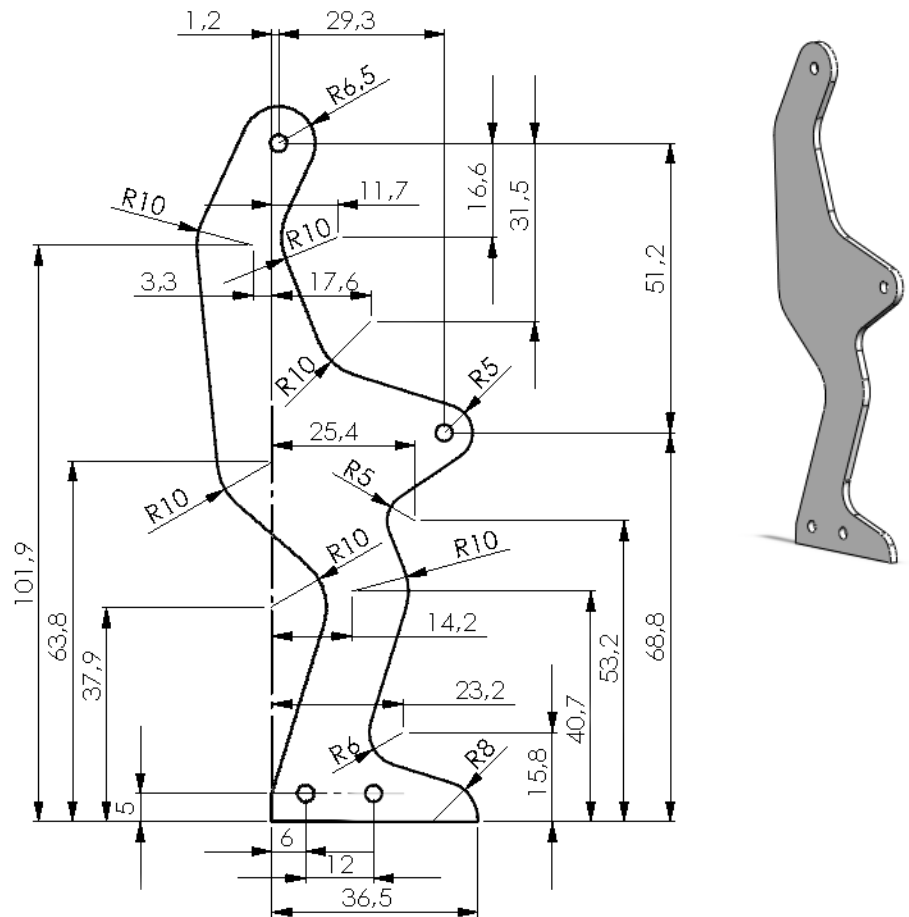


ITEM NO.	PART NUMBER	QTY.
1	12-3-23	1
2	12-3-22	2

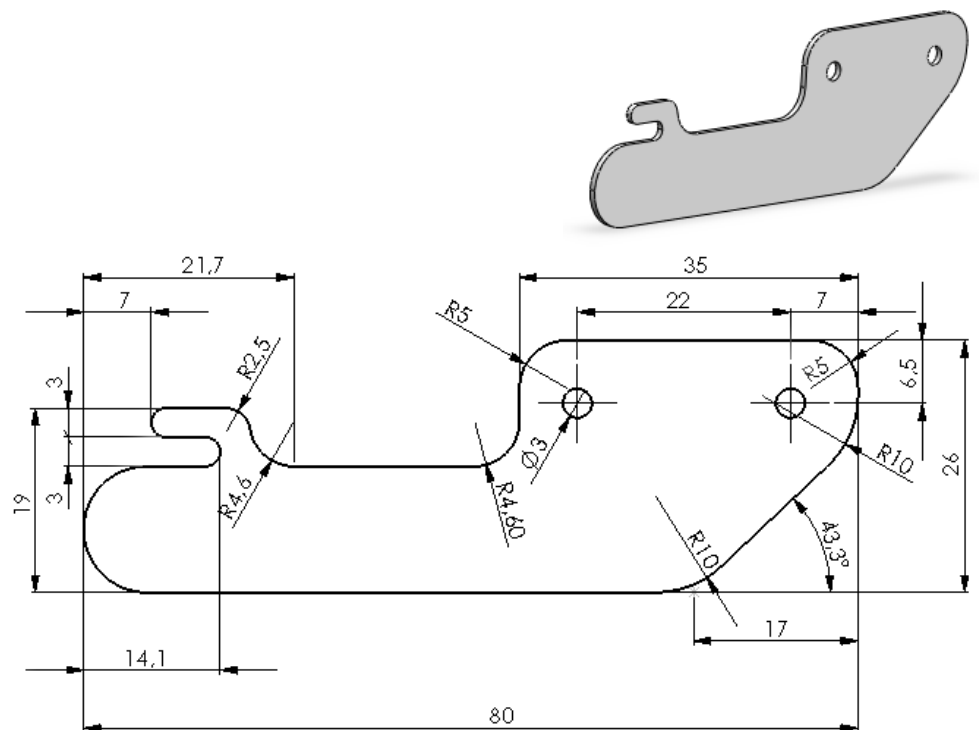
Oefening 11-3-25



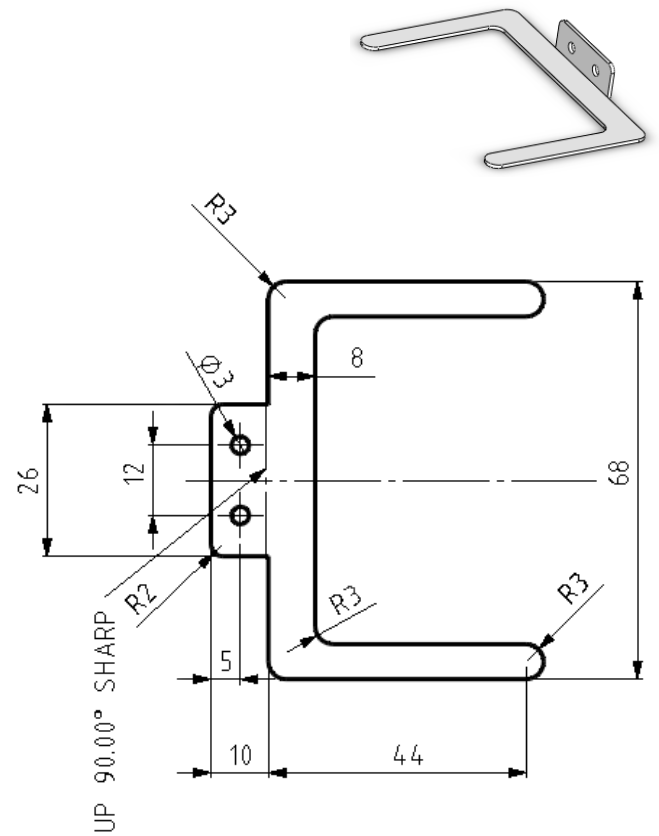
Oefening 11-3-26



Oefening 11-3-27



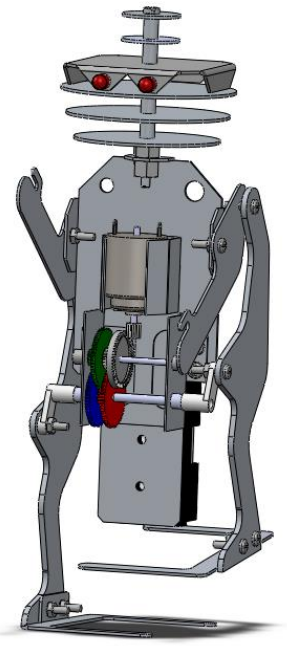
Oefening 11-3-28



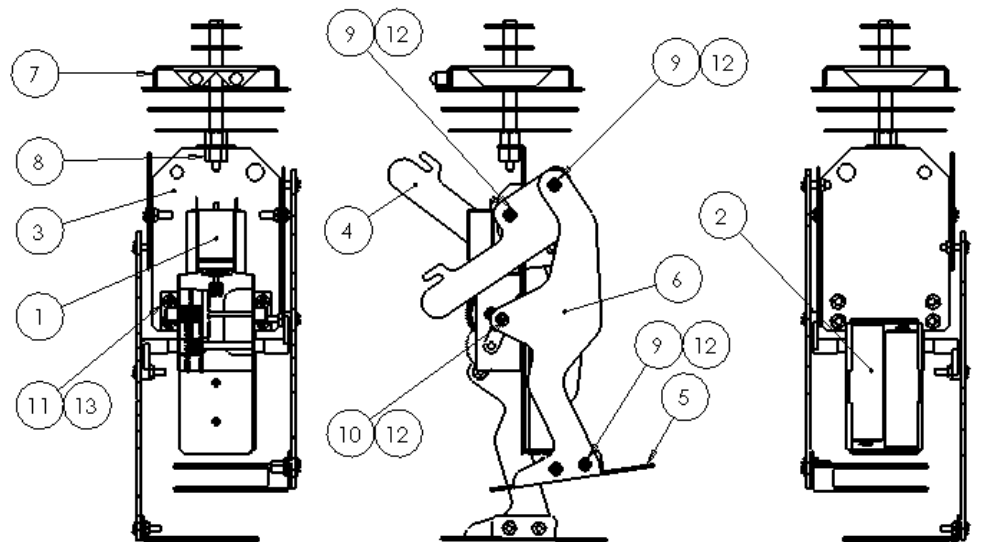
Oefening 11-3-29

Maak de complete assembly. In de stuklijst zie je welke onderdelen gebruikt zijn.

Zorg, door de juiste mates aan te brengen, dat de robot 'echt' kan lopen.



ITEM NO.	PART NUMBER	QTY.
1	12-3-21	1
2	12-3-24	1
3	12-3-25	1
4	Arm	2
5	12-3-28	2
6	12-3-26	2
7	12-3-6	1
8	Hexagon Nut ISO - 4034 - M5 - N	2
9	ISO 1580 - M2.5 x 10 --- 10N	8
10	ISO 1580 - M2.5 x 12 --- 12N	2
11	ISO 1580 - M3 x 8 --- 8N	4
12	Hexagon Nut ISO - 4032 - M2.5 - W - N	10
13	Hexagon Nut ISO - 4032 - M3 - W - N	4

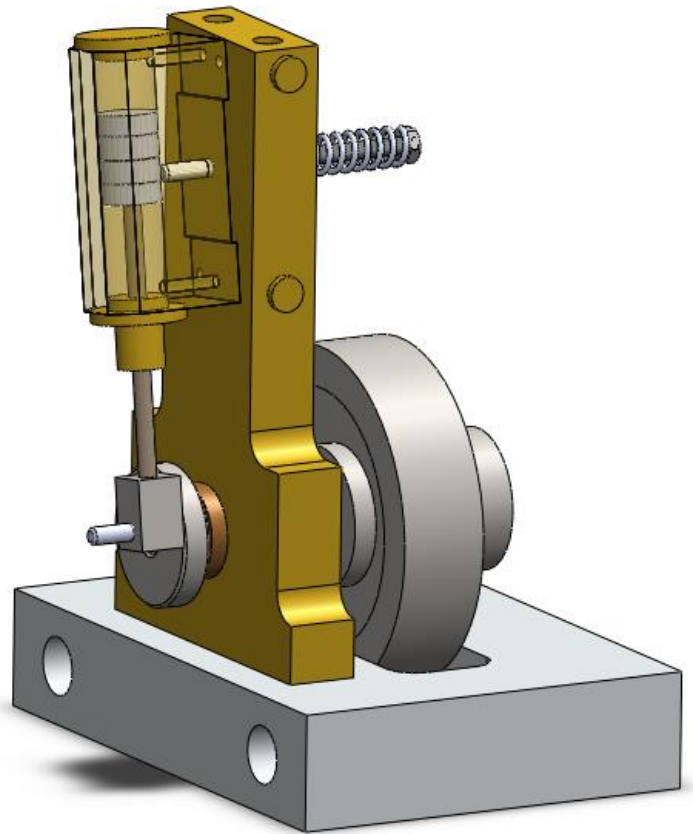


Oefening 11-3-30

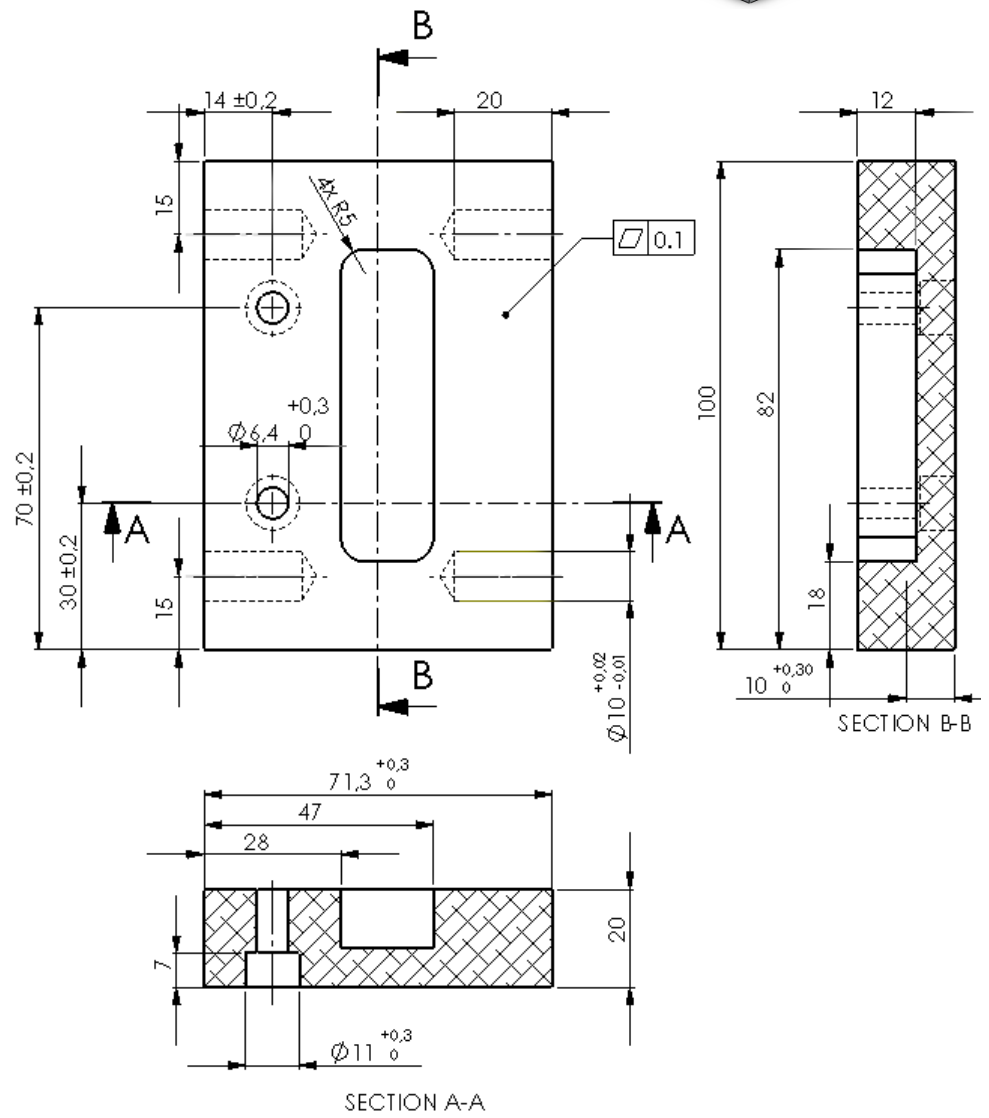
Maak renderingen van de robot Gebruik de afbeeldingen hiernaast als voorbeeld.



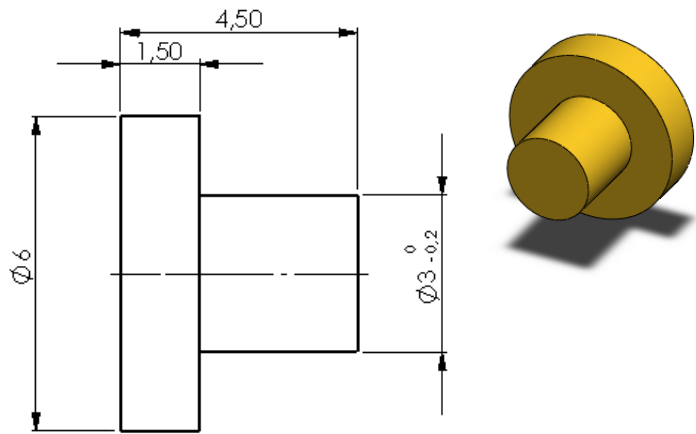
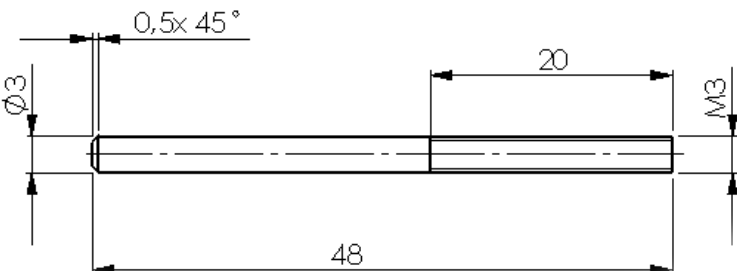
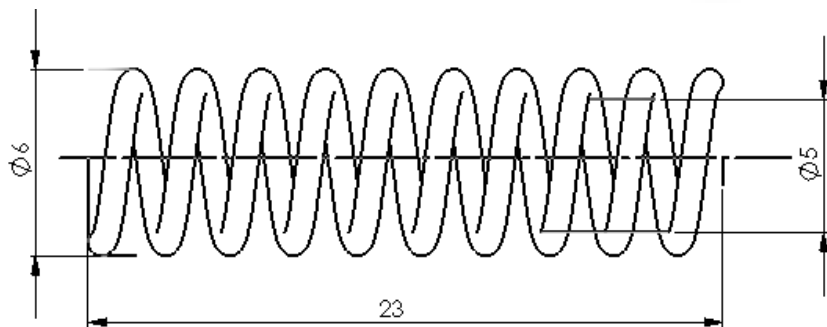
Oefening 11-4
Luchtmotor



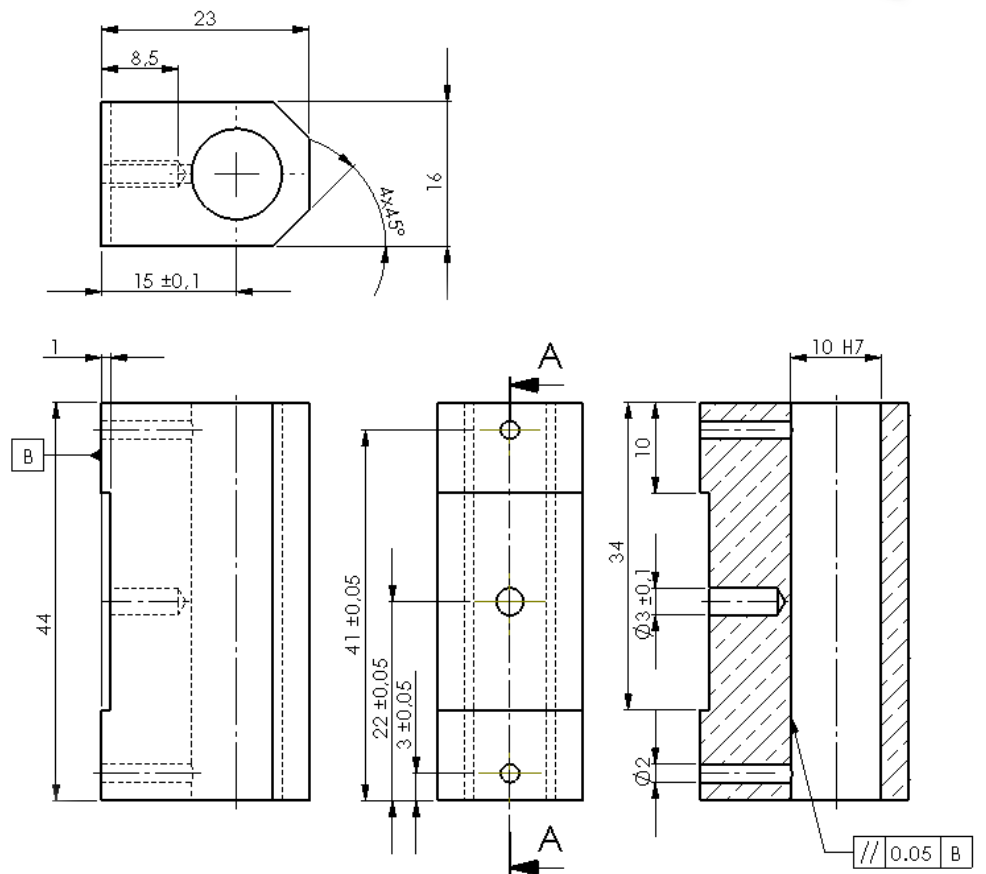
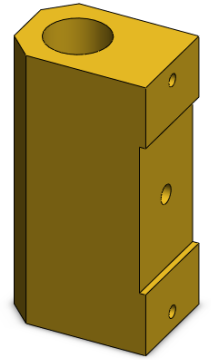
Oefening 11-4-1



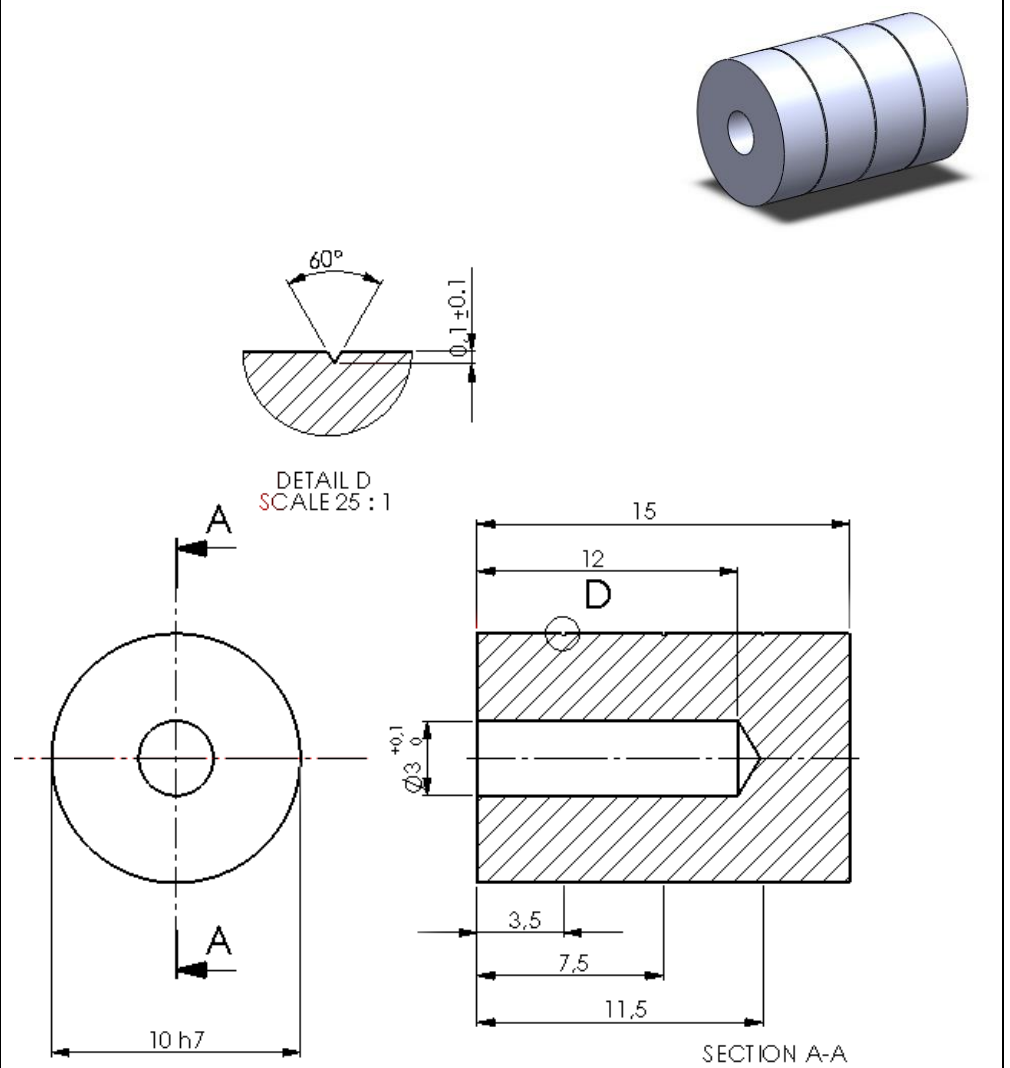
Oefening 11-4-2

Oefening 11-4-3	
Oefening 11-4-4	
Oefening 11-4-5	

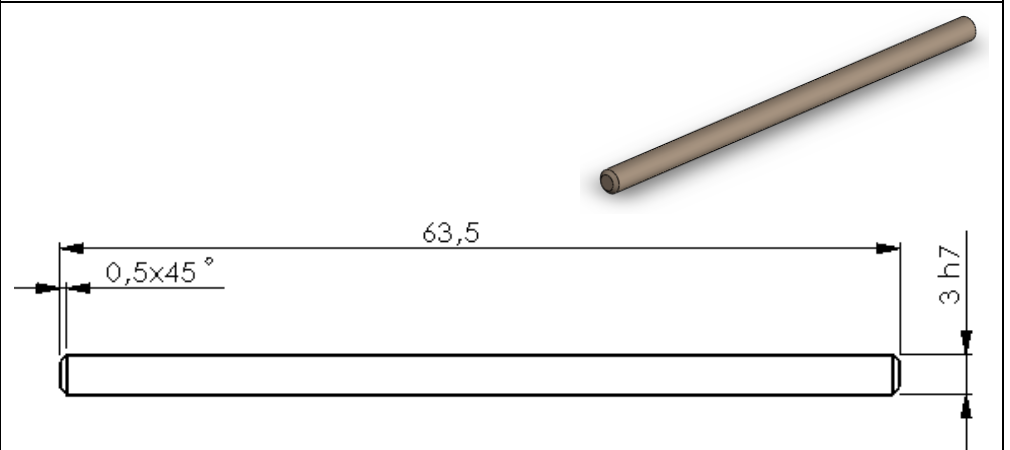
Oefening 11-4-6



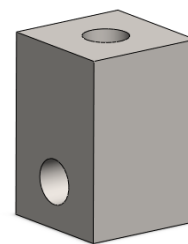
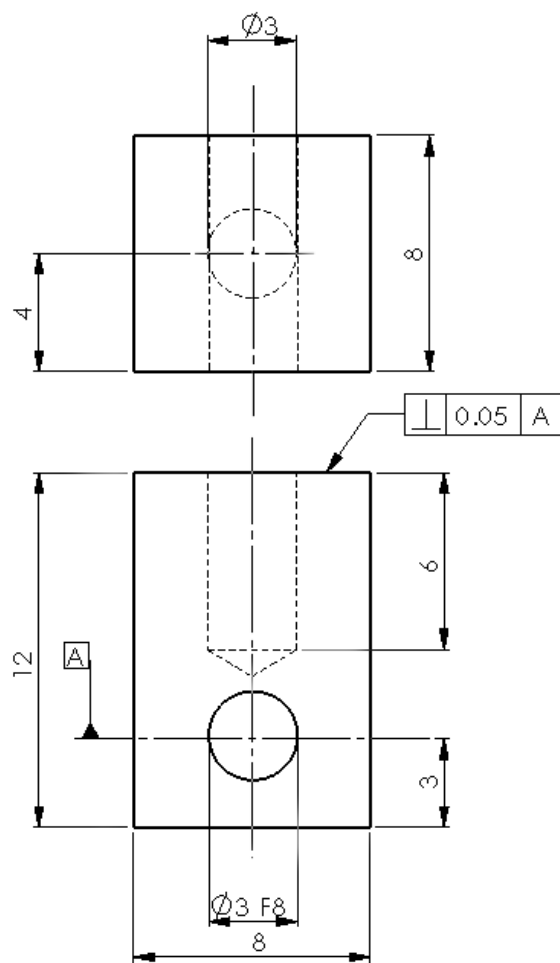
Oefening 11-4-7



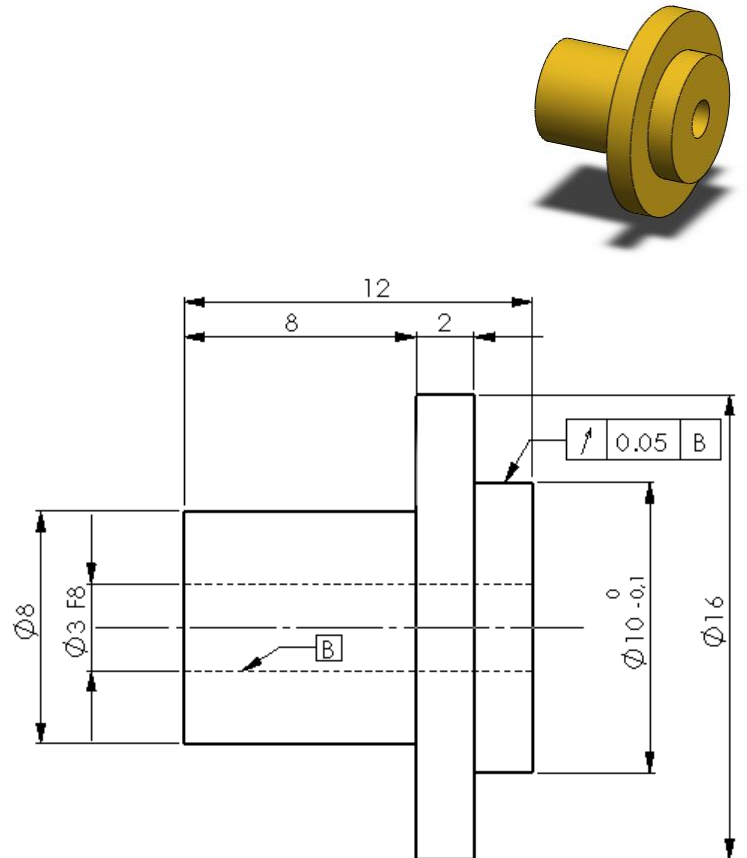
Oefening 11-4-8



Oefening 11-4-9

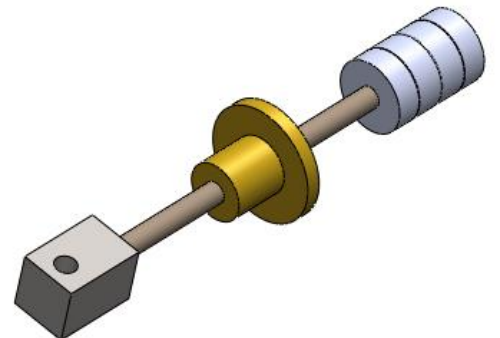


Oefening 11-4-10

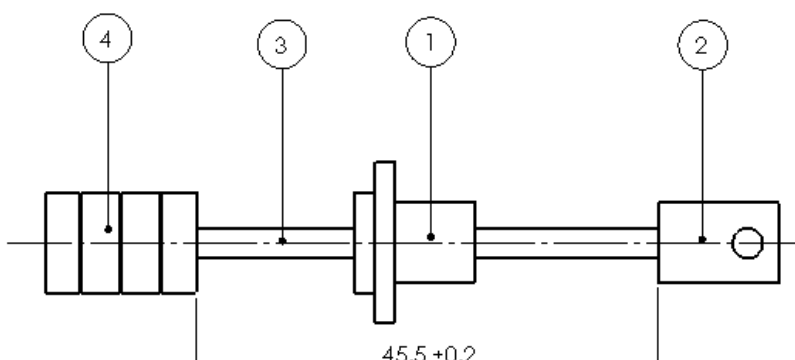


Oefening 11-4-11

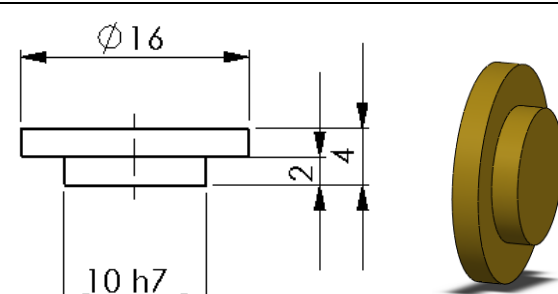
Maak een assembly. In de stuklijst zie je welke onderdelen gebruikt zijn.



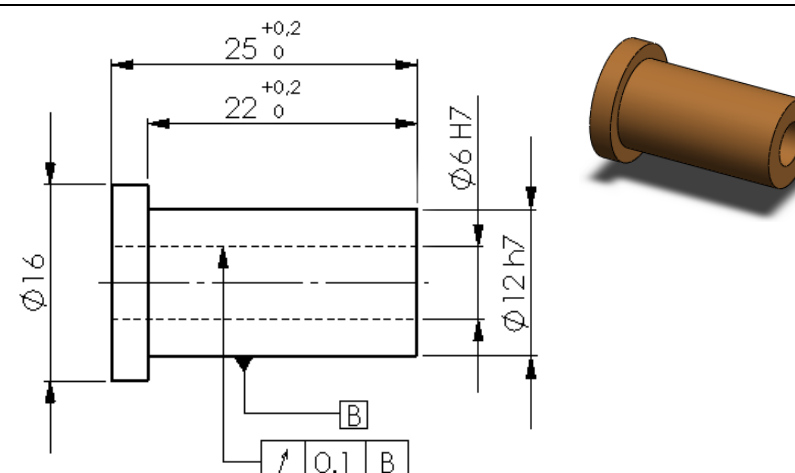
ITEM NO.	PART NUMBER	QTY.
1	11-4-10	1
2	11-4-9	1
3	11-4-8	1
4	11-4-7	1



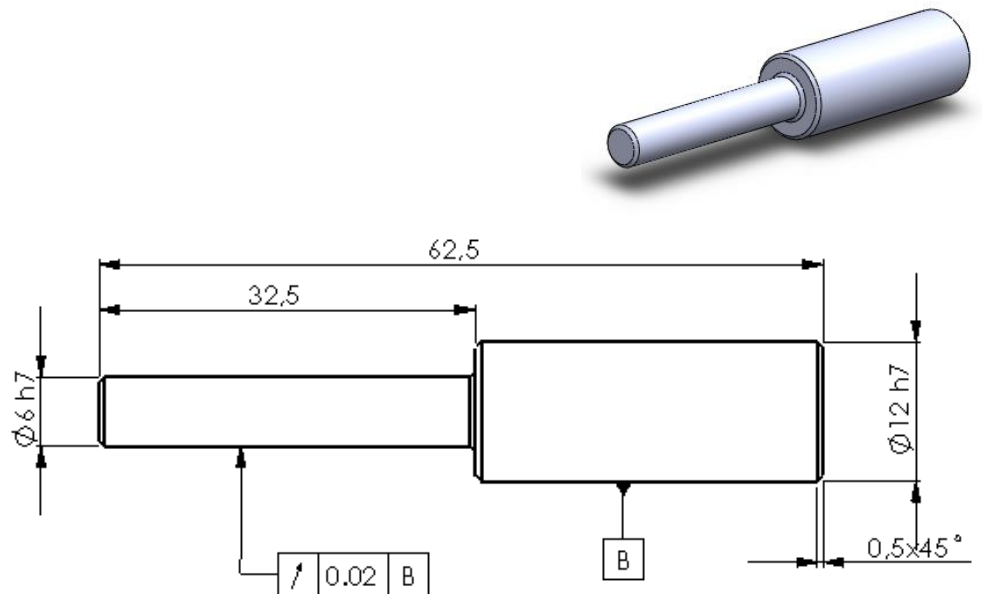
Oefening 11-4-12



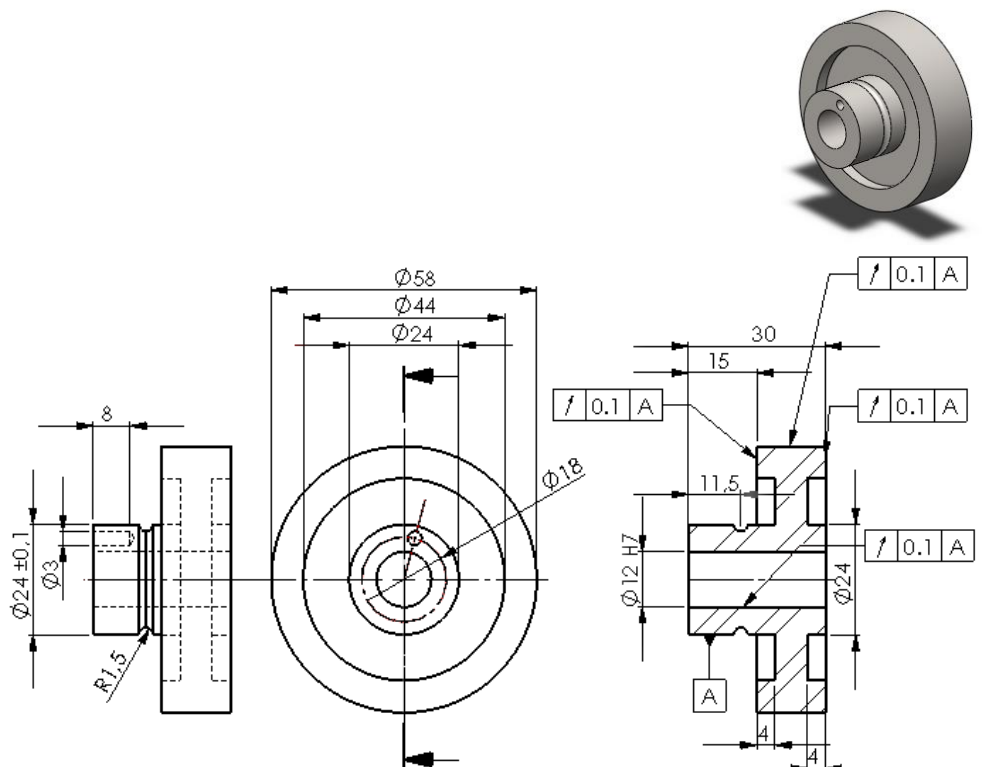
Oefening 11-4-13



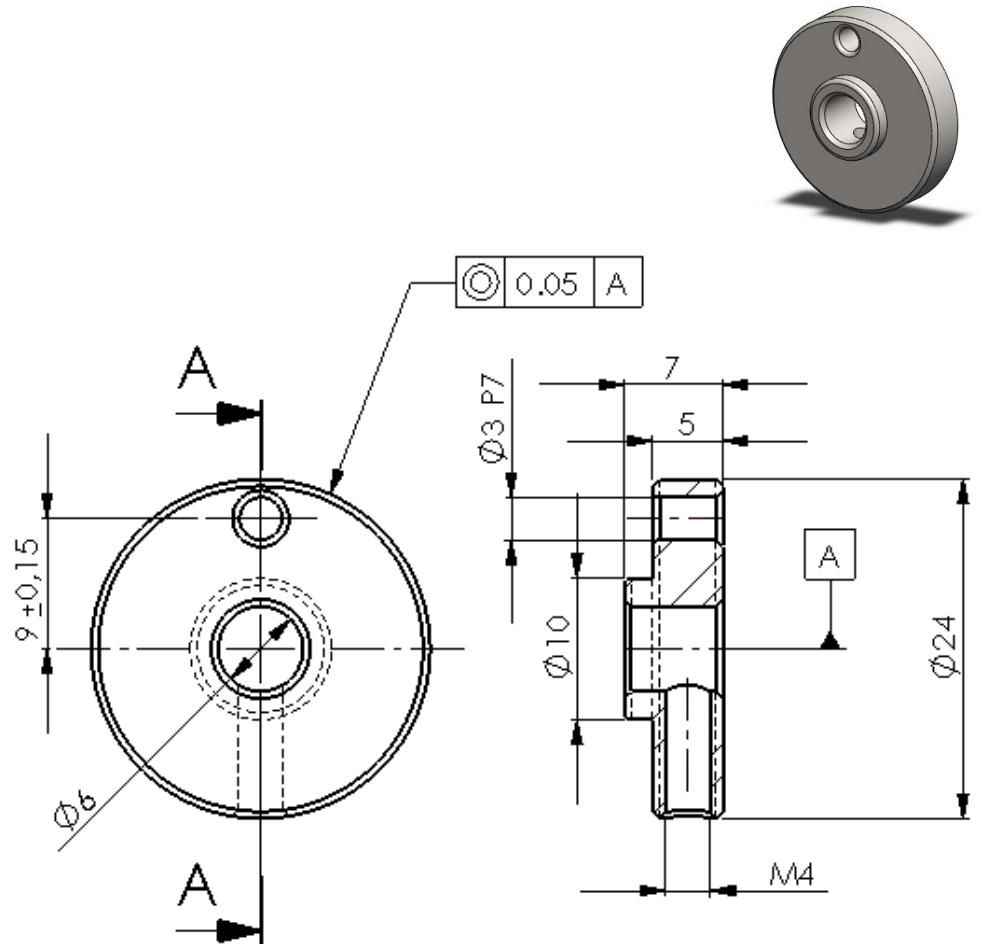
Oefening 11-4-14



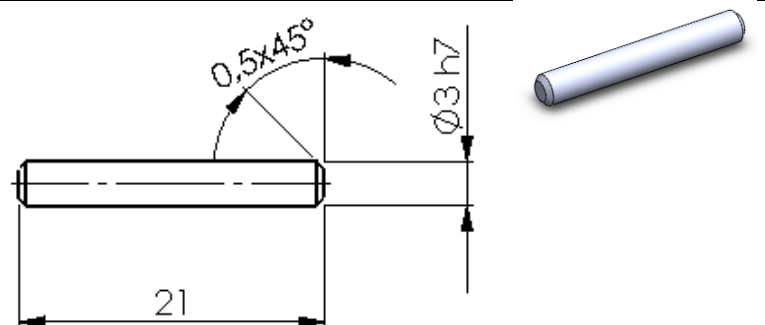
Oefening 11-4-15



Oefening 11-4-16

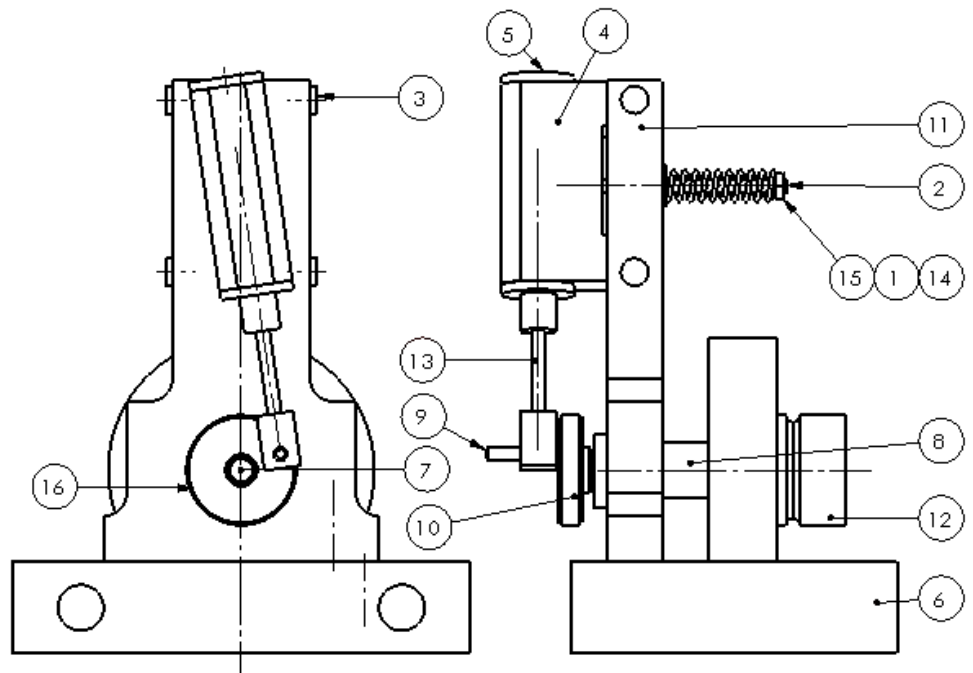
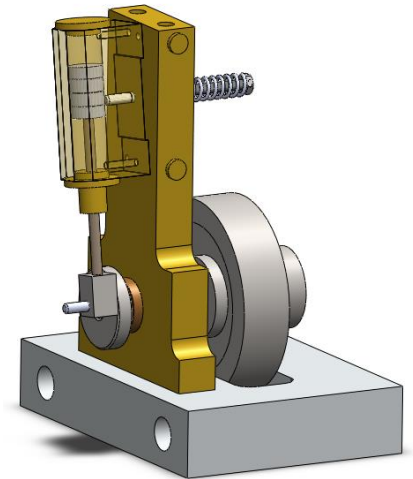


Oefening 11-4-17



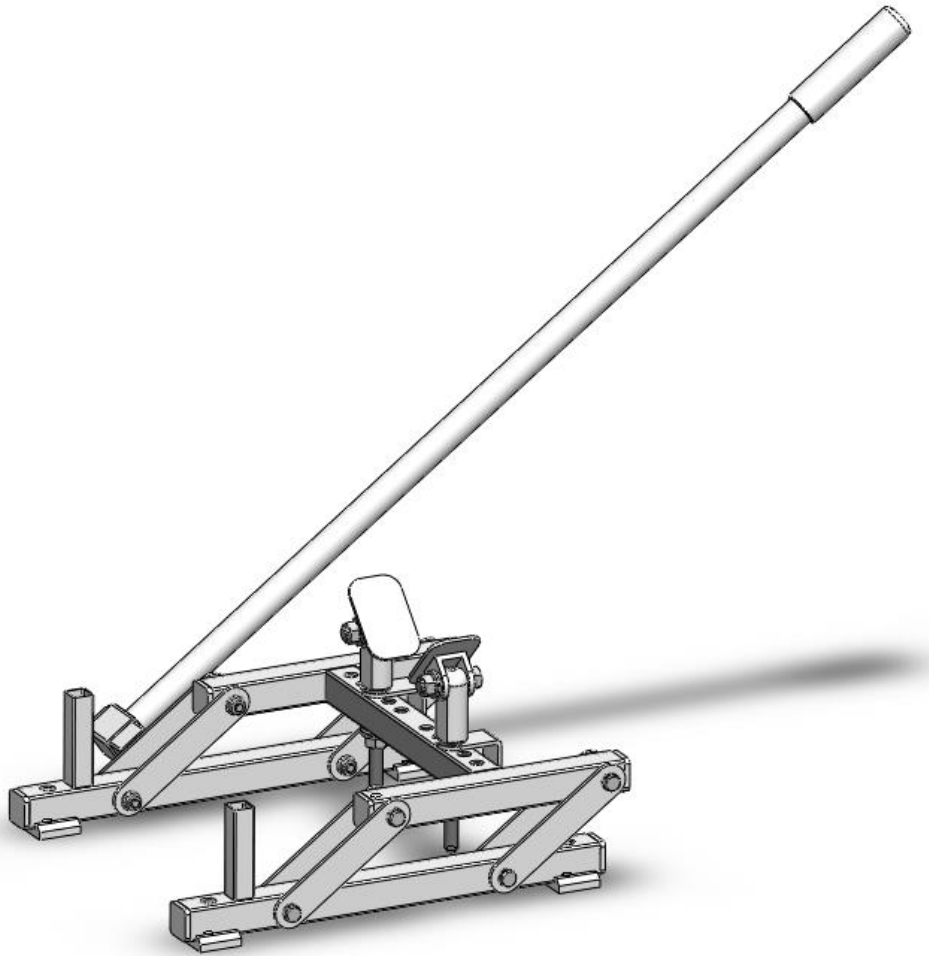
Oefening 11-4-18

Maak de assembly van de
luchtmotor.

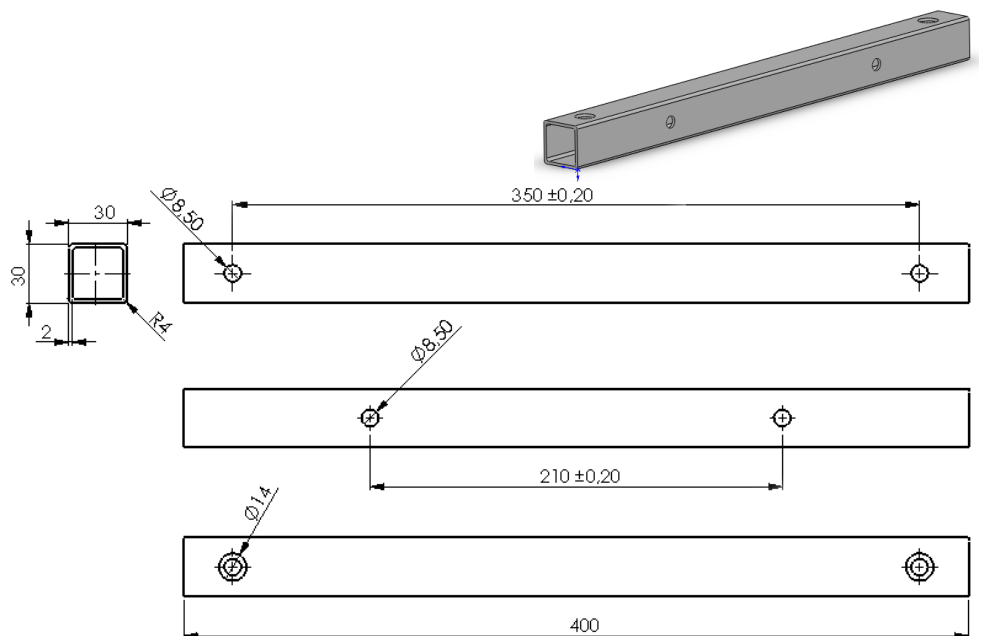


ITEM NO.	PART NUMBER	QTY.
1	11-4-5	1
2	11-4-4	1
3	11-4-3	4
4	11-4-6	1
5	11-4-12	1
6	11-4-1	1
7	11-4-14	1
8	11-4-13	1
9	11-4-17	1
10	11-4-16	1
11	11-4-2	1
12	11-4-15	1
13	11-4-11	1
14	Washer ISO 7093 - 3	1
15	Hexagon Nut ISO - 4032 - M3 - W - N	1
16	ISO 4027 - M4 x 8-N	1

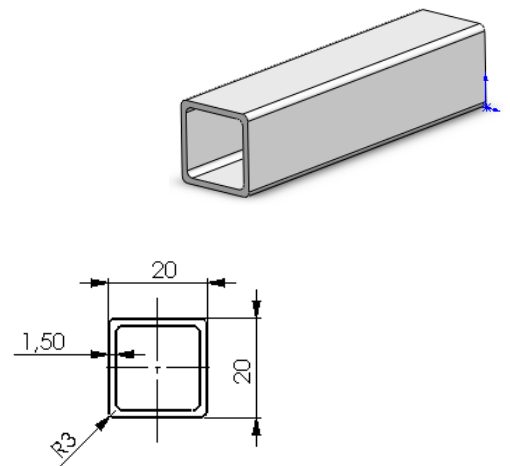
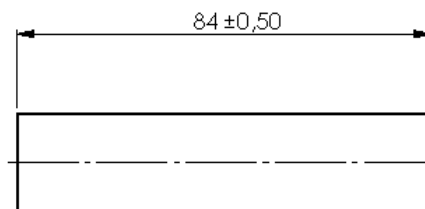
Oefening 11-5
Scooterkrík



Oefening 11-5-1

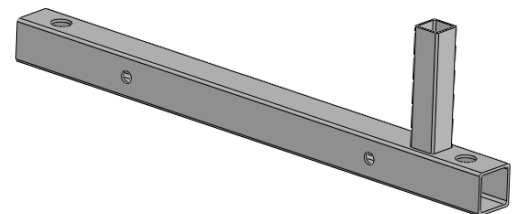


Oefening 11-5-2

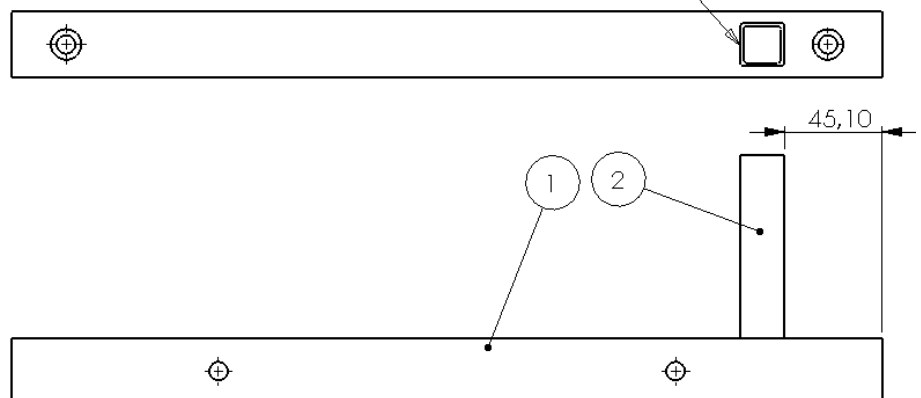


Oefening 11-5-3

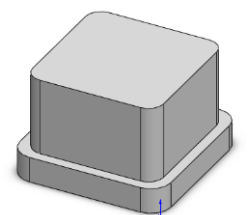
Maak een lassamenstelling

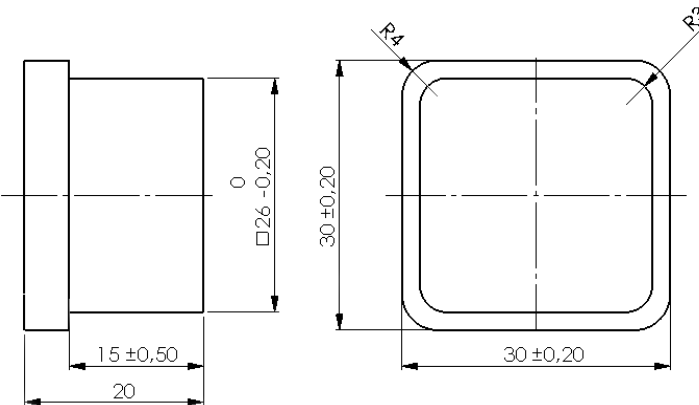
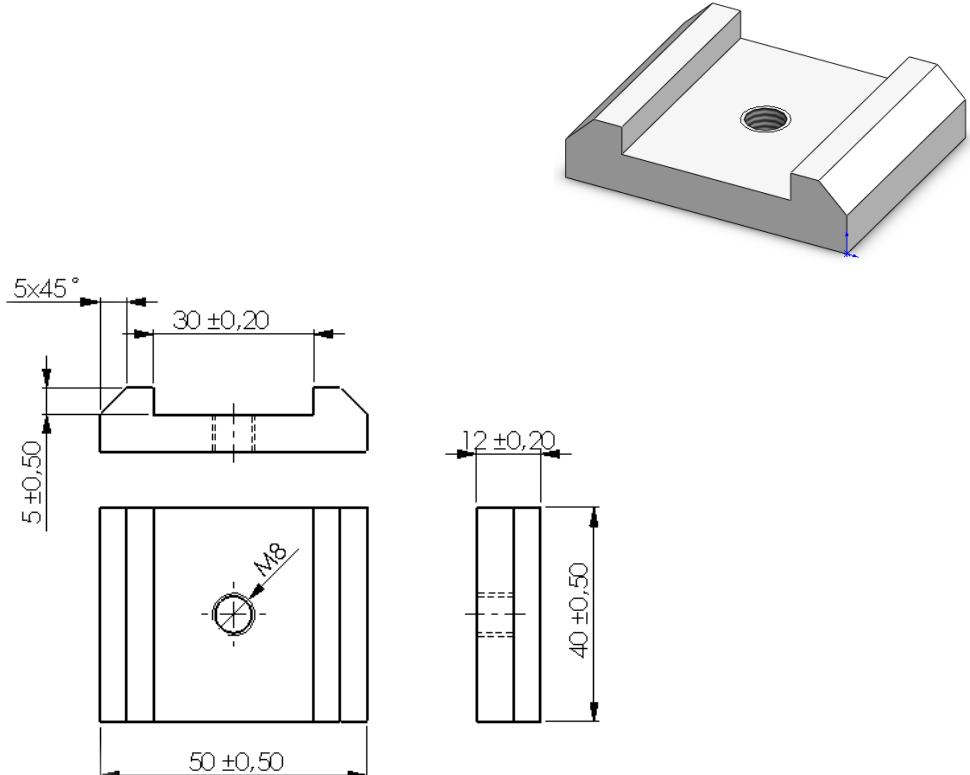


ITEM NO.	PART NUMBER	QTY.
1	11-5-1	1
2	11-5-2	1



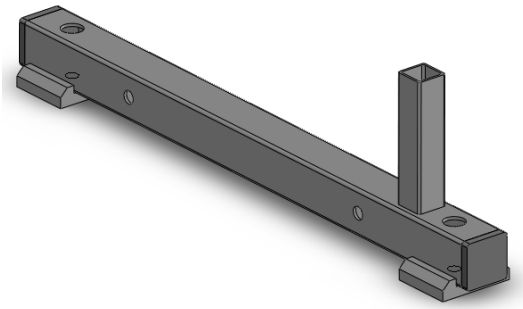
Oefening 11-5-4



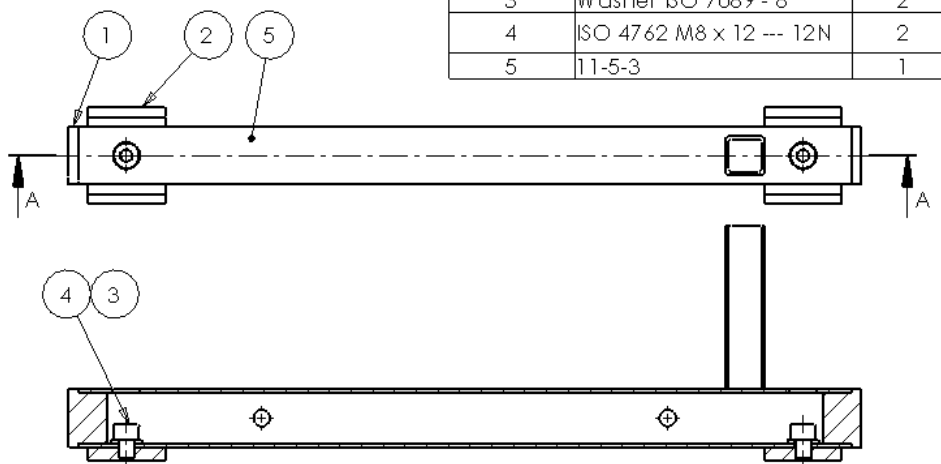
	
Oefening 11-5-5	

Oefening 11-5-6

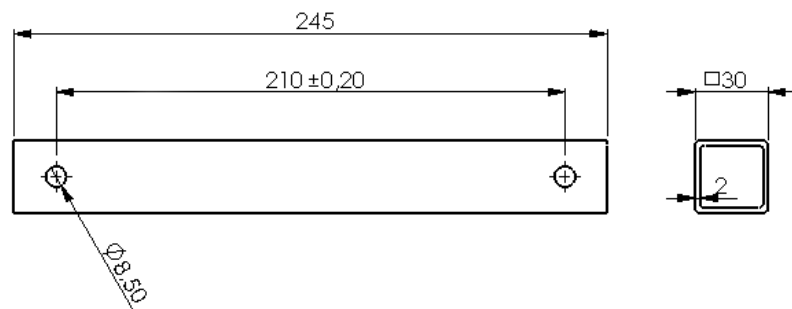
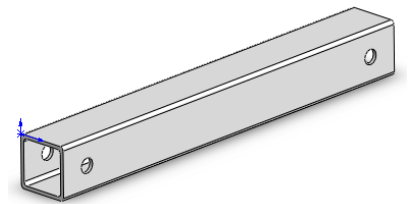
Maak de samenstelling. Gebruik onderdelen uit Toolbox zoals in de stuklijst te zien is.



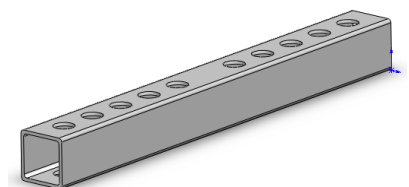
ITEM NO.	PART NUMBER	QTY.
1	11-5-4	2
2	11-5-5	2
3	Washer ISO 7089 - 8	2
4	ISO 4762 M8 x 12 --- 12N	2
5	11-5-3	1

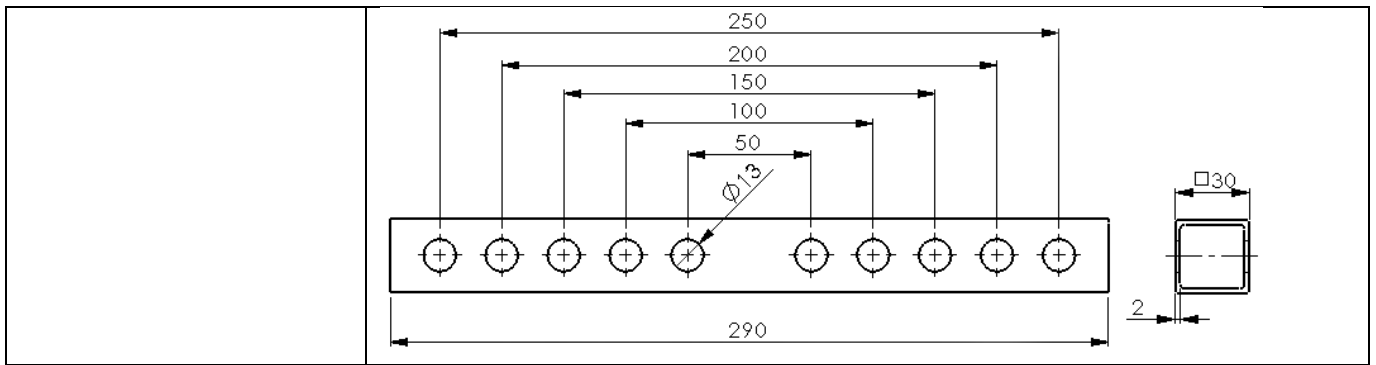


Oefening 11-5-7



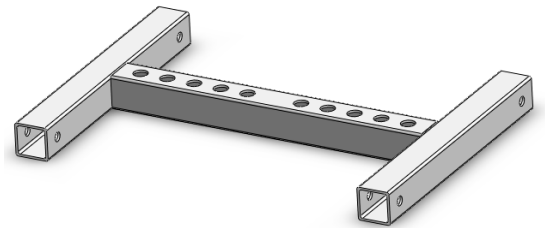
Oefening 11-5-8



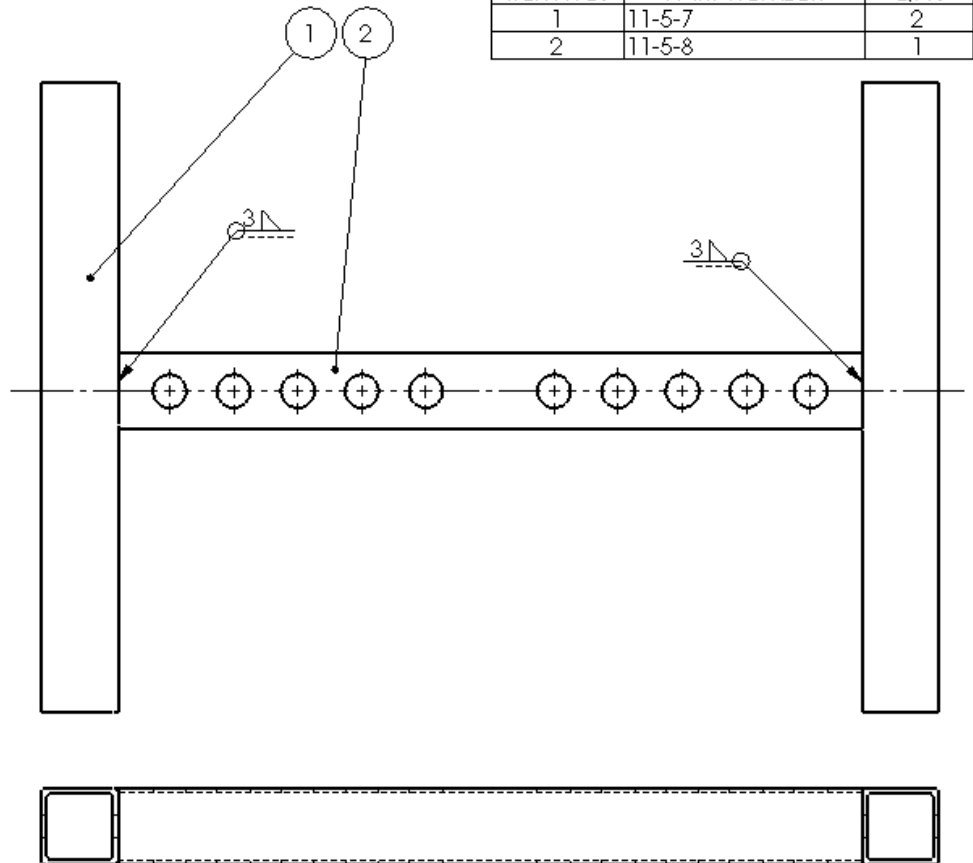
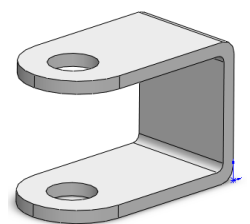
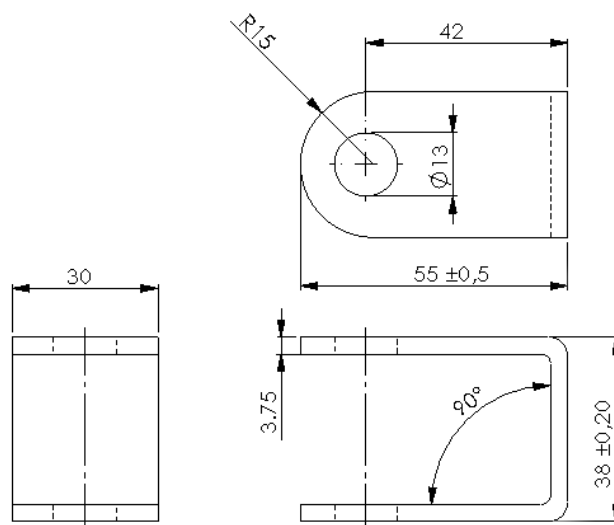


Oefening 11-5-9

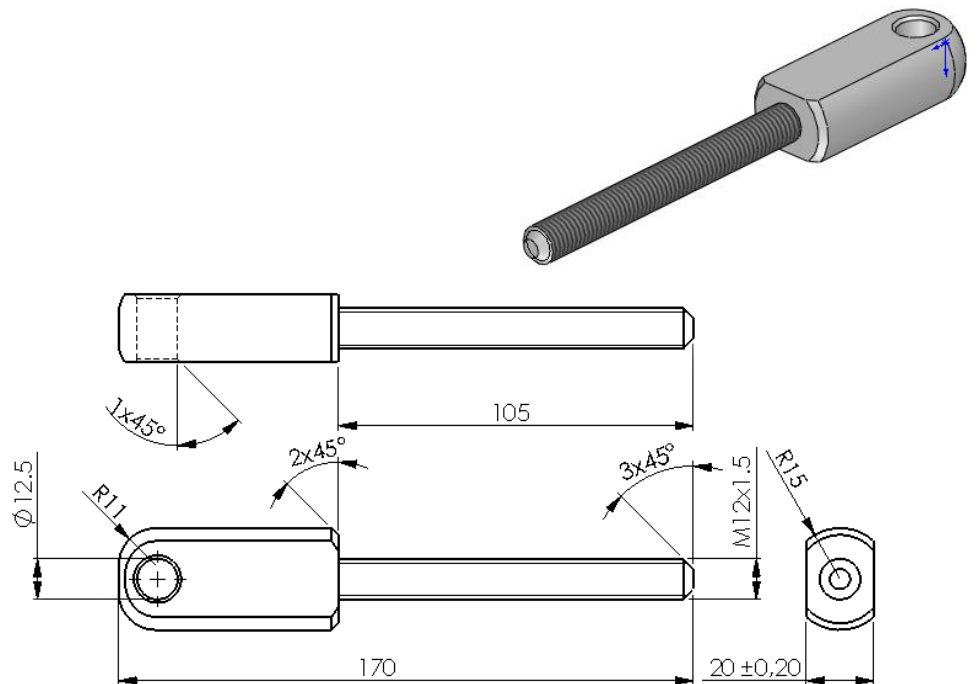
Maak de lassamenstelling.



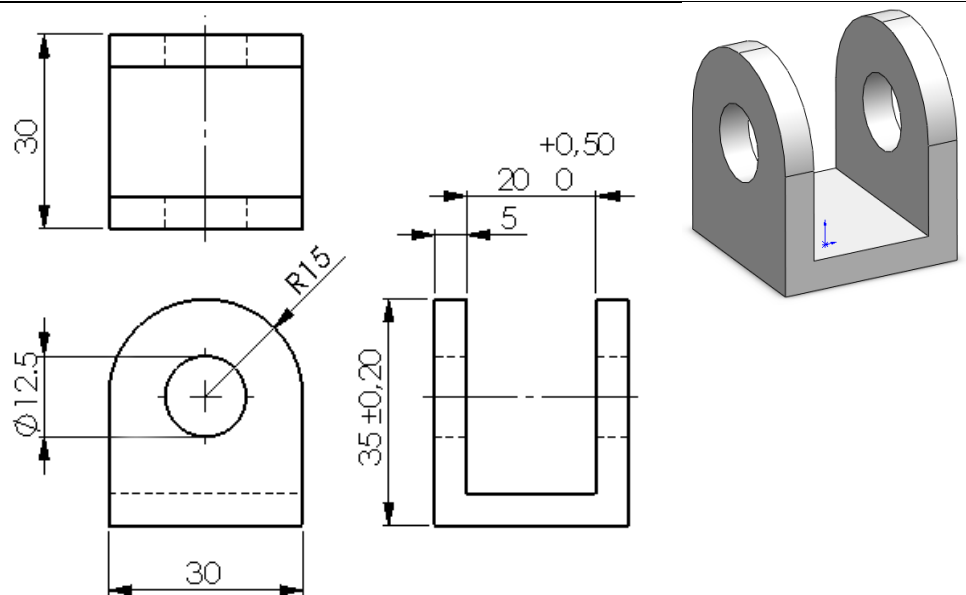
ITEM NO.	PART NUMBER	QTY.
1	11-5-7	2
2	11-5-8	1

**Oefening 11-5-10**

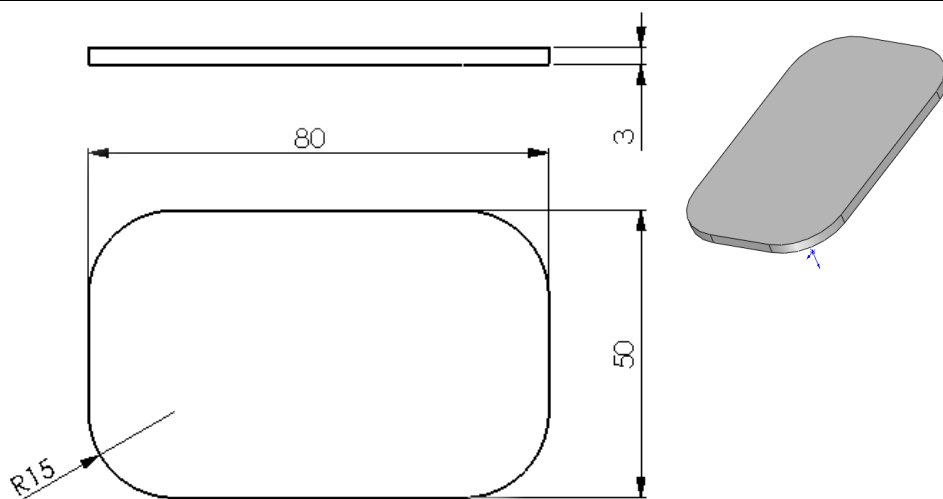
Oefening 11-5-11



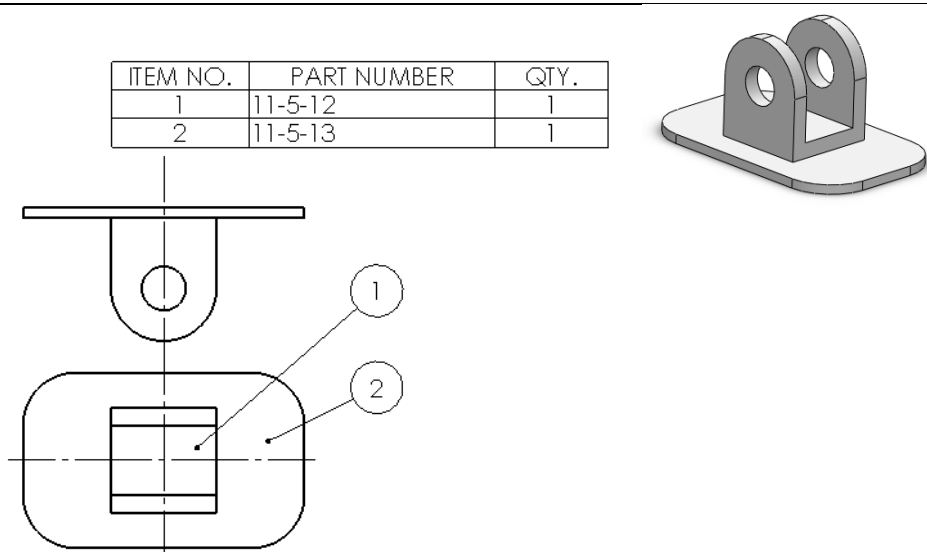
Oefening 11-5-12



Oefening 11-5-13

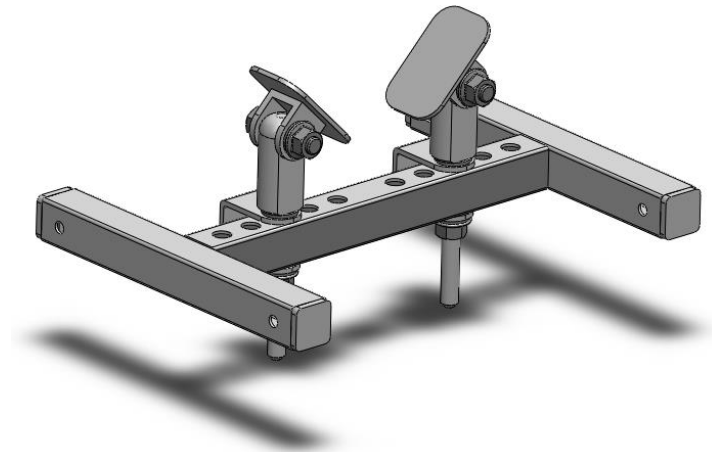


Oefening 11-5-14

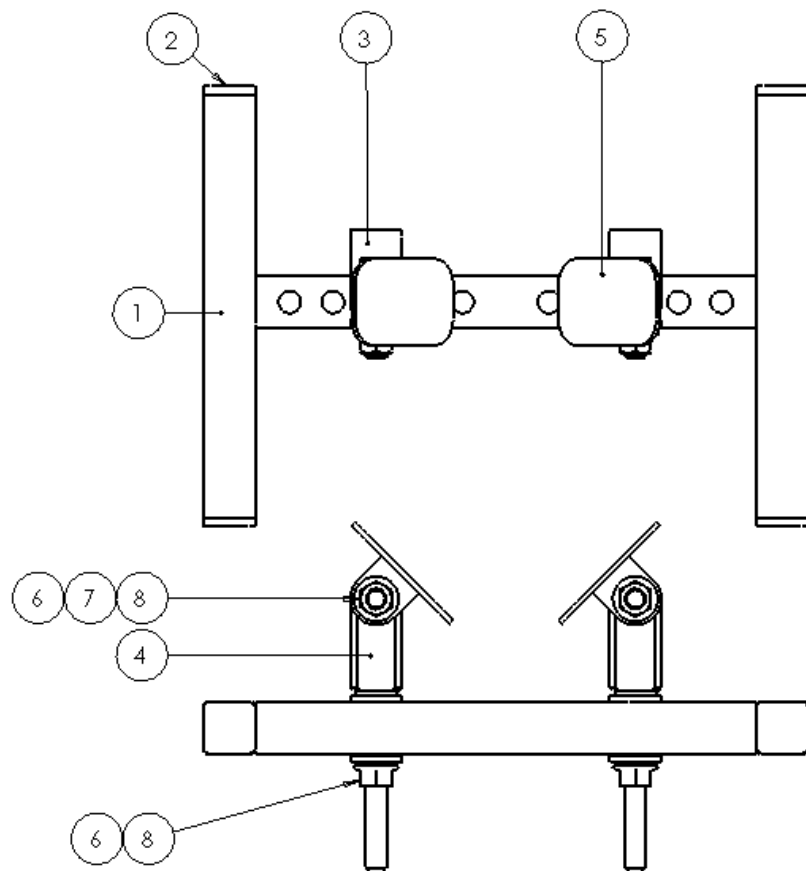


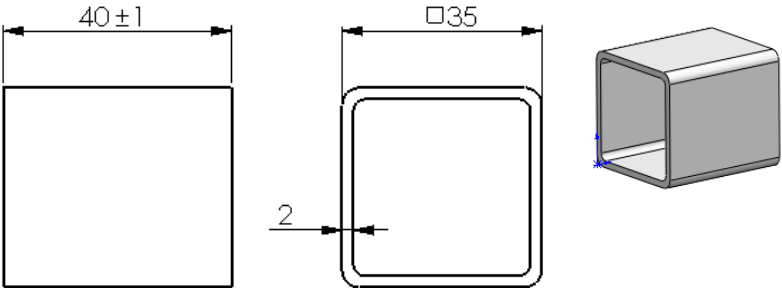
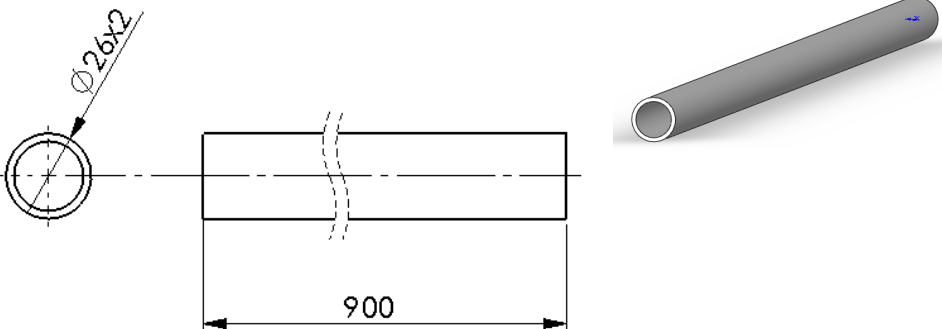
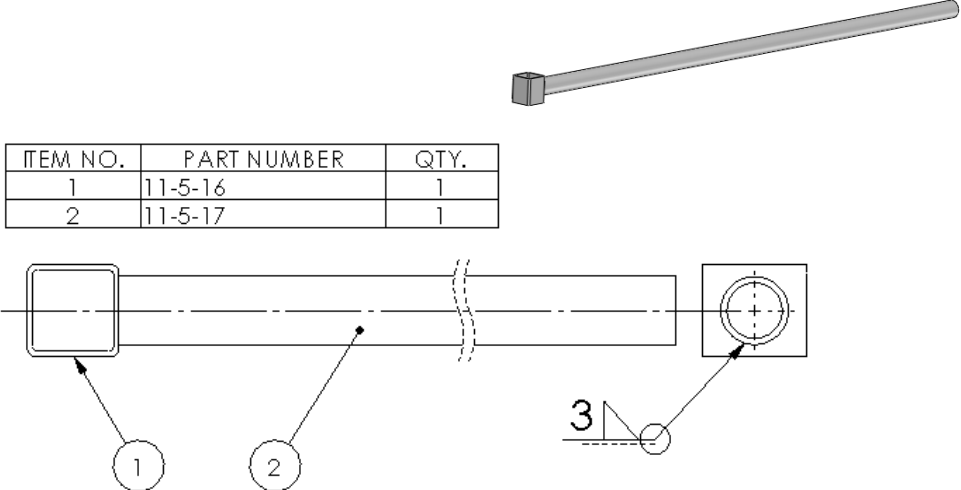
Oefening 11-5-15

Maak de samenstelling. Gebruik onderdelen uit Toolbox zoals in de stuklijst te zien is.

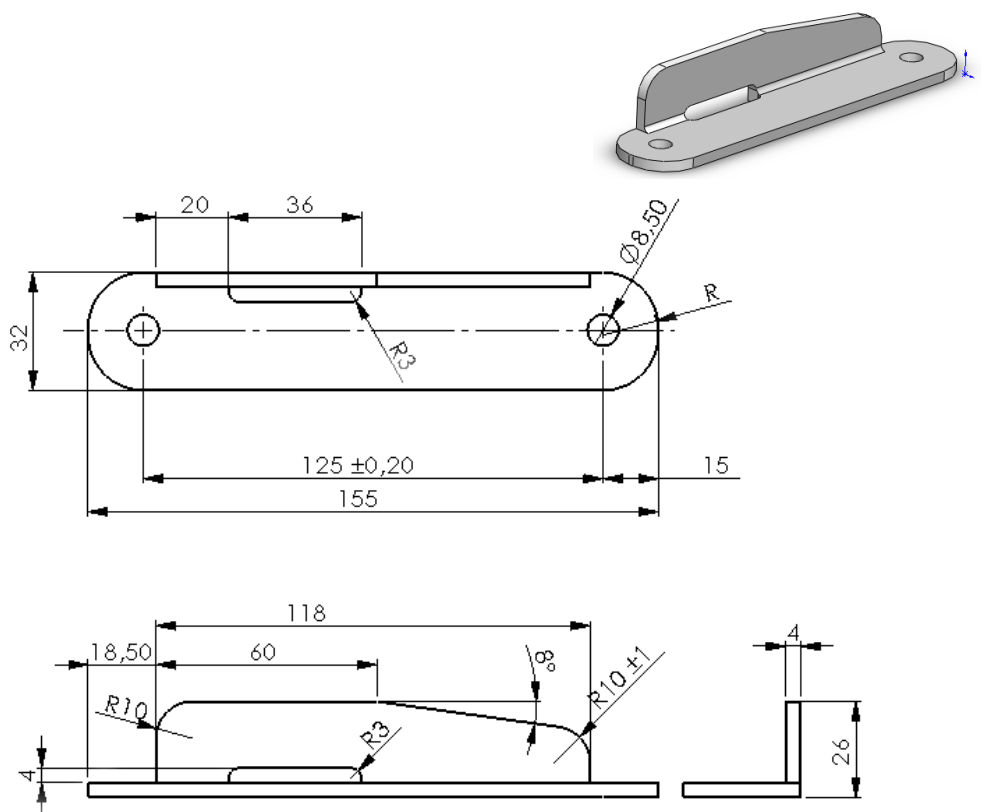


ITEM NO.	PART NUMBER	QTY.
1	11-5-9	1
2	11-5-4	4
3	11-5-10	2
4	11-5-11	2
5	11-5-14	2
6	Washer ISO 7089 - 12	8
7	ISO 4014 - M12 x 50 x 50-N	2
8	Hexagon Flange Nut ISO - 4161 - M12 - N	4

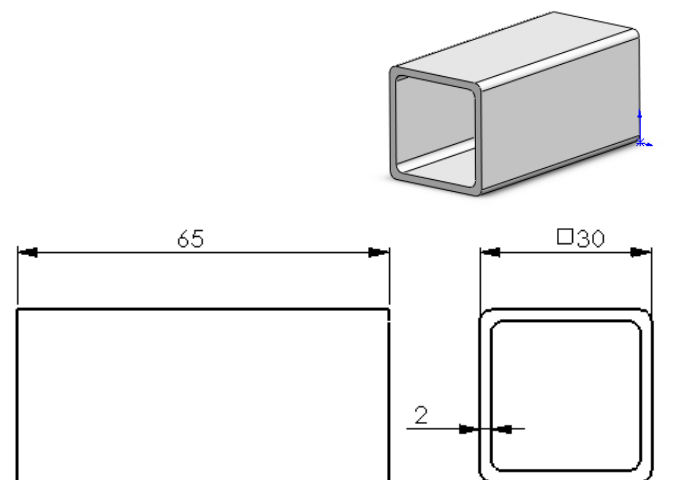


Oefening 11-5-16										
Oefening 11-5-17										
Oefening 11-5-18 Maak de lassamenstelling	 <table border="1" data-bbox="555 1025 1050 1111"> <thead> <tr> <th>ITEM NO.</th><th>PART NUMBER</th><th>QTY.</th></tr> </thead> <tbody> <tr> <td>1</td><td>11-5-16</td><td>1</td></tr> <tr> <td>2</td><td>11-5-17</td><td>1</td></tr> </tbody> </table>	ITEM NO.	PART NUMBER	QTY.	1	11-5-16	1	2	11-5-17	1
ITEM NO.	PART NUMBER	QTY.								
1	11-5-16	1								
2	11-5-17	1								

Oefening 11-5-19

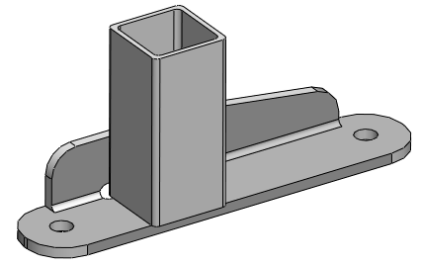


Oefening 11-5-20

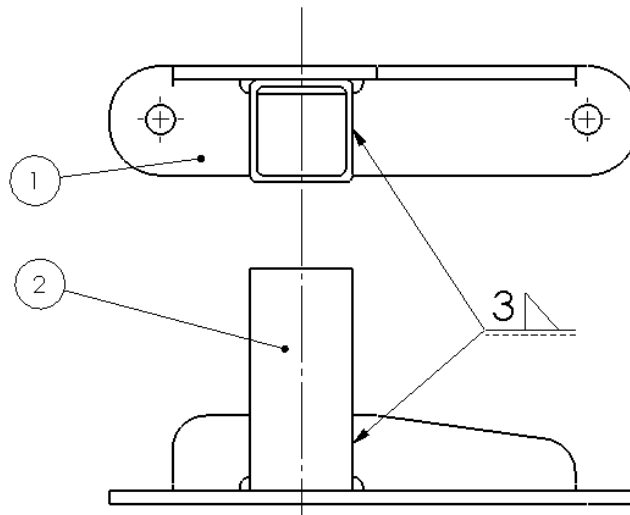
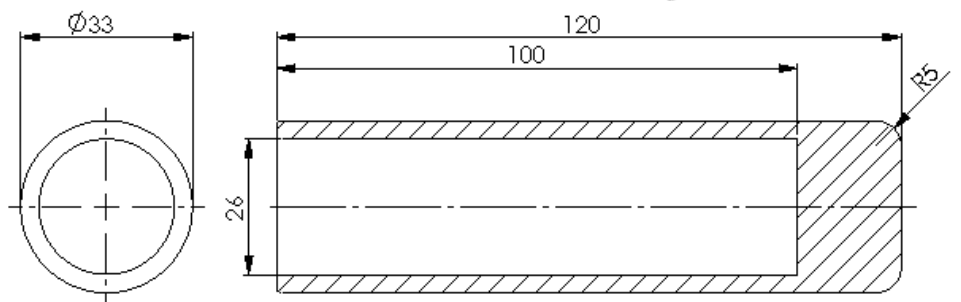
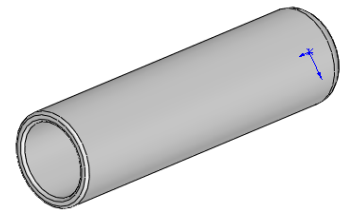


Oefening 11-5-21

Maak de lasseramenstelling.

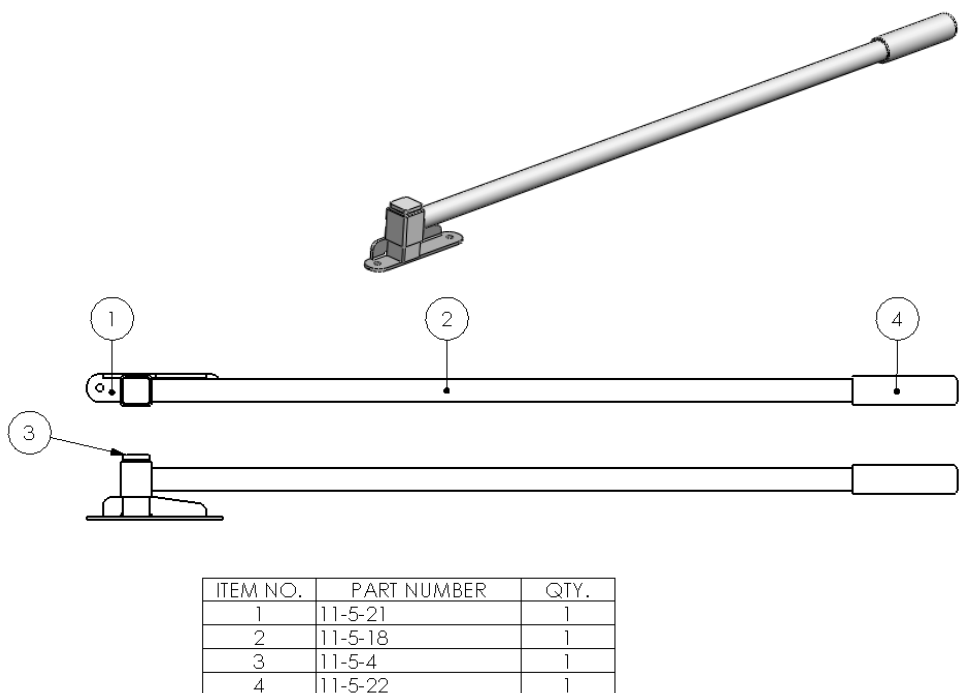
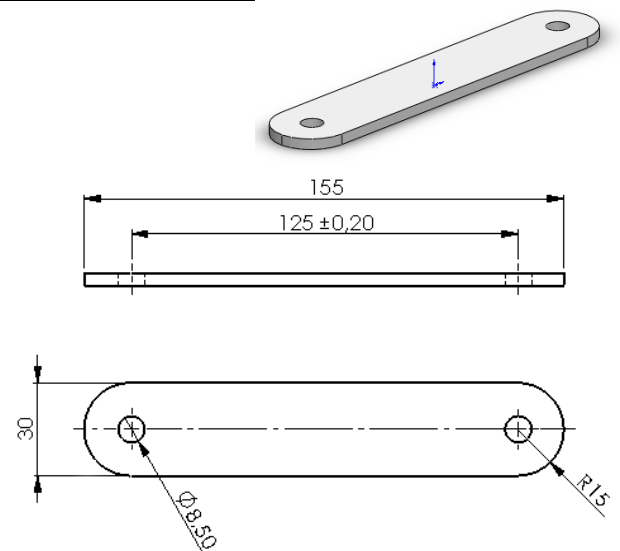


ITEM NO.	PART NUMBER	QTY.
1	11-5-19	1
2	11-5-20	1

**Oefening 11-5-22**

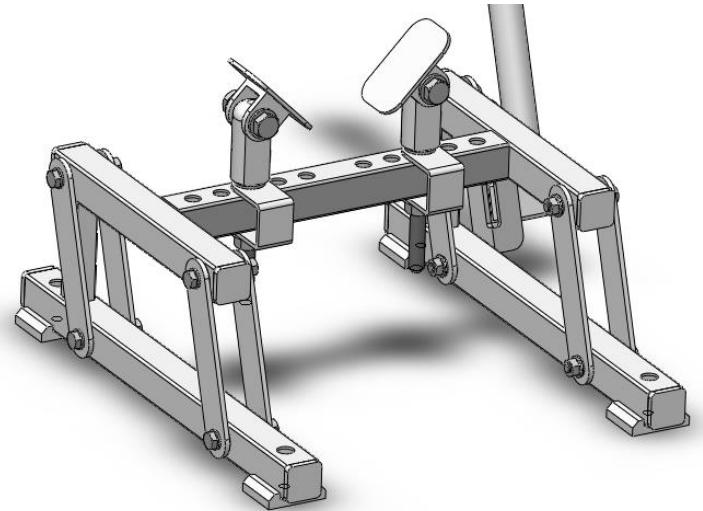
Oefening 11-5-23

Maak de samenstelling.

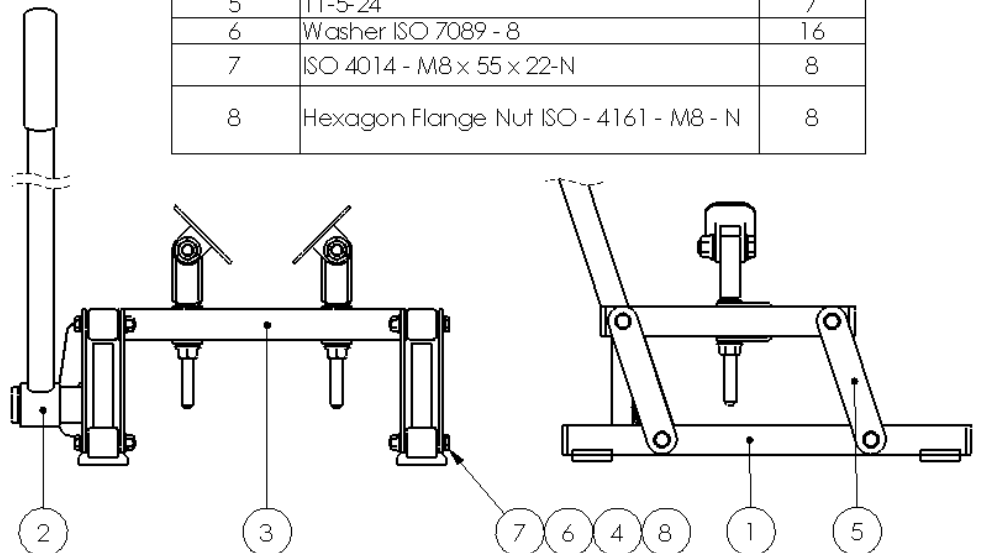
**Oefening 11-5-24**

Oefening 11-5-25

Maak de complete samenstelling. Gebruik onderdelen uit Toolbox zoals in de stuklijst te zien is.



ITEM NO.	PART NUMBER	QTY.
1	11-5-6	2
2	11-5-23	1
3	11-5-15	1
4	Washer ISO 7093 - 8	16
5	11-5-24	7
6	Washer ISO 7089 - 8	16
7	ISO 4014 - M8 x 55 x 22-N	8
8	Hexagon Flange Nut ISO - 4161 - M8 - N	8



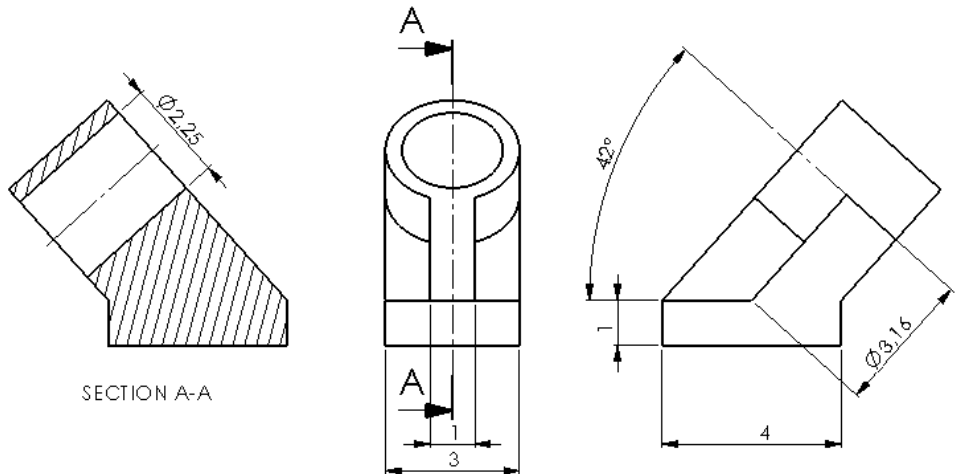
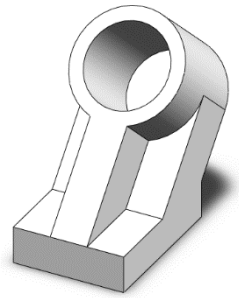
Oefeningen bij Tutorial 12

Oefening 12-1

De maten in deze oefening zijn gegeven in inches.

Het materiaal van dit onderdeel is: 6061 Alloy

Bepaal het gewicht van dit onderdeel.



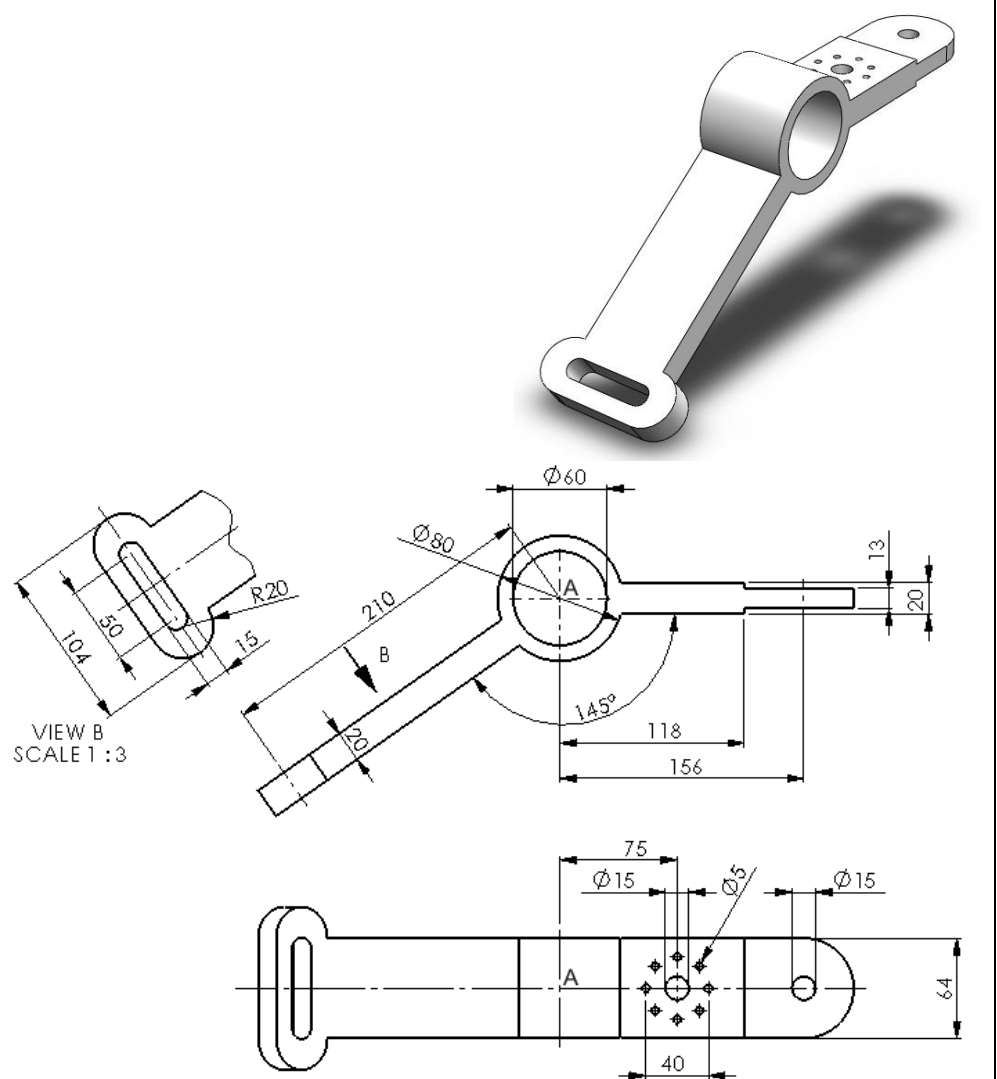
Oefening 12-2

Het materiaal van dit onderdeel is: 6061 Alloy

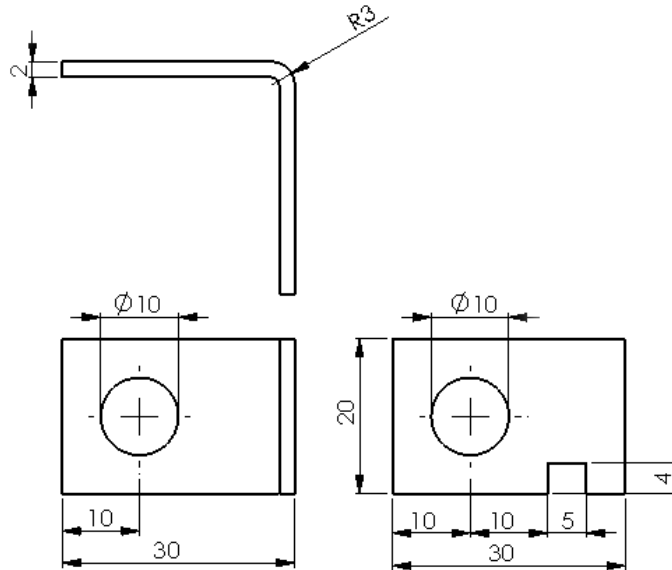
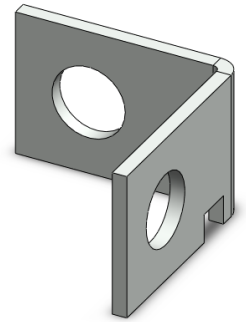
Bepaal het gewicht van dit onderdeel.

De oorsprong (origin) van het model is in de tekening aangegeven met de letter A.

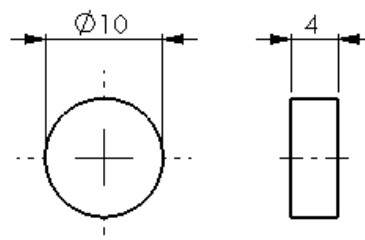
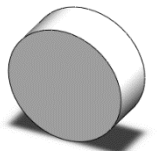
Bepaal de coördinaten van het zwaartepunt.



Oefening 12-3a



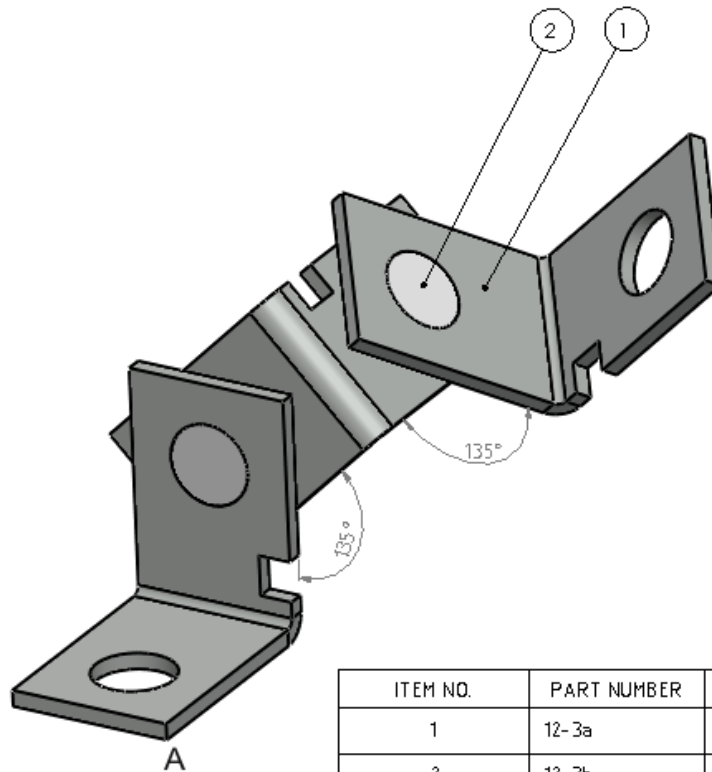
Oefening 12-3b



Oefening 12-3c

Maak een assembly zoals je hiernaast ziet, met de onderdelen uit 11-3a en 11-3b

De oorsprong (origin) ligt op het hoekpunt bij A. Bepaal de coördinaten van het zwaartepunt.



ITEM NO.	PART NUMBER	QTY.
1	12-3a	3
2	12-3b	2

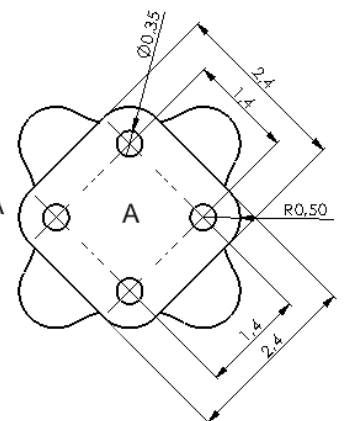
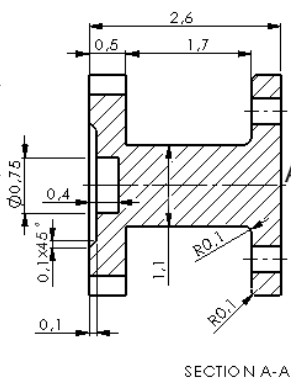
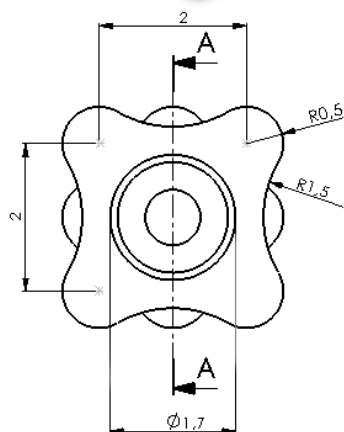
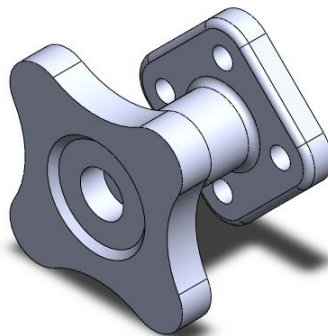
Oefening 12-4

De maten in deze oefening zijn gegeven in inches.

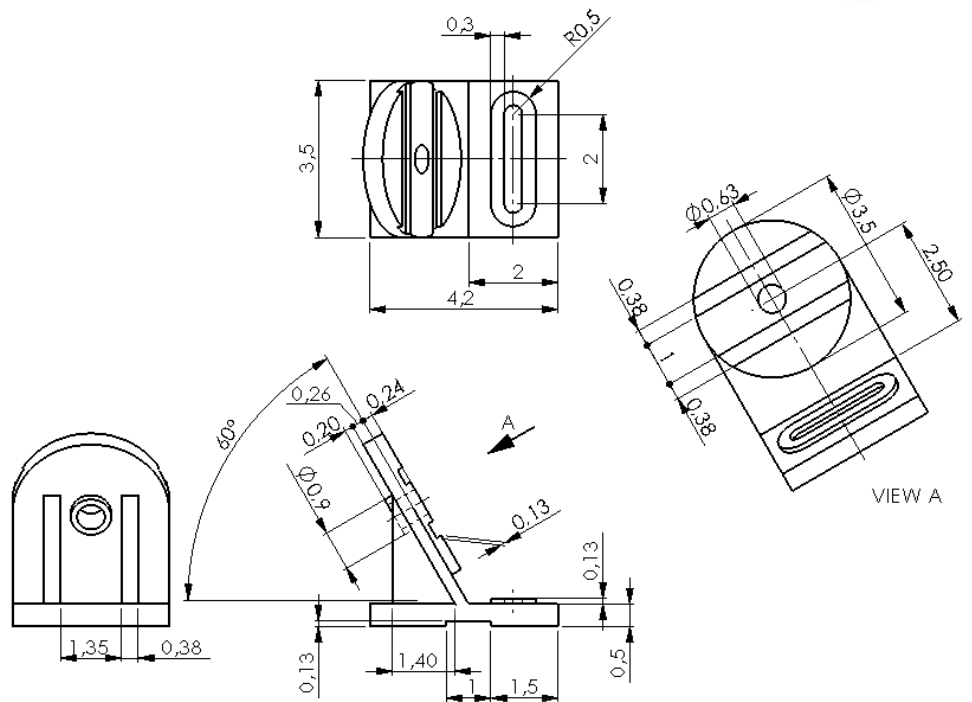
Het materiaal van dit onderdeel is: 1060 Alloy

Bepaal het gewicht van dit onderdeel.

De oorsprong (origin) van het model is in de tekening aangegeven met de letter A. Bepaal de coördinaten van het zwaartepunt.



De maten in deze oefening
zijn gegeven in inches.
Bepaal het volume van dit
onderdeel .



SOLIDWORKS werkt in het onderwijs

3D CAD is niet meer weg te denken uit de technische wereld van vandaag. Of uw vakgebied nu Werktuigbouw, Metaal, Metaal-Electro, Industrieel Product Ontwerpen of Autotechniek is: 3D CAD is hét gereedschap van de ontwerper en engineer vandaag de dag. Van alle 3D-CAD programma's die er op de markt zijn, is SOLIDWORKS het meest gebruikt in de Benelux. Dit is te danken aan een unieke combinatie van eigenschappen: groot gebruiksgemak, brede inzetbaarheid en uitstekende ondersteuning. In de jaarlijkse updates worden steeds weer wensen van gebruikers in de software opgenomen, wat jaarlijks leidt tot uitbreiding van de functionaliteit, maar ook tot optimalisatie van functies die al in het programma aanwezig waren.

Onderwijs

Een groot aantal onderwijsinstellingen, uiteenlopend van Lager Technisch Onderwijs tot de Technische Universiteiten, koos al voor SOLIDWORKS. Waarom?

Voor een **docent** betekent de keuze voor SOLIDWORKS de keuze voor gebruiksvriendelijke software, die leerlingen of studenten snel onder de knie hebben. SOLIDWORKS leent zich daarom bij uitstek voor toepassing in bijvoorbeeld probleemgestuurd onderwijs of in competentiegericht onderwijs. Voor verschillende onderwijsniveaus zijn gratis Nederlandstalige tutorials beschikbaar, zoals een serie tutorials voor lager en middelbaar technisch onderwijs, waarin stap voor stap de basisbeginselen van SOLIDWORKS uiteengezet worden, of de tutorial Geavanceerd Modelleren, waarin juist complexere onderwerpen, zoals het modelleren van complexe dubbelgekromde vlakken aan de orde komt. Alle tutorials zijn Nederlandstalig, en gratis te downloaden van www.SOLIDWORKS.nl Aarzel niet om uw collega docenten of uw studenten attent te maken op alle gratis mogelijkheden die door SOLIDWORKS op deze website geboden worden!

Voor een **leerling of student** is het leren van SOLIDWORKS in de eerste plaats heel erg leuk en uitdagend. Door SOLIDWORKS te gebruiken, wordt techniek veel inzichtelijker en tastbaarder, waardoor het werken aan opdrachten en projecten veel realistischer en leuker wordt. Bovendien weet elke leerling of student dat de kansen op een baan duidelijk groeien wanneer SOLIDWORKS, de meest gebruikte 3D-CAD software in de Benelux, op zijn of haar cv staat. Bijvoorbeeld www.cadjobs.nl zie je een groot aantal vacatures en stageplaatsen waarvoor kennis van SOLIDWORKS vereist is. Dat maakt de motivatie om SOLIDWORKS te leren alleen nog maar groter.

Om het gebruik van SOLIDWORKS nog makkelijker te maken, is er een Student Kit beschikbaar. Gebruikt de opleiding SOLIDWORKS, dan kan elke leerling of student de Student Kit **gratis** downloaden. De Student Kit is een volledige versie van SOLIDWORKS, die alleen voor educatieve doeleinden gebruikt mag worden. De gegevens die je nodig hebt om de Student Kit te downloaden, kun je via de docent verkrijgen. Ook kun je de Student Kit [downloaden](http://www.SOLIDWORKS.nl) via www.SOLIDWORKS.nl. Aarzel niet om uw collega studenten of uw docenten attent te maken op alle gratis mogelijkheden die door SOLIDWORKS op deze website geboden worden!

Voor de **ICT-afdeling** betekent de keuze voor SOLIDWORKS dat investeringen in nieuwe computers soms uitgesteld kunnen worden omdat SOLIDWORKS relatief lage hardware-eisen stelt. De installatie en het beheer van SOLIDWORKS in een netwerkomgeving is zeer eenvoudig, onder meer door het gebruik van netwerkllicenties. En mochten er toch problemen ontstaan, dat is er een gekwalificeerde helpdesk beschikbaar, die u snel weer op weg helpt.

Certificering

Wanneer je SOLIDWORKS voldoende beheerst, kun je ook deelnemen aan het CSWA-examen. CSWA staat voor Certified SOLIDWORKS Associate. Nadat je dit examen met goed gevolg hebt afgelegd, krijg je een certificaat waarmee je eenvoudig kunt aantonen dat je SOLIDWORKS voldoende beheerst. Dat is handig bij het solliciteren naar een baan of een stageplek. Na het doornemen van deze serie tutorials voor lager en middelbaar technisch onderwijs, heb je voldoende kennis van SOLIDWORKS om aan het CSWA-examen deel te nemen.

Tot slot

SOLIDWORKS heeft zich voor lange tijd gecommitteerd aan het onderwijs. Door docenten te ondersteunen waar dat mogelijk is, door lesmateriaal beschikbaar te stellen en jaarlijks aan de nieuwste versie van de software aan te passen, door de Student Kit beschikbaar te stellen. De keuze voor SOLIDWORKS is een keuze voor de toekomst. De toekomst van het onderwijs, dat zich verzekerd weet van brede ondersteuning en de toekomst van leerlingen en studenten, die na hun opleiding de beste kansen willen krijgen.

Contact

Heb je nog vragen over SOLIDWORKS, neem dan contact op met uw reseller, of kijk op <http://www.SOLIDWORKS.nl>

