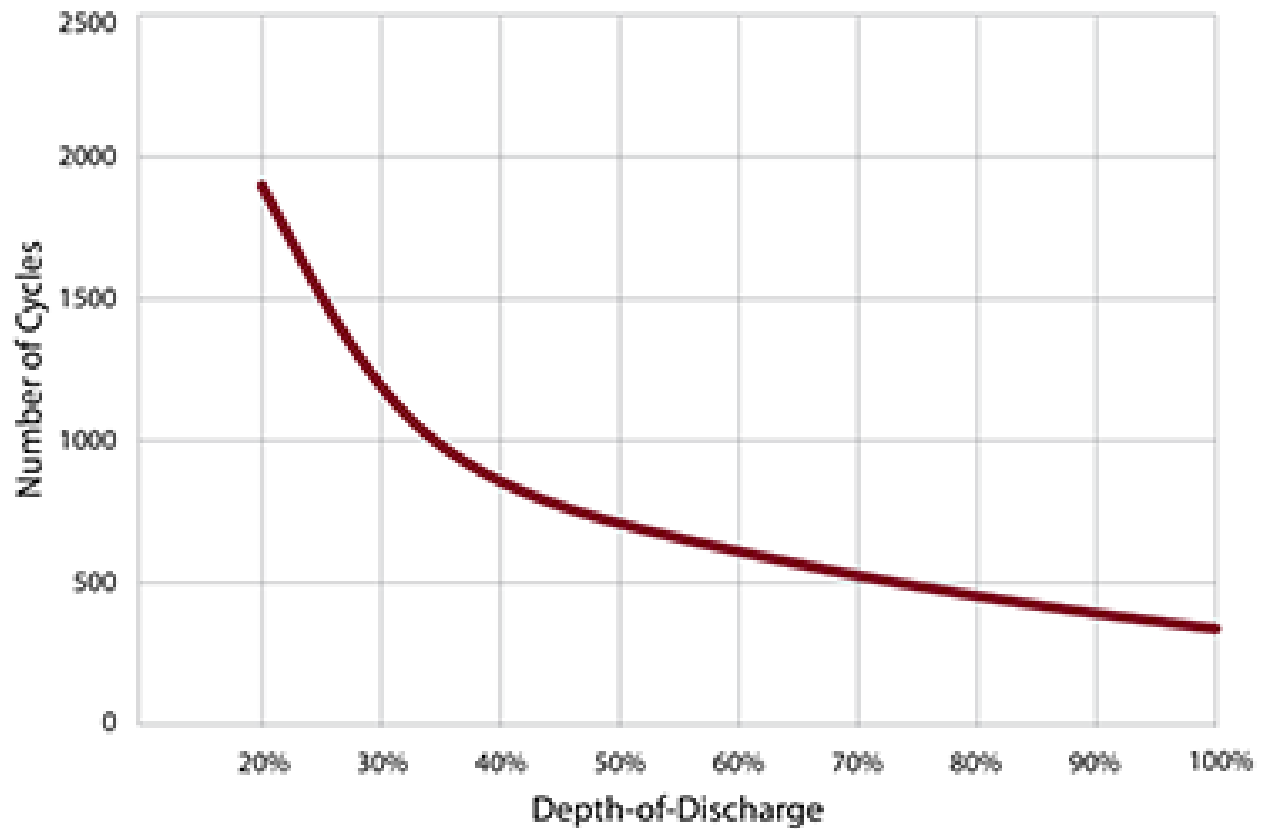


## Bijlage

### 1. Levensduur van een accu bij het aantal laadcycli

## TYPICAL CYCLE LIFE IN A STATIONARY APPLICATION



Een accu die je steeds voor 50% ontlad gaat 750 laadcycli mee. Ontlaad je de accu maar voor 30% (dus 70% blijft in de accu) dan neemt de levensduur toe tot (in dit geval) 1200 laadcycli.

## 2. Meting naar enkelhoek in de scanner

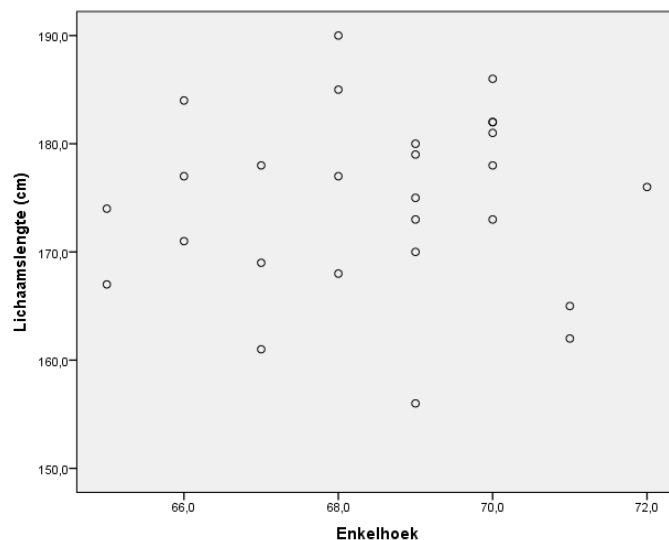
De meting is uitgevoerd onder 27 vrijwillige testpersonen van verschillende leeftijden. Tabel 1 laat per leeftijd het aantal proefpersonen in de testgroep zien. De indeling van de leeftijdsgroepen is gebaseerd op de verdeling van DINED (dit is de indeling waaruit de doelgroep ook is opgebouwd, zie; Doelgroep EXO-L).

| Leeftijd | Aantal |
|----------|--------|
| (-20)    | 1      |
| (20-30)  | 15     |
| (31-60)  | 9      |
| (60+)    | 2      |

Tabel 1. Verdeling van testgroep per leeftijdsgroep.

De enkelhoekuitslagen die werden gevonden varieerde tussen de 65° en de 72° met een gemiddelde enkelhoek van 68,5°. De gemiddelde lichaamslengte van de testgroep is 174,8 cm (min.= 156cm, max.=190cm).

Tegen de verwachting in is er geen correlatie gevonden ( $r=0.037$ ,  $p=0.853$  (niet significant) tussen de lichaamslengte en de enkelhoek in de scanner. Figuur 1 laat zien dat er geen verband is tussen de lichaamslengte en de enkelhoek.



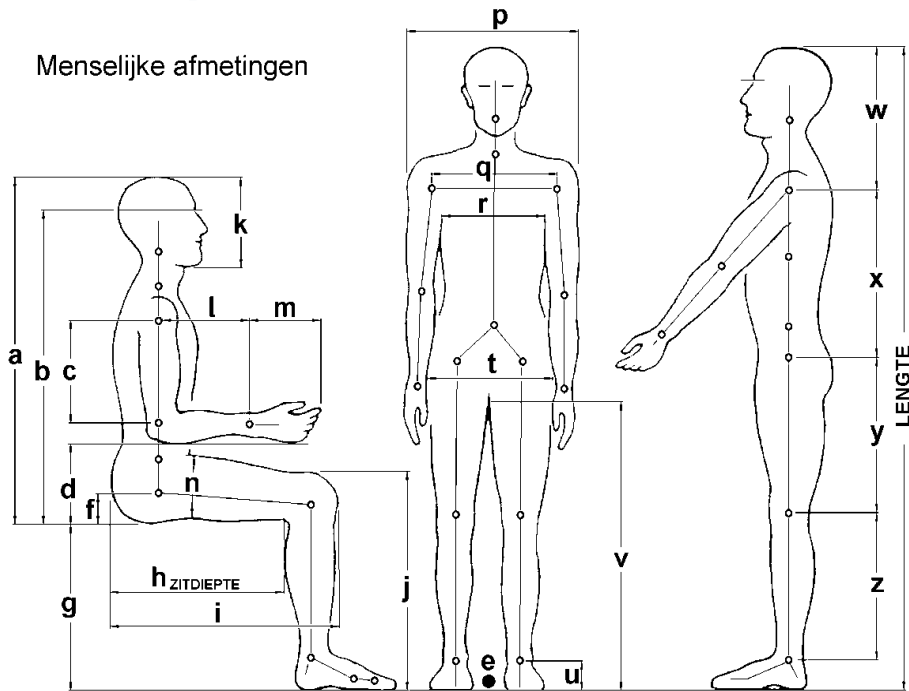
Figuur 1. Geen verband tussen Lichaamslengte en de enkelhoek

Om door te kunnen gaan met de scanner in het ontwerp is er voor gekozen om als enkelhoek het gemiddelde van alle gemeten enkelhoeken te gebruiken namelijk 68,5°.

### 3. Lichaamslengte maten bij P10 en P90 van man, vrouw en gemiddelde man/vrouw.

|                 | measure (P) | Lichaamsl | Zittend knieholte-v | Zitvlak ho | Heupbree |
|-----------------|-------------|-----------|---------------------|------------|----------|
| 12-13 man       | 10          | 1467      | 402                 | 749        | 264      |
|                 | 90          | 1665      | 466                 | 855        | 344      |
| 12-13 vrouw     | 10          | 1460      | 403                 | 753        | 257      |
|                 | 90          | 1666      | 479                 | 847        | 315      |
| 12-13 man-vrouw | 10          | 1464      | 402                 | 751        | 258      |
|                 | 90          | 1665      | 473                 | 851        | 332      |
| 14 vrouw        | 10          | 1561      |                     |            |          |
|                 | 90          | 1733      |                     |            |          |
| 14 man          | 10          | 1578      |                     |            |          |
|                 | 90          | 1786      |                     |            |          |
| 14 man-vrouw    | 10          | 1567      |                     |            |          |
|                 | 90          | 1762      |                     |            |          |
| 20-30 vrouw     | 10          | 1601      | 409                 | 842        | 367      |
|                 | 90          | 1773      | 473                 | 934        | 437      |
| 20-30 man       | 10          | 1745      | 457                 | 907        | 351      |
|                 | 90          | 1951      | 537                 | 1007       | 425      |
| 20-30 man-vrouw | 10          | 1621      | 416                 | 855        | 359      |
|                 | 90          | 1901      | 518                 | 985        | 433      |
| 31-60 vrouw     | 10          | 1579      | 401                 | 825        | 374      |
|                 | 90          | 1725      | 467                 | 905        | 454      |
| 31-60 man       | 10          | 1673      | 440                 | 880        | 364      |
|                 | 90          | 1867      | 522                 | 970        | 430      |
| 31-60 man-vrouw | 10          | 1594      | 409                 | 837        | 368      |
|                 | 90          | 1822      | 503                 | 949        | 444      |
| 60+ vrouw       | 10          | 1522      | 393                 | 788        | 366      |
|                 | 90          | 1688      | 463                 | 878        | 454      |
| 60+ man         | 10          | 1643      | 437                 | 853        | 367      |
|                 | 90          | 1815      | 509                 | 947        | 429      |
| 60+ man-vrouw   | 10          | 1550      | 405                 | 802        | 366      |
|                 | 90          | 1780      | 495                 | 928        | 442      |
| 20-60 vrouw     | 10          | 1582      | 403                 | 828        | 368      |
|                 | 90          | 1754      | 469                 | 926        | 442      |
| 20-60 man       | 10          | 1711      | 450                 | 896        | 358      |
|                 | 90          | 1923      | 532                 | 994        | 430      |
| 20-60 man-vrouw | 10          | 1607      | 412                 | 846        | 362      |
|                 | 90          | 1879      | 514                 | 976        | 436      |

#### 4. Antropometrische Data (Broeren, 2011)



|        | E: kg gewicht |     |     |     |      |     |     |     |     |     |     |     |     |     |     |     | T1 bij zitten |     |     |    | T2 bij staan |     |     |     |     |
|--------|---------------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-----|-----|----|--------------|-----|-----|-----|-----|
| Lengte | A             | B   | C   | D   | E    | F   | G   | H   | I   | J   | K   | L   | M   | N   | P   | Q   | R             | T1  | T2  | U  | V            | W   | X   | Y   | Z   |
| 1092   | 617           | 518 | 175 | 165 | 19,1 | 58  | 267 | 272 | 366 | 318 | 196 | 147 | 122 | 91  | 251 | 206 | 178           | 211 | 198 | 58 | 465          | 257 | 302 | 241 | 234 |
| 1118   | 627           | 528 | 183 | 165 | 20,0 | 58  | 274 | 279 | 376 | 325 | 198 | 152 | 124 | 94  | 254 | 208 | 180           | 213 | 201 | 61 | 478          | 262 | 307 | 249 | 239 |
| 1143   | 640           | 541 | 188 | 168 | 20,9 | 61  | 279 | 287 | 384 | 335 | 201 | 157 | 127 | 97  | 257 | 211 | 180           | 218 | 206 | 61 | 493          | 267 | 312 | 257 | 246 |
| 1168   | 650           | 551 | 193 | 168 | 21,3 | 61  | 287 | 295 | 394 | 345 | 201 | 160 | 130 | 99  | 262 | 213 | 183           | 221 | 208 | 64 | 508          | 272 | 318 | 262 | 254 |
| 1194   | 660           | 559 | 198 | 168 | 22,2 | 61  | 292 | 302 | 404 | 356 | 203 | 165 | 132 | 102 | 267 | 218 | 185           | 226 | 213 | 64 | 526          | 277 | 323 | 269 | 262 |
| 1219   | 671           | 569 | 206 | 168 | 23,1 | 61  | 297 | 312 | 414 | 363 | 203 | 170 | 135 | 104 | 274 | 221 | 188           | 229 | 216 | 66 | 538          | 279 | 330 | 277 | 267 |
| 1245   | 681           | 579 | 211 | 168 | 24,0 | 61  | 305 | 320 | 424 | 371 | 206 | 175 | 140 | 107 | 282 | 226 | 191           | 234 | 221 | 66 | 554          | 284 | 335 | 284 | 274 |
| 1270   | 691           | 589 | 216 | 168 | 25,4 | 61  | 312 | 328 | 432 | 381 | 206 | 180 | 142 | 109 | 290 | 234 | 193           | 239 | 224 | 69 | 569          | 287 | 343 | 290 | 282 |
| 1295   | 701           | 598 | 218 | 170 | 26,8 | 64  | 318 | 335 | 442 | 391 | 206 | 188 | 145 | 112 | 297 | 239 | 196           | 244 | 229 | 69 | 584          | 290 | 348 | 300 | 290 |
| 1321   | 714           | 612 | 224 | 170 | 28,1 | 64  | 325 | 343 | 452 | 399 | 206 | 193 | 147 | 114 | 307 | 244 | 201           | 249 | 234 | 69 | 599          | 295 | 356 | 305 | 297 |
| 1346   | 724           | 622 | 226 | 170 | 29,5 | 64  | 330 | 353 | 460 | 409 | 208 | 198 | 147 | 117 | 315 | 249 | 203           | 254 | 239 | 71 | 612          | 300 | 361 | 312 | 302 |
| 1372   | 732           | 630 | 229 | 173 | 30,8 | 64  | 335 | 361 | 470 | 419 | 208 | 201 | 150 | 119 | 325 | 254 | 206           | 259 | 244 | 71 | 627          | 302 | 366 | 320 | 312 |
| 1397   | 744           | 643 | 234 | 175 | 33,1 | 64  | 340 | 368 | 480 | 427 | 211 | 206 | 150 | 122 | 333 | 259 | 211           | 264 | 249 | 74 | 643          | 307 | 373 | 325 | 318 |
| 1422   | 754           | 653 | 239 | 178 | 34,5 | 64  | 345 | 376 | 488 | 437 | 211 | 208 | 152 | 124 | 340 | 267 | 216           | 269 | 254 | 74 | 653          | 312 | 378 | 333 | 325 |
| 1448   | 765           | 663 | 241 | 80  | 36,7 | 64  | 353 | 386 | 498 | 447 | 211 | 213 | 155 | 127 | 351 | 272 | 218           | 274 | 259 | 76 | 665          | 315 | 386 | 400 | 330 |
| 1473   | 775           | 673 | 246 | 183 | 38,1 | 64  | 361 | 394 | 505 | 455 | 213 | 216 | 157 | 130 | 361 | 279 | 224           | 279 | 264 | 76 | 681          | 320 | 391 | 348 | 338 |
| 1499   | 787           | 686 | 249 | 188 | 39,9 | 64  | 366 | 401 | 516 | 465 | 213 | 218 | 160 | 132 | 368 | 287 | 229           | 284 | 269 | 76 | 696          | 325 | 399 | 353 | 345 |
| 1524   | 798           | 696 | 251 | 91  | 42,1 | 64  | 373 | 409 | 523 | 470 | 213 | 221 | 163 | 135 | 376 | 292 | 234           | 290 | 274 | 79 | 709          | 330 | 404 | 361 | 351 |
| 1544   | 808           | 706 | 257 | 193 | 62,6 | 66  | 378 | 417 | 533 | 480 | 213 | 226 | 168 | 137 | 386 | 300 | 239           | 297 | 282 | 79 | 721          | 333 | 409 | 371 | 358 |
| 1575   | 818           | 716 | 259 | 198 | 65,8 | 66  | 386 | 424 | 541 | 488 | 213 | 229 | 170 | 140 | 396 | 305 | 244           | 302 | 287 | 79 | 734          | 338 | 414 | 378 | 366 |
| 1600   | 831           | 729 | 262 | 203 | 67,1 | 66  | 391 | 432 | 549 | 498 | 216 | 231 | 173 | 142 | 401 | 312 | 251           | 310 | 292 | 79 | 747          | 343 | 422 | 384 | 373 |
| 1626   | 843           | 742 | 267 | 206 | 69,4 | 71  | 399 | 439 | 559 | 508 | 216 | 234 | 175 | 147 | 411 | 318 | 257           | 318 | 300 | 81 | 757          | 345 | 427 | 391 | 381 |
| 1651   | 859           | 754 | 269 | 211 | 70,8 | 76  | 404 | 450 | 566 | 516 | 218 | 239 | 178 | 152 | 419 | 323 | 264           | 323 | 305 | 81 | 770          | 351 | 432 | 399 | 389 |
| 1676   | 871           | 767 | 274 | 216 | 72,6 | 79  | 411 | 460 | 574 | 526 | 218 | 244 | 180 | 157 | 427 | 330 | 272           | 330 | 312 | 84 | 782          | 356 | 437 | 406 | 394 |
| 1702   | 884           | 777 | 277 | 218 | 74,4 | 81  | 419 | 467 | 582 | 533 | 218 | 246 | 183 | 160 | 437 | 335 | 277           | 338 | 320 | 86 | 798          | 358 | 445 | 411 | 401 |
| 1727   | 897           | 787 | 279 | 224 | 76,2 | 81  | 427 | 472 | 589 | 544 | 221 | 251 | 188 | 165 | 445 | 345 | 284           | 345 | 328 | 86 | 813          | 363 | 452 | 419 | 406 |
| 1753   | 912           | 800 | 282 | 229 | 78,5 | 86  | 432 | 480 | 597 | 551 | 221 | 254 | 191 | 170 | 452 | 351 | 292           | 356 | 335 | 89 | 828          | 368 | 457 | 424 | 414 |
| 1778   | 922           | 810 | 287 | 231 | 80,3 | 86  | 437 | 488 | 607 | 561 | 224 | 257 | 193 | 175 | 462 | 356 | 300           | 366 | 343 | 89 | 841          | 371 | 465 | 432 | 422 |
| 1803   | 935           | 820 | 292 | 234 | 81,6 | 89  | 445 | 493 | 617 | 569 | 226 | 259 | 198 | 178 | 470 | 363 | 310           | 376 | 351 | 91 | 856          | 376 | 470 | 437 | 429 |
| 1829   | 950           | 833 | 295 | 236 | 83,5 | 94  | 452 | 500 | 630 | 579 | 229 | 264 | 203 | 180 | 478 | 371 | 318           | 384 | 361 | 91 | 869          | 381 | 475 | 445 | 437 |
| 1854   | 960           | 843 | 300 | 239 | 85,3 | 97  | 462 | 505 | 643 | 589 | 231 | 267 | 206 | 180 | 485 | 376 | 325           | 394 | 371 | 94 | 881          | 384 | 480 | 452 | 445 |
| 1880   | 973           | 853 | 302 | 244 | 87,1 | 97  | 470 | 511 | 653 | 597 | 236 | 269 | 211 | 180 | 493 | 384 | 333           | 401 | 378 | 94 | 897          | 389 | 488 | 460 | 450 |
| 1905   | 986           | 864 | 307 | 246 | 88,9 | 97  | 475 | 518 | 665 | 605 | 239 | 272 | 213 | 183 | 503 | 389 | 343           | 411 | 389 | 94 | 912          | 394 | 495 | 465 | 457 |
| 1930   | 998           | 876 | 312 | 249 | 90,7 | 102 | 480 | 523 | 676 | 615 | 244 | 277 | 218 | 183 | 513 | 394 | 351           | 422 | 399 | 97 | 925          | 396 | 500 | 472 | 465 |
| 1956   | 1011          | 886 | 315 | 251 | 92,5 | 104 | 488 | 528 | 686 | 622 | 249 | 282 | 224 | 185 | 521 | 401 | 358           | 432 | 406 | 97 | 937          | 401 | 505 | 480 | 472 |
| 1981   | 1024          | 897 | 318 | 254 | 94,3 | 104 | 495 | 533 | 693 | 630 | 257 | 284 | 229 | 188 | 526 | 409 | 366           | 442 | 417 | 99 | 953          | 406 | 513 | 485 | 478 |

5. Instappen in de auto.(pose 2 t/m 6)



Pose 2

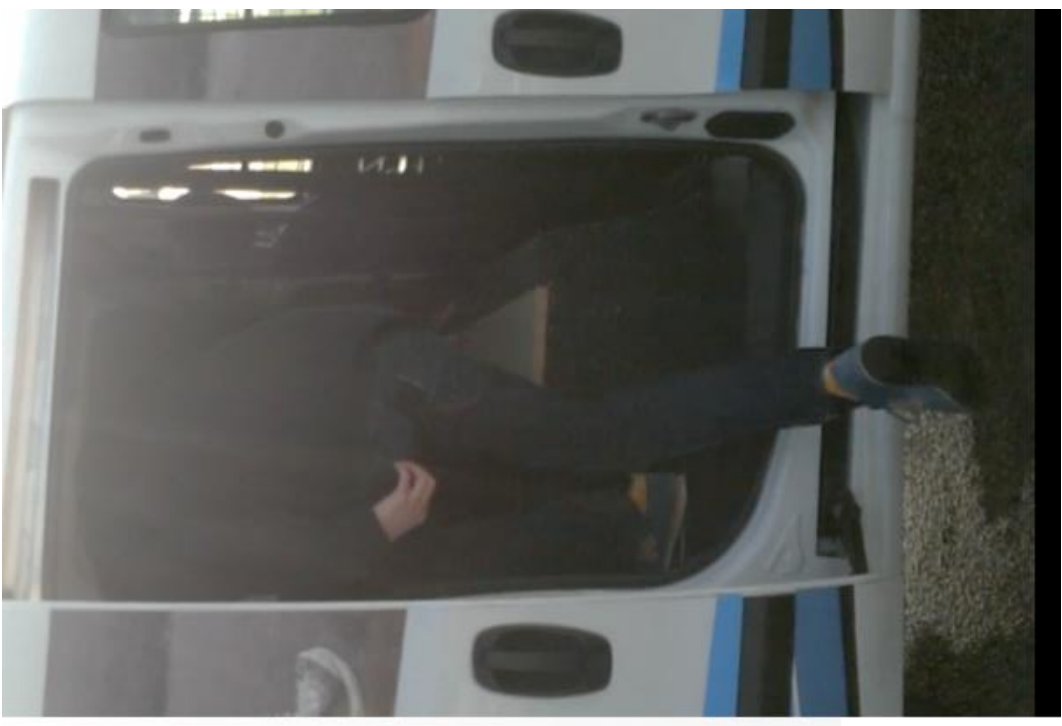


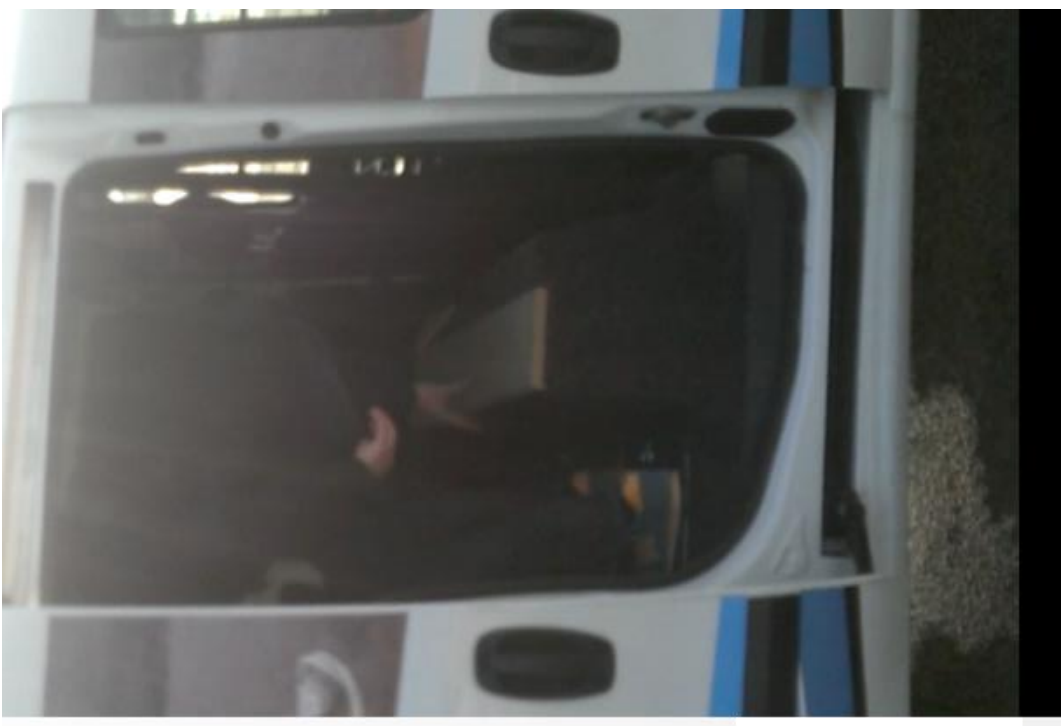
Pose 3





Pose 4





Pose 5





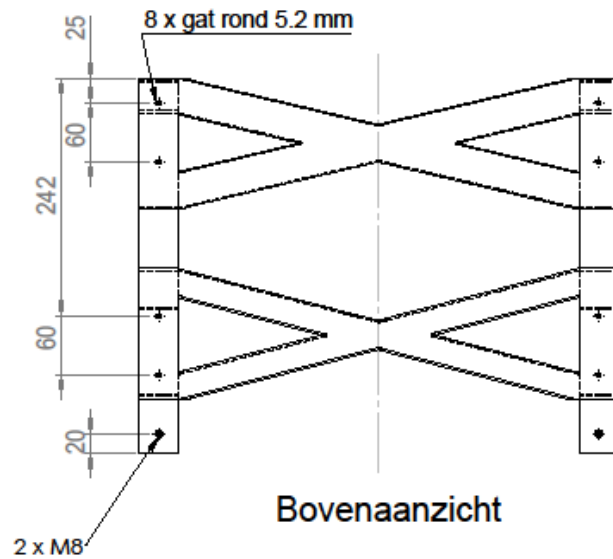
Pose 6

## 6 Lineaire looprail geleider en een loopwagen

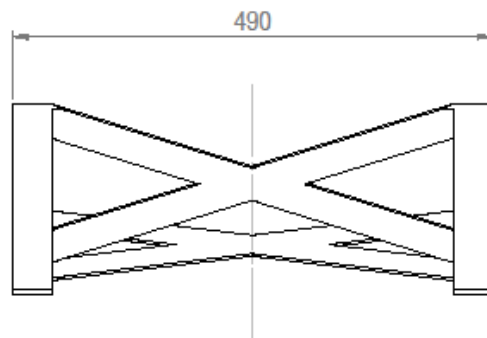


Links een aluminium looprail geleider en recht een loopwagen.

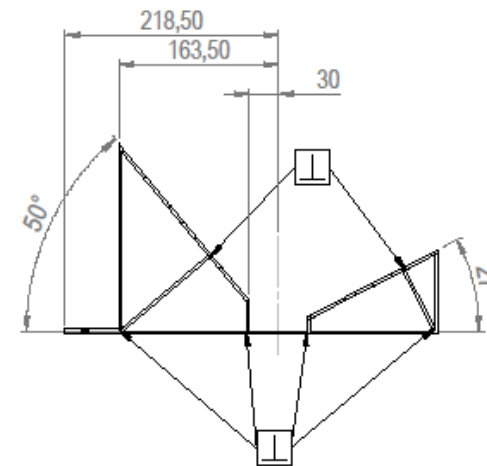
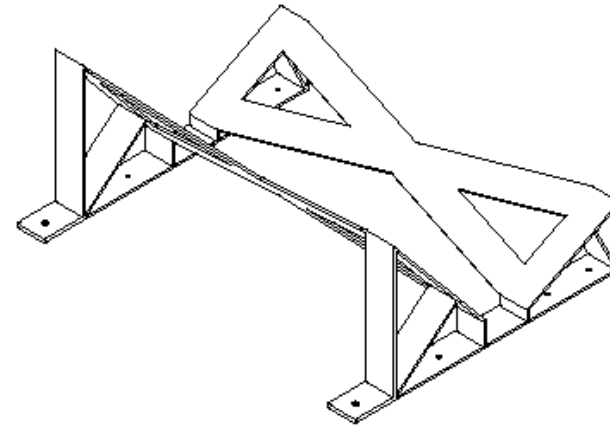
## 7. Scanner frame



Bovenaanzicht

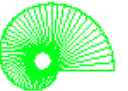


Vooraanzicht

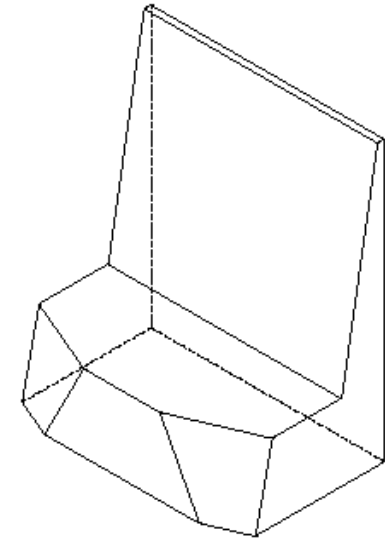
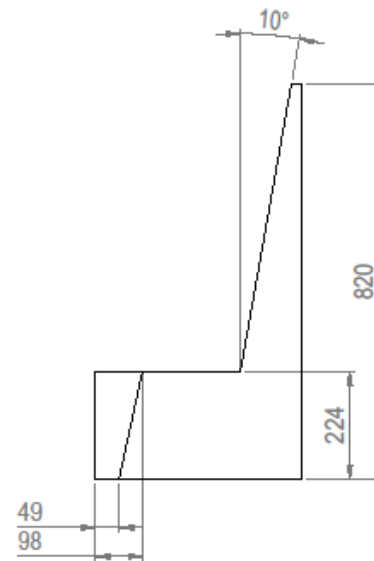
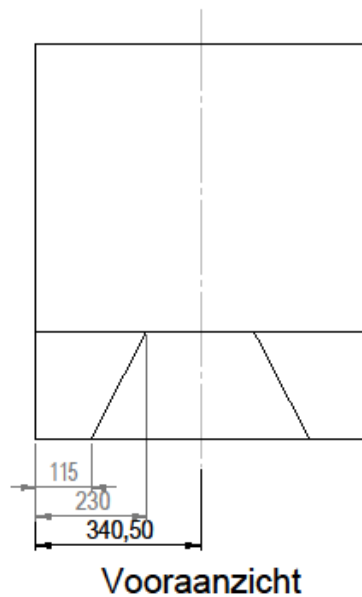
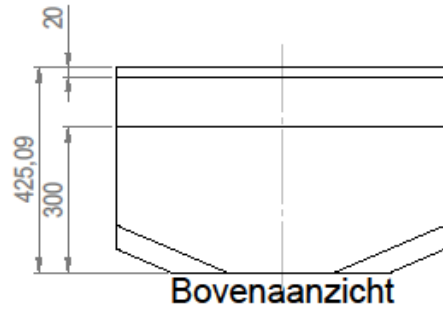


Zijaanzicht

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|---------------------------------------------------------------------------------------|-------------------------|-----------------------------|
| Amerikaanse projectie.                                                                | Schaal 1:10             | Naam: Mario Beekman         |
|  | Maateenheid : mm        | ID-Code:                    |
|                                                                                       | Datum : 10-6-2016       | Opmerking:                  |
|  | HAAGSE HOGESCHOOL       | Opdracht/project:           |
| BewegingsTechnologie                                                                  |                         | Zit-scan-optelling          |
|                                                                                       |                         | Tek.nr.                     |
|                                                                                       |                         | Bestand: Scanner frame Tech |
|                                                                                       | Benaming: Scanner frame | A4                          |

## 9. Scanner stoel



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| Amerikaanse projectie.                                                                                        | Schaal 1:10             | Naam: Mario Beekman          |  |
|                                                                                                               | Maateenheid : mm        | ID-Code:                     |  |
| <br>BewegingsTechnologie | Datum : 10-6-2016       | Opmerking:                   |  |
|                                                                                                               | Opdracht/project:       | Tek.nr.                      |  |
|                                                                                                               | Zif-scan-optelling      | Bestand: Scanner stoeltechni |  |
|                                                                                                               | Benaming: Scanner stoel | A4                           |  |

## 8.SolidWorks rapport materiaal eigenschappen STAAL

| SolidWorks rapport materiaal eigenschappen STAAL                                                                                                                                                                                                                          |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Raport gewicht "scanner houder" bij gebruik van staal met een soortelijk gewicht 7800 kg/m <sup>3</sup> .                                                                                                                                                                 |  |  |
| Mass properties of Scanner houder<br>Configuration: Default<br>Coordinate system: -- default --                                                                                                                                                                           |  |  |
| Density = 0.01 kilograms per cubic centimeter                                                                                                                                                                                                                             |  |  |
| Mass = 3.86 kilograms                                                                                                                                                                                                                                                     |  |  |
| Volume = 494.36 cubic centimeters                                                                                                                                                                                                                                         |  |  |
| Surface area = 0.35 square meters                                                                                                                                                                                                                                         |  |  |
| Center of mass: ( meters )<br>X = 0.25<br>Y = 0.06<br>Z = 0.02                                                                                                                                                                                                            |  |  |
| Principal axes of inertia and principal moments of inertia: ( kilograms * square meters )<br>Taken at the center of mass.<br>Ix = ( 1.00, 0.00, 0.00)      Px = 0.06<br>Iy = ( 0.00, -0.19, -0.98)      Py = 0.15<br>Iz = ( 0.00, 0.98, -0.19)      Pz = 0.20             |  |  |
| Moments of inertia: ( kilograms * square meters )<br>Taken at the center of mass and aligned with the output coordinate system.<br>Lxx = 0.06      Lxy = 0.00      Lxz = 0.00<br>Lyx = 0.00      Lyy = 0.19      Lyz = 0.01<br>Lzx = 0.00      Lzy = 0.01      Lzz = 0.15 |  |  |
| Moments of inertia: ( kilograms * square meters )<br>Taken at the output coordinate system.<br>Ixx = 0.08      Ixy = 0.06      Ixz = 0.02<br>Iyx = 0.06      Iyy = 0.43      Iyz = 0.01<br>Izx = 0.02      Izy = 0.01      Izz = 0.40                                     |  |  |