

Sensoren in ontwerpfase

Wim Ven

Ergonomiecongres 24-10-2023



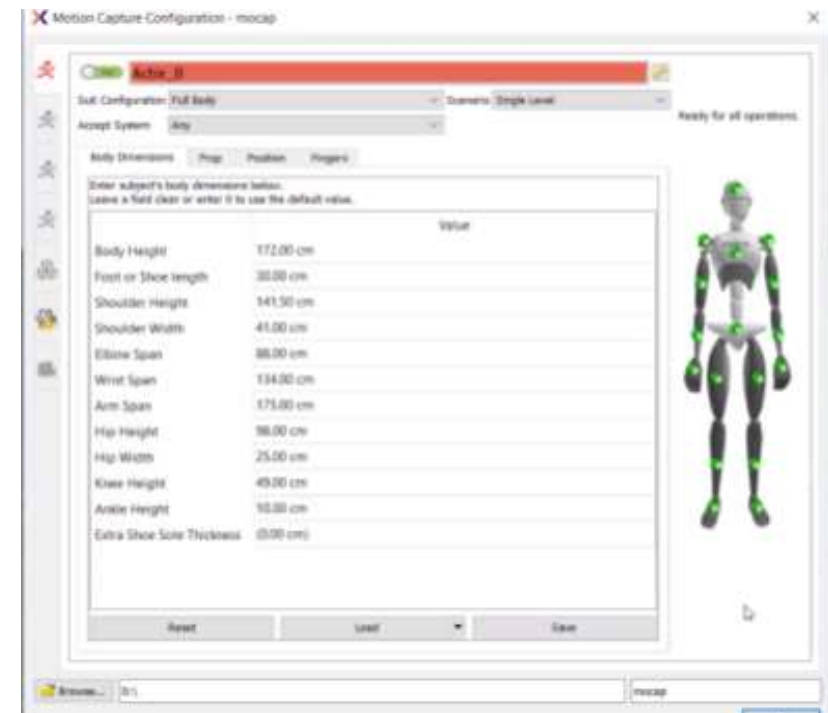
3D motion capture

Wat willen/kunnen we meten?

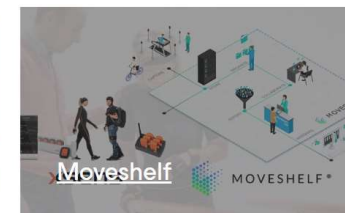
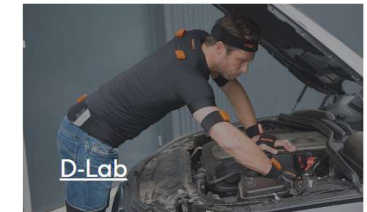
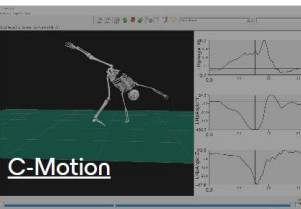
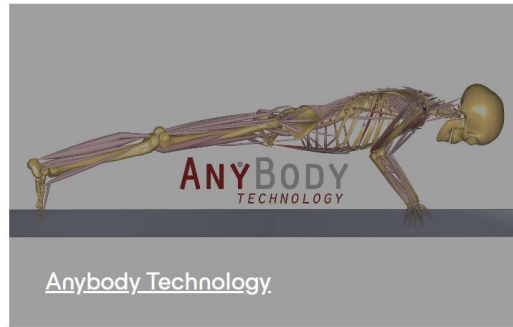
- Sensoren
- camera's
- AI

Hier gebruikt: Xsens

- Gewrichtshoeken
- snelheid van de beweging
- totale duur buiten grenzen

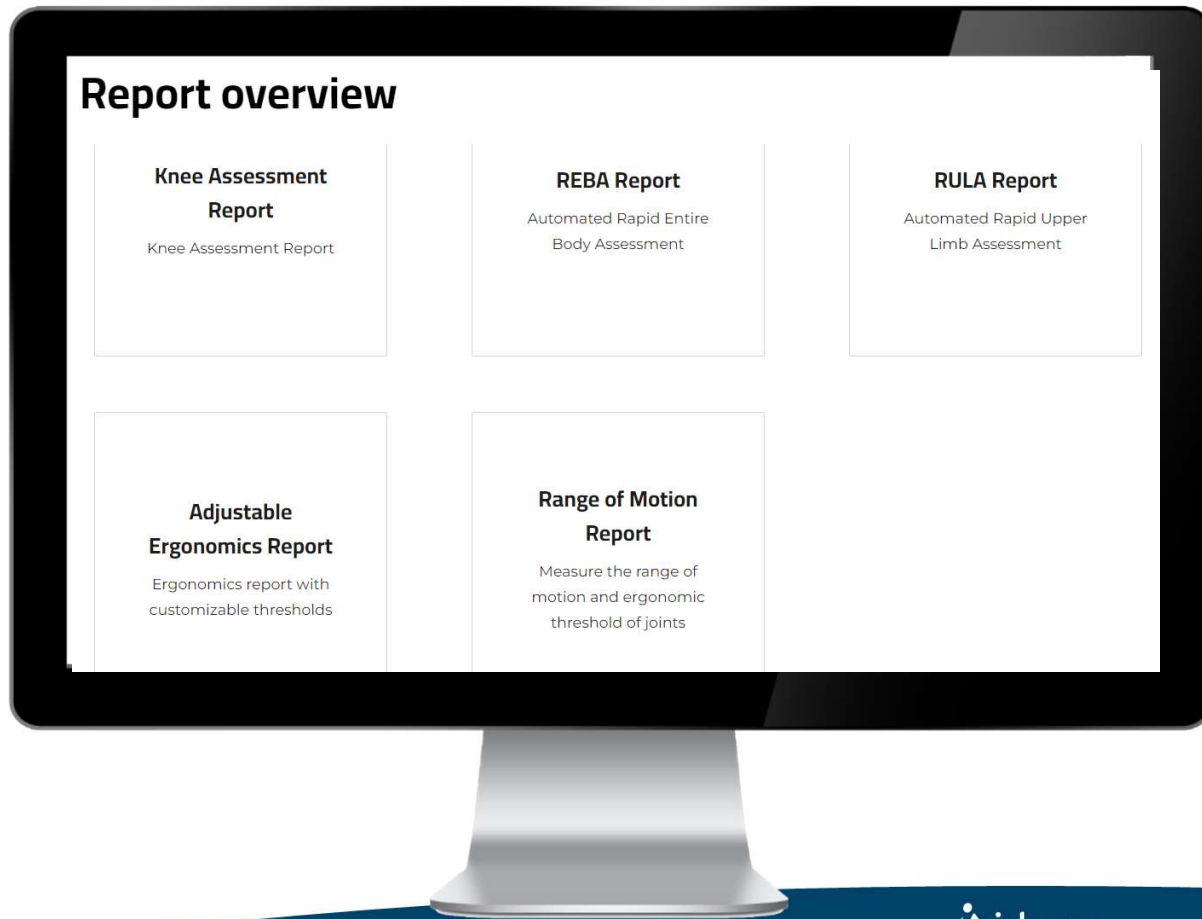


Software voor analyse van MVN bestanden



Xsens motion cloud

Movella



Objectieve analyse
Focus Houding
Gewicht manueel toe te voegen
Visualisatie

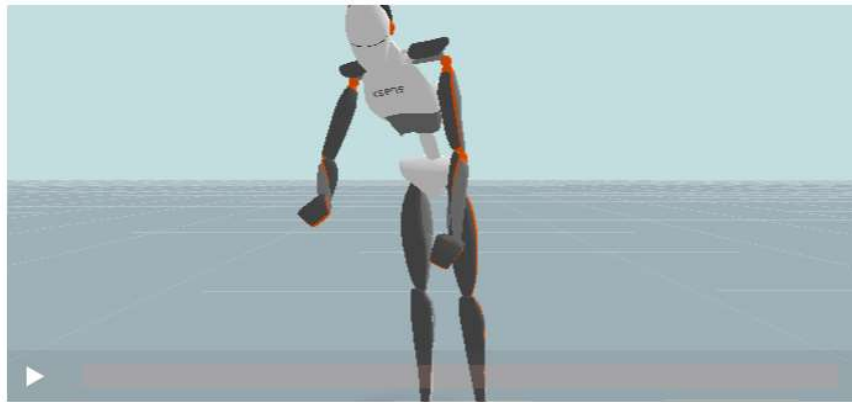
Taak: Premontage product X

Deeltaken

- Part A nemen (rechter arm)
- Part B nemen (linker arm)
- Part A en part B monteren tot product X
- Product X in een doos leggen en tussenlaag plaatsen
- Volle doos op pallet plaatsen

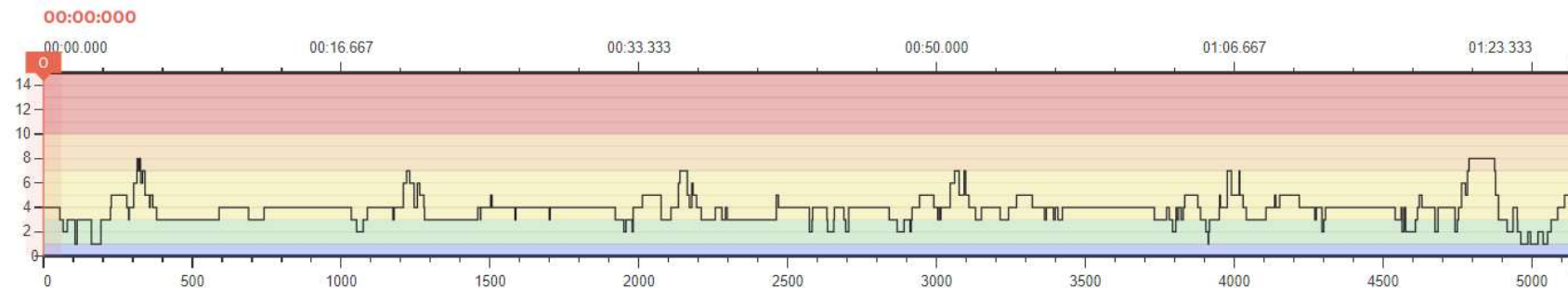
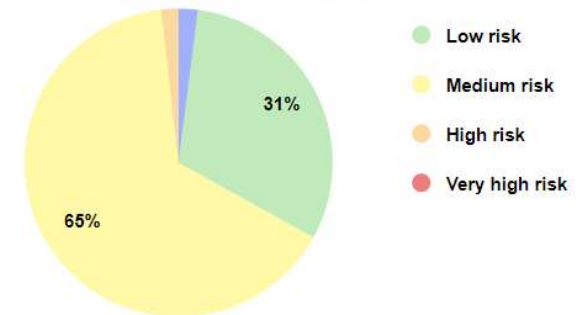
REBA resultaat eerste meting

REBA outcome



Edit report

Export



REBA resultaat eerste meting

Score C

Score A: 2
Score B: 5
Score C: 4

Activity score

1 or more body parts are held for longer than 1 minute (static) +1
Repeated small range actions (more than 4x per minute) +1
Action causes rapid large range changes in postures or unstable base +1

REBA score

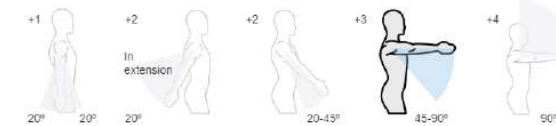
Table C Score: 4 + Activity Score: 0 = REBA Score: 4

1 Negligible risk
2-3 Low risk, change may be needed
4-7 Medium risk, further investigation, change soon
8-10 High risk, investigate and implement change
11+ Very high risk, implement change

Score A	Score B											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	8	8	9	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

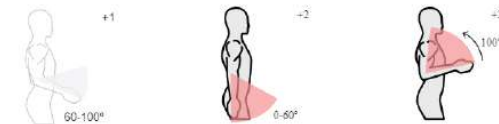
Table C

Upper Arm Position

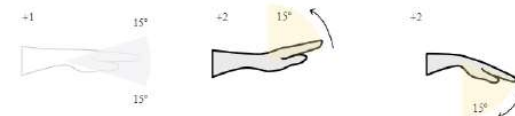


If shoulder is raised +1
If upper arm is abducted +1
If arm is supported or person is leaning -1

Lower Arm Position



Wrist position



If wrist is bent from midline or twisted +1

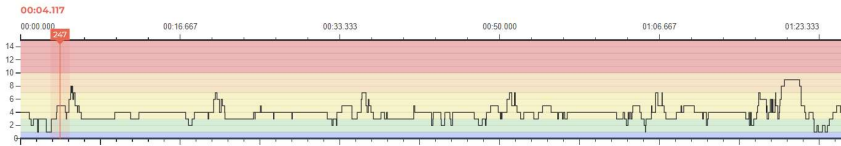
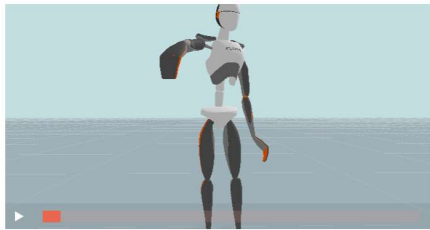
Table B		Lower Arm					
		1			2		
		Wrist	1	2	3	1	2
Upper arm score	1	1	2	2	1	2	3
	2	1	2	3	2	3	4
	3	3	4	5	4	5	5
	4	4	5	5	5	6	7
	5	6	7	8	7	8	8
	6	7	8	8	8	9	9

Table B

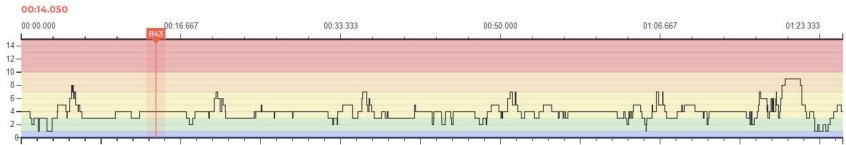
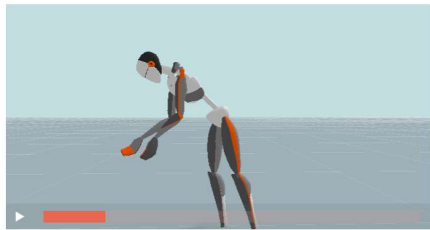
Interpretatie van de hoogste en breedste pieken

REBA

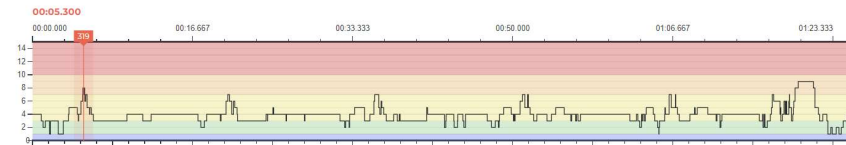
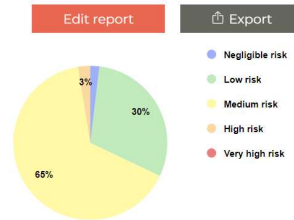
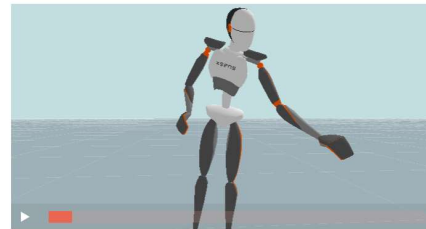
REBA outcome



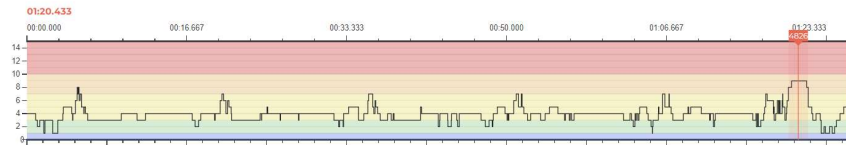
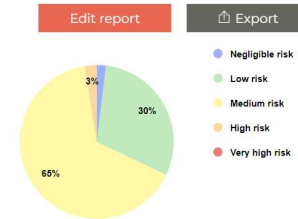
REBA outcome



REBA outcome

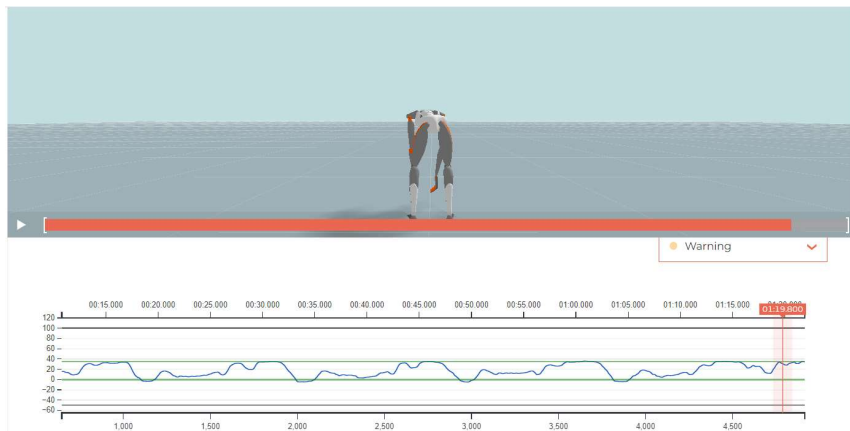
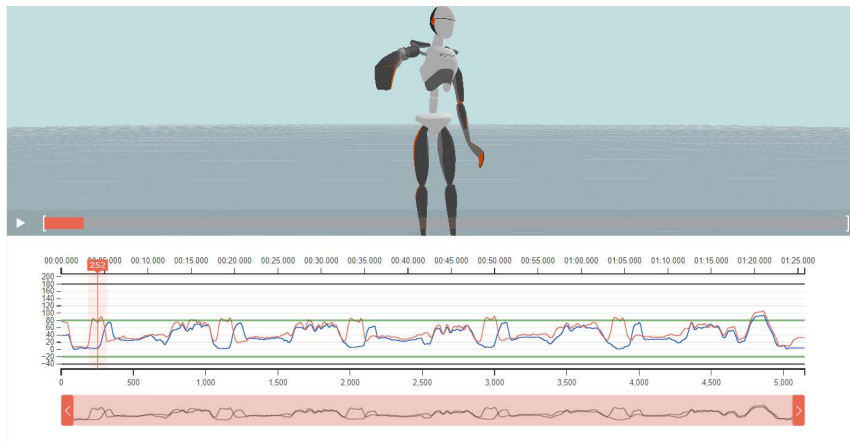


REBA outcome

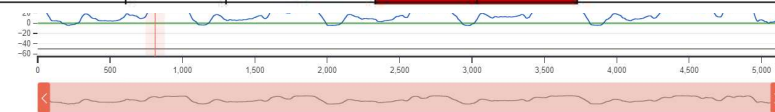
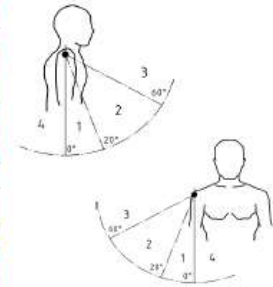


Interpretatie van de hoogste en breedste pieken

ADJUSTABLE ERGONOMICS REPORT (EN-1005-4 & EN-1005-5) en Handboek Fysieke belasting

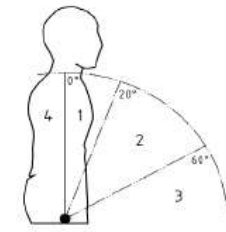


Schouderbuiging (voorw/zijw)	0-20°	alle			
	20-60°	< 1x/min			
		≥ 1-2x/min			
		≥ 2-4x/min			
		≥ 4x/min			
	>60°	≥ 0,5x/min			
		≥ 0,5-1x/min			
		≥ 1-2x/min			
		≥ 2x/min			



Grenswaarden dynamische bewegingen (<4s)

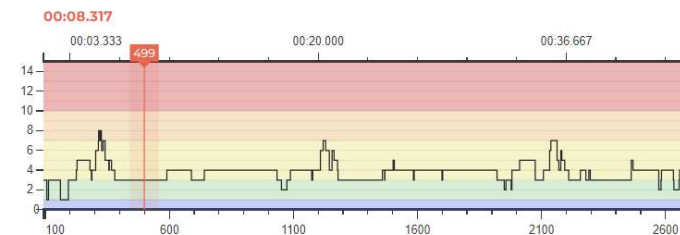
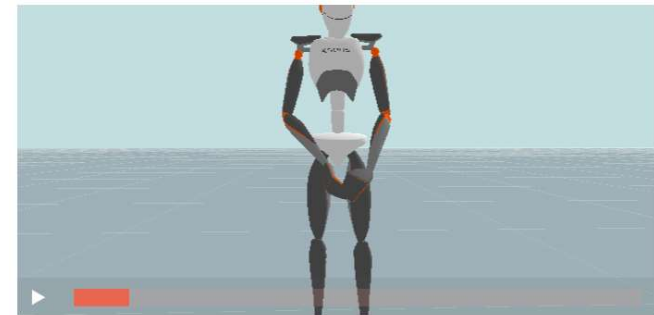
Rompbuiging	0-20°	alle	1-4u	>4u
	20-60°	< 1x/min		
		≥ 1-2x/min		
		≥ 2-4x/min		
		≥ 4x/min		
	>60°	≥ 0,5x/min		
		≥ 0,5-1x/min		
		≥ 1-2x/min		
		≥ 2x/min		



Risicofactoren houding vanwege

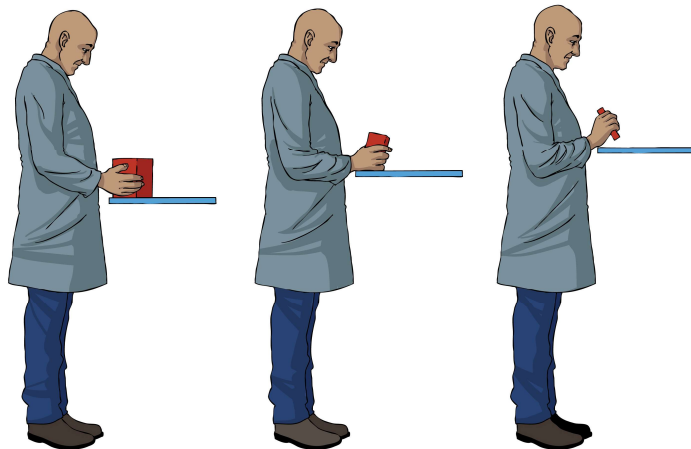
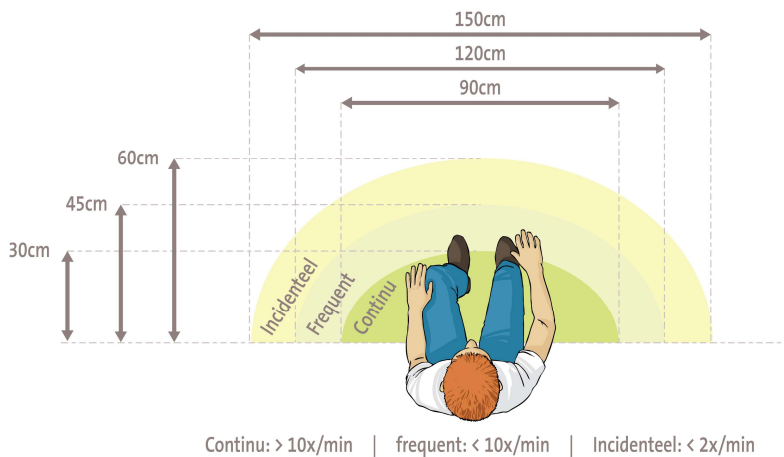
- Grijphoogte en reikafstand tot positie part A
- Grijphoogte en reikafstand tot positie part B
- Plaatsing doos om in te laden
hoogte + zijdelings
- Pallet staat op de grond
- Hoogte van werken

REBA outcome



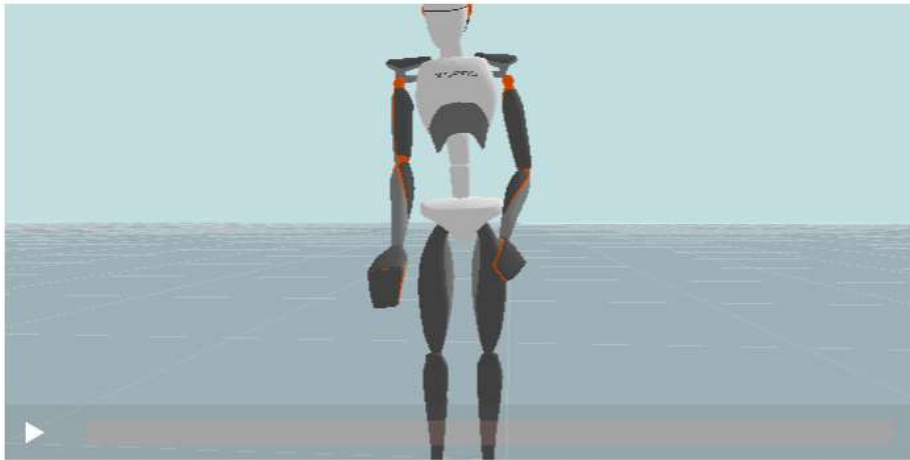
Aanzet tot preventiemaatregelen

Optimalisatie reikafstanden en grijphoogte tot Parts
Werkhoogte aanpassen + Herplaatsen doos op werkbank
Schaartranspallet om stapelhoogte te optimaliseren



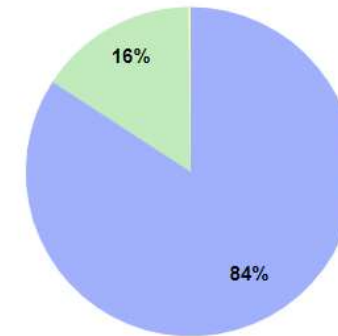
REBA resultaat na verbeteringen

REBA outcome

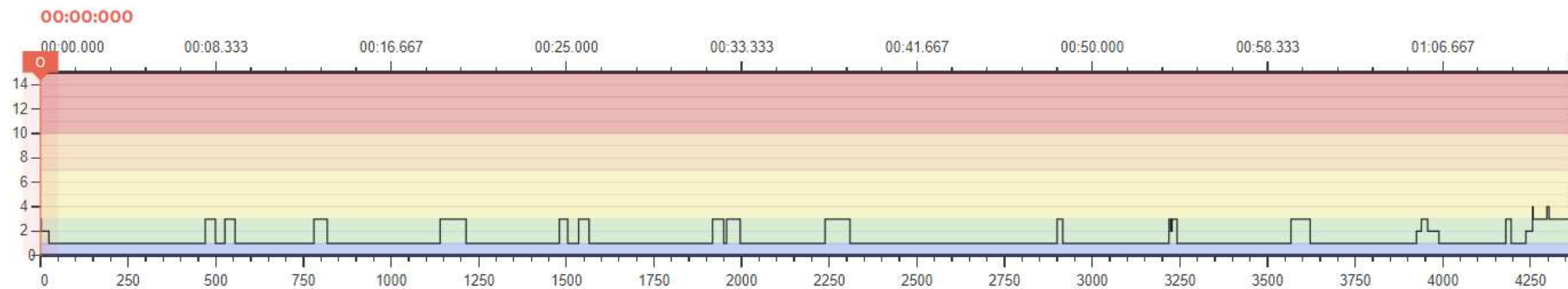


Edit report

Export



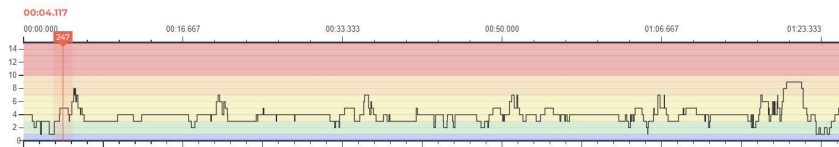
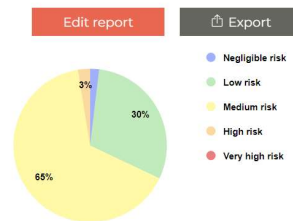
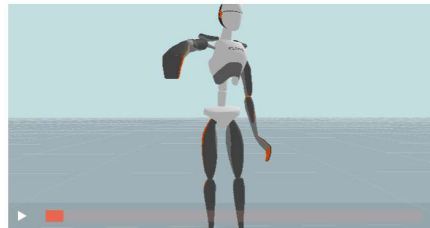
- Negligible risk
- Low risk
- Medium risk
- High risk
- Very high risk



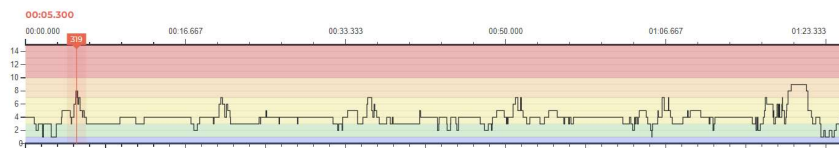
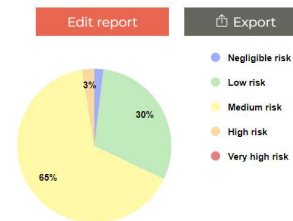
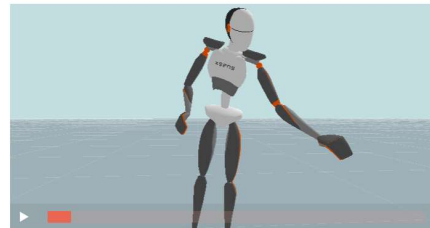
Voordelen systeem

Vergelijken van zelfde actie

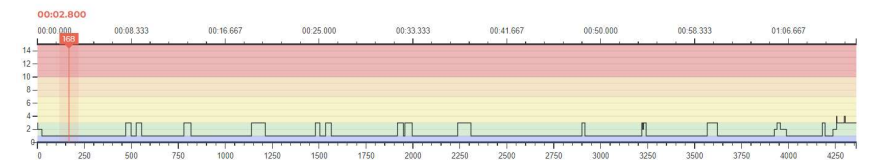
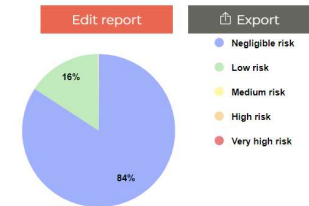
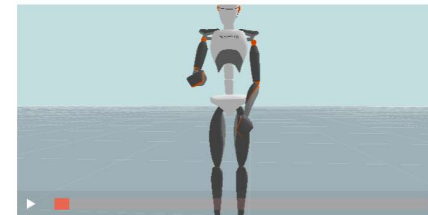
REBA outcome



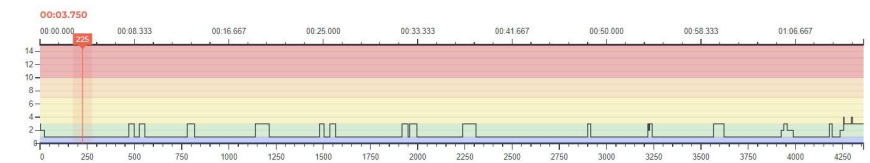
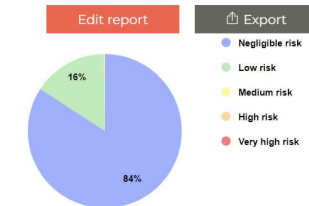
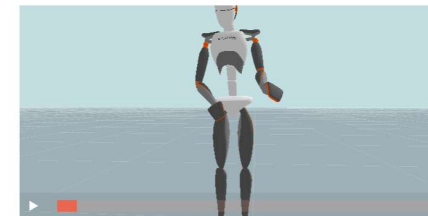
REBA outcome



REBA outcome



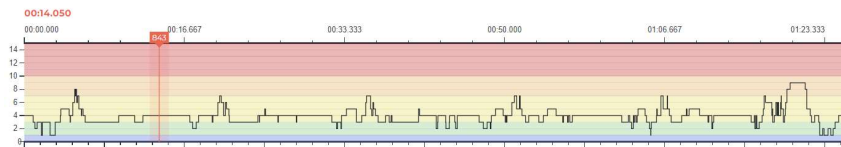
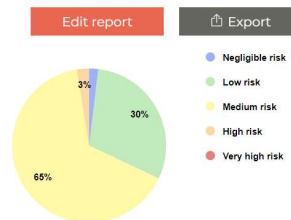
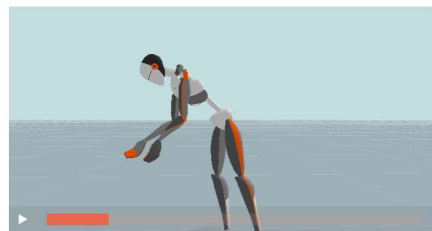
REBA outcome



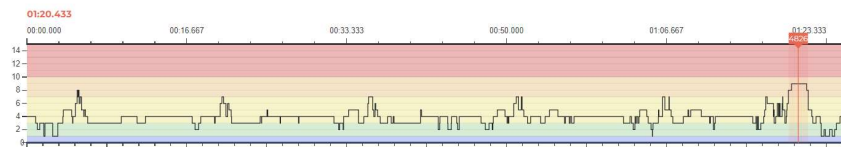
Voordelen systeem

Vergelijken van zelfde actie

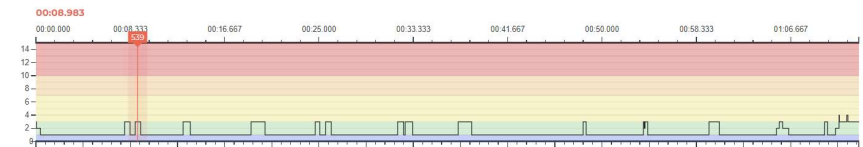
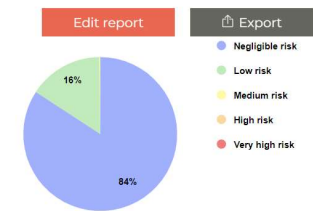
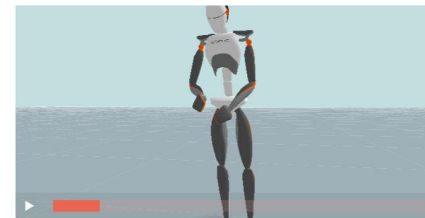
REBA outcome



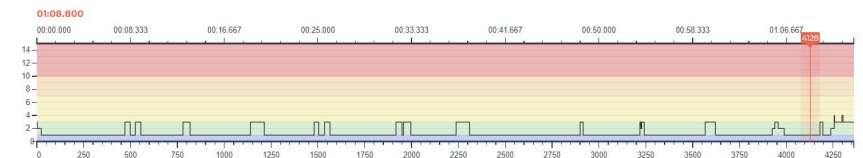
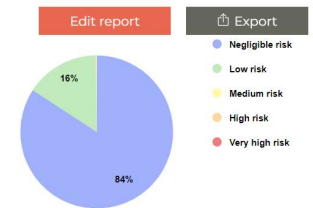
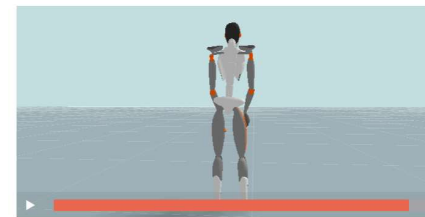
REBA outcome



REBA outcome



REBA outcome



Vragen



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Antwerpen



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