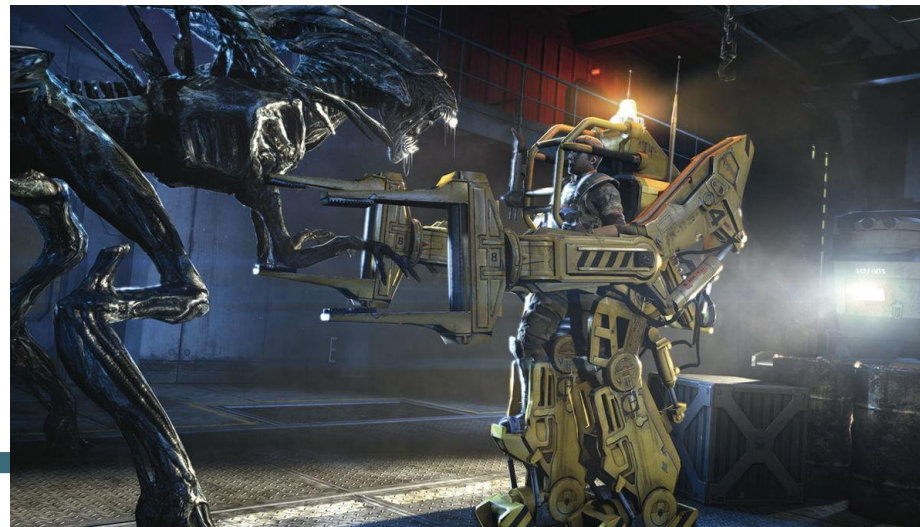


Exoskeletter

Niels W. Falk, Head of Consulting and Innovation, CEO



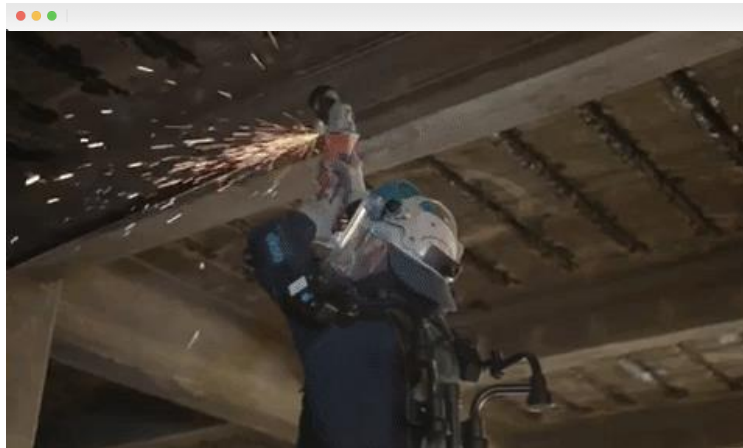
Exoskeleton



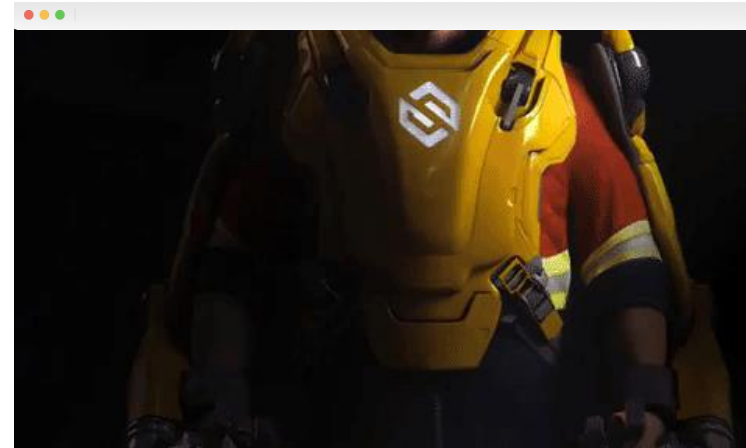
Exoskeletter Aktive og passive



Materiale lånt fra SuitX



Materiale lånt fra Ekso Bionics

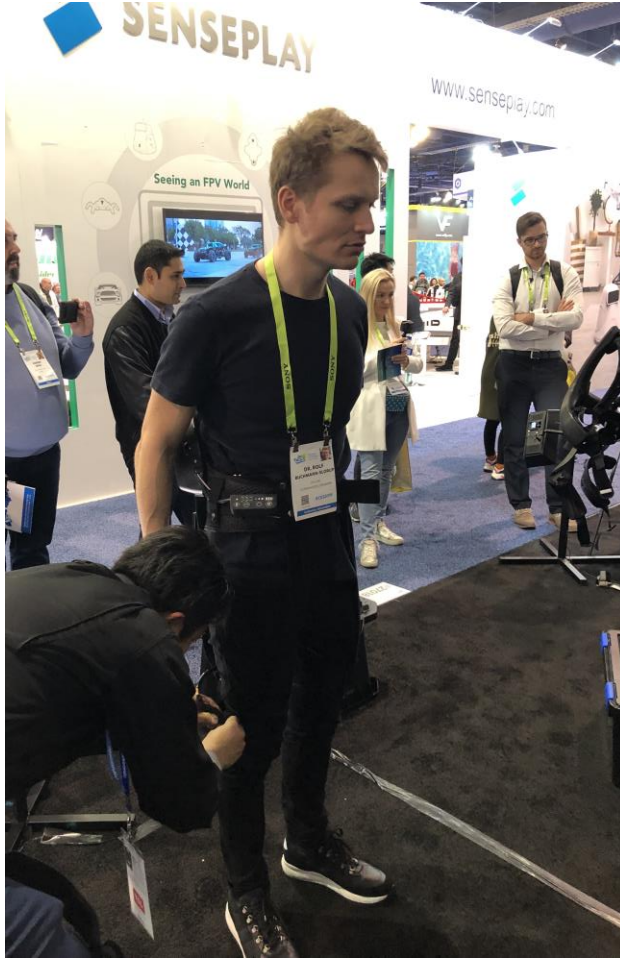


Materiale lånt fra Sarcos

Exoskeletter

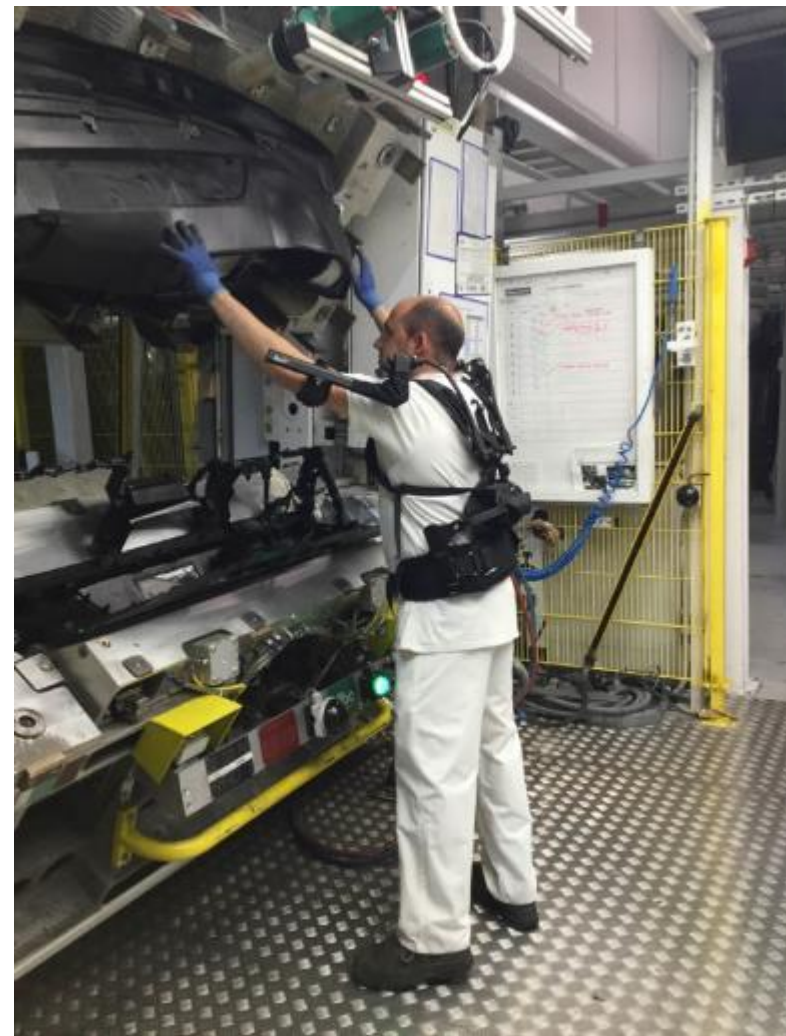


Exoskeleton



SUITX













BACKX MODEL AC

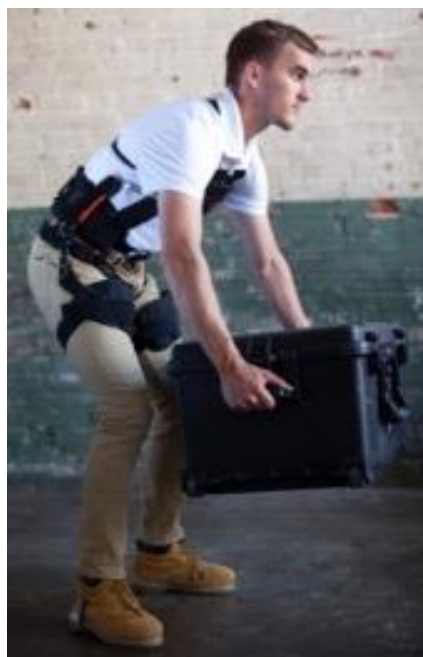
Device Weight 10 lb (4.5 kg)

Support to user 30 lb (13.6 kg)

Put on/take off time 48/15 sec

Compatibility shoulderX, legX

Price (USD) \$4,000



BACKX MODEL S

7.5 lb (3.4 kg)

30 lb (13.6 kg)

35/20 sec

legX

\$4,000



LEGX

5.1 lb (2.3 kg) per leg

60 lb (27.2 kg)

90/30 sec

backX AC, shoulderX

\$6,000



SHOULDERX

11.8 lb (5.4 kg)

3-12 lb (1.4-5.4 kg)

80/40 sec

backX AC, legX

\$4,000



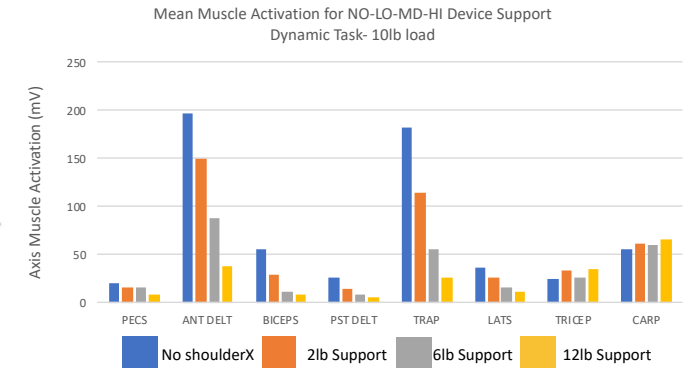
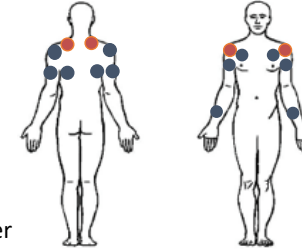
shoulderX Studies

EMG Study: Overhead Drilling

- 10 LB (4.5 KG) tool
- Overhead tasks

Results

- Substantial assistance to
 - Anterior deltoid
 - Trapezius muscles
- No substantial change to other agonist/antagonist muscles

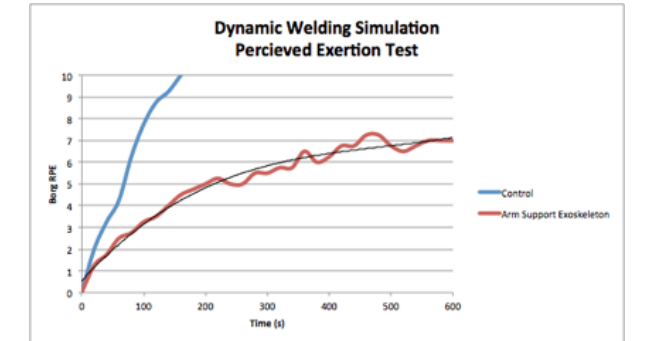


Endurance Study: Welding Simulation

- 2.5lb tool (1.1 KG)
- Welding simulation (eye level)
- 5 Subjects

Results

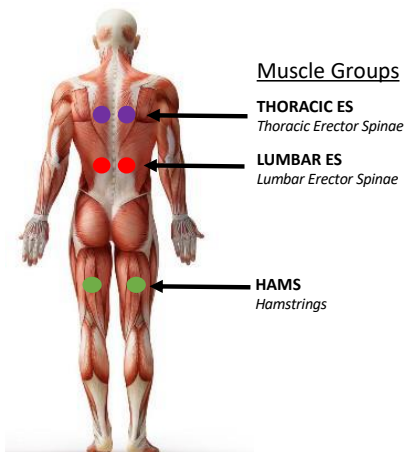
- Without shoulderX: 2m15s to fatigue
- With shoulderX: 15m to fatigue



backX Study

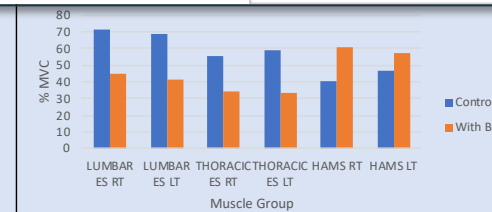
- 4 male subjects, 26-41 years old

Electrode Placement



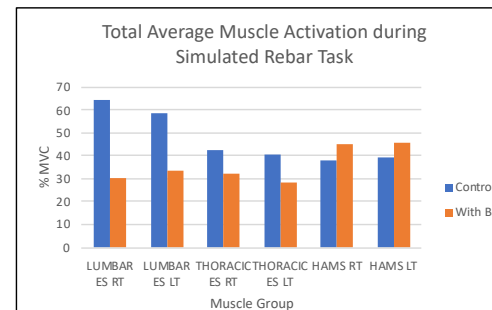
Repetitive Lifting Task

- Substantial assistance to lower back muscles: average 40% reduction in erector spinae (lumbar and thoracic) activation.
- Average 37% increase in hamstring activation



Simulated Rebar Task

- Substantial assistance to lower back muscles: average 37% reduction in erector spinae activation
- Average increase 16% in hamstring activation



Wearables og sensorer



Test på byggepladser



Exoskeletter afprøvet i praksis

- Stilladsarbejdere
- Lagerarbejdere
- Nedrivere
- Murer
- Installation el og vvs
- Værksted
- Vedligehold og service
- Beton
- Procesindustri



Data (database)															
Initiater															
Exoskeletter brugt															
Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX	Amix BackX
Exoskeletter brugt (timer)															
0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
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Exoskeletter gjorde mig mindre træ															
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Exoskeletter øgede mig overanstret															
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Exoskeletter var let at tage på og af															
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Exoskeletter var let at bruge															
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

DAGENS Totalrådgivning til modernisering af Nykøbing Falster Sygehus, Ribe Bryghus, teknisk rådgivning til European Spallation Source i S



Feedback fra tests

- Det virker - hjælper meget i konkrete situationer
- Føles ikke tunge eller hæmmende at have på
- Tager lidt tid at lære, at bruge – og justere
- Ergonomisk støtte - gør man er mindre træt - retter op på stillinger og løft
- Bedst til de trængende - der er noget kultur, der skal tilpasse sig før man kan bruge dem præventivt



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