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Research to Standards

ASTM INTERNATIONAL
Exo Technology Center of Excellence

ASTM Committee F48 on *Exoskeletons and Exosuits*

Donald R. Peterson, PhD, MS, FAIMBE
Chair of F48

Chair, ANSI S2.39, S3.39 on *Human Exposure to Mechanical
Vibration and Shock*

Dean of the College of Engineering and Engineering Technology
Professor of Mechanical Engineering
Northern Illinois University

Affiliated Professor of Biomedical Engineering
Texas A&M University



ASTM - Over a Century of Openness



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13,000
ASTM
standards
operate
globally

Applied to
just about
everything
from steel to
sustainability

They
improve
the lives
of millions
every day

How ASTM Works

- Worldwide acceptance and trust comes from the principle of openness
- Experts, individuals, organizations, academia, governments, trade associations, consultants and consumers come together
- Over 30,000 members from 150+ countries
- Exchanging expertise and knowledge
- Participating in a transparent process – open to anyone, anywhere
- Timely and relevant. Fully representative of sectors. An aid to innovation, not a hurdle to overcome



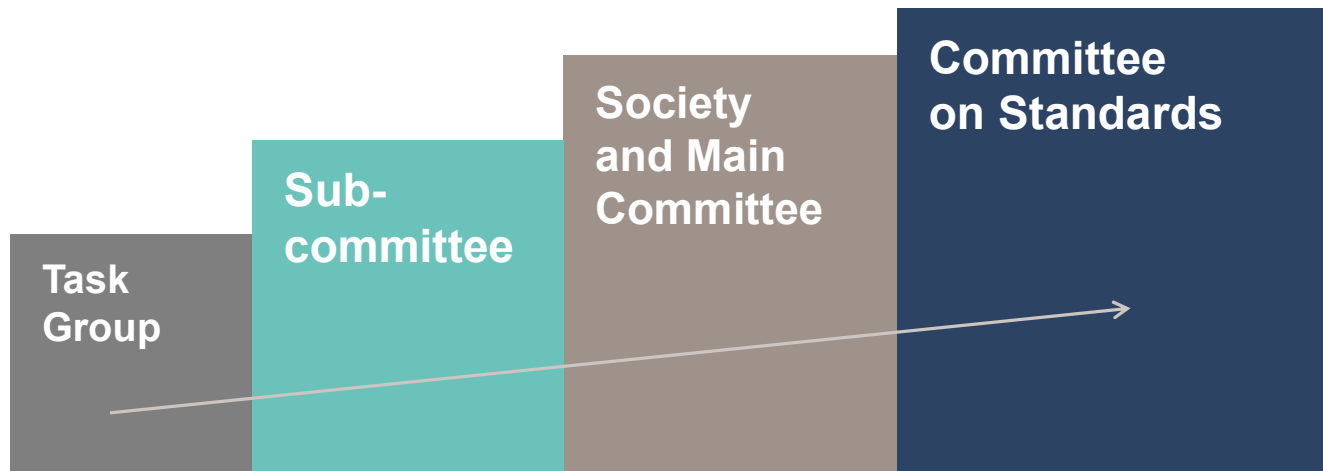
30,000+
members
150+
countries

Standards Process in ASTM



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- Documents are drafted and revised in the task group
- A completed draft is voted on by the Subcommittee and, if approved, it moves to a Main Committee vote but, if not, it returns to the Task Group for re-drafting
- After Subcommittee approval, the Main Committee and entire Society
- If approved, but negatives remain, it is presented to the Committee on Standards (COS) for final review to ensure ASTM procedures were followed
- Detailed procedures included in *Regulations Governing ASTM Technical Committees*



ASTM Committee **F48** - *Exoskeletons and Exosuits*



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- Established in 2017
 - **F48.01** Design and Manufacturing
 - **F48.02** Human Factors and Ergonomics
 - **F48.03** Task Performance and Environmental Considerations
 - **F48.04** Maintenance and Disposal
 - **F48.05** Security and Information Technology
 - **F48.06** Risk Management
- **170+** F48 Committee Members
- **15** Approved Standards
- **27** Work Items
- Monthly WebEx Meetings
- Biannual Meetings

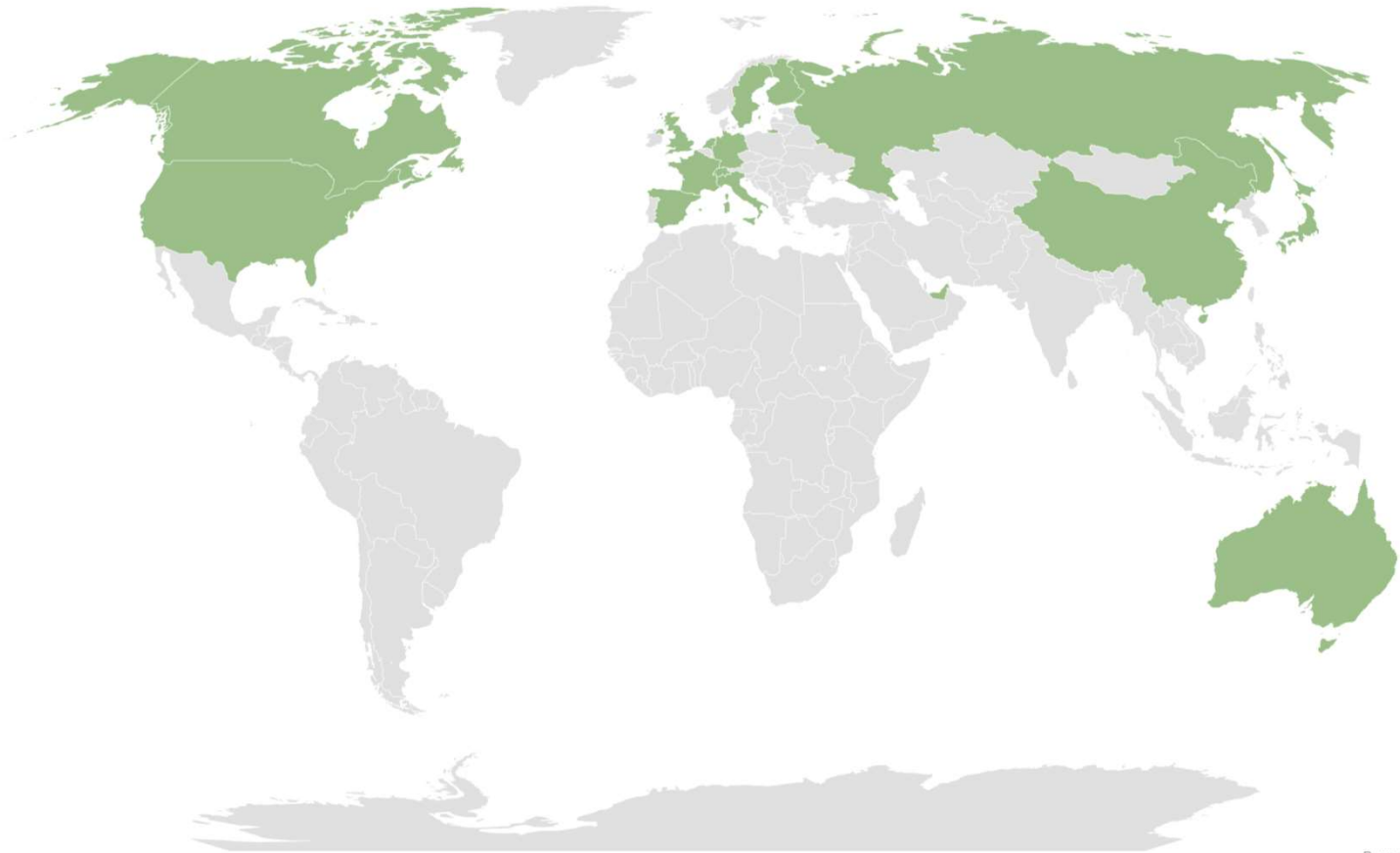


ASTM Committee F48 Members



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Country
Australia
Canada
China
Finland
France
Germany
Italy
Japan
Netherlands
Russia
Singapore
Spain
Sweden
Switzerland
United Arab Emirates
United Kingdom
United States



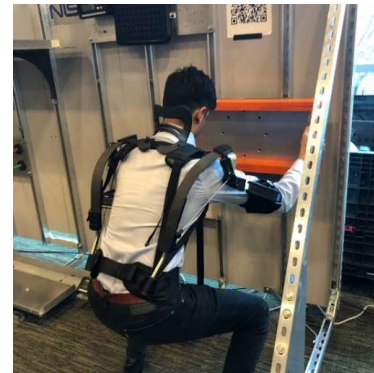
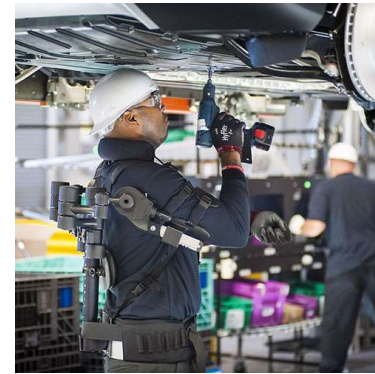
Standards with Committee F48

Approved Standards for Purchase – Volume 15.08



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1. **F3323** - Standard Terminology for Exoskeletons and Exosuits
2. **F3358** - Standard Practice for Labeling and Information for Exoskeletons
3. **F3392** - Standard Practice for Exoskeleton Wearing, Care, and Maintenance Instructions
4. **F3427** - Standard Practice for Documenting Environmental Conditions for Utilization with Exoskeleton Test Methods
5. **F3443** - Standard Practice for Load Handling When Using an Exoskeleton
6. **F3444/F3444M** - Standard Practice for Training Exoskeleton Users
7. **F3474** - Standard Practice for Establishing Exoskeleton Functional Ergonomic Parameters and Test Metrics
8. **F3517** - Standard Practice for Movement Tests When Using an Exoskeleton
9. **F3518** - Standard Guide for Quantitative Measures for Establishing Exoskeleton Functional Ergonomic Parameters and Test Metrics
10. **F3519** - Standard Guide for Establishing a Reporting Structure for Exoskeleton Analysis
11. **F3523** - Standard Test Method for Exoskeleton Use: Confined Space: Horizontal Movement
12. **F3527** - Standard Guide for Assessing Risks Related to Implementation of Exoskeletons in Task-Specific Environments
13. **F3528** - Standard Test Method for Exoskeleton Use: Gait
14. **F3540** - Standard Guide for Hazards for Consideration when Designing Exoskeletons
15. **F3578** - Standard Test Method for Evaluating Exoskeleton Fall Risk due to Stumbling



Committee F48 Leadership



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Committee F48 Officers

Chair: Don Peterson

Vice Chair: Bobby Marinov

Vice Chair Awards: Ron Zmijewski

Membership Secretary: Matthew Dickinson

Recording Secretary: Kevin Purcell

Members-At-Large

1. Tom Sugar
2. Philip Mattson
3. Jen Neugebauer-Sperlein
4. David Brodie
5. Matthew Marino

Student Chapter

Dr. Matthew W. Dickinson

F48.04 –Maintenance and
Disposal - subcommittee chair

Course Leader for MEng/BEng
Computer Aided Engineering

School of Engineering
University of Central Lancashire



**University of
Central Lancashire**
UCLan

Quick Facts

Number of Members 170+

Number of Standards 15

Number of Work Items 27

Global Participation 17 Countries represented

The standards are available in Volume 15.08 in the
Annual Book of ASTM Standards

Meetings F48 meets twice each year,
in the Spring during ASTM Committee Week and in
the Fall in conjunction with industry related events

Committee F48 on Exoskeletons and Exosuits

<https://www.astm.org/COMMITTEE/F48.htm>

Staff Manager

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Committee F48 Fall 2022 Meeting

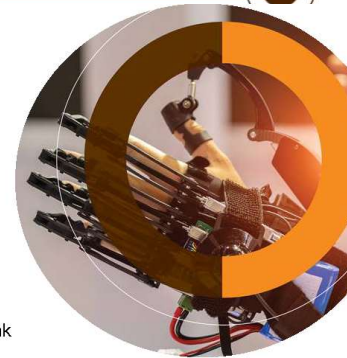


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ASTM COMMITTEE F48 ON EXOSKELETONS AND EXOSUITS

Location: Hybrid (WebEx and The Sheraton New Orleans Hotel)
Date: November 1st and 2nd
Facilitator: ASTM International Committee F48

Contact: Nora Nimmerichter (nnimmerichter@astm.org) for the WebEx Link



Tuesday, November 1st

8:30am - 9:45am, CT	F48 Welcome and New Member Orientation	
10:15am - Noon, CT	F48.03 Task Performance & Environmental Considerations	Bostelman
1:00pm - 4:00pm, CT	F48.06 - Risk Management	Dwyer

Wednesday, November 2nd

8:00am - 9:45am, CT	F48.01 - Design and Manufacturing	Dickinson & Yang
10:15am - Noon, CT	F48.04 Maintenance and Disposal	Dickinson
1:00pm - 2:00pm, CT	F48.05 Security and Information Technology	Bhashyam
2:00pm - 3:30pm, CT	F48.91 Terminology	Daniels
3:30pm - 5:00pm, CT	F48 - Main Committee Meeting	Peterson

Tuesday and Wednesday, November 1st and 2nd, **Symposium on Medical Devices of the Future - What's Needed for Fatigue, Fracture Resistance, and Durability in Transportation, Medical Devices, and Exoskeletons**

ASTM International's Exo Technology Center of Excellence (ET CoE)



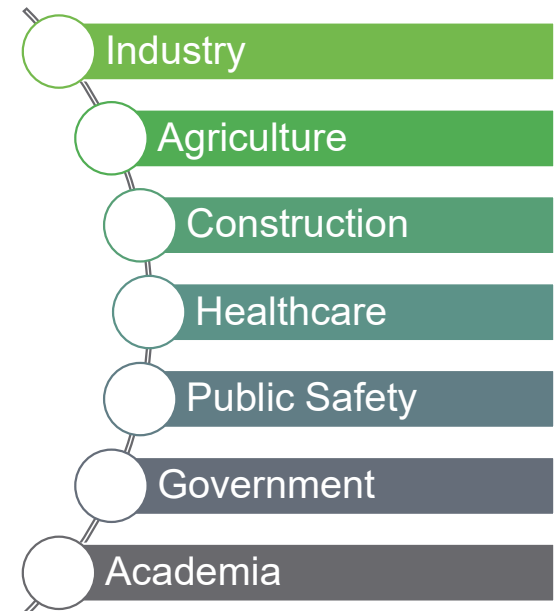
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From preventing serious injury, to helping complete heavy or constant repetitive tasks, or even making it possible for the elderly or the disabled to move again, **exo technologies empower our everyday lives.**

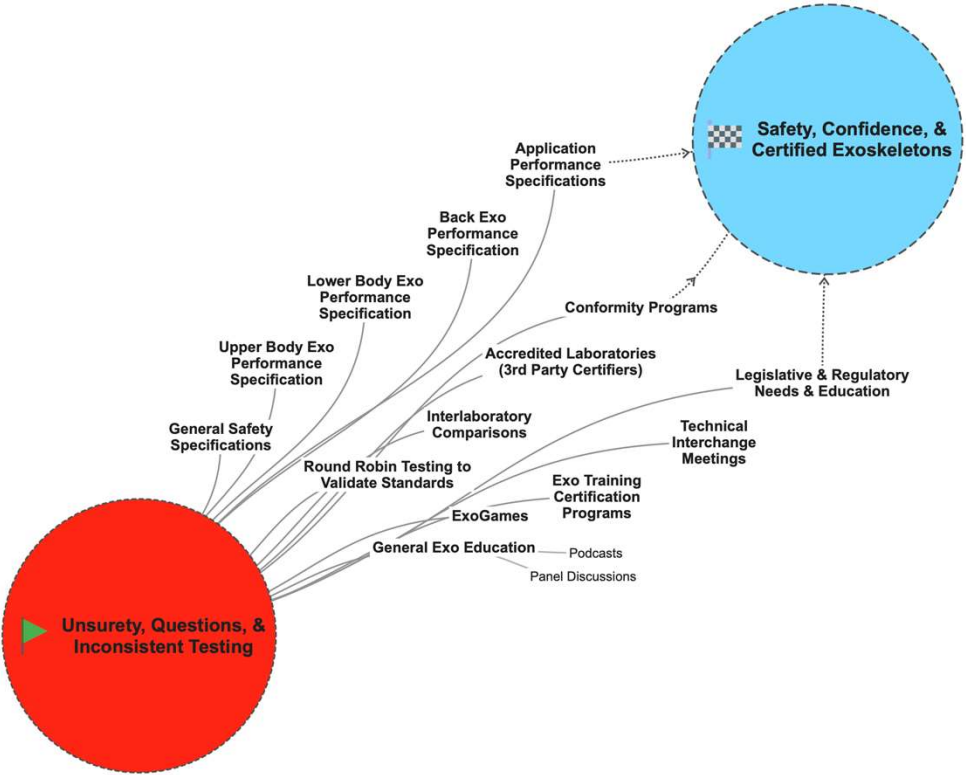
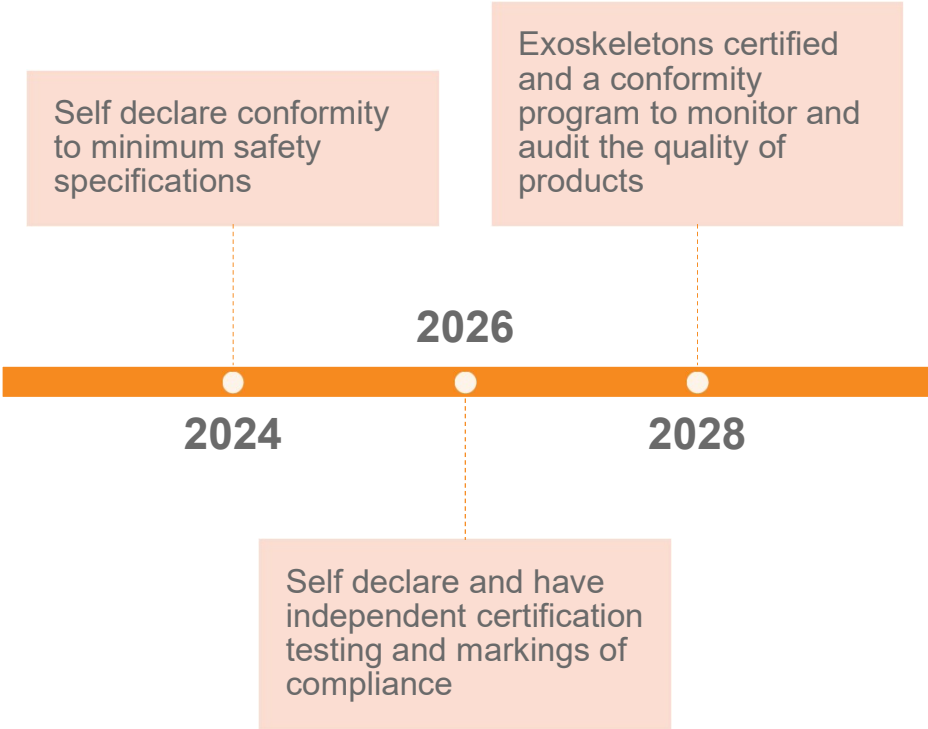
Our vision is for *people of all ages able to pursue a high-quality of life and fully participate in work and society thanks to safe, reliable, and effective exoskeletons*

Our mission is to *accelerate* exo technology research, standards, testing, and training by

- Building trust and confidence
- Creating strong global partnerships
- Creating a knowledge center



ET CoE Roadmap



ASTM Xcellerate: Strengthening the World's Emerging Technologies from Research to Standards



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ASTM Xcellerate
houses all our current
and future emerging
technology activities

Enables Global Cooperation
Deliver Targeted Standards Research
Provide Sharp Market Insight and Expertise
Accelerate Speed to Market



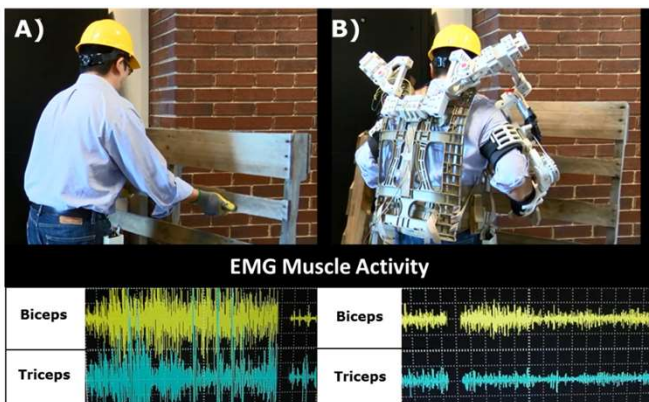
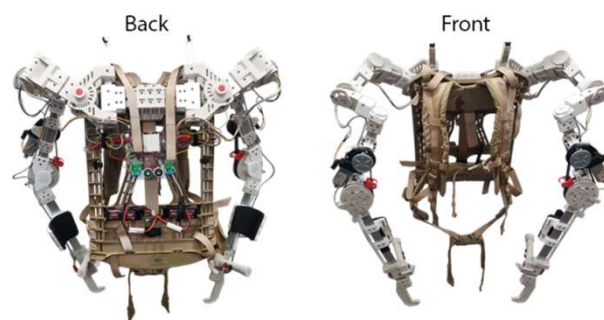
Pillars

Centers of Excellence (ET CoE)
Technical Experts
Market Insight
Advisory Services

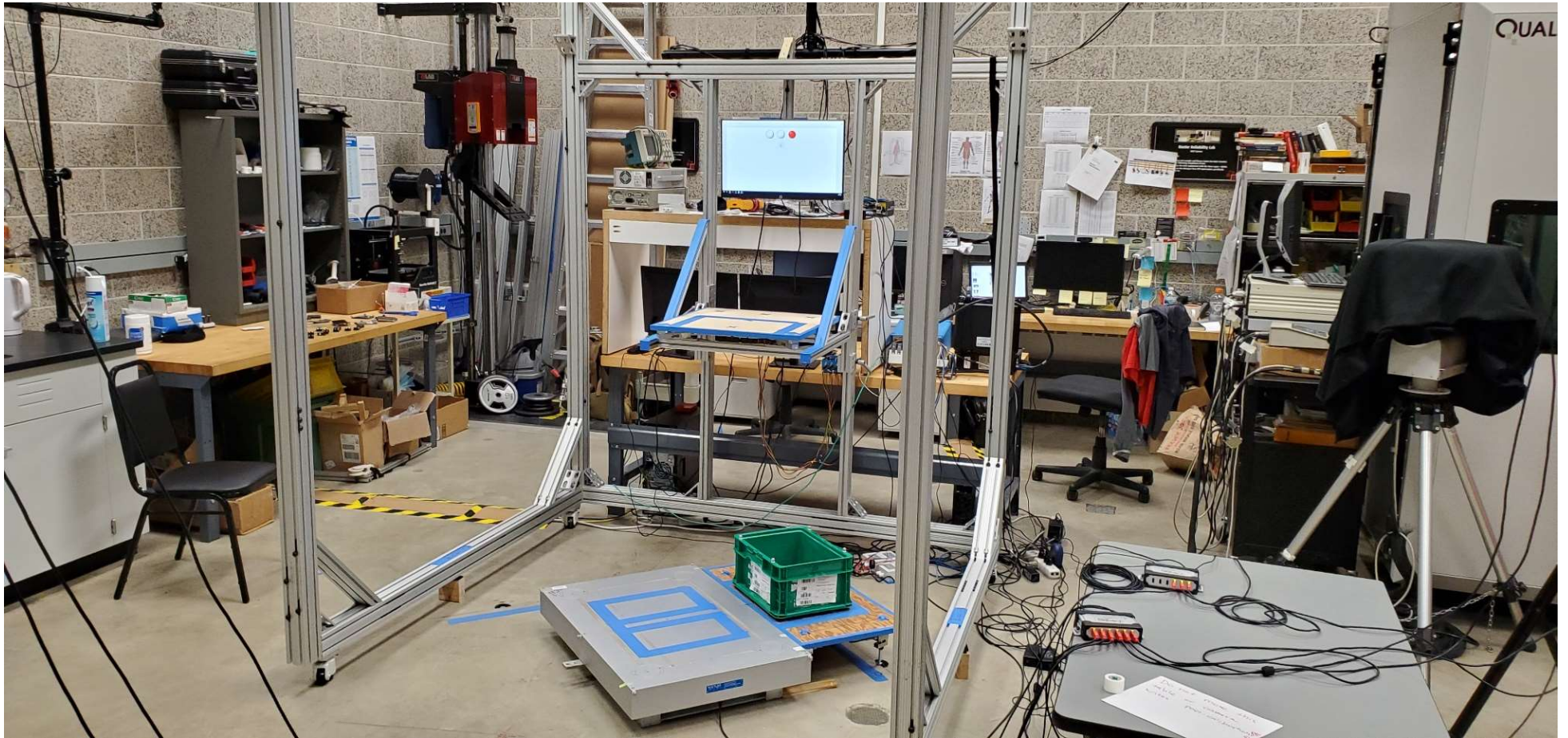
ASTM Xcellerate: www.astmxcellerate.com

www.astmxcellerate.com/technology/exo-technologies/

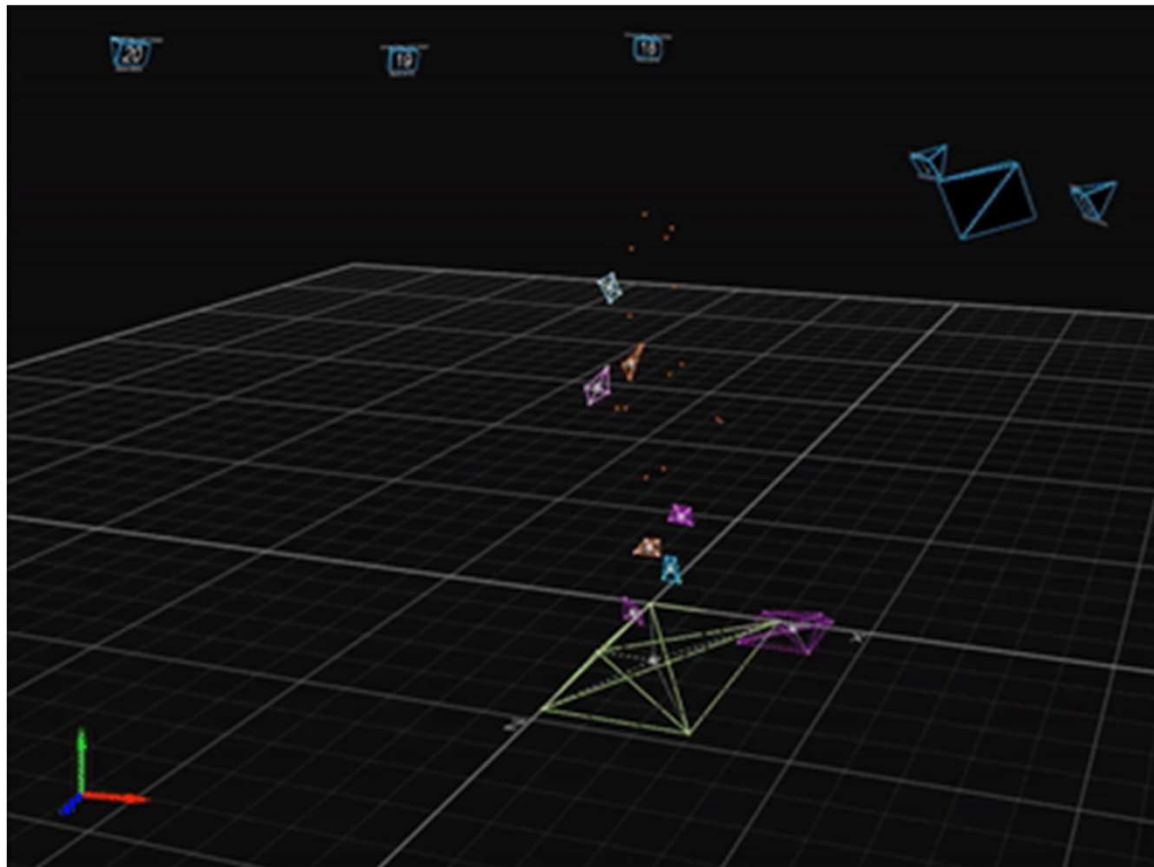
Low-Cost Disposable Active/Passive Exoskeletons



Assessment of Material Handling



Assessment of Material Handling



Do Exoskeletons and Tools Mix?



Industrial Exoskeletons; new systems ...
therobotreport.com



Industrial exoskeletons expand ...
therobotreport.com



Uncanny Exosuit: The Industrial ...
newequipment.com



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suitx.com



Korean Shipbuilder Testin...
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whole bunch of people wearing robots ...
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SuitX Industrial exoskel...
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Enters Industrial Wearable Market ...
automationworld.com



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informedinfrastructure.com



Helps Workers Carry Their Loads
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fastcompany.com



Sarcos Demonstrates ...
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wearable-technologies.com



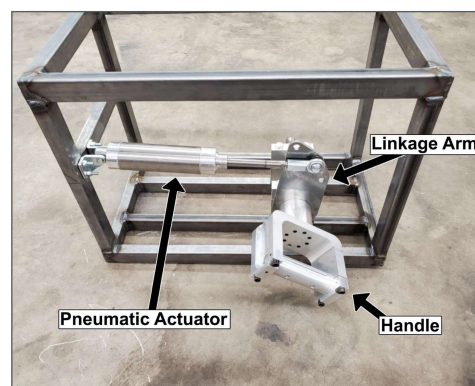
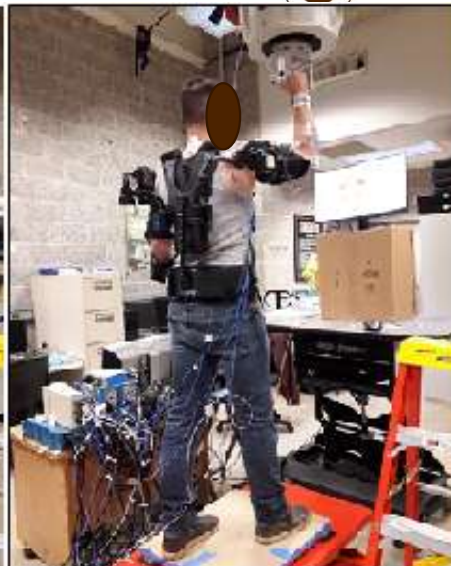
actuators for German Bionic exoskeleton
roboticsandautomationnews.com



Potential of Exoskeleton Robots ...
robotica.org



Research and Standards Development





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Thank you!

ASTM Committee F48 on *Exoskeletons and Exosuits*

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Nora Nimmerichter – Staff Manager of Committee F48
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