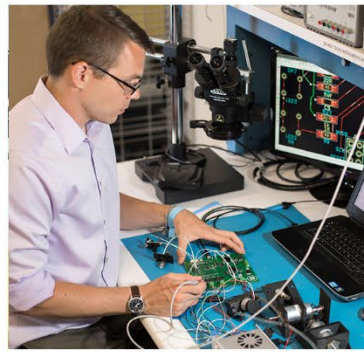
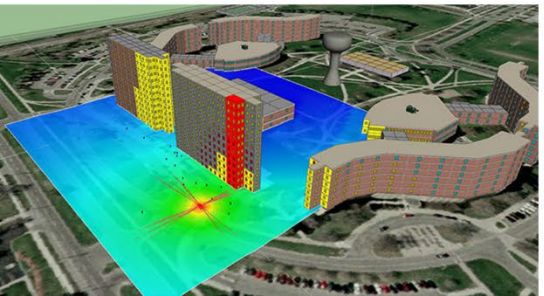
Applied Research Associates, Inc. (ARA)
Reusable Respirators, LLC (RR)
Overview

December 1, 2023



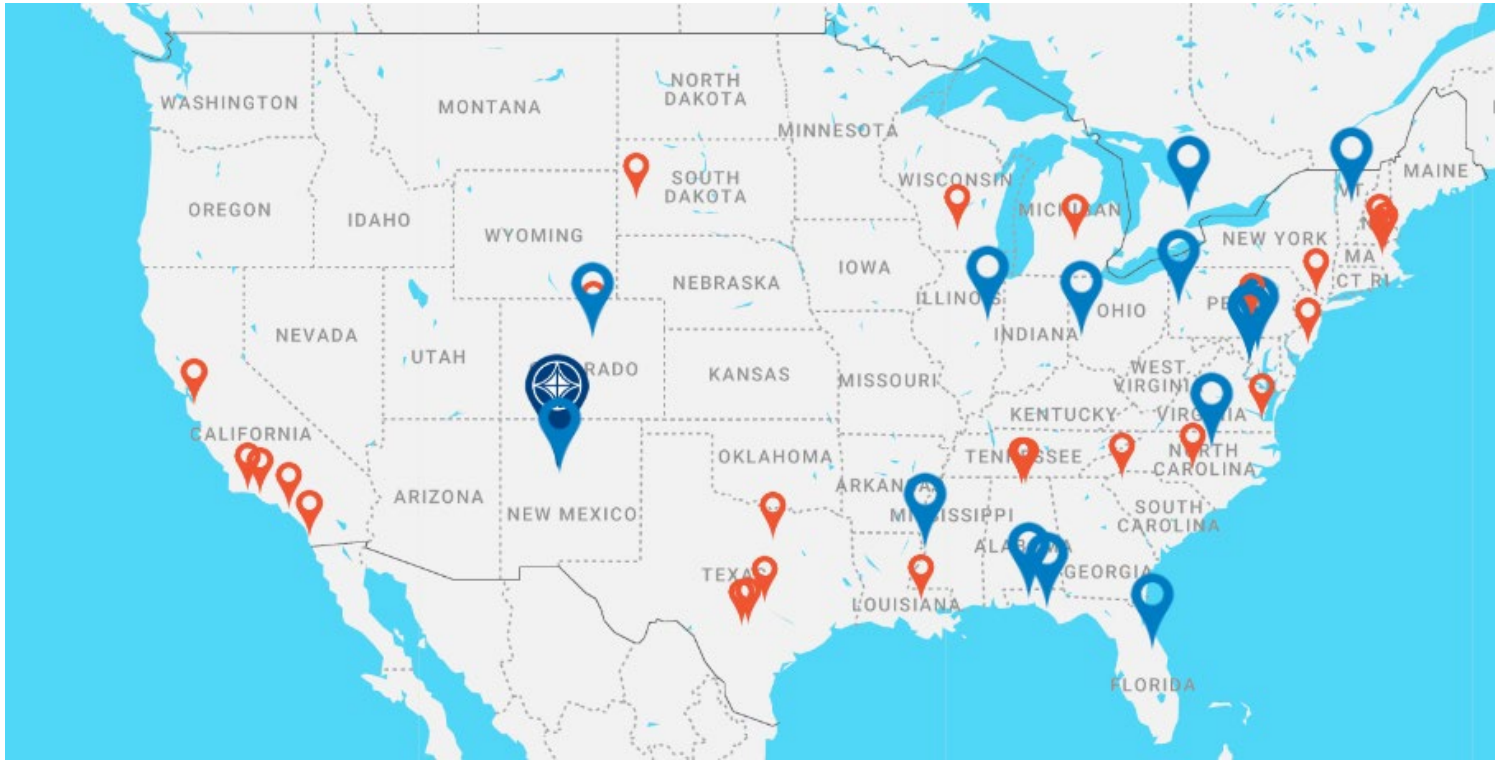




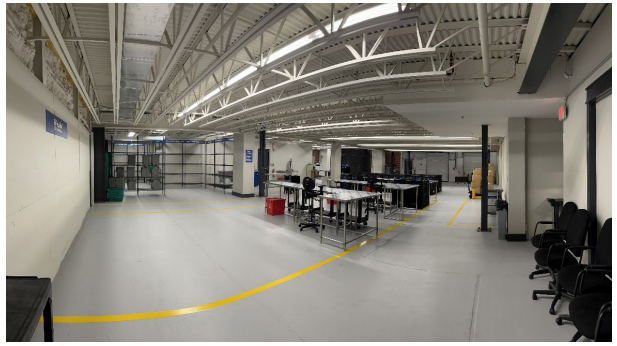
About ARA, Inc.

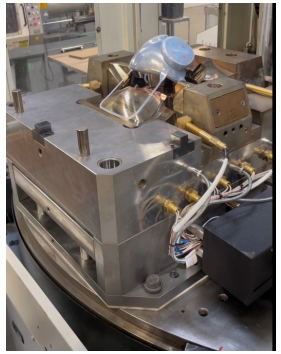
- Founded 1979, Albuquerque, New Mexico
- 2,011 employee owners at locations in the U.S. and Canada
- FY23 sales of $600 million



About RR LLC

- Founded in April 2020
- Wholly Owned Subsidiary of Applied Research Associates
- Extensive reach-back to ARA for SME and financial backing
- Established as the ISO 13485 manufacturing arm of ARA
- Primary Operating Location, Panama City, FL
- Design and Development capability using state of the art tools
- One stop shop from design through high-volume manufacturing
- Marketing, branding, sales and distribution capabilities
- Extensive regulatory experience with FDA, NIOSH, and TGA





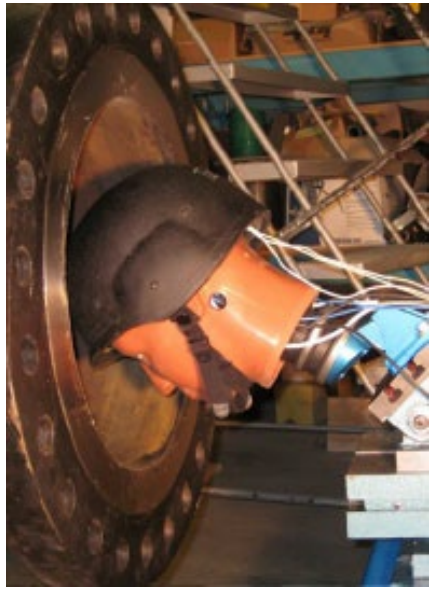
Facilities

Over 30 locations in the U.S. & Canada

- Cleared, SAP, and SCIF facilities
- Classified computing and storage
- CMMI® Maturity Level 3 Appraised *Raleigh, NC & Niceville, FL*
- ISO 13485 Manufacturing Facility, *Panama City, FL (RR)*
- ISO 9001:2015 Certified *Randolph, VT*

Laboratory, Manufacturing & Testing Facilities

- Renewable Fuels Laboratory *Panama City, FL*
- Ablatives Laboratory *Centennial, CO*
- Materials Measurement Laboratory *Alexandria, VA*
- Engineering Science/Instrumentation Laboratory *Littleton, CO*
- Materials Properties Laboratory *Randolph, VT*
- ISO 9001 Manufacturing/Prototyping Facility *Randolph, VT*
- ISO 13485 Manufacturing Facility, *Panama City, FL (RR)*
- Environmental RDT&E Laboratory *Panama City, FL*
- 3-100 GHz Compact Radio Frequency Laboratory *Dayton, Ohio*

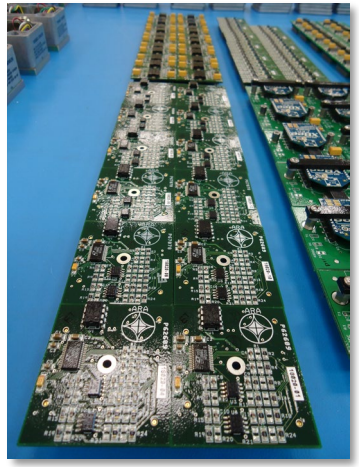


ARA
www.ara.com

Prototyping Capabilities

- Machine Shop
- Electronics
- Fabrication
- Welding
- Assembly

Electronics Assembly

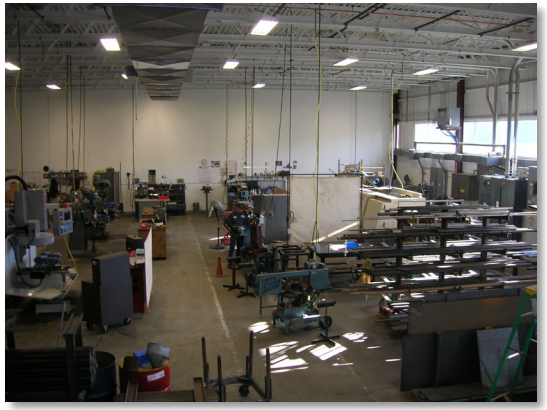


Electronics Lab

Welding Shop

Fabrication

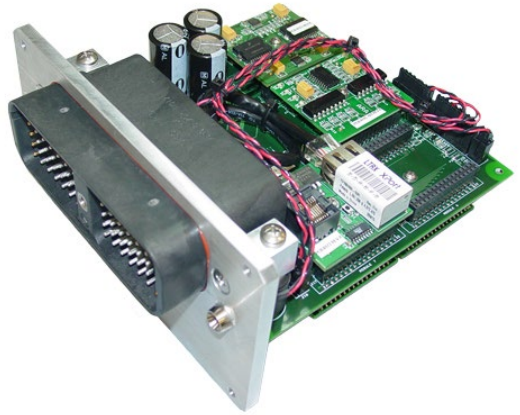
Controlled Inventory

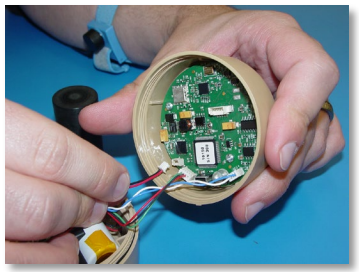


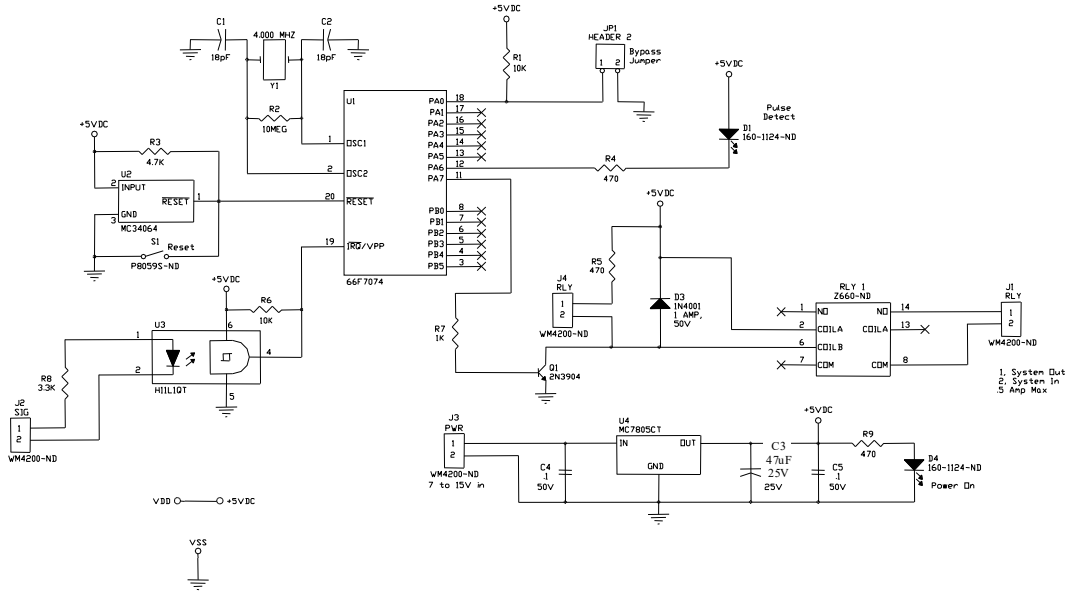
Machine Shop

Electronics Capabilities

- PCB Design
- PCB Fabrication
- PCB Population
- Micro-Controller Programming
- Enclosure Assembly
- Calibration
- Testing
- ISO 9001:2008
- NIST Traceable

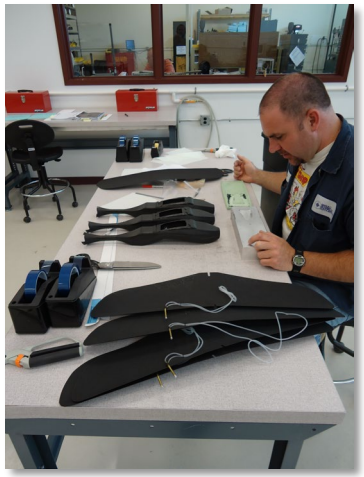






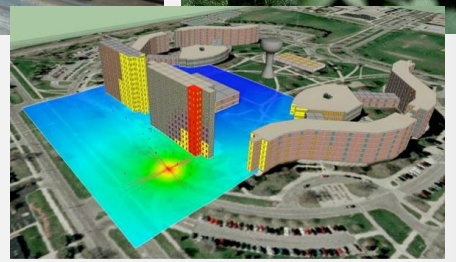
Climate Controlled Composite Layup area.

- Positively pressurized
- Climate controlled
- High intensity task lighting (>400lux)
- Integrated vacuum system
- Material cold storage
- Dual Opening Laminating Compression Press
- Convection Clean Room Oven

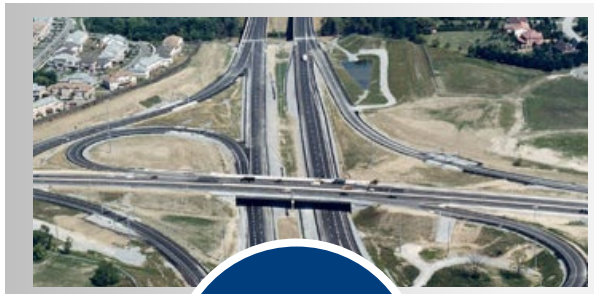








National Security

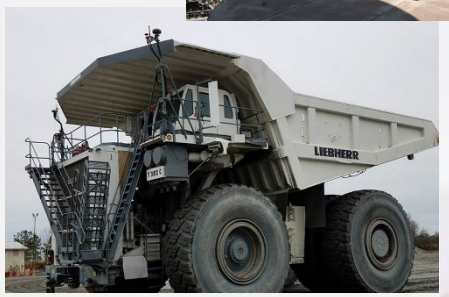



Infrastructure

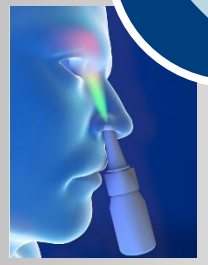
INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

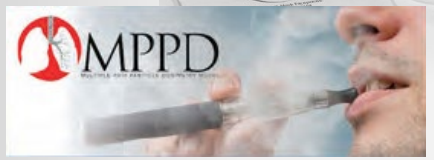
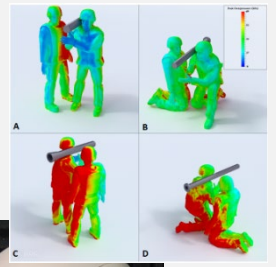
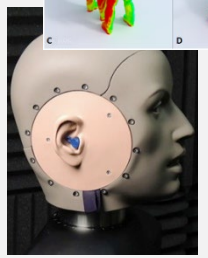
Energy and Environment

HCU PRETREAT
WATER. TEMPERATURE. PRESSURE. TURBULENT FLOW.




Health Solutions



ARA Business Areas

National Security

ARA delivers innovative solutions to assess, detect, deter, defeat, and respond to threats facing us at home and abroad.

Infrastructure

ARA leads in technologies and services to improve performance and sustainability of infrastructure for transportation, buildings, and energy systems.

Energy & Environment

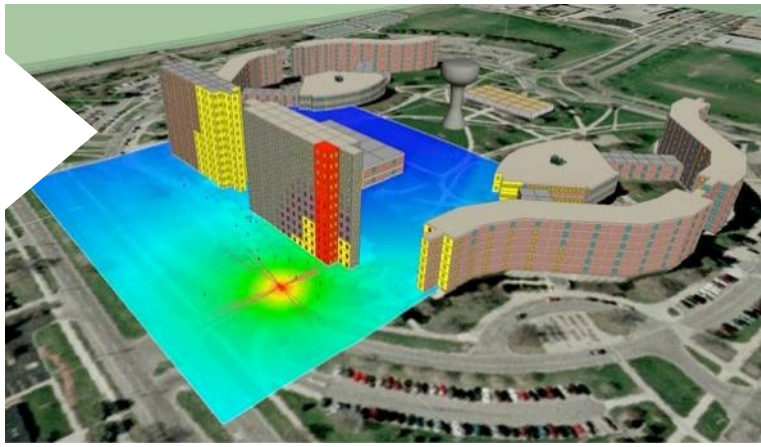
ARA provides innovative engineering services and products for alternative fuels, and the power and utility services market.

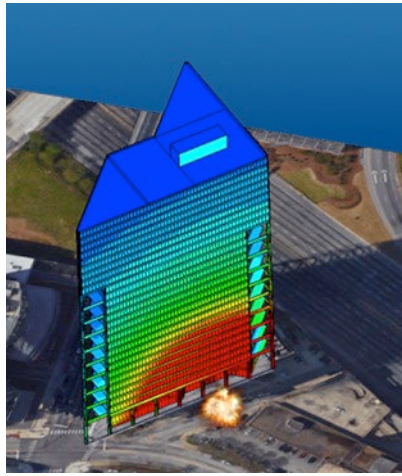
Health Solutions

ARA provides specialized research and technology services, testing and product development in health science and engineering.

National Security

- Weapons Development, Testing, and Effects
- Blast Effects, Protective Design, and Physical & Electronic Security
- Risk Assessment and Management
- C4ISR Systems
- Modeling and Simulation
- Strategic Analytical Services
- Cognitive Solutions
- Innovative Training Solutions
- Injury Biomechanics and Protective Design
- Response and Planning Tools
- Systems Engineering



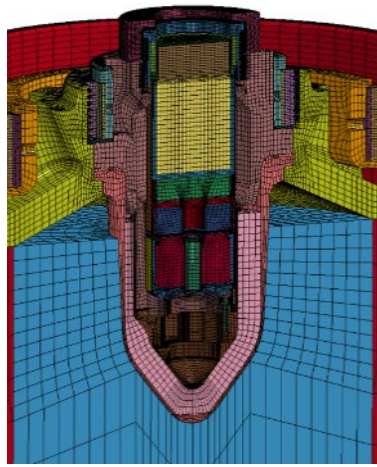


Infrastructure

- Airport Services
- Pavement Engineering
- Highway R&D and Technology Deployment
- Traffic Monitoring
- Transportation Asset Management
- Transportation System Security and Safety
- Innovative Training Solutions
- Geotechnical & Structures
- Crashworthiness Analysis
- Infrastructure Software Solutions
- Transportation Policy & Planning
- Railroad Services
- Department of Defense Infrastructure
- Aviation R&D and Technology Deployment
- Software Application and Technology Development
- Infrastructure Risk Management

National Security

- Robotics and Unmanned Systems
- Firefighting and Fire Protection Systems
- Department of Defense Infrastructure
- Thermal Protection Technology, Engineering, and Manufacturing
- Software Application and Technology Development
- Sensors, Instrumentation, & Test Services
- Computational Electromagnetics & Fluid Dynamics
- Antenna and Radome Design, Testing, and Manufacturing
- Electronic Materials Research and Applications
- RF Technologies
- Laboratory Management Services

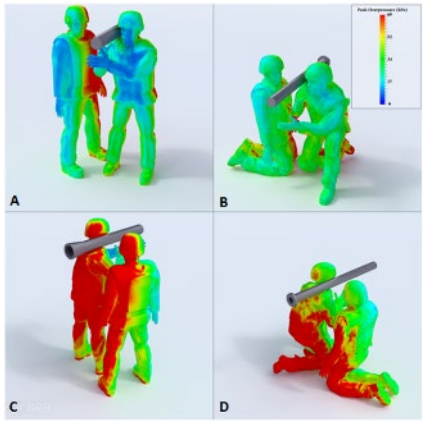


Energy & Environment

- Sustainable, Scalable Energy Technologies
- Advanced Biofuels and Renewable Chemicals
- Perchlorate Treatment Solutions
- Risk Assessment and Management
- Innovative Training Solutions
- Modeling and Simulation
- Geotechnical Solutions
- Software Application and Technology Development

Health Solutions

- Inhalation and Respiratory Mechanics
- Bioaerosols and Applied Microbiology
- Cognitive Solutions
- Innovative Training Solutions
- Modeling and Simulation
- Injury Biomechanics and Protective Design
- Response and Planning Tools
- Software Application and Technology Development
- Food and Water Safety



Questions

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Backup

Engineering Science Division

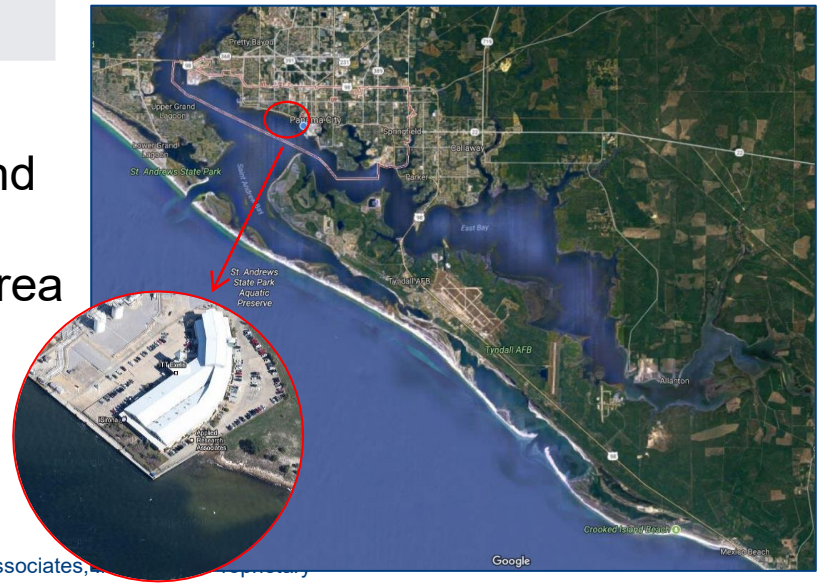
Panama City, FL

Relevant Expertise

Mechanical Engineering	Chemistry
Aerospace Engineering	Robotics and Automation
Chemical Engineering	Biofuels
Civil Engineering	Training and Education
Computational Fluid Dynamics	

Facilities

- 25,000-ft^2 facility with labs, offices, and fabrication spaces
- 3,350-ft^2 high bay demo/fabrication area
- 1,50- ft^2 R&D labs (chemistry, microbiology, aerosols)
- Deep-water port



RESPIRATORY MODELING & PROTECTION

- HIGH-FIDELITY MODELING AND SIMULATION
- PHARMACOKINETIC MODELING
- RESPIRATORY DOSIMETRY
- RESPIRATORY PROTECTION DESIGN AND EVALUATION
- COMPUTATIONAL FLUID DYNAMICS (CFD) MODELING
- RAPID PROTOTYPING
- HUMAN FACTOR OUTREACH
- AEROSOL/DROPLET EVALUATION

DISRUPTING THE RESPIRATORY PROTECTION INDUSTRY

ARA is using cutting-edge technology and manufacturing techniques to provide a better respiratory protection solution for health care workers.*

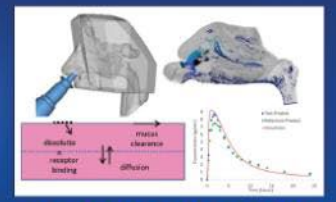
- Designed to address needs of health care workers (HCWs)
- Capable of being reprocessed (washed and autoclaved) and reused numerous times
- Iteratively developed with direct feedback from HCWs

Non-reprocessible version for the general public approved by NIOSH in Jan 2022.

PROTECTING MILITARY WORKING DOGS

ARA is leveraging expertise in respiratory protection research and development to develop an escape respirator for military working dogs (MWDs)**

- Designed to protect the MWD in the event of potential CB threat exposure via inhalation
- Loose-fitting, positive pressure system compatible with canine fur
- Working with existing CB protection manufacturers
- Provides the first respiratory protection solution for MWDs since WWII



STEROID NASAL SPRAYS

ARA is developing physiologically-based pharmacokinetic (PBPK) models to study absorption characteristics of intranasal corticosteroid sprays.

- High-fidelity CFD simulations of nasal spray deposition
- Experimental validation
- PBPK models of steroid absorption and bioavailability

TOBACCO PRODUCT DOSIMETRY

ARA is developing a Java-based software platform that incorporates respiratory dosimetry models, a nicotine PBPK model, and toxicity data to characterize potential risks of electronic and combustible cigarettes.

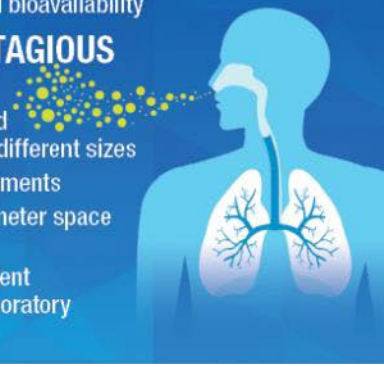
- Uses the Multiple-Path Particle Dosimetry (MPPD) model
- Over 50 tobacco product constituents (nicotine, flavors, aldehydes, metals)
- Novel tool to assess human health risks

COMPUTATIONALLY EFFICIENT MULTISCALE LUNG MODELING OF AEROSOL DOSIMETRY

- Develop two-way coupled 3D-1D airflow and particle transport models to predict site-specific aerosol deposition
- Establish a framework to include local airway and tissue mechanics
- Incorporate disease alteration in airway and tissue mechanics
- Provides state of the art modeling tool for drug delivery via inhalation and risk assessment

END-TO-END MODEL FOR CONTAGIOUS RESPIRATORY DISEASES

- Models the generation, transport, fate, and inhalation of pathogen-laden particles of different sizes
- Perform risk analysis in variety of environments
- Perform sensitivity analyses across parameter space to prioritize R&D
- Novel approaches to particle-size dependent risk analysis; extrapolation of discreet laboratory results to real-world inputs.



ARA's innovative solutions provide advanced protection for respiratory health.

*This project has been funded in whole or in part with federal funds from the Department of Health and Human Services; Office of the Assistant Secretary for Preparedness and Response; Biomedical Advanced Research and Development Authority, under contract number HHSO100201700032C. Product under development and not FDA cleared.

** Financial support by IWTSD does not constitute an express or implied endorsement of the results or conclusions of the project by either IWTSD or the Department of Defense

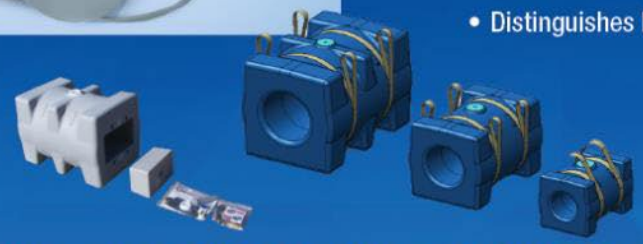
INNOVATIVE PRODUCTS & SOLUTIONS

- A TRUSTED VALUE-ADDED PARTNER
- EXPERIENCED TALENT WITH DIVERSE MANUFACTURING EXPERIENCE
- COLLABORATION FROM DESIGN TO BUILD
- CAPABLE OF SIMULTANEOUS PRODUCT BUILDS
- DECADES-LONG SUCCESS IN DESIGNING SMALL INTRICATE ITEMS TO LARGE COMPLEX EQUIPMENT

ELASTOMASKPRO

NIOSH-approved reusable N95 elastomeric respirator

- Filtered exhalation
- Wipes clean
- Maintains fit for thousands of uses
- 3 - 5x more breathable than many elastomeric respirators



SIDD - SCALABLE IMPROVISED DEVICE DEFEAT

- Explosively-driven water-jet disrupter system
- Dramatically reduces collateral damage
- Optimized for C4; can use alternative explosives
- For use by EOD units, bomb squads, etc.
- Rapidly deployed manually or by RC vehicles
- Optional strap for transport

PASSIVE RF INJECTION SPECTROMETRY (PRISM™) FOR QUANTIFIABLE TRUST

- Non-destructive, rapid, high-volume testing of on-wafer, bare die packaged test articles
- Chip signatures built through S-parameter measurement of every pin combination
- Robust statistical analysis for real-time detection of counterfeit, modified, or damaged chips
- Distinguishes between manufacturers, data/lot codes, wear and again, and residual states

ARA RF VIRTUOSO™ ANTENNA TECHNOLOGY

- Rapid, cost-effective design, fabrication and testing of custom conformal broadband array solutions
- Engineered frequency selective and radar absorbing materials for RCS and EMI reduction
- Wideband, electronically scannable, high-power, light weight, low profile
- Innovative and reconfigurable modular building block construction
- Suitable for SIGINT, radar, EW, navigation, and communications on air, sea, land, and space platforms

RF VIRTUOSO ANTENNA TECHNOLOGY

ARA's product development expertise offers novel, dependable tools and solutions for defense, first responder, and commercial markets.