



RESPIRATOR FIT
EVALUATION CHALLENGE

Informational Webinar

Feb 2, 2023 01:00 PM in Eastern Time (US and Canada)

Today's Agenda



1. Introductions
2. Challenge / Problem Area Background
3. Prize Competition Overview
4. Phase 1 Submission Requirements
5. Phase 1 Evaluation Criteria
6. Commentary on Phases 2 & 3
7. How to Enter & Next Steps
8. Q/A



Webinar Housekeeping

- Panelists will be able to speak throughout the webinar; attendees will be unable to speak but are welcome to participate through the Q&A feature
- Questions can be submitted through Q&A feature in your participant taskbar
- Questions will first be reviewed by our moderators then shared during the live Q&A at the conclusion of the event

Recording will be shared at:

<https://challenges.capconcorp.com/respiratory-fit-evaluation-challenge/>

Webinar Introductions



Challenge Sponsor Representative:

Adam Smith, PhD

Senior Scientist,
National Personal Protective Technology Laboratory

Challenge Administered by:

- Capital Consulting Corporation
- Ensemble Government Services

Oliver Gerland IV

Director of Strategy, Ensemble



Disclaimer: The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. Mention of a company or product name does not constitute endorsement by NIOSH.

Proper Fit is Critical for Filtering Facepiece Respirator Effectiveness



Respirators protect from a variety of hazards that lead to health problems with short and long-term effects such as lung damage and cancer.

Filtering facepiece respirators (FFRs) are a type of air-purifying respirator that removes particulates from the inhaled airstream of the wearer.

FFRs are made of filter material that traps particulates such as dusts and biological particles before they are inhaled by the wearer.

FFRs provide protection against particulates, but not gases or vapors.

FFRs need to form a tight seal against the user's face.



Three Key Factors Required for a FFR to Be Effective

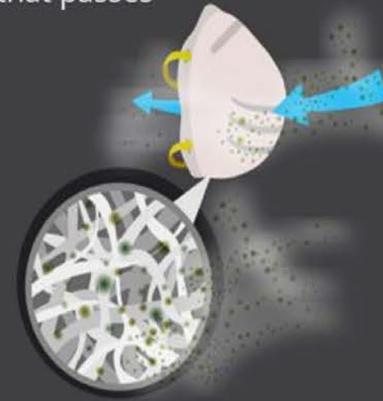


① The respirator must be put on correctly and worn during the exposure.

② The respirator must fit snugly against the user's face to ensure that there are no gaps between the user's skin and respirator seal.



③ The respirator filter must capture more than 95% of the particles from the air that passes through it.



*If your respirator has a metal bar or a molded nose cushion, it should rest over the nose and not the chin area.

The Different Dimensions of People and Respirators Impact Fit



Humans come in many shapes and sizes, as do respirators. This results in wide variability of physical dimensions and features of both people and respirators.

The ability of a respirator to form a satisfactory seal may be significantly affected by these variabilities.

If the respirator-user match (fit) is not checked, an unsatisfactory seal/barrier may unknowingly exist allowing excessive leakage of airborne contaminants into the wearer's breathing zone.

A fit test can assess whether a specific type, model and size of respirator adequately fits a specific individual end user.



There Are Existing Methods to Evaluate Respirator Fit

A fit test is a test protocol conducted to verify that a respirator is both comfortable and provides the wearer with the expected level of protection.

- Qualitative Methods - detected by the wearer's sense of taste, smell, or involuntary cough
- Quantitative Methods - measured by an instrument, to verify the respirator's fit

User seal checks involve covering the respirator surface, usually with hands.

- Positive-Pressure seal check (breathing out) -> pressure build up
- Negative-Pressure seal check (breathing in) -> no air entering in

Users can follow the written instructions of the respirator manufacturer and conduct checks via visual and tactile inspections by following the manufacturers instructions.



Photo by NIOSH

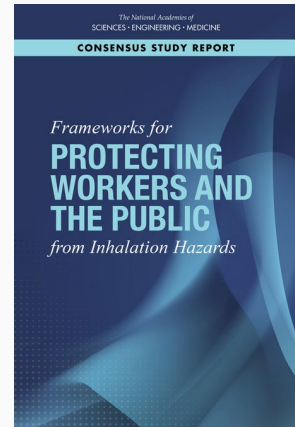


Traditional Fit Testing Might Not Be Practical Depending on Circumstances



“The threats posed by inhalation hazards extend far beyond specific worker groups that have historically used respiratory protection in the workplace.”

1. Research and anecdotal information reveal that health workers in certain settings may not conduct initial or annual fit testing on a consistent basis due to lack of resources and procedures being impractical to implement widely across an organization.
2. The general public is wearing tight fitting respirators without the benefit of a fit test to know if the respirator selected is properly providing the intended level of protection.
3. Under serious outbreak conditions, current approaches to quantitative and qualitative fit testing are constrained and lack the ability to efficiently scale.



[Frameworks for Protecting Workers and the Public from Inhalation Hazards | The National Academies Press](#)

Solutions Are Needed to Provide Immediate Evaluation and Feedback to End Users



Novel technologies and innovative approaches will be demonstrated using NIOSH Approved® FFRs

Solutions should consider how to provide feedback to a diverse group of end users, as well as faces of under-represented populations*

Solutions may involve:

- Innovative approaches to know that a respirator will fit a particular face
- Innovative approaches to determine fit after a user initially puts on a respirator
- Innovative approaches to determine fit continuously while being worn
- Qualitative or quantitative fit evaluation solutions

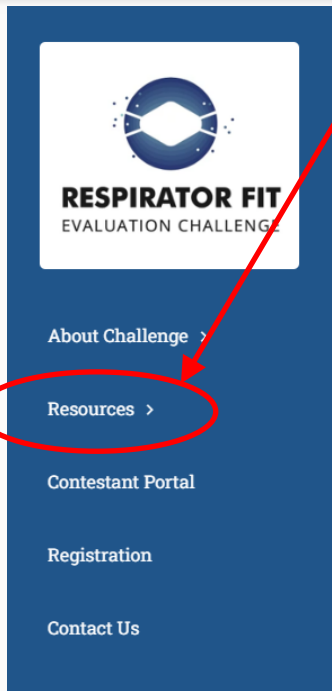
The Challenge is not focused on building a better fitting respirator



Photo by 3M

*As defined by NIOSH Anthropometric Data and ISO Digital Headforms: <https://www.cdc.gov/niosh/data/datasets/rd-10130-2020-0/default.html>

Challenge Resources



The Resources tab on the challenge website homepage contains links to valuable external resources and FAQs

- [Certified Equipment List | NPPTL | NIOSH | CDC](#)
- [Fit Test FAQs | NPPTL | NIOSH | CDC](#)
- [A Guide to Air-Purifying Respirators, DHHS \(NIOSH\) Publication No. 2018-176 \(cdc.gov\)](#)
- [1910.134 App A - Fit Testing Procedures \(Mandatory\). | Occupational Safety and Health Administration \(osha.gov\)](#)
- [Overview of the ASTM F3407 Standard Test Method for Respirator Fit Capability | Blogs | CDC](#)



The Challenge will be implemented as a three-phased, \$350,000 competition.

- Phase 1: Submit Concept Paper (10 pg.)
- Phase 2: Build & Demonstrate a Prototype
- Phase 3: NIOSH Testing & Evaluation

By the end of the competition, solutions should aim to be market-ready with user-friendly fit feedback solutions for end users of filtering facepiece respirators (FFRs).

PRIZE AWARDS

PHASE 1



20
Awardees

\$5K per Awardee, **\$100K** Total

PHASE 2



10
Awardees

\$10K per Awardee, **\$100K** Total

PHASE 3



3
Awardees

\$150K Total



x 1

1st Place
\$75K



x 1

2nd Place
\$50K



x 1

3rd Place
\$25K

Phase 1 Contestants must submit a 10-page Concept Paper on the Challenge website.

Concept Papers must be no longer than 10 pages, with up to two additional pages for letters of commitment or support.

Challenge Website:

<https://challenges.capconcorp.com/respiratory-fit-evaluation-challenge/>



**Submit a Phase 1 Concept Paper by:
May 1st, 2023!**

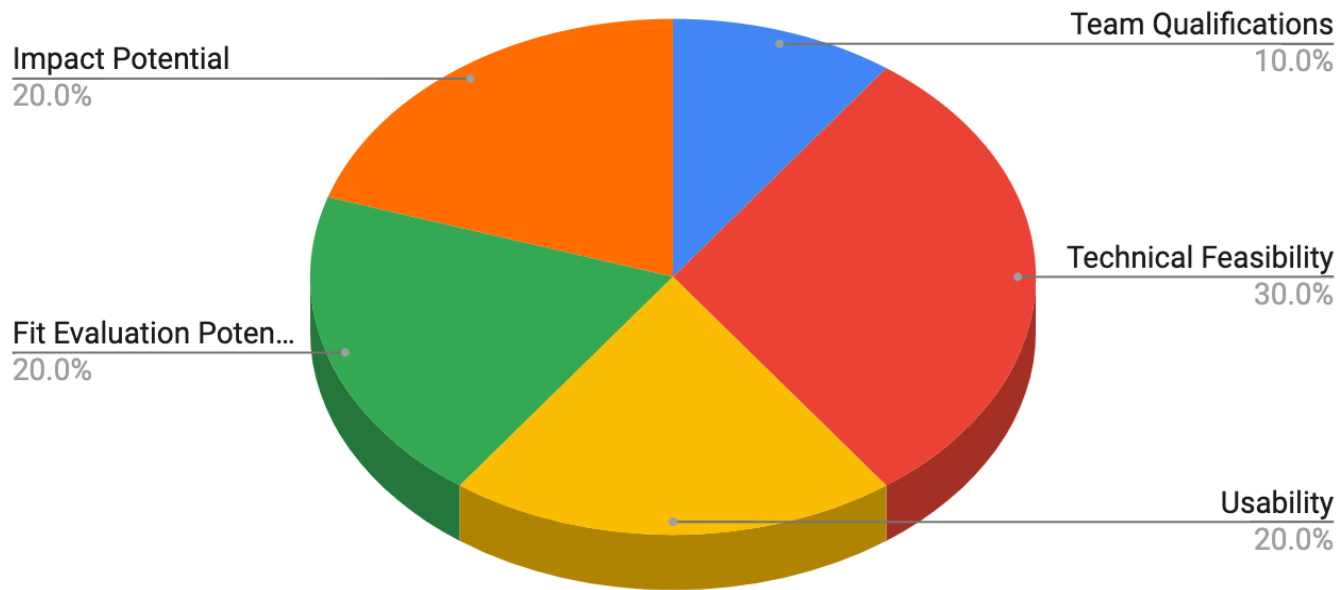
Phase 1 Concept Paper Submission Requirements

Submission Component	Component Description	Recommended Page Length
Executive Summary	Describes the overall team, solution, and data collection approach.	1
Team Description and Organizational Qualifications	Describes your team and the primary qualifications of your team and organization as it pertains to Fit Testing.	1
Fit Solution and Evaluation Approach	Describe your proposed solution and the overall fit evaluation approach.	3
Prototype Sketch	Develop a sketch, workflow, or visual representation of the fit solution	1
Ability to address the Challenge Goal	Describe how your solution addresses the problem statement in an innovative and impactful manner.	1
Data collection and measurement approach	Describes your method for collecting results and delivering results to those performing fit tests immediately.	2
Plans for Prototyping & Testing	Describe your plan for prototyping and testing if you were to be selected for Phase 2 & Phase 3	1

Phase 1 Evaluation Criteria

For full details on the Phase 1 evaluation criteria visit the Challenge Website:

<https://challenges.capconcorp.com/respiratory-fit-evaluation-challenge/home/about-challenge/#evaluation-criteria>



KEY DATES





Commentary on Phases 2 & 3

Phase 2: Prototyping

Winning Phase 1 contestants will develop verifiable prototypes of their fit evaluation solutions and conduct small-scale evaluations.

The findings from their evaluation and prototype development efforts must be documented in a Phase 2 Prototype Demonstration Report and visually captured in a 3-5 minute product demonstration video.

Phase 3: NIOSH Evaluation

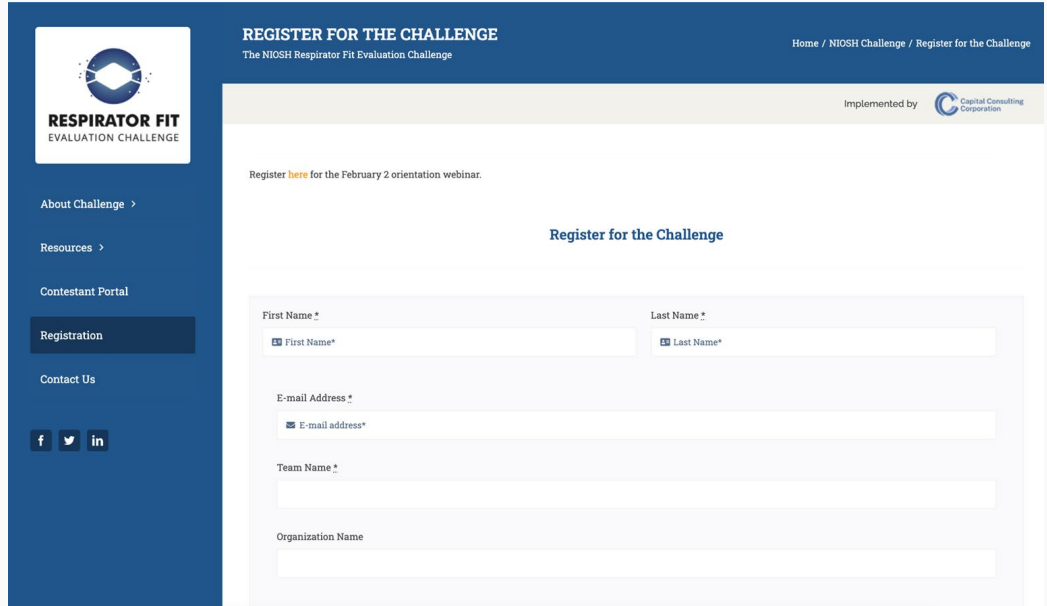
To compete for the Phase 3 NIOSH Fit Evaluation prizes, innovators will be required to submit to NIOSH staff a sufficient number of pre-production prototype devices.

How to Enter & Next Steps

Register your team.

Each team is required to identify a Team Leader who registers an official Team on the Challenge site

Submit a Phase 1 Concept Paper by:
May 1st, 2023!



The screenshot shows the 'REGISTER FOR THE CHALLENGE' page for 'The NIOSH Respirator Fit Evaluation Challenge'. The page has a dark blue header with the challenge logo on the left and navigation links on the right. The main content area is white and contains a registration form. The form includes fields for First Name, Last Name, E-mail Address, Team Name, and Organization Name. A link to register for a webinar is also present.

REGISTER FOR THE CHALLENGE
The NIOSH Respirator Fit Evaluation Challenge

Home / NIOSH Challenge / Register for the Challenge

Implemented by Capital Consulting Corporation

Register [here](#) for the February 2 orientation webinar.

[Register for the Challenge](#)

First Name *
First Name*

Last Name *
Last Name*

E-mail Address *
E-mail address*

Team Name *

Organization Name



Q/A
Thank you!