



***Respiratory Protective Devices –
Technologies, Gaps/Challenges, & Opportunities to Meet Needs of Public &
Workers in Non-Regulated Workplaces***

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Manufacturer's Role in Meeting Respiratory Protection Needs of Workers & Public

- Develop & Manufacture RPDs meeting appropriate standards
- Includes Instructions regarding
 - Proper Use & Care
 - Limitations of Use
- Stay abreast of technologies that advance performance of RPDs to meet needs of users
- Understanding customers/users demand for product

But 1st We Need a Target for Performance

-From A Regulatory Perspective

- Need Realistic, Practical Product Certification Standard(s)
 - Government
 - Consensus
- Products Developed to Meet Specifications
 - Challenge conditions & Filtration performance
 - Breathing Resistance at given flow rate
- Facial Anthropometrics Information

Challenge/Breakthrough Concentrations			
Representative Test Agent	Challenge Concentration (ppm)	IDLH Concentration (ppm)	Breakthrough ¹ Concentration (ppm)
Cyclohexane	2600	1300	10
Sulfur dioxide	1500	100	5
Hydrogen sulfide	1000	100	5
Cyanogen chloride	300	ND ² REL Ceiling 0.3	2
Phosgene	250	2	1.25
Hydrogen cyanide	940	50	4.7
Ammonia	2500	300	12.5
Phosphine	300	50	0.3
Nitrogen dioxide	200	20	1 ppm NO ₂ or 25 ppm NO
Formaldehyde	500	20	1
P100 filter >99.97% efficient			

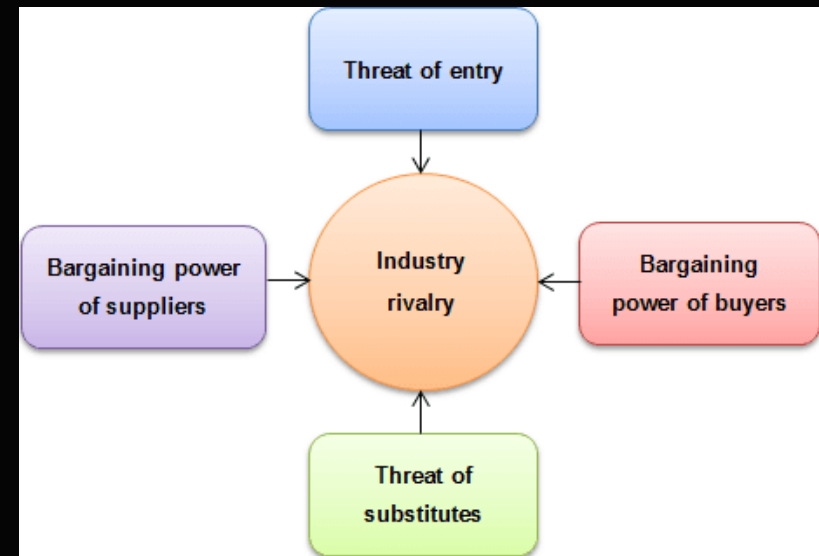
¹ CBRN canisters are not evaluated to breakthrough, only to the capacity time of intervals of 15 minutes.

² IDLH for cyanogen chloride has not been determined. The NIOSH Recommended Exposure Limit (REL) ceiling value is 0.3 ppm. The ceiling value should not be exceeded at any time.

2nd Need to Know Likely Market for Product(s)

-From a Marketing/Business Perspective

- In line with Organization's Strategy?
- What is the Scope/Size of Market?
 - Is it Driven by Government Mandate, Required use or Public Awareness?
- Understand User Needs/Preferences
- Is there a Favorable Business Case?
 - NPV, SWOT
 - Five Forces Assessment



Tasks Involved with Product Development

-From a Technology Perspective

- Can existing product/technology be leveraged?
- Does new technology have to be developed?
- Does one type have to be effective against all potential wildfire, biological & CBRN related hazards?
- Does user know when or how to match respirator to hazard(s)?
- Does it have to be a “one size fits all”?
- Is source control necessary?



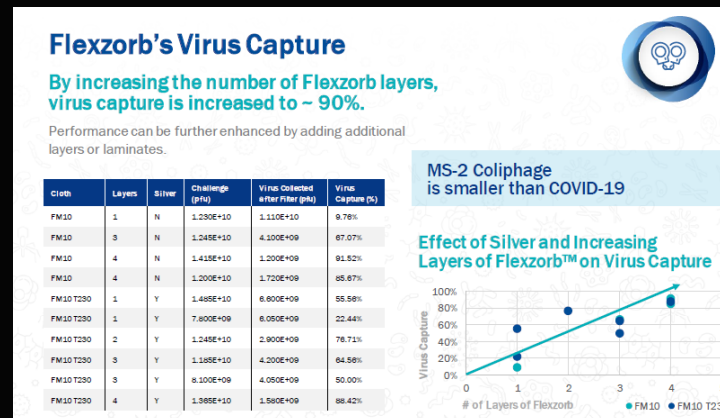
Some Likely Design Enhancements Needed for Meeting Needs of Public-Just a few!

- 1) Sorbents capable of filtering broader range of airborne toxicants, while maintaining low breathing resistance
- 2) Improved moisture resistant CO catalyst (Wildland Fire applications, if needed)
- 3) Faceseal materials which accommodate broader range of facial anthropometrics, while maintaining retention to face while perspiring, & eliminate need for fit testing
- 4) Facial imaging technology to assist users in selecting appropriately fitting RPD

Potential Solutions for Needed Filtration

-Further Study Needed!

Impregnated Carbon Fabric



CO-Lattice Catalyst



Potential Solutions for Improved Fit/Seal & Comfort

-Further Study Needed

Faceseal Gel material



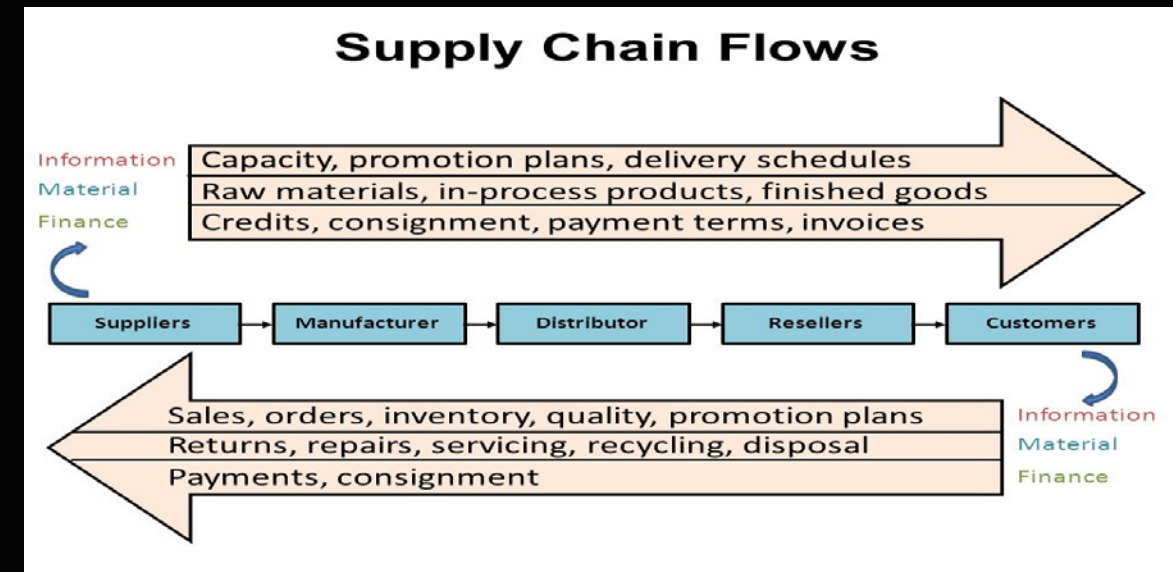
Measurements & 3D Printing for Improved Fit, even with Facial Hair



Stakeholders & Key to Successful Supply Chain

-Do you want a Partner or Simply a Supplier?

- Implement/integrate ERP System to match needs with Respirator Manufacturer
- Consider only Domestic Sourcing
- Consider partnering with GPO organization, or modeling one's system



Information should flow in both directions

Closing Remarks & Recommendations

-How Government Can Assist/Partner with Industry

- 1) Facilitate or Drive Development of Product Specification
-Government or Consensus
- 2) Establish whether product is required or voluntary
- New products usually developed for markets mandating/requiring use
- 3) Support research on advanced air filtration, facesal & facial measurement technologies
- 4) Consider benchmarking new, non-certified respirators on market
- 5) Partner with national healthcare supply chain GPO to gain deeper & continuous insight on use, source & distribution challenges

Thank You

