



# Engineering Controls for SARS Cov-2 in the Transportation Sector

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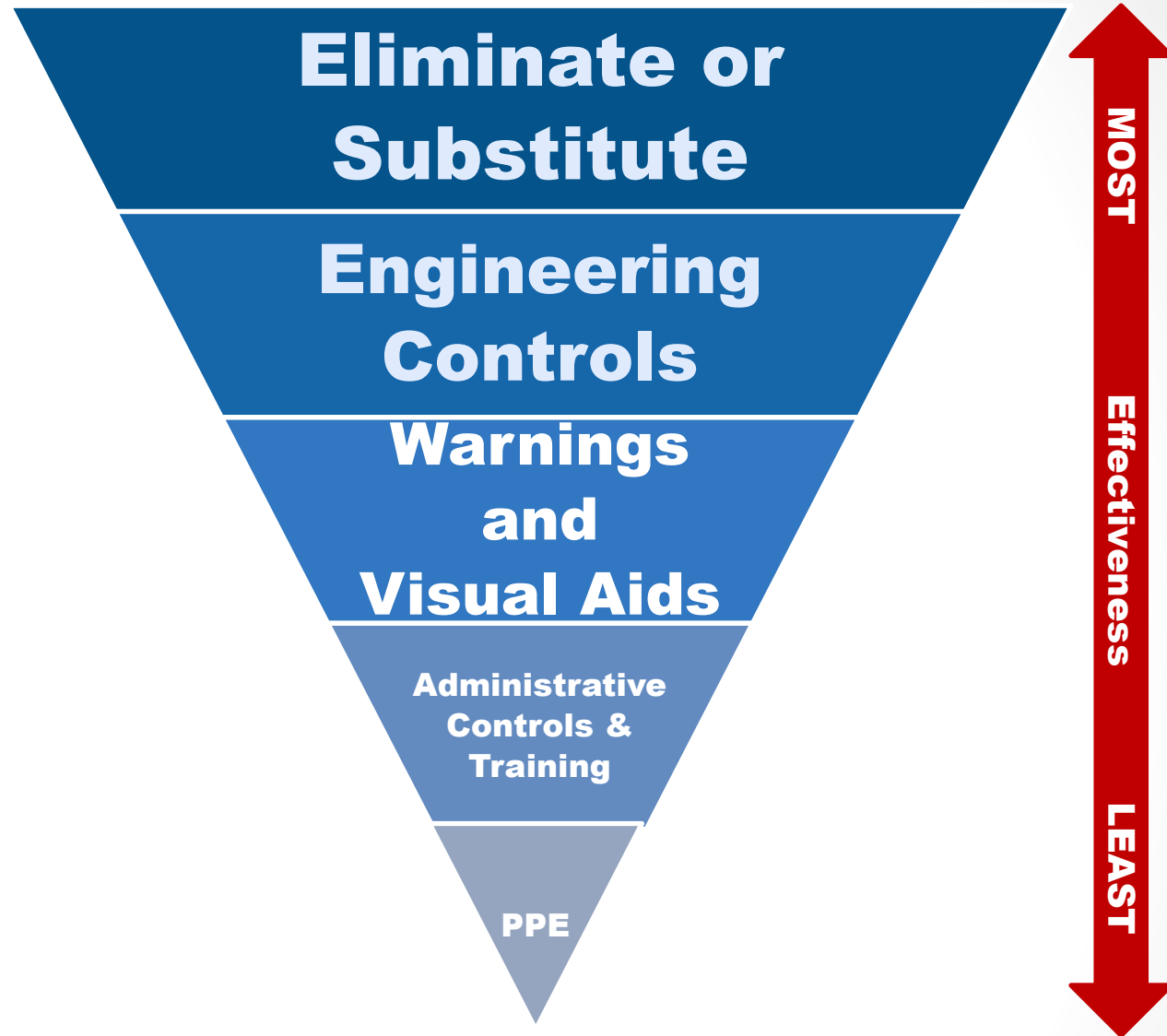


# Outline

- Engineering Controls for SARS COV-2
  - Distancing
  - Ventilation
- Focus on the importance of worker involvement
  - What have been some major concerns
  - What Hurdles still exist



- **Sick and Susceptible Stay Home**
- **Maximize ventilation**
- **Maximize physical distance**
- **Disinfection**
- **Signage**
- **Train and train and train and train and train**
- **Mandatory face coverings.**



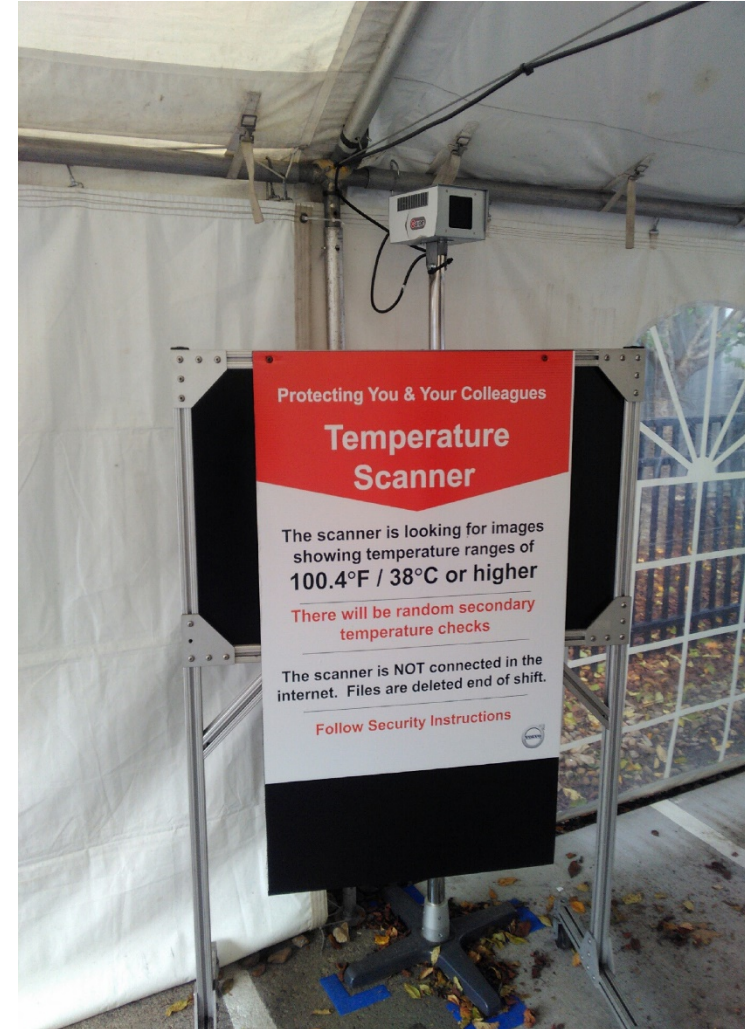




# Temperature Scan Concerns

## “Why is this information Needed”

- Reassure workers that temperature scan is for entry purposes only
  - Data is not permanent record or available on internet
  - “the scanner is NOT connected in the internet. Files are deleted end of shift”
- There have been elevated temperatures found at some UAW facilities that have lead to quarantine.



# Break Areas

Signage



Better: Barriers



# Company goal before reopening

Each site shall make a risk-based determination, for the various tasks performed, to identify tasks where social distancing is challenging to maintain at all times. Work stations shall be configured to include 6-foot distancing between employees. Consider temporary physical barriers between work stations.





# Process Evaluation Assembly

## Example Truck Plant

- What was the interaction level of each job? Would it require working within 6ft of one another?
- If yes, would a change to the SWI prevent this <6ft risk?
- If not, would a change to the Work Station prevent the risk of <6ft risk?
- If not, would a “Station Curtain” suspended above be able to divide the work area?
- If not would a “Chassis Guard/Barrier” mounted to the chassis provide protection to mitigate risk?
- If not would a “Tool Guard/Barrier” mounted to a crane or tool provide protection?
- If none of the above worked we deemed the job to have an additional PPE requirement

## Standardized Work

EIS	NO.	OPERATION ELEMENT DESCRIPTION	INT REF	ZONE	WORK	INNAGE	KANBAN	VIB CH
	1	READ MANIFEST						
	2	SET LUGNUTS TO STARTER GUN						
	3	WALK TO START						
	4	SET WHEEL ASSY TO HUB W/ ASSIST						
EIS	5	TEMP INSTALL (5) LUGNUTS TO WHEEL ASSY				0.00	0.1668	0.1668
	6	WALK TO LUGNUT RUNNER						
EIS	7	SECURE LUGNUTS W/ NUT RUNNER						
	8	WALK TO START						
	9	LOAD FOOTREST						
	10	SET LUGNUTS TO STARTER GUN						
	11	WALK TO VEHICLE						
	12	REMOVE LEFT REAR HUB NUT CLIP						
EIS	13	SET WHEEL ASSY TO HUB W/ ASSIST						
EIS	14	TEMP INSTALL (5) LUGNUTS TO WHEEL ASSY						
	15	WALK TO LUGNUT RUNNER						
EIS	16	SECURE LUGNUTS W/ NUT RUNNER						
	17	RETURN TO START						
TOTAL WORK TIME BY BASE KATASHIKI								
TOTAL WORK TIME BY LOADED KATASHIKI								
TOTAL TIME BY WORK TYPE						43.0	0.3336	0.3336



OU JOB SPECIFIC SOCIAL DISTANCING CONFLICTS

Group Jobs (OU 400)	# Employees for each Job (only OU 400)	Status	Shared tools?	Time % of conflict	Increase Takt Tim	Alternate/Additional Process	PPE Required
WIRING (LEFT)	1	6 feet side by side	No	85%	Same	Will have a plastic drop dividing the jobs and creating a barrier	
Wiring (ALT)	1	6 feet side by side	No	85%	Same	Alt wiring will do trans wiring due to have plastic drop from above structure to separate people	
Trans Wiring	1	6 feet side by side	No	85%	Same	Will have a plastic drop dividing the jobs and creating a barrier	
BATTERY Cable	1	No Conflict	No	50%	Yes		
WATER PLUMB/B-C	1	6 feet side by side	Yes	100%	Yes	Will be eliminated on 60 rate	
Waterplumbing 2	1	6 feet side by side	No	100%	Yes	Will not be in conflict with social distancing once the above job is eliminated	
CAC LH	1	6 feet side by side	No	85%	Same	Going to stagger the left and right employees and move one down a station on the line to create separation.	
CAC RH	1	6 feet side by side	No	85%	Same	Going to stagger the left and right employees and move one down a station on the line to create separation.	
RAD SWING RH	1	6 feet side by side	No	100%	Same	Still under investigation and looking for possible solutions	
RAD SWING LH	1	6 feet side by side	No	100%	Same	Still under investigation and looking for possible solutions	
P/S BUILD UP	1	No Conflict	No	0%	Same		
HOSES BU	1	No Conflict	No	0%	Same		
WATERSPIDER	2	No Conflict	Yes	0%	Same		
RAD BU	2	6 feet side by side	Yes	100%	Same	Building another build up table so that the employees can each build radiators separately	
RAD FINISH	1	No Conflict	No	50%	Same		

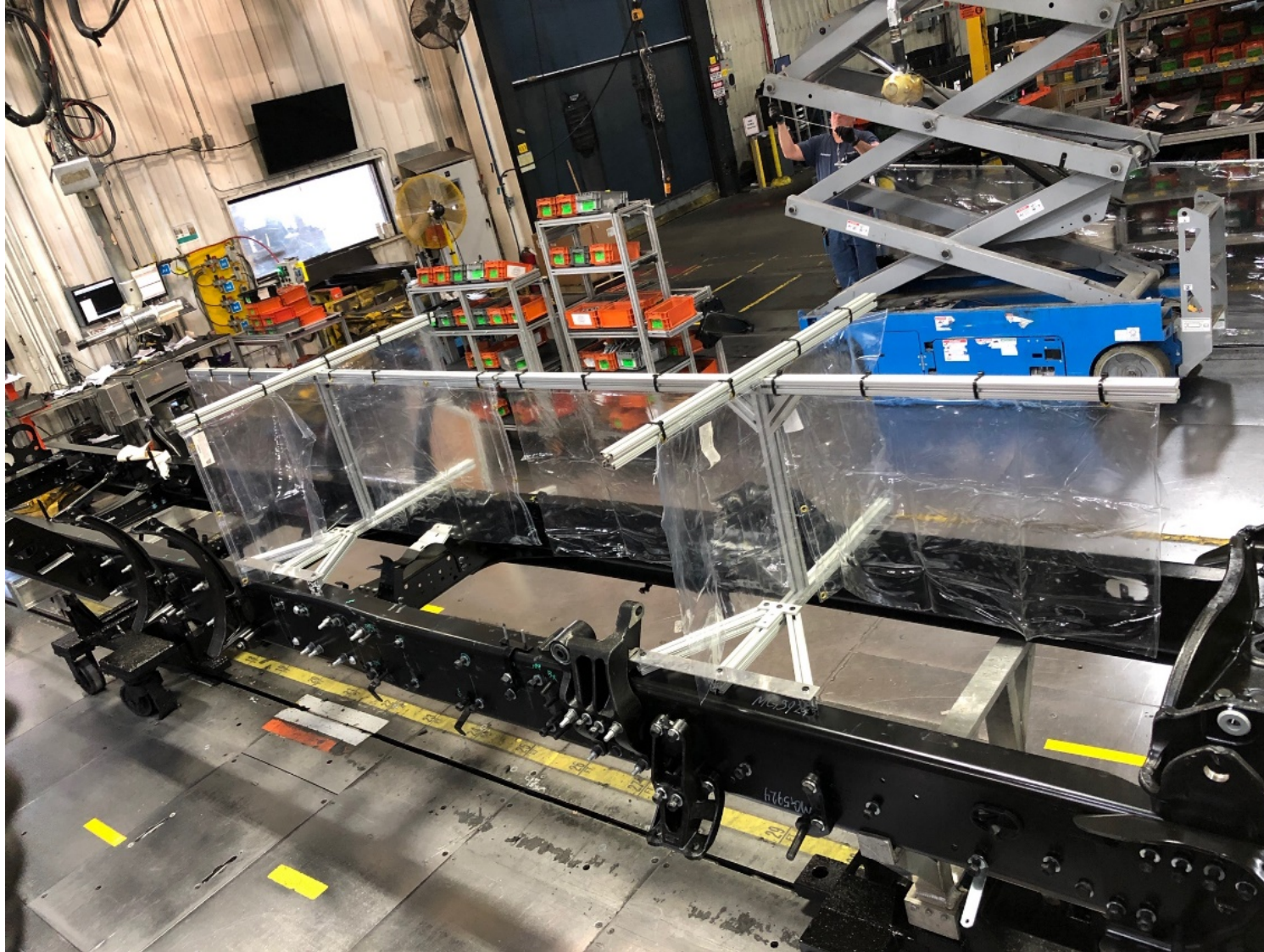


# Line Speed considerations

- On start up the target for large assembly plant was 10 trucks per day
- 30 trucks were produced
- Full production is 79 trucks per day
- Evaluation of physical distance conflicts took line speed into consideration
  - But full production still creates spacing conflicts



# Example of Physical Barrier





# Difficult work spaces





# Two person Task in Confined Area



- With circulating fans and air conditioning off workers face covering use declined
- Workers dropped out from heat stress
  - UV radiation being used inside to decontaminate Truck Cabs
  - Planned tunnel for UV radiation on Chasis line



## Two person jobs : Ergonomic considerations for Lifting and Assembly

Photo source: New York Times



# Ventilation Concerns

## Concerns

- Air conditioning and filters improved
  - Maximize MERV filtration
- Floor fans running
  - Necessary for cooling
- Run ventilation continuously
- Some plants opening loading dock doors
  - Many UAW facilities do not have air conditioning

## Examples of Plants' Varied in MERV filtration (Same Company)

### Plant 1:

- Prefilter – MERV 8
- 2<sup>Nd</sup> Stage Filter – MERV 10
- Final Filter – MERV 13 or 15

### Plant 2:

- MERV12

But working with filter supplier to boost that up to MERV16 (highest we can go) on the majority of the roof-top units.

### Plant 3

- MERV 9 is prefilter and MERV12 is the final filter.





# Multi-stage filters

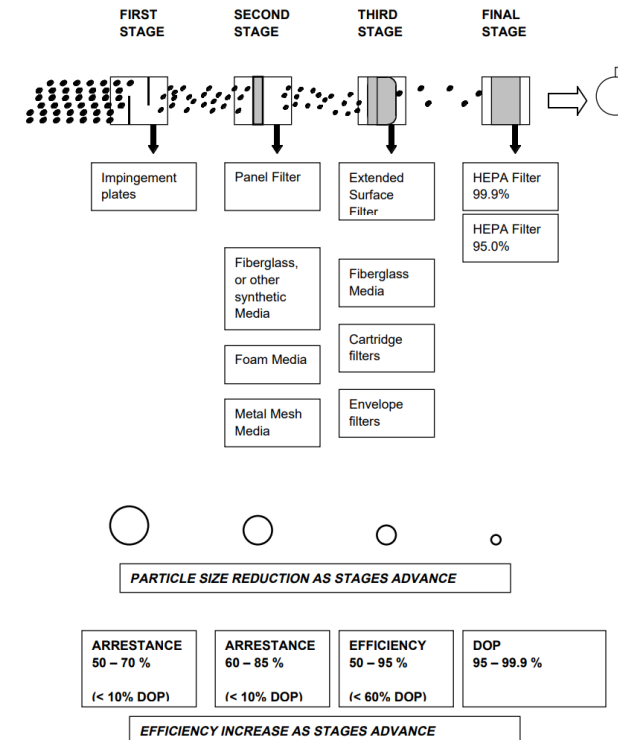
## Best performing plant

Plant 1:

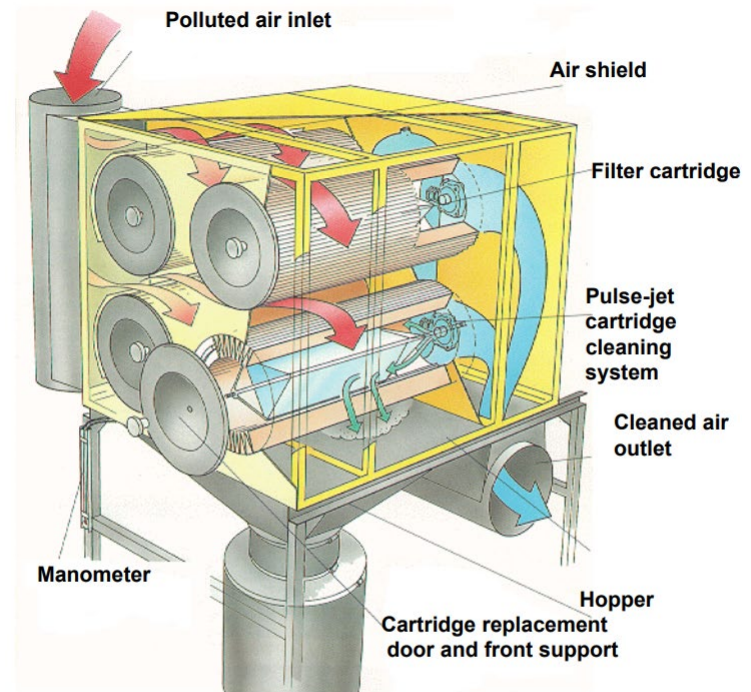
- Prefilter – MERV 8
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## Example of Multistage Filter

Example of the typical multi-stage collector arrangement:



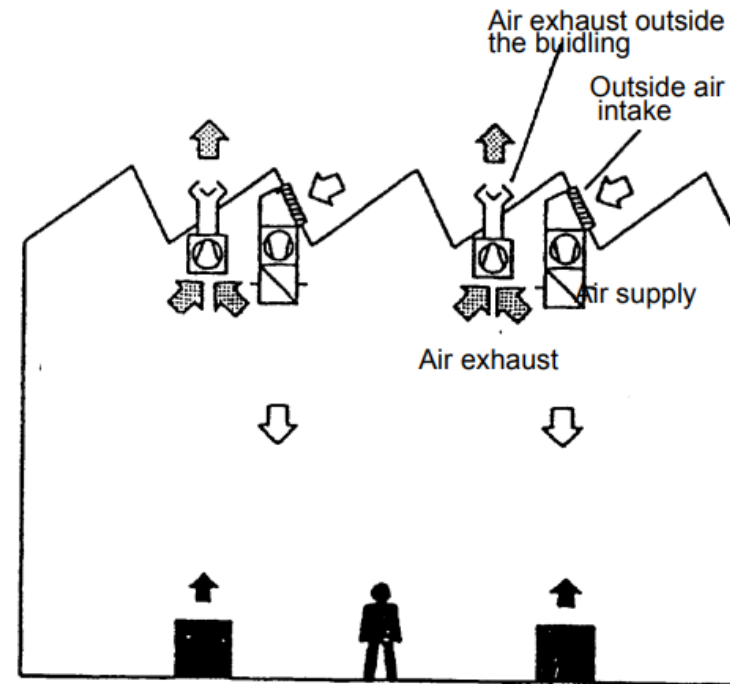




**Figure 5.16.** Schematic of a self-cleaning cartridge filter. Reproduced with permission from Plymovent AB.

# Clean Air Distribution

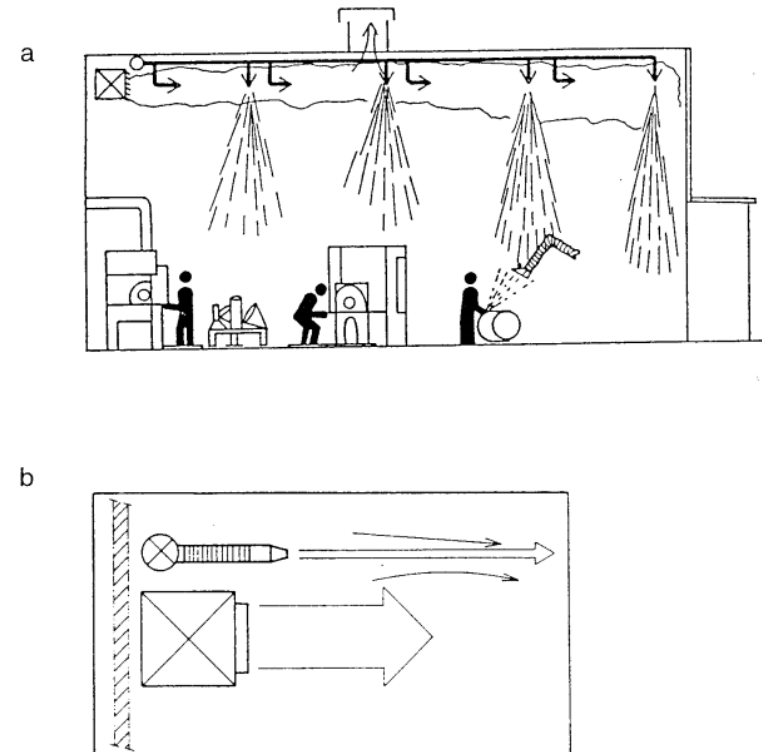
- Once you filter and condition the air how do you distribute it to eliminate entraining virus?





# Concentrated Air Supply with Directing Air jets

Concentrated air supply with horizontal and vertical directing jets. Goteborg, Sweden



# Ventilation Controls for Machining Fluid Myco-bacteria





# NIOSH HHE

Evaluation of Metalworking Fluid Exposure,  
Dermatitis, Respiratory Symptoms, and  
Psychosocial Factors in an Engine  
Machining Plant



- Report describes a number of engineering controls
- Raises questions about some practices
  - Validates some ventilation adjustments
  - Serious questions on illness surveillance



# Ventilation Improvements Validated by NIOSH



Right angle extension  
for exhaust



### **New Fresh Air drop**

Fresh air plenum delivered in stagnant area where





## **Bad Practice**

Putting filter material over the end of the exhaust for the mist collector  
NIOSH reports point out ineffectiveness



# Exhaust discharge equipped with angled vent

## with angled vent



# Local Exhaust Ventilation

Photo published in 2000.  
(We know how to do this)



**Note Barrier Guard and downdraft**

- “Unidirectional flow ventilation for the polishing and grinding operation at DaimlerChrysler body shop in Sindelfingen. Air is supplied through special panels with low velocity and low turbulence and is extracted through square opening in the floor with grating cover. Two work places located on each side of the car body are separated with plastic curtain to prevent cross contamination.”  
Ventilation Guide for the Automotive Industry Page 24



## Face shield with Fan and Filter

Workers concerned with fogging of eyewear. Created with on-site 3D printer.

