The Effects of Copper Mesh on the Suppression of Navy Cable Fires by Ultra Fine Water Mist

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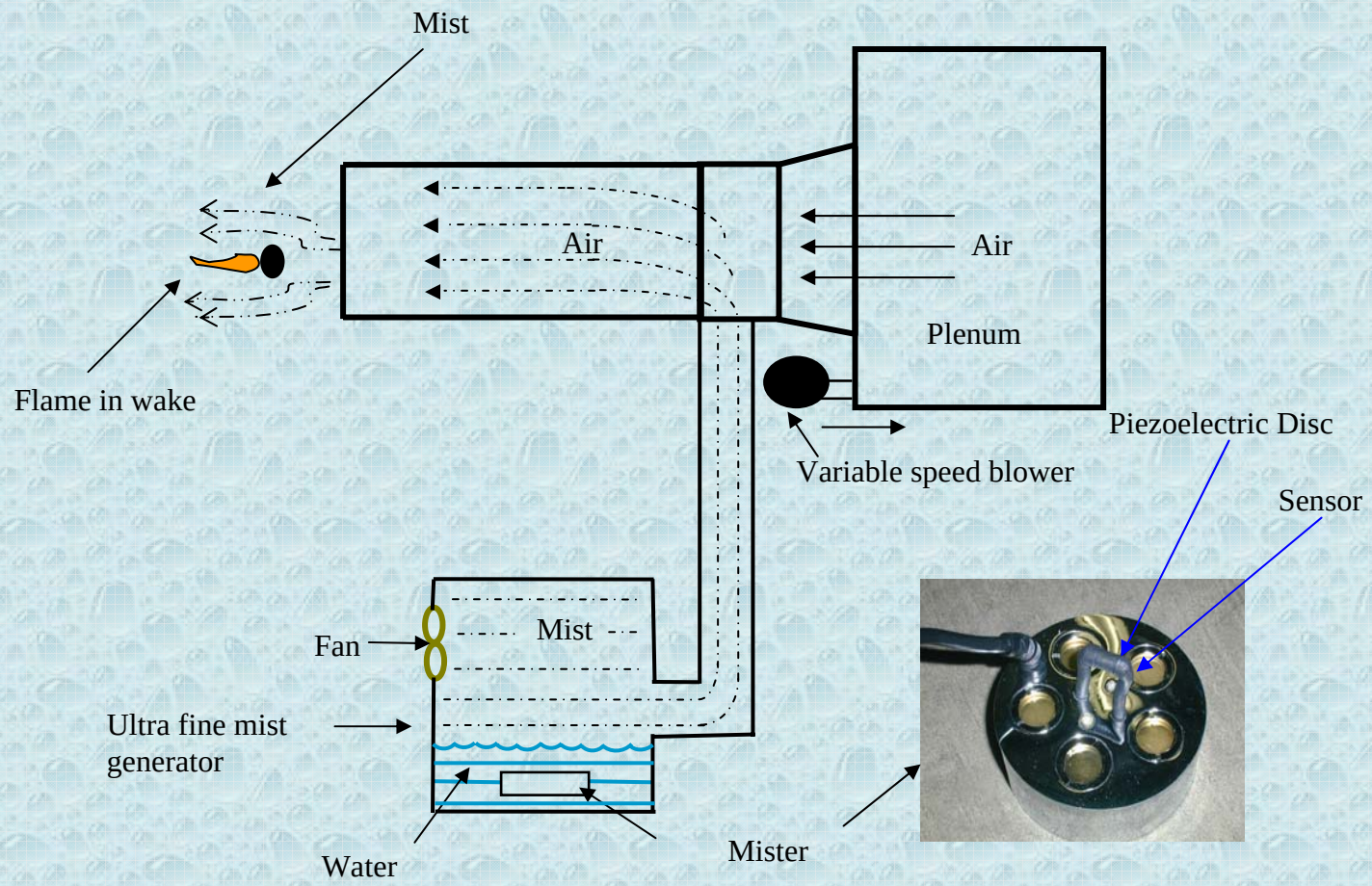
Motivation

- Navy Ship sub-floor compartments contain power and communication cables vital for ships mission
- Need to quickly extinguish the sub-floor fire to save the ship mission
- Ultra Fine Mist (UFM) is a good candidate to quickly extinguish sub-floor fire since the UFM is environmentally safe and has minimal water damage

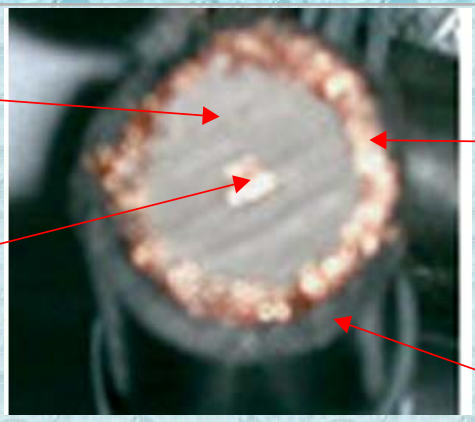
Objective

- Show the role of the copper mesh on the burning of the Navy communication cable in cross-flow
- Show the role of the copper mesh on the extinguishment of the Navy communication cable fire in a cross-flow by ultra fine water mist

Experimental Setup



A Closer Look at the Cable



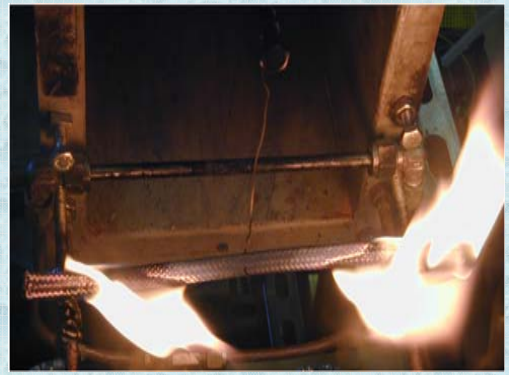
Cable with PVC cover

Cable with copper mesh exposed

Pictures of the Cable Burning Without Mist

Side view ~ 0 s after ignition

Top view ~30 s after ignition



Top view ~185 s after ignition flame spread to the end

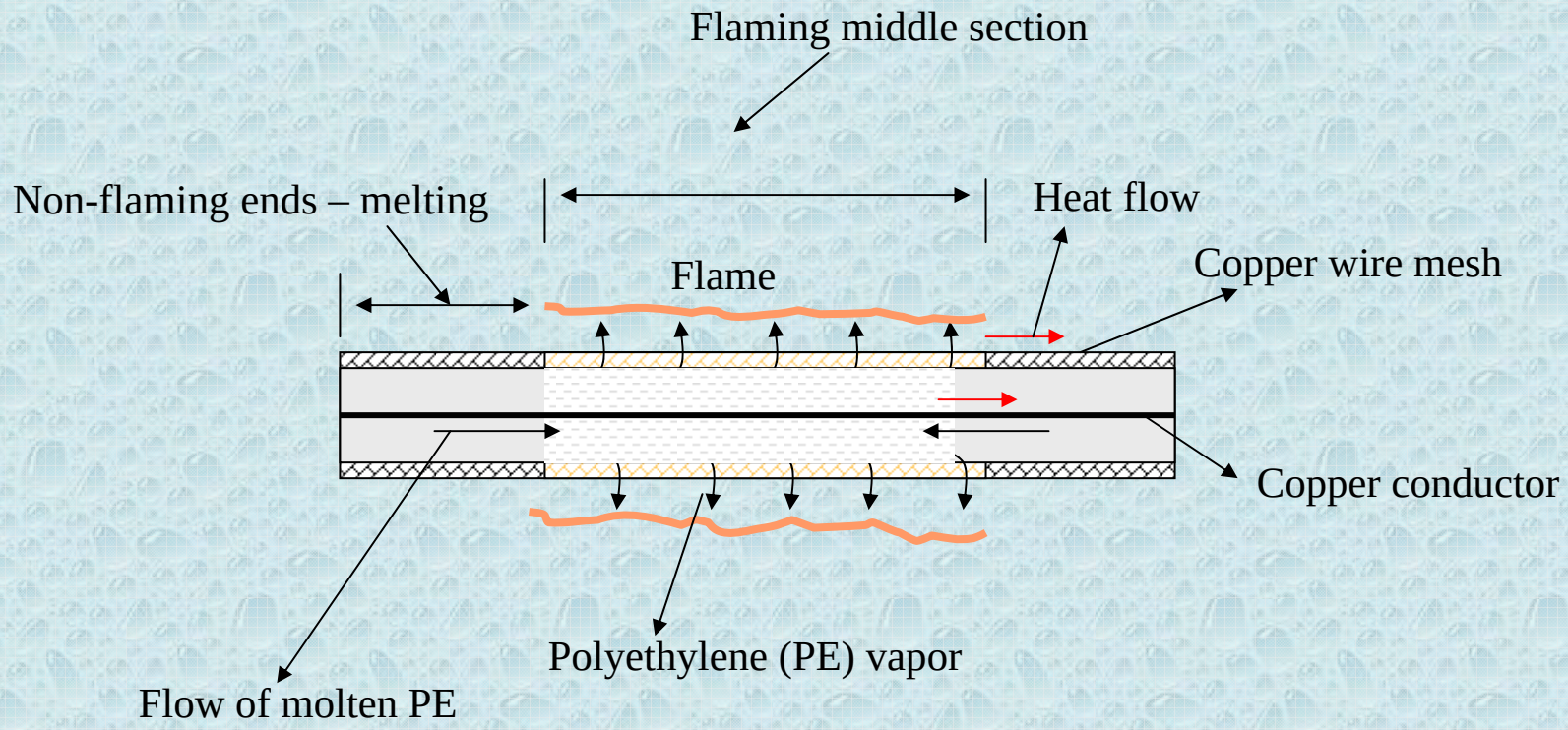
Pictures of the Burning Cable with Mist

~15 sec after mist

Top view ~ 40 sec after mist
Burning in the middle only

~ 80 sec after mist

Hypothesis: Role of the Copper Mesh



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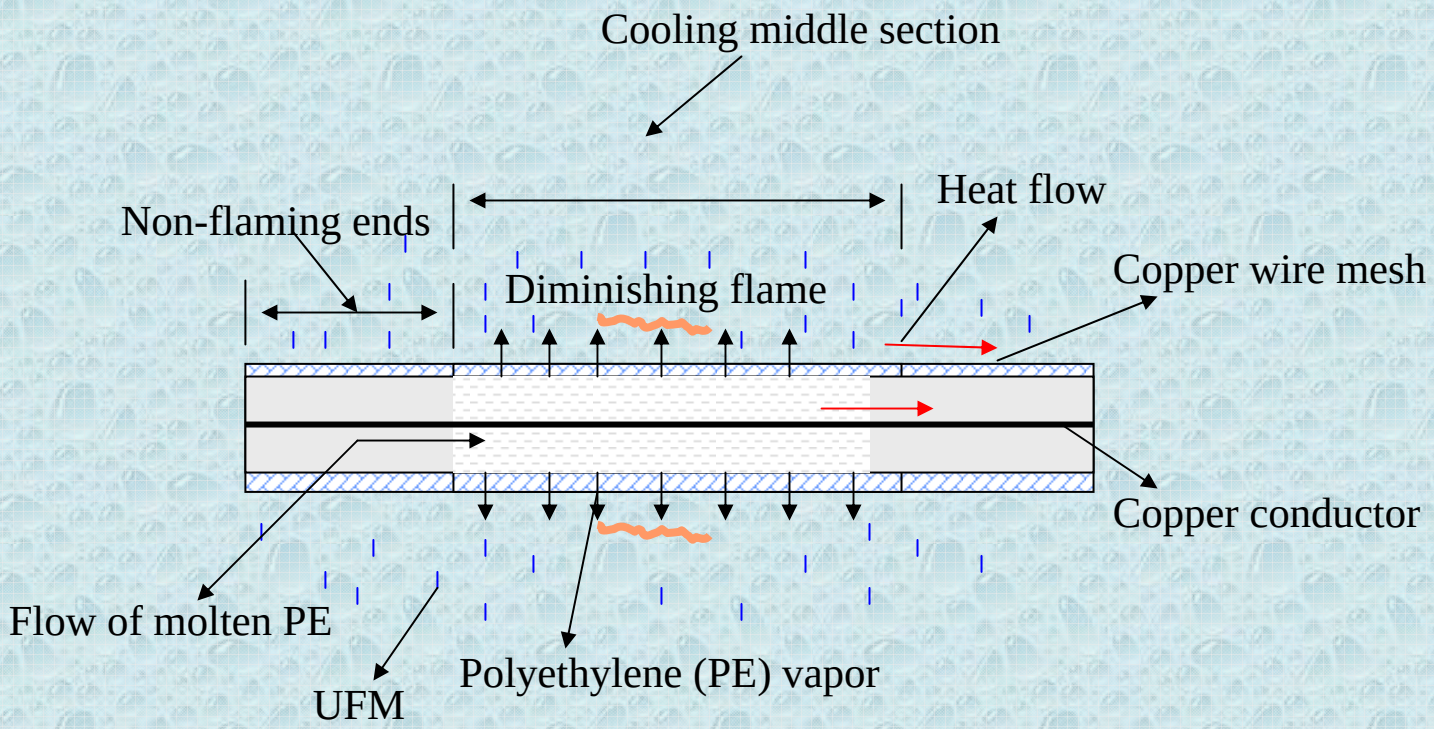
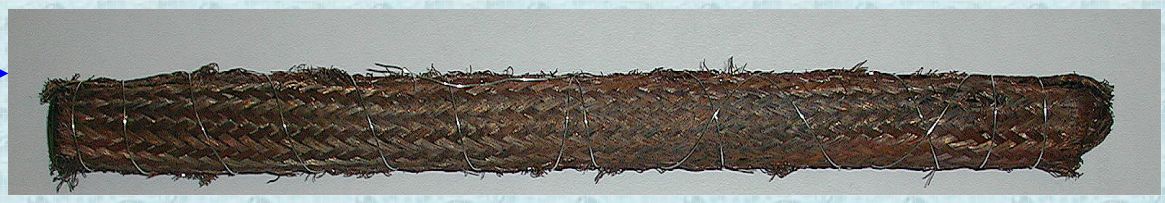


Hypothesis: The copper mesh will enhance the suppression of the cable flame in the presence of UFM.

Experimental Setup (continued)

PMMA Rod

Wrapped PMMA Rod



- Polymethyl Methacrylate (PMMA) was used in place of the actual navy cable (M17/77).
- The PMMA fire wouldn't extinguish with the low mist concentrations that were used in our experiments.
- Wrapped PMMA with copper mesh to see if the mesh effected the suppression of the fire in a cross flow.

Results

Sample	UFM mass fraction (%)	Time to Extinguishment after mist is introduced (s)
PMMA rod – no Cu wire	18	Still flaming after 600 s
PMMA rod with Cu wire mesh wrapped over it	18	33
↓	14.6	33
	10	57
	7.9	53
	4.1	142

Conclusion

- The results of our tests prove that the copper mesh enhances the suppression of the cable fires.

Acknowledgements

- Dr. Chuka Ndubizu
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- Damian Rouson

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