

3rd PJ Paul Combustion Researchers Meet
VSSC Tiruvananthapuram

Some Puzzles on
Diesel-on-Water Pool Fire Combustion

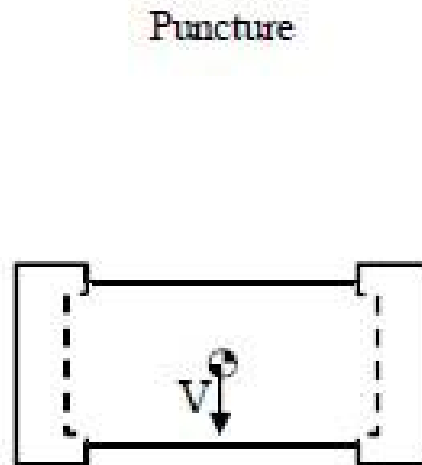
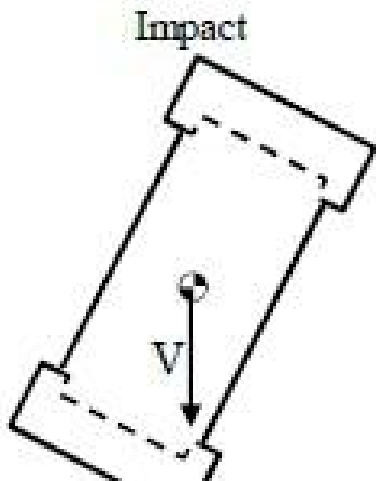
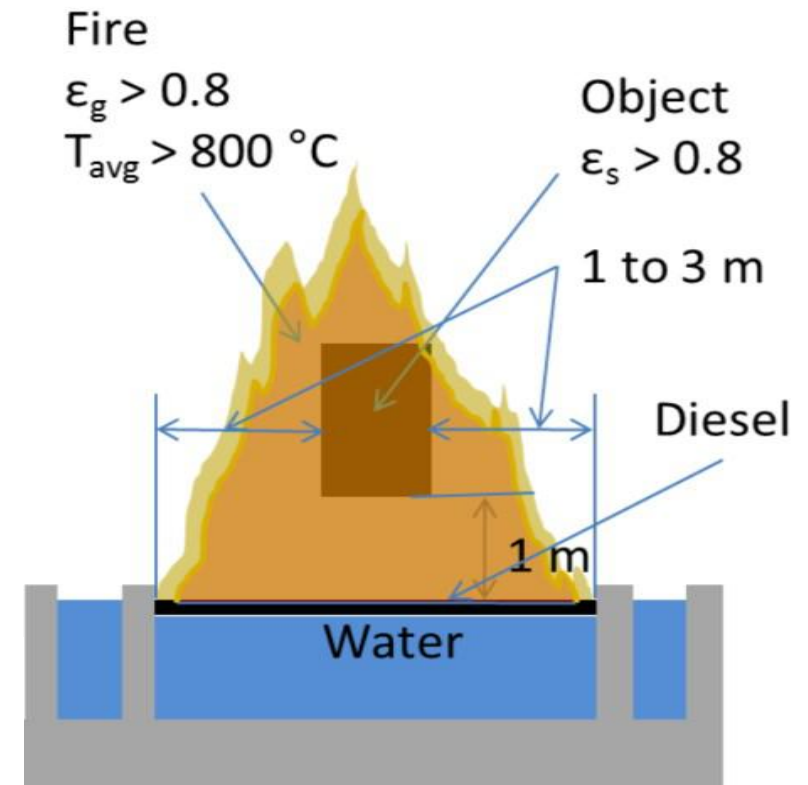
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Content

- Background
- JU Experience
- Description of Diesel on water pool fire
- Investigative techniques
- Discussion
- Conclusion

Diesel Layer Combustion: JU Experience

- JU has conducted diesel layer pool fire studies for BARC to qualify new generation transportation packages
- Studies require packages to be subjected to ~ 30 min duration engulfing fire
- Burn rate value necessary to decide initial fuel layer thickness

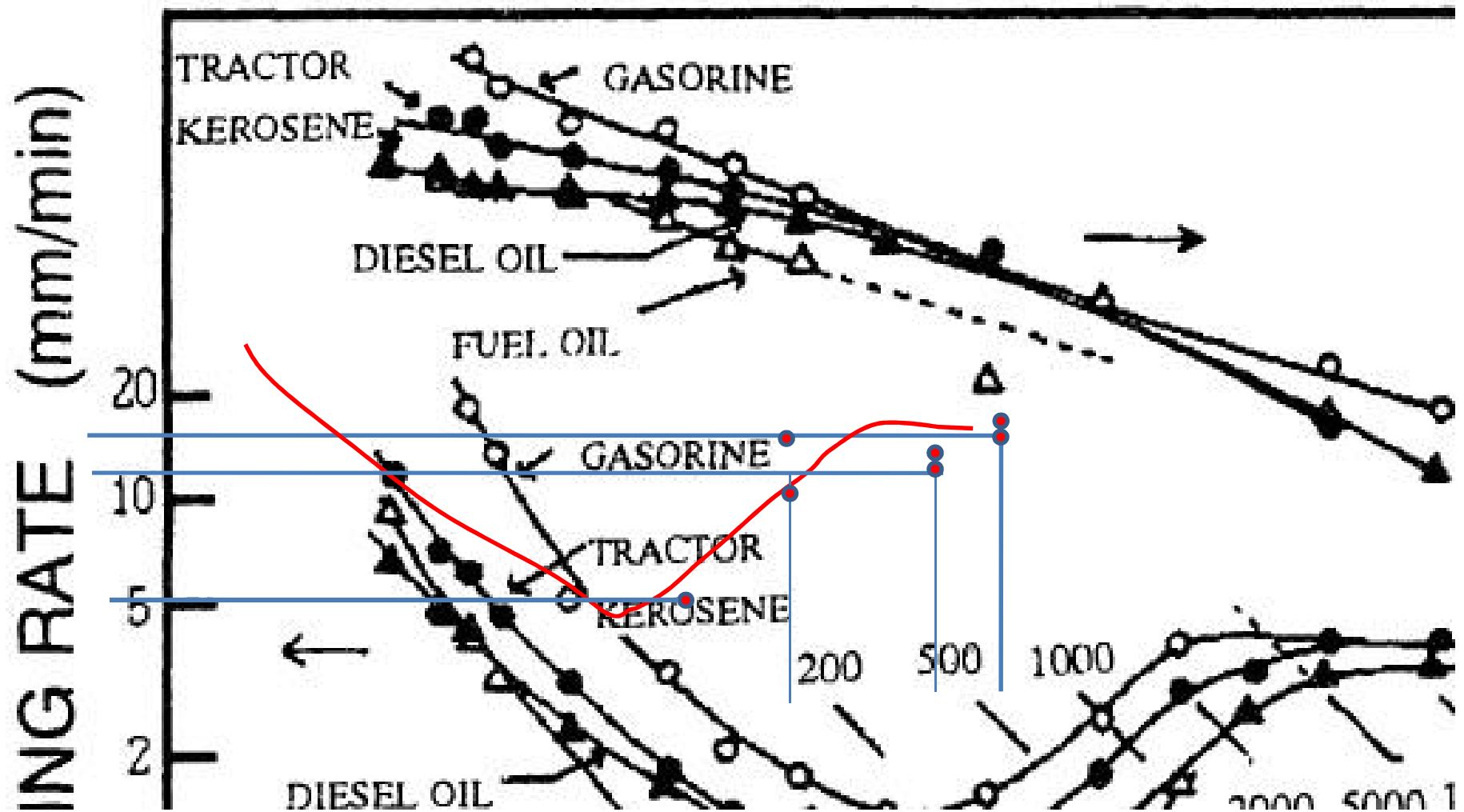


Pool Fire Experiments at JU

SI	Test date	Area m ²	Fuel bed mm	Burn time (min)	Average Burn Rate			Parameters Recorded
					mm/ min	kg/s	Fuel Flux g/m ² s	
1.	13 th Feb., 0445 hrs	4.65	23 (28°C)	400+240* (6.6+4.0)	--	--	--	Burn rate, T _{lip}
2.	15 th Feb. 0430 hrs	4.65	57 (28°C)	1380 (23.0)	2.47	0.158	34.0	Burn rate, T _{lipr} , TI Small Calorimeter
3.	15 th Feb. 0545 hrs	4.65	48 (28°C)	1080 (18.0)	2.60	0.166	36.0	Burn rate, T _{astr} , TI
4.	09 th Apr., Test A	0.23	34 (30°C)	713 (11.8)	2.03	0.006	27.0	Burn rate
5.	10 th Apr. Test B	0.23	90 (32°C)	738 (12.3)	1.95	0.007	28.3	Burn rate
6.	11 th Apr. Test C	0.23	150 (39°C)	706 (11.75)	2.04	0.007	29.4	Burn rate
7.	12 th Apr. Test D	0.23	150 (44°C)	453 (7.55)	3.17	0.010	43.4	Burn rate, T _{wall}
8.	15 th Apr. Test E	0.23	150 (35°C)	450 (7.5)	3.2	0.010	43.4	Burn rate, T _{wall}
9.	16 th Apr. Test F	0.23	150 (39°C)	709 (11.8)	2.03	0.006	26.0	Burn rate
10	15 th May	16.4	103 (28°C)	1920 (32)	3.21	0.747	45.9	Burn rate, T _{astr} , Large Calorimeter, TI

T_{lip} -- Lip Temperature, T_{AST} -- Adiabatic Surface Temperature, T_{wall} -- Wall Temperature,
TI -- Thermal Imagery

JU Test Results on Hottel Plot

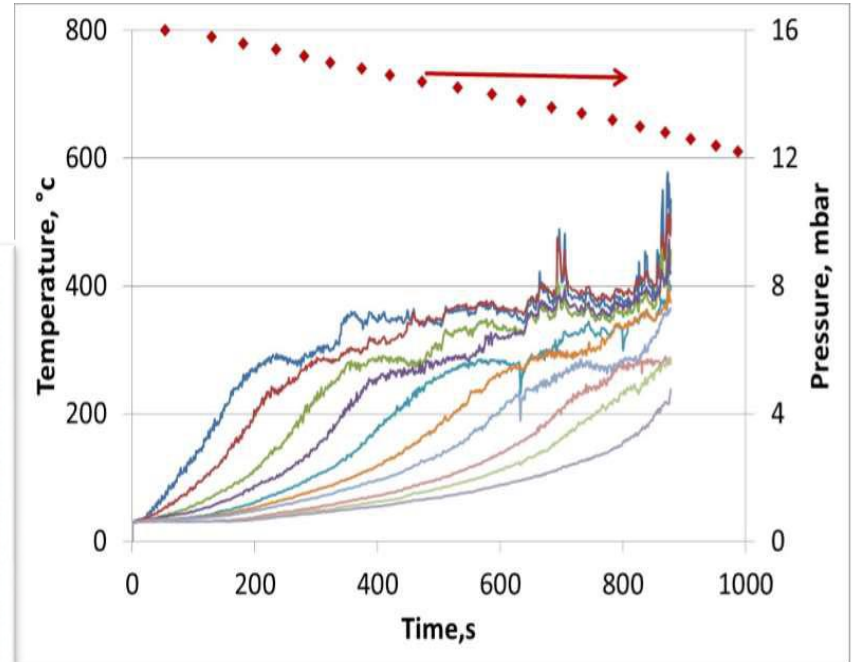
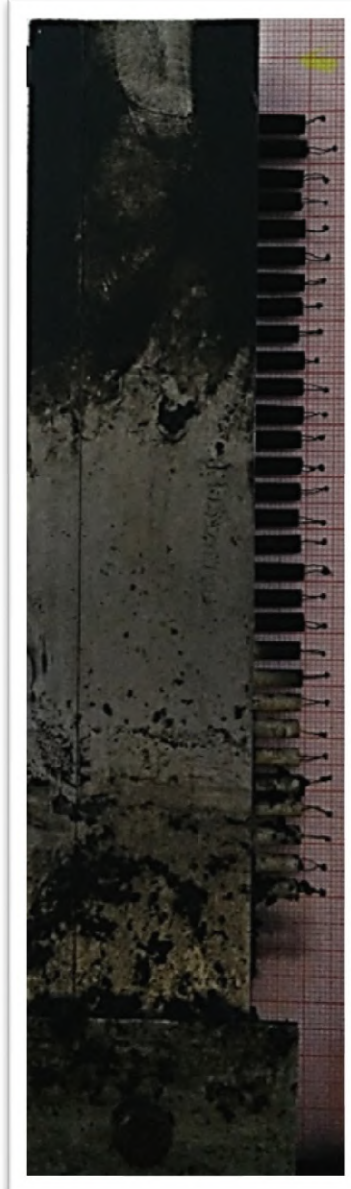


Experimental Techniques



Experimental Techniques

P_r in water tank and T in fuel & water layers were measured
Wind velocities during the fire measured
Thermal imagery and video recorded



T & P Data from Barrel Fire Tests



TC Rake



Submerged Pressure Sensor

4 m Pool Fire Results

