

17th Century Cat Piss and the EWC Combustor: A Short and Partial History of the J Stove

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PHILOSOPHICAL

TRANSACTIONS.

May the 25th. 1686.

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1. **A**N Account of an Engine that Consumes Smoak, shown lately at St. Germans Fair in Paris; Communicat. d by Mr. Justell. R.S.S. 2. An Extract of the Journals des Sca-

An Account of an Engine that consumes Smoak, shown lately at St. Germans Fair in Paris Communicated by Mr. Justell R.S.S.

TO burn all sorts of Wood in the middle of a Room without making any Smoak, is a thing so extraordinary, that all those that have heard speak of it, as well Philosophers as others, have asserted it impossible: but Mr. Dalefine Engineer, prosecuting his discoveries, has found out a Machine, which tho' very little and portable, consumes all the Smoak of all sorts of Wood whatsoever, and that so, that the most curious eye cannot discover it in the Room, nor the nicest Nose smell it, altho' the Fire be perfectly open. This has given such satisfaction to all that have seen it, and to the King himself, that he has caused the Experiment to be made several times before Him.

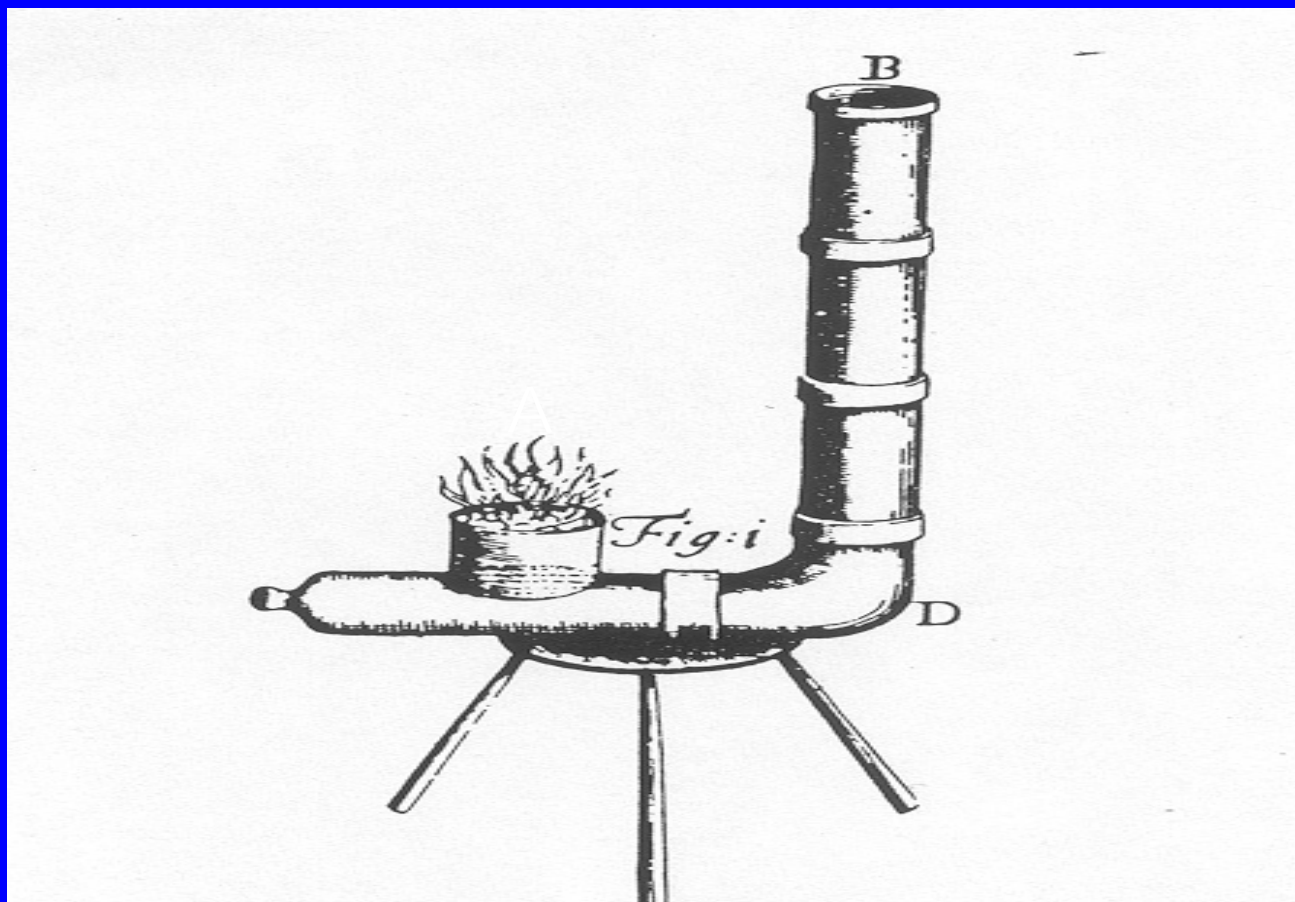
This Engine is made after the manner represented in Fig. 12 and is composed of several hoops of hammer'd Iron of about 4 or 5 Inches diameter, which sbut one into the other: It stands upright in the middle of the Room, upon a sort of Trestle made on purpose. A is the place where the Fire is made, where if you put little peices of Wood, it will not make the least smoak, neither at A nor B, over which you cannot hold your hand within half a foot, there comes out so great a heat: If you take one of these peices of Wood, out of the Fire at A, it smoaks presently, but ceases immediately so soon as it is cast in the Fire again. The most fatid things, as a Coal steep in Cats-piss, which stinks abominably when taken out of the Fire, notwithstanding in this Engine makes not the least ill scent. The same did Red-Herrings broiled thereon; on the other side all perfumes are lost in it, and Encense makes no smell at all, when burnt therein. We have since learnt that this is not shown, but when th: Fire at A is well kindled, and the Tunnel B D very hot, so that the Air that feeds the Fire cannot come that way, but must

Philosophical Transactions of the Royal Society,
London, Num 181, page 78, May the 25th, 1686
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[Testing Procedures]

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We have since learnt that this is not shown, but when the Fire A is well kindled, that the Tunnel BD very hot, so that the air that feeds the fire cannot come that way, but must and press in upon the open Fire; whereby the Smoak and Flame is all forced inwards, must pass through the heap of burning Coals in the Furnace A, in which passage the parts thereof are so dispersed and refined, that they become inoffensive both to the Eye and Nose.

J-Stove Work at East-West Center/University of Hawaii in 1980s

- MSE thesis of Nazrul Islam working under a EWC grant, 1985.
 - J Fox, thesis advisor
 - KR Smith and M Antal, research advisors
- Nazrul is a Bangladeshi, now working in New Zealand
- Called the “EWC Combustor”

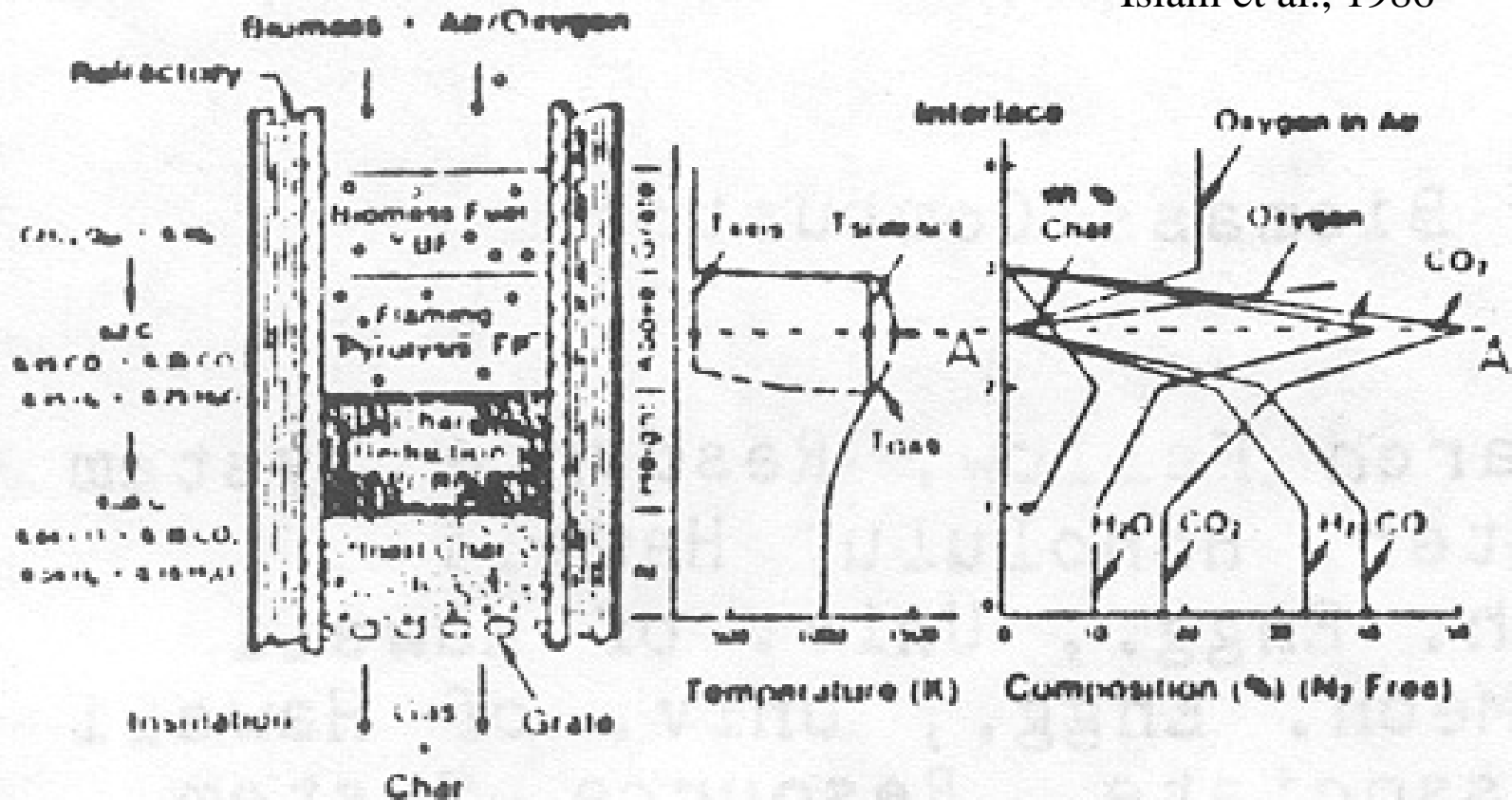
EAST-WEST STOVE
LABORATORY PROTOTYPE COMBUSTER

TEST*	MOISTURE CONTENT** (%)	FIRING RATE (KG/HR)	SECONDARY AIR	EMISSION FACTOR CO-G/KG	EMISSION FACTOR TSP-G/KG	COMBUSTION EFFICIENCY
1)	6	0.59	NO	319	45.5	75.6
2)	9	1.00	NO	410	17.4	68.0
3)	9	0.88	NO	385	56.7	70.0
4)	9	0.89	NO	433	22.7	67.0
5)	12	0.75	NO	336	13.5	77.5
6)	33	0.85	NO	9.7	0.30	99.5
7)	9	0.91	YES	12.4	0.1	99.3
8)	9	0.94	YES	3.2	0.6	99.7
9)	9	0.86	YES	5.4	0.3	99.8

* EACH LINE IS THE MEAN OF FOUR OR FIVE INDIVIDUAL EXPERIMENTS.

** BIRCH DOWELS 1-1/2 INCH LONG, 5-7/16 INCH DIAMETER.

Islam et al., 1986



Source: Dr. T. J. Reed, Solar Energy Research Institute

Figure 1: A stratified downdraft gasifier. Oxidant and fuel flow in horizontal layers down through the flaming pyrolysis, reduction and inert char zones. The temperatures and gas compositions at different cross sections are shown alongside the gasifier.

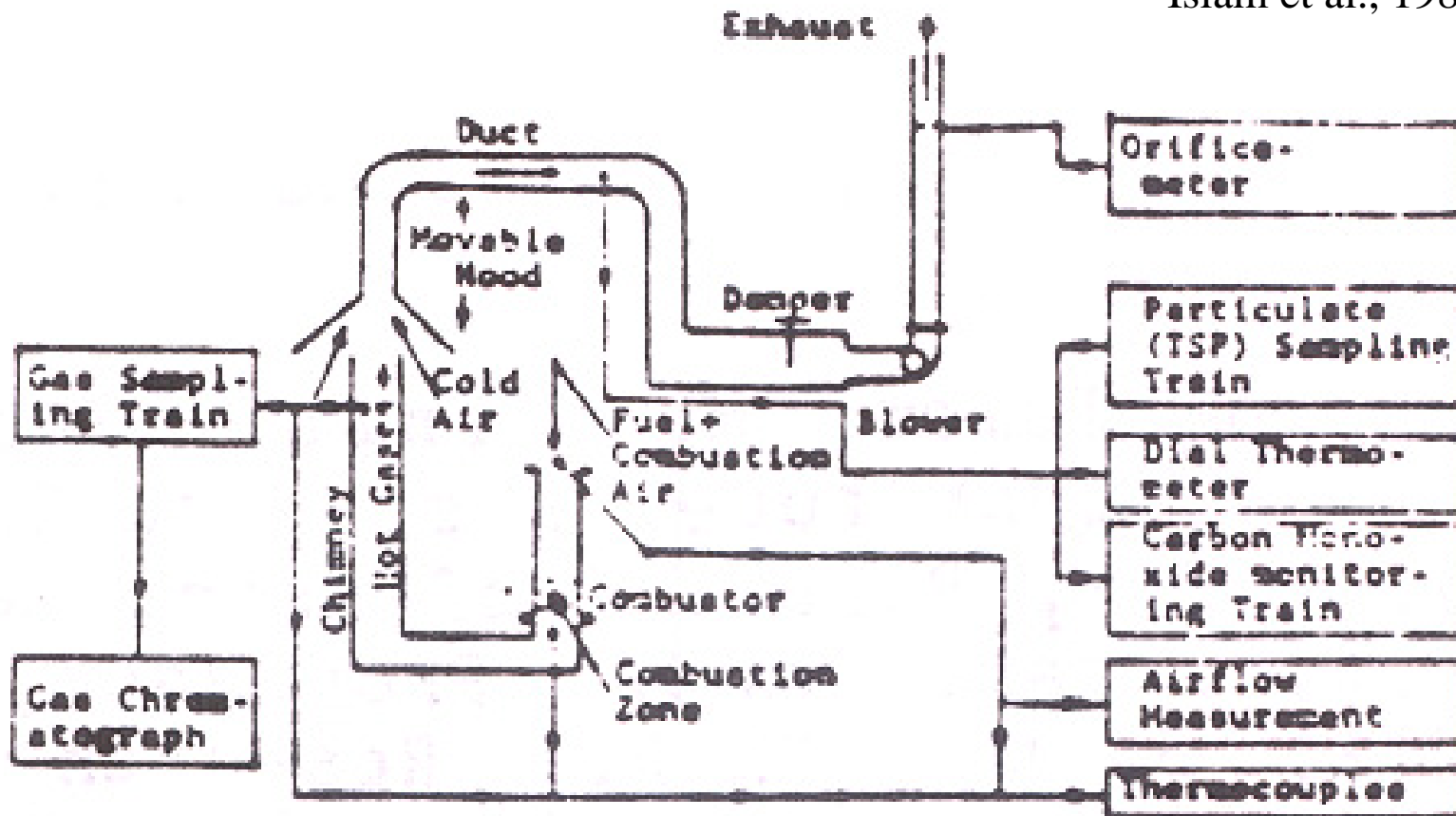


Figure 2: Experimental setup showing location of various instrumentation. Fresh fuel and combustion air are fed from the top and react in the combustion zone at the bottom of the combustor. The reactants pass up, and are diluted with cold air turning vaporized tar to aerosol.

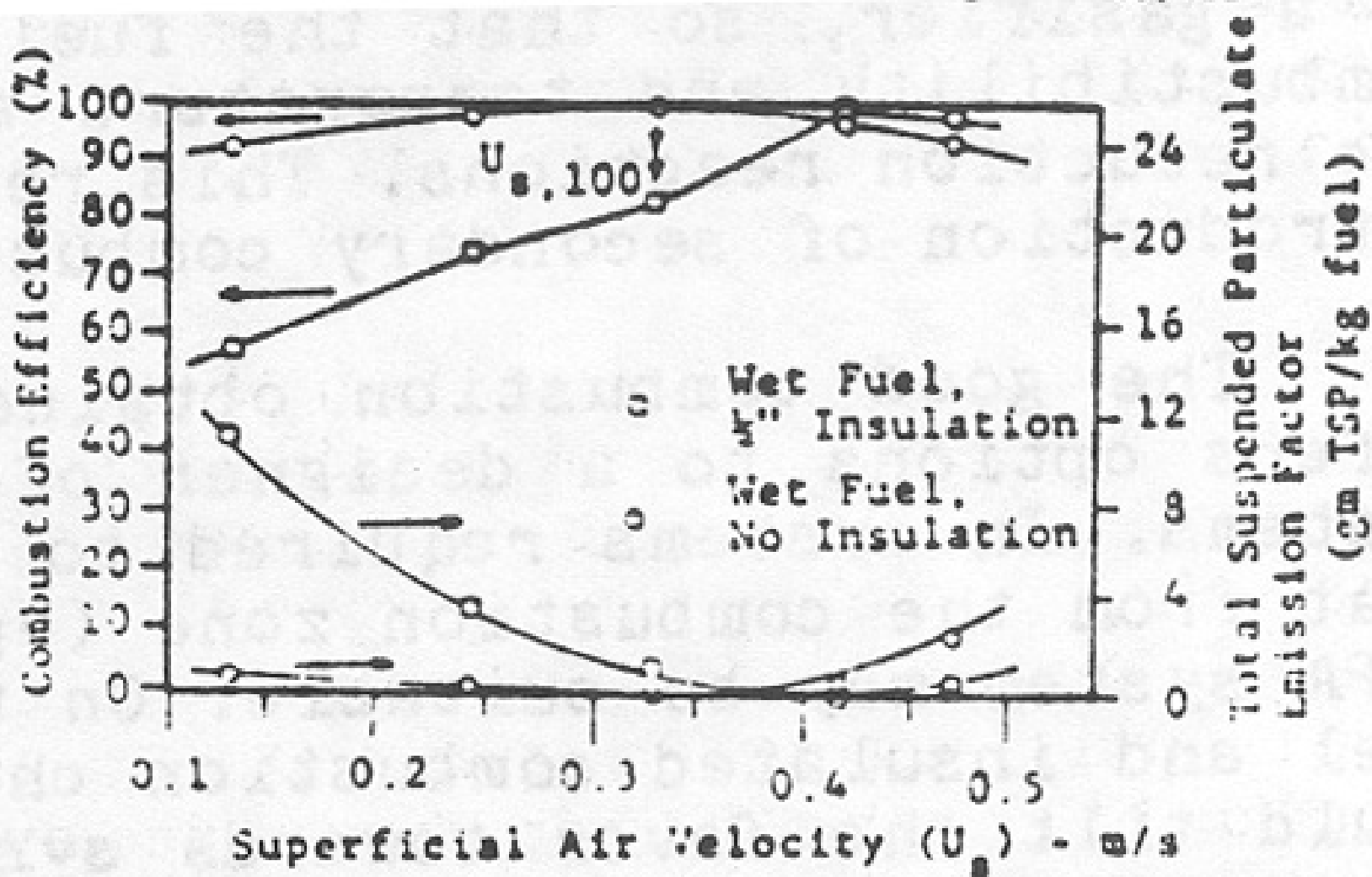


Figure 5: Combustion efficiency and total suspended particulate matter emission as a function of superficial air velocity for different reactor conditions. Complete combustion occurs at $U_{s,100}$ for a set of specified reactor conditions. Particulate emission at this point is almost zero.