

AC 2007-828: LABORATORY PRACTICUM IN COMBUSTION

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Laboratory Practicum in Combustion

The textbooks on combustion identify advanced undergraduate or graduate students as their target audience due to the high complexity of the course material. In most of the engineering programs the combustion course is a rare offering—a laboratory practicum is even less common with few experiments performed if present. Developing a laboratory component for a combustion course presents a challenging task where the theory quickly becomes intricate and the equipment expensive. In addition, the literature about Combustion laboratory practicum is scarce. “The Institution” School of Engineering emphasizes the importance of offering engineering courses with laboratory exercises as a tool for helping students to connect theory and practice. The purpose of this paper is to share our experiences of offering a laboratory-based Combustion course and to encourage a discussion among instructors on this topic. The experiments discussed in the paper are

- Calorimetry, based on a comparison of petro- and biodiesel.
- Internal combustion engine performance, based on small- and large-engine test cells.
- Exhaust analysis, which compares engines with and without catalytic aftertreatment.
- Laminar and diffusion flames, flame speed of laminar stoichiometric flames, liftoff, blow-out, diffusion flame length, all based on a propane-fueled Bunsen burner.
- Droplet evaporation, based on a comparison of evaporative rates of petro- and biodiesel.
- Proximate analysis of coal, based on western and eastern coals.

At the end of the Combustion course, students provided their feedback on how well each experiment related to the course material. Their responses were influenced by the availability and quality of the manuals, the difficulty of data reduction and the level of participation in the experiment.