

over roughly 3000 seconds. After approximately 5000 seconds of sample time the tar concentration reaches a quasi-steady state.

Significant differences are present when comparing the dynamic response of the innovative reactor design shown in Figure 11 to the v5 reactor shown in Figure 10. For instance, the innovative reactor spikes in tar and shows an exponential decline over 3000 seconds whereas the v5 reactor rises in tar and comes to a quasi-steady state. The innovative reactor and the v5 responses seem to match an impulse and step input, respectively, which would indicate major differences in reactor dynamics. The average tar concentrations for the innovative design and the v5 are 63 mg tar/Nm³ syngas and 491 mg tar/Nm³ syngas respectively. A lower tar concentration is evidence of a more effective tar cracking reactor design.

4. CONCLUSIONS

Tar concentration in gasification systems changes rapidly and sometimes unpredictably. Tar testing with standard methods have no ability to capture fluctuations in tar concentration. However, the OLTT apparatus used in the present work effectively captures fluctuations in tar concentration. Dynamic effects of events and changes in testing parameters such as altering the electrical output, refueling, testing location, and reactor architecture are now visible and can be understood in greater detail. Several conclusions may be drawn from the present work:

1. The OLTT apparatus is capable of capturing dynamics in tar concentration.
2. Consistent results are obtained from the OLTT apparatus shown in Figures 5 - 10.
3. Events such as altering the electrical output, refueling, testing location, and reactor architecture influence tar concentration in nonlinear and sometimes unpredictable ways.

The development and application of the OLTT apparatus has opened new potential for further research.

1. Development of theoretical models to predict the influence of events and test parameters.
2. Better testing resolution to capture the influence of events that occur rapidly.
3. A larger data set of results for better statistical averages

and comparison between dynamic events.

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