

Turbocharging the Single Cylinder Four Stroke Diesel Engine

Michael Buchman (Tata & NSF Fellow) and Prof. Amos Winter

Massachusetts Institute of Technology
Global Engineering and Research Laboratory

TATA CENTER
TECHNOLOGY + DESIGN

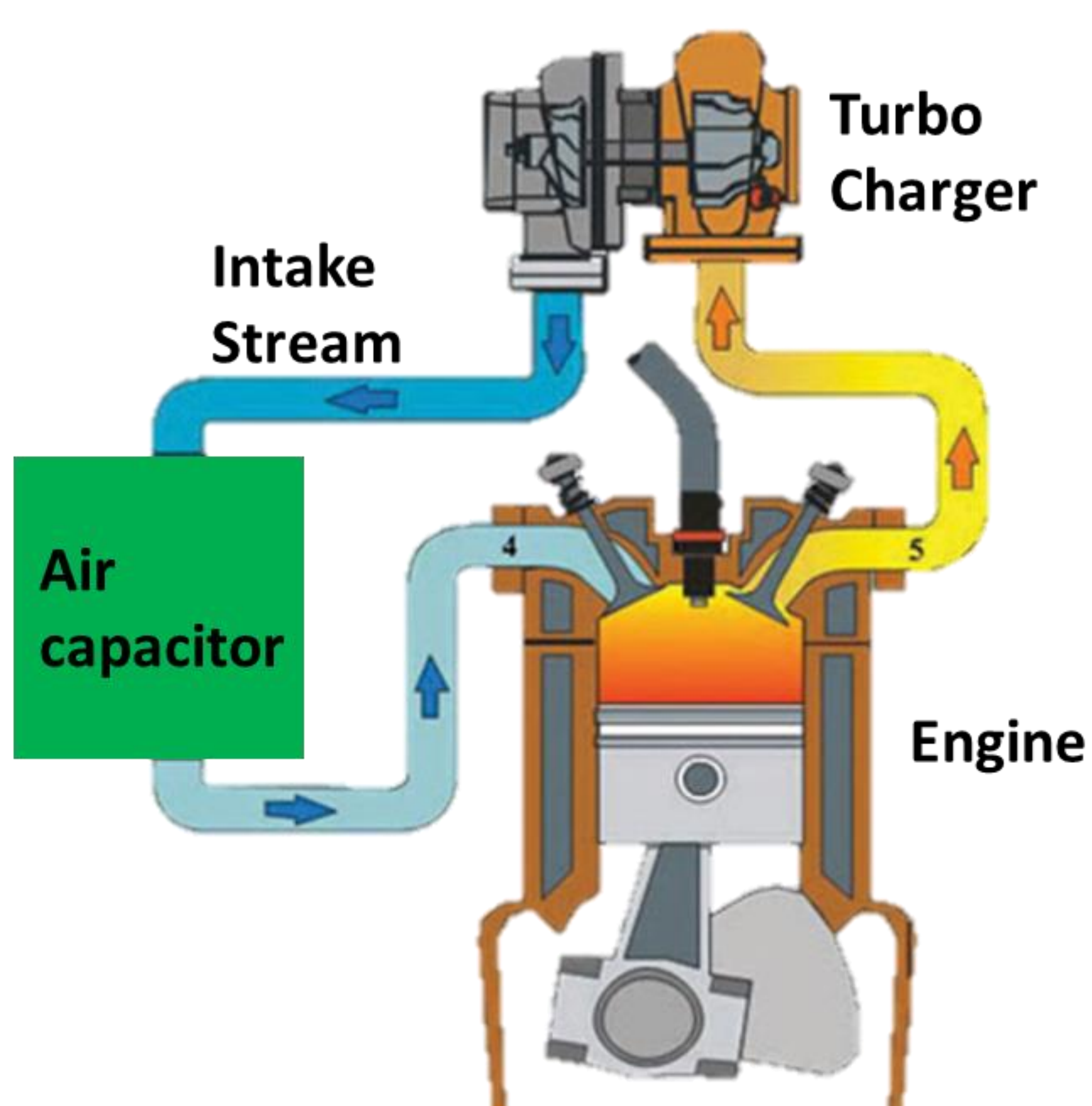
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Opportunity

- Farm workers migrating to urban centers for higher paying jobs
- This is leading to a shortage in farm labor
- Shortage can be overcome with mechanization
- Turbocharging makes diesel engines more efficient and lower cost
- Single cylinder engines are ubiquitous in agriculture in India
- Turbocharging is not done on single cylinder engines currently because of the pulsating nature of the exhaust

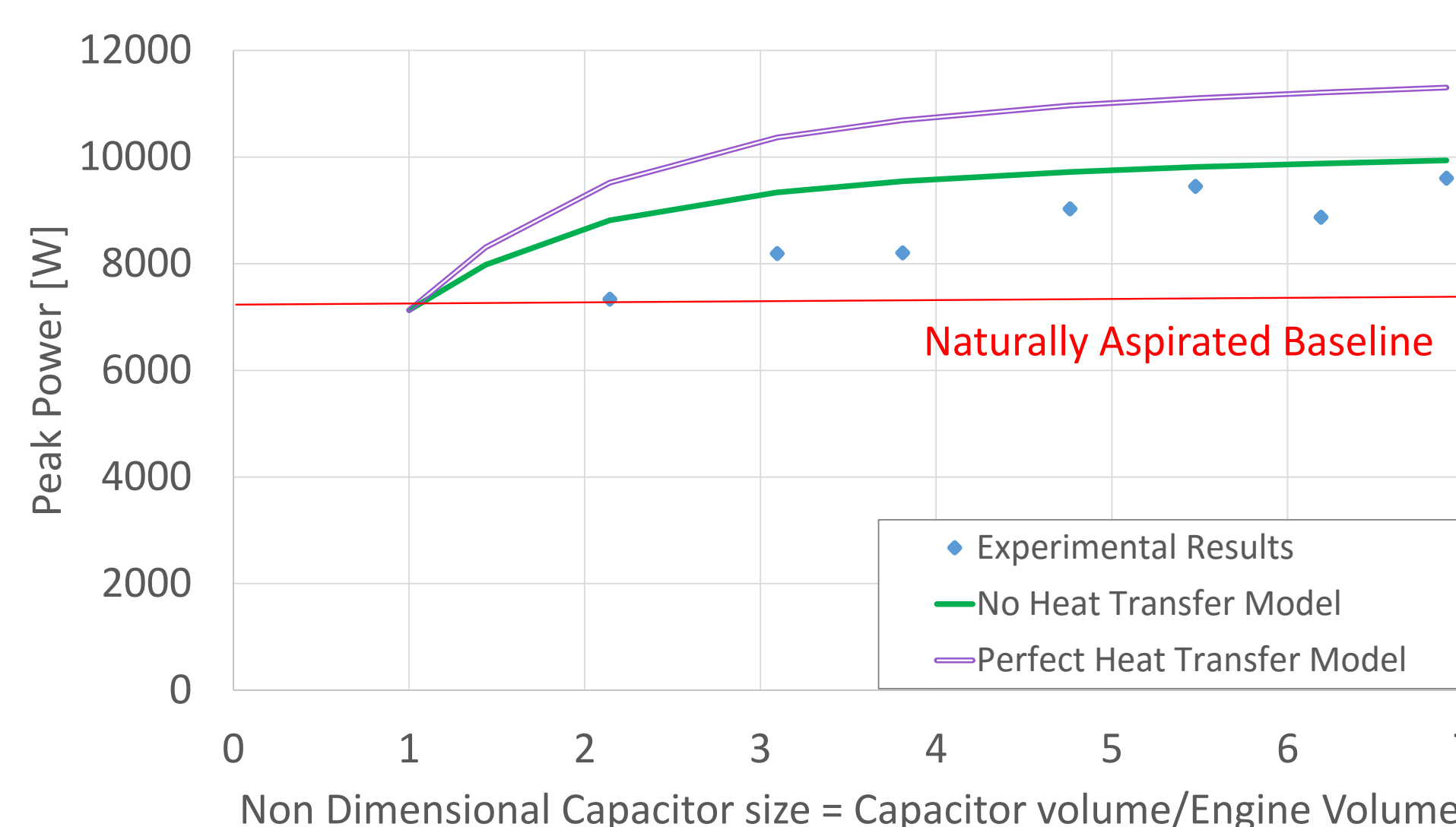
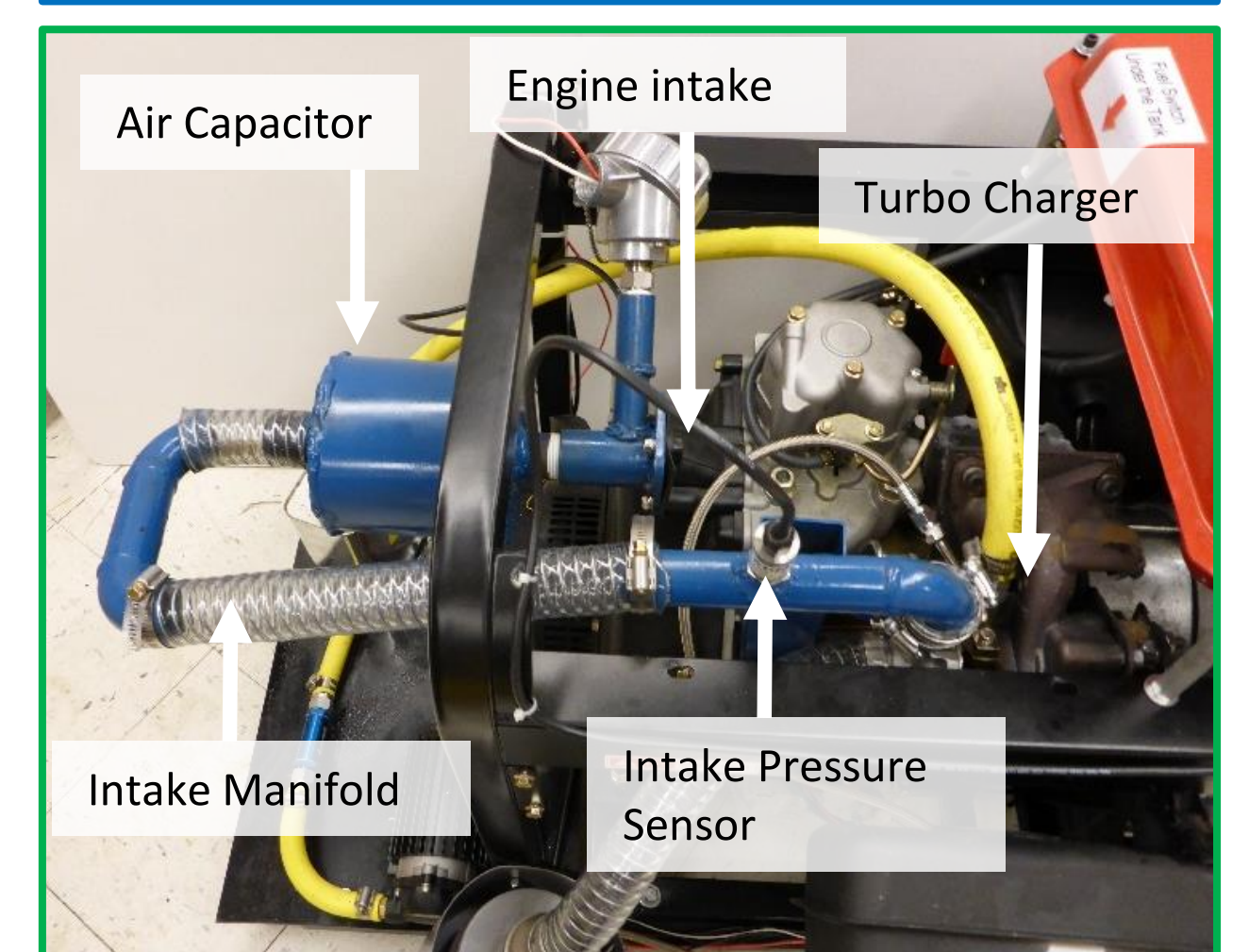
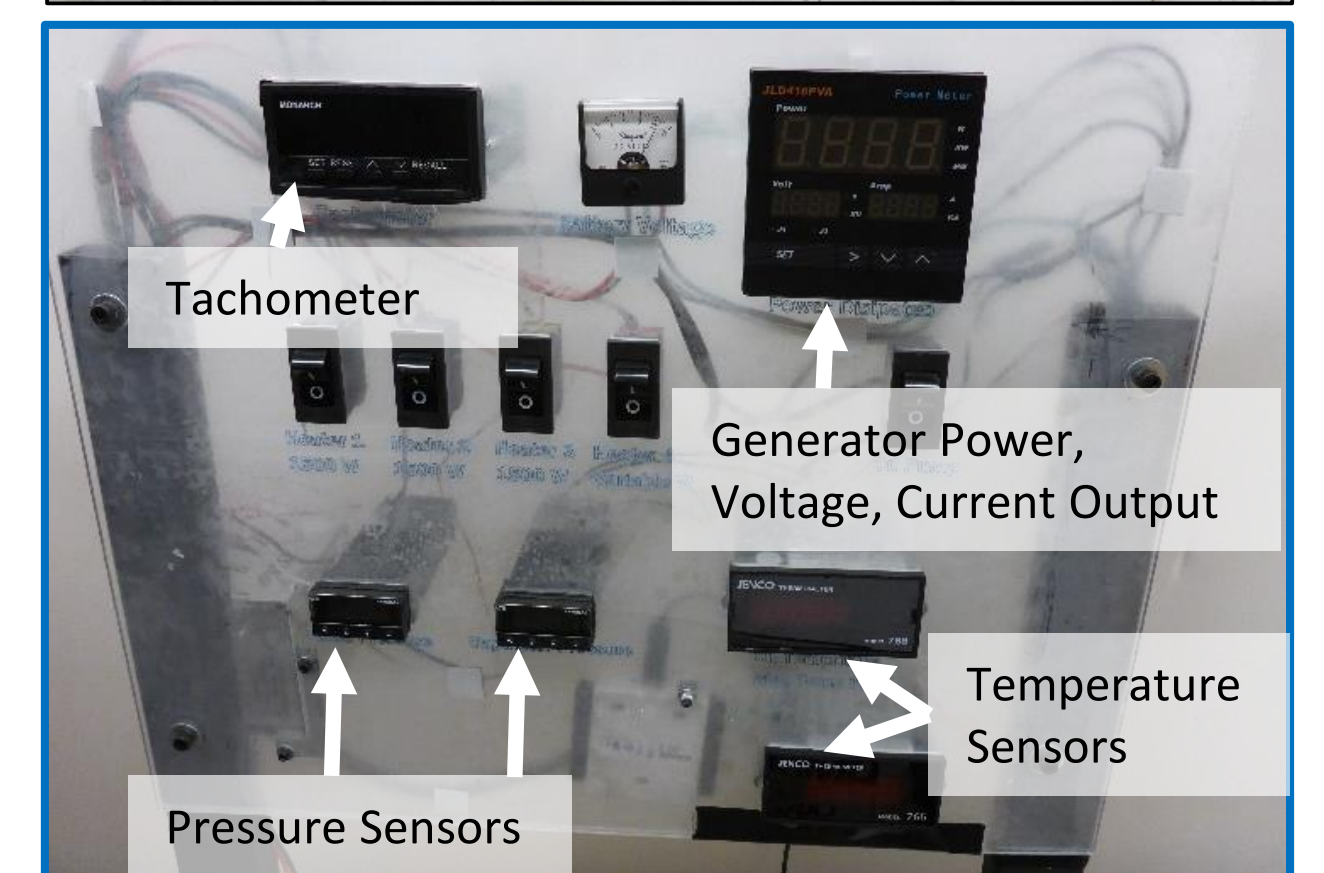
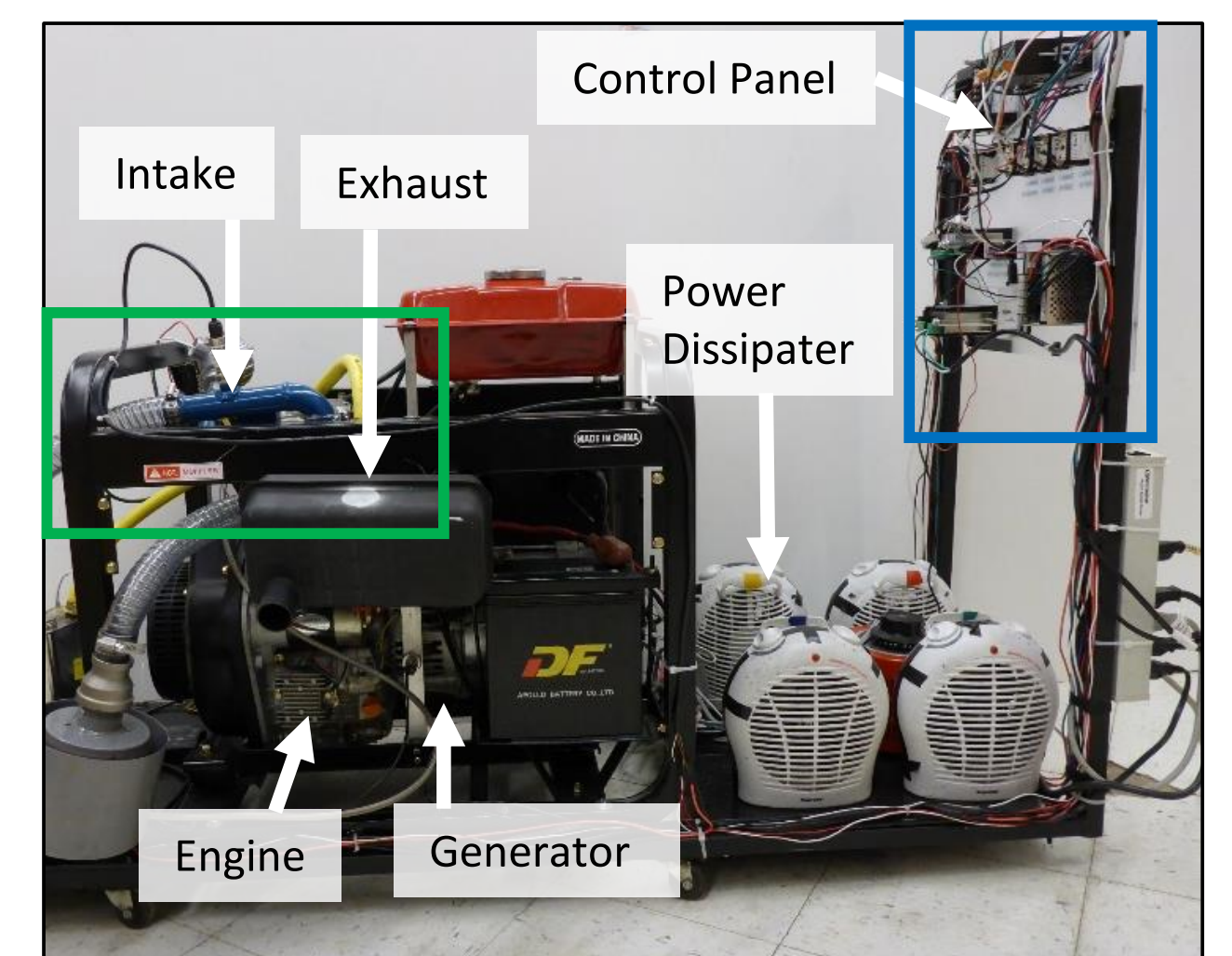
Proposed Solution

- The solution is to add a pressurized volume (air capacitor) between the turbocharger and intake valves



Prototype & Results

- An initial model and an experiment were built to predict how the engine will perform
- The experiment was designed to be simple and low cost
- Model of the intake manifold was built and predicted a 40-60% power gain
- Experiment showed that the turbocharger and air capacitor was feasible
- Experiment showed and Increase intake air density by 43% percent
- Experiment showed and Increase in power by 29% percent



Results of simple experiment built to test the first order feasibility of turbocharging a single cylinder diesel engine compared to model.

Simple experiment built to test the first order feasibility of turbocharging a single cylinder diesel engine.

Next Steps

- An advanced computational model is being built to more accurately predict how turbocharging affects peak power output, emissions impact and fuel economy
- An experiment that can accurately measure power output, emissions impact and fuel economy
- The experiment and the model will undergo iterations in parallel until it is possible to predict engine behavior and the system is optimized

Acknowledgments

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