

EXHAUST VALVE CONTROL SYSTEM FOR NEXT GENERATION CLEAN SNOWMOBILE

Sponsor: NIATT, Center for Clean Vehicle Technology

Client Contact: Peter Britanyak

The U of I Clean Snowmobile has made major modifications to its gasoline direct-injected 600cc two stroke engine over the last 6 years. Many components of the system have been redesigned in order to optimize fuel economy and emissions. One component of this system that has not received attention is the exhaust system. Typically, high performance two-stroke engines create a supercharging effect by pushing the fresh fuel/air mixture that is pulled out of the cylinder during the scavenging process back into the cylinder before the piston closes the exhaust port. At engine speeds where the exhaust system is designed to operate, high levels of efficiency and power density are achieved. However, at engine speeds where the system is not designed to operate, the opposite happens. The pressure wave created by the opening of the exhaust port is reflected back by the tuned pipe and arrives at the exhaust port too early in the engine cycle. The pressure wave then enters the cylinder through the exhaust port and the sudden increase in volume causes a pressure drop and fresh fuel and air are pulled into the exhaust system. To counteract this effect, two-stroke engines are often run excessively rich in order to combat the lost fresh charge. Advanced fuel injection systems can mitigate this somewhat, but a closed-loop exhaust control valve is needed to reduce fuel short-circuiting at light loads. It is hoped that this project will run on a fast track, producing a functioning prototype by the end of the first semester and conducting extensive performance tests as well as system refinements during the second semester. Members of this design team are expected to collaborate with the 2009-10 Clean Snowmobile Team, attending regular meetings, assisting in engine preparation, and supporting engine testing for the 2010 competition.