There are many computer aided engineering tools and software used by aerospace engineers to design and predict specific parameters of an airplane. These tools help a design engineer to predict and calculate such parameters such as lift, drag, pitching moment, takeoff range, maximum takeoff weight, maximum flight range and much more. However, there are very limited ways to predict and calculate the minimum control speeds of an airplane in engine inoperative flight. There are simple solutions, as well as complicated solutions, yet there is neither standard technique nor consistency throughout the aerospace industry. To further complicate this subject, airplanes have the option of using an Automatic Thrust Control System (ATCS), which directly alters the minimum control speeds of an airplane.

This work addresses this issue with a tool used to predict and calculate the Minimum Control Speed on the Ground (VMCG) as well as the Minimum Control Airspeed (VMCA) of any existing or design-stage airplane. With simple line art of an airplane, a program called VORLAX is used to generate an aerodynamic database used to calculate the stability derivatives of an airplane. Using another program called Numerical Propulsion System Simulation (NPSS), a propulsion database is generated to use with the aerodynamic database to calculate both VMCG and VMCA.

This tool was tested using two airplanes, the Airbus A320 and the Lockheed Martin C130J-30 Super Hercules. The A320 does not use an Automatic Thrust Control System (ATCS), whereas the C130J-30 does use an ATCS. The tool was able to properly calculate and match known values of VMCG and VMCA for both of the airplanes. The fact that this tool was able to calculate the known values of VMCG and VMCA for both airplanes means that this tool would be able to predict the VMCG and VMCA of an airplane in the preliminary stages of design. This would allow design engineers the ability to use an Automatic Thrust Control System (ATCS) as part of the design of an airplane and still have the ability to predict the VMCG and VMCA of the airplane.