



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Paul T. Baeyens	Project Number S0202
Project Title Isodynamic Spring Resistance System	
Abstract Objectives/Goals My main objective was to create an isodynamic resisting force provided for the user wishing to "arm-wrestle" my machine. I wanted the resisting force to be constant at every point of rotation by using a cam with specific dimensions attaining to the spring used. One of my main goals was to construct a machine which is more efficient than the traditional "free-weight and pulley" system, ultimately eliminating inertial forces to a negligible proportion, creating an isodynamic resisting force. Methods/Materials Methods: I used the law of summation of torques (which equals 0) to calculate the length of the cam at each degree of rotation. I used nylon rope, scrap wood, plywood board, bolts and screws, foam padding, 5-minute Epoxy, Elmer's Wood Glue, a dowel rod-0.022225 meter diameter, a spring, a compact fish scale, and a surplus of scratch paper. [All materials were found by using available resources except for the plywood board, spring, and fish scale, which ultimately brought my project cost to a slim \$24.74] Results After construction of my project, I tested the machine with a fish scale, which proved that an isodynamic resisting force was obtained. Conclusions/Discussion After completing my project, I found that my project theory was successful and could be used in large-scale quantity, replacing various free-weight and pulley machines in local gyms. Not only would a spring resistance system provide a safer environment, it weighs less, is much less expensive, is more efficient, and provides a constant resisting force unlike free-weights, which could be accelerated upwards, decreasing force applied.	
Summary Statement I created an arm-wrestling machine with a constant resisting force throughout the entire process, eliminating all inertial forces to a negligible proportion as involved with a pulley and free-weight system.	
Help Received Father helped operate skill saw; Father permitted me to use spare parts lying around house.	