

Custom Designed Tilt Test Table for E-One

E-One, a leading manufacturer of fire-fighting equipment selected the West Bend Division of Bushman Equipment, Inc. to design and build a high capacity tilt table to test their new breed of fire trucks.

E-One, established in 1974 and employing more than 1,300 people, manufactures virtually every type of fire and rescue vehicle required by fire departments, rescue/EMS squads and airports.

One of the requirements in producing their Aircraft Rescue and Fire Fighting (ARFF) trucks is to test them in accordance with SAE J2180. This specification establishes the procedure for measuring the Static Rollover Threshold for heavy trucks. Very simply, it determines the angle at which the trucks could tip over.

E-One previously performed this test using two in-house manufactured tilt tables spaced approximately 25 feet apart. The existing equipment was causing increasing concerns. First, today's trucks are heavier, but it was not feasible to increase the capacity of the existing tables. Secondly, it was very difficult to coordinate control of the two independent hydraulic tables. It had become obvious the existing equipment had to be replaced.

In response, West Bend designed one large, high capacity table as opposed to the two smaller independent tables. Based on projected loads, the tilt table was built with a drive-on top, 11 feet wide and 40 feet long, and with enough capacity to tilt loads weighing up to 150,000 pounds.

The table had to be mounted outside and above grade, due to local flooding concerns in Florida. In its folded down position, the table is over three feet tall. E-One added the concrete ramps leading onto and off the table.

The table was designed and manufactured at the Bushman/West Bend facility in Menomonee Falls, WI. It consisted of two main structures.



The base is a two piece weldment, and the tilt top that the truck drives onto is a separate piece. These two pieces were hinged together on the 40 foot side. Tilting is accomplished by five, 7 inch diameter dual acting hydraulic cylinders,

operating at a system pressure of 2,000 psi from a 25 hp remote mounted hydraulic power unit. A steel curb was incorporated into the table top, and safety tie down bars were built to secure the trucks.

The table was fully assembled at West Bend and tested with 150,000 pounds of steel and concrete block weights. Tests were performed with an evenly distributed load and then with the load re-distributed (70/30) to simulate an actual truck. Pressure compensated adjustable flow control valves were used to keep

the table flat while raising and lowering.



During a test, the truck is driven onto the table, and its axles are secured with chains. The truck is then tilted to the point when the tires begin to lift off the table. This position determines the rollover threshold that is recorded.

Since the table is used outdoors, all controls are housed in NEMA 4X stainless steel cabinets. The

fully functional operator's console is equipped with operating switches and a position readout. Once energized, the table tilts at 0.25 degrees/second. An inclinometer is incorporated into the table. Digital readouts are located on the operator's console and on a separate six-inch, free standing scoreboard visible to everyone in the test area.

The installation was well planned. The table weighed approximately 52,000 pounds, but unloading, leveling, anchoring, field wiring and hydraulic plumbing were completed in just three days.

According to Greg Hofmann, E-One's manufacturing engineer in charge of the project, the table has expanded E-One's capabilities.





“The stability of any vehicle is determined by a low center of gravity. This tilt table not only allows us to test ARFF vehicles, but also a host of other trucks.” Hofmann added, “With this test data we are now determining critical center of gravity information

which is crucial as we develop and refine our designs. This gives E-One a sharp, new competitive edge in the marketplace”.

Bushman AvonTec provide custom solutions to complex problems. To see what they can do to help move your business forward, visit their website, www.BushmanAvonTec.com.

To learn more about E-One and ARFF vehicles, go to www.e-one.com.