

What a Shock II! Newton Still Correct!

Preliminary observations of Kegel and Bowling Installations topography testing, continued.

December 7, 2009, by Lou Trunk

One month ago, I wrote the first report on the ground-breaking topography testing we began. We have taken the process to unprecedented levels, producing the most interesting and thought-provoking results that I have ever heard of in bowling, let alone produced and witnessed, in my 40 years of bowling business research experience.

Intuitively, any person highly involved with lane research, repair, and installation, (me especially), has always had the notion that “flatter is better.” However, at the same time, the tolerances for flatness developed and put in rule form prior to WWII by The American Bowling Congress have been widely accepted (including by me) as a fair and reasonable approximation of “flatness.” A bowling center conforming to the flatness rule for these 70+ years was undeniably considered “fair.” Several things have happened in recent years and most especially this month, to change my mind set.

First, over the past several years, with the proliferation of synthetic lane installations, bowling centers are no longer visited every other year or so by resurfacing crews (skilled and thorough professionals for the most part), to sand the wood lanes back to levelness. Secondly, the nature of the annual USBC (ABC-WIBC) sanction certification inspection of a bowling center has led to “levelness atrophy” – that is, since inspections are only performed annually in three snap-shot locations, America’s lanes have become well out of specification elsewhere. Through settling, climate change, and ball abuse, - general wear and tear - lanes atrophy from levelness. Further, though the levelness rule calls for a lane to be level and without crowns and depressions exceeding .040” OVER THE ENTIRE LANE, everyone knows that levelness INSPECTION will NEVER take place outside of the three narrow snap shot “windows.” Less than craftsman-like crews, under pressure to maximize profits, have not emphasized levelness in areas they are CERTAIN, will not be scrutinized. As a result, lanes are generally not very flat. In fact, LESS THAN 1% of the “sanctioned” centers in this country are actually within the .040” tolerance as stated in the rule in place now - the same rule that has been in place since the late 1930’s.

BUT THAT’S NOT THE WORST PART!!!



Newton... what a guy.

The latest findings relating to ball path change as a function of gravitational forces on non-flat lane surfaces would have again made Sir Isaac proud. However, to my knowledge, he was not a serious bowler.

As if it wasn't bad enough that "lane mapping" data has shown that the average "certified" bowling lane is not nearly in USBC specification, our tests have shown that the worst part of the situation, is that even legal irregularities have a huge impact on ball path.

In ground breaking work this month, we have been able to QUANTIFY the gravitational effect of non-flat lanes over relatively short distances. Thousands and thousands of shots have been analyzed over dozens of lane shapes.

In the report dated one month ago, I explained our test thoughts as it relates to momentum, and Newton's First and Second Laws:

In layman's terms these experiments involve three basics: Momentum (and the law of conservation of momentum): a body's momentum equals it's mass times it's velocity $P=mv$ (P is the symbol for Momentum), Newton's First Law, his law of inertia: in the absence of force, a moving body will move in a straight line at constant speed, and his Second Law: when a force is applied to a body, an acceleration will result in the direction of the force. Most important with regard to Newton's Second Law for our experiments is that the net force on an object is equal to the time rate of change of its linear momentum. I.E. the more momentum ($P=mv$) a ball has, the more force will be needed (gravitational force from a tilt or depression) to act upon the ball, in order to change the ball's path by a certain change distance.

These laws mandate that gravitational effects must be roughly PROPORTIONAL. Examples: a certain ball traveling at twice speed will be influenced by topography about half as much, a ball traveling at a certain speed will be influenced about half as much as a ball twice it's weight.

As Newton whispered, "I told you so," our tests showed over and over that ball path change was in fact near proportional. Through repeated testing and double checking, ball path displacement over short distances was QUANTIFIED for situations where all else was equal.

Once a ball path change amount is known for a certain weight and speed on a certain quantity of non-levelness, one can calculate the ball path change for ANY weight, speed, and non-levelness, since all of these changes must be very nearly proportional in the relatively narrow range of bowling speeds and ball weights. Softer balls, or shots on softer lane surfaces were slightly less effected by tilts while harder balls, or shots on harder lanes were effected slightly more by tilts, due to the fact that more slope is needed to overcome higher friction situations. Frictional slow-down and energy have now entered our experiment realm. The forgotten force though, is gravity. We have always known that friction has much to do with ball motion, but we have dismissed gravity, because the general conception was that all lane are basically flat. That is simply not the case, most especially today vs. pre-synthetic lanes

We calculated Transitional and Rotational kinetic energy of a given shot, and the numbers were fascinating. In energy calculation of course, velocity has exponential effect. A ball thrown at 21 MPH has about twice the energy of a ball thrown at 15 MPH. The dual advantage of much more energy plus less effect from non-levelness, goes a long way in explaining why "strokers" have a hard time competing with "boomers" in today's game. We are now deeply into the complicated analysis of energy dynamics, and are developing a rating system, where lanes are compared to their mates pointing out non-matched pairs, and an overall fairness rating for a center, as well as developing a "gravity chart" that can be used in conjunction with a oil pattern graph, to provide a bowler with the rest of the information needed to decide how to attack a certain pair of lanes in a bowling center.

Our testing continues.