THE INSIDE LINE: 2011/01/18 - Weather, Topography, and Ball Motion

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In the first issue of THE INSIDE LINE, we promised that our next article would discuss how weather affects topography and ball motion. Since lanes are made up of wood, and sub components of wood, we know temperature will affect the shape of them. However, the one part of weather that significantly affects the shape of lanes is the humidity, or lack thereof.

Because wood is porous, and high humidity means there is a lot of moisture in the air, humidity tends to make wood swell up. Low humidity, when there is very little moisture in the air, makes wood compress as the moisture is not as present in pores of the wood. For those that have seen what happens to wood approaches when a spilled drink was left there too long, you know the effects. Bowling lanes do the same thing.

Humidity and Temperature

When bowling lanes and wood based components that make up lanes are exposed to humidity and temperature changes, extra moisture in the air often "enters" the wood material at a point of least resistance. But because there are many differences in construction, and depending on the sub-foundation material and underlayment, as well as the many different wood components utilized in building a bowling lane, the only thing we can be sure of is weather definitely changes lane shape. However *how* it changes can vary greatly from situation-to-situation.

For instance, often the outer edges of certain materials, like wafer board Parallel Strand Lumber (PSL), are much more susceptible to moisture penetration from the sides rather than from the top. This contamination happens much faster than moisture penetration elsewhere, so in this case the swelling causes a depression.

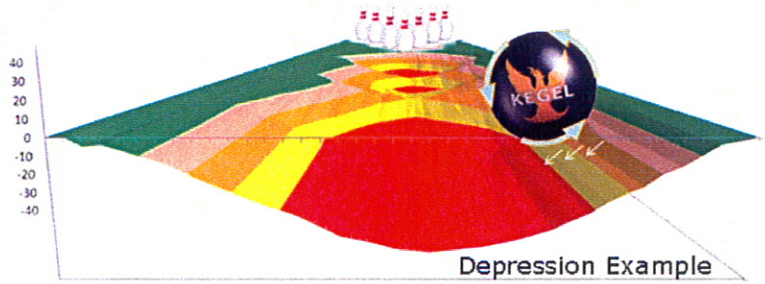
In other instances, swelling causes the wood, or boards, to compress against each other which can cause a "push up" effect. In this case swelling can cause a crown, or less of a depression.

But how does this affect lane conditions? First, lane conditions in this case are not about the oil pattern, it's about the condition of the lane. Time has altered the term lane conditions to mean only oil. This was not the case for the majority of time modern bowling has been in existence. So in this case, we'll discuss lane conditions as it relates to the shape of the lane, and how those shapes affect ball motion.

Depressions and Ball Motion

If weather change makes your lanes become depressed, this shape not only helps guide the ball towards the center of the lane, it also makes the ball lose energy faster. The reason for this increased loss of energy is the rotational effect of the bowling ball against the side hill of the depression.

Here is a graphical example:



As you can see, for a right-handed player, or left-handed back-up bowler, the rotation of the ball is counter clockwise to the slope, and therefore acts like the ball is trying to rotate uphill. This makes the ball lose energy faster versus a flat lane. When lanes are shaped in this manner, ball motion is more of an "arcing" type motion because of the early loss of energy. This loss of energy is also the root cause of why some houses are referred to as a "10-pin center".

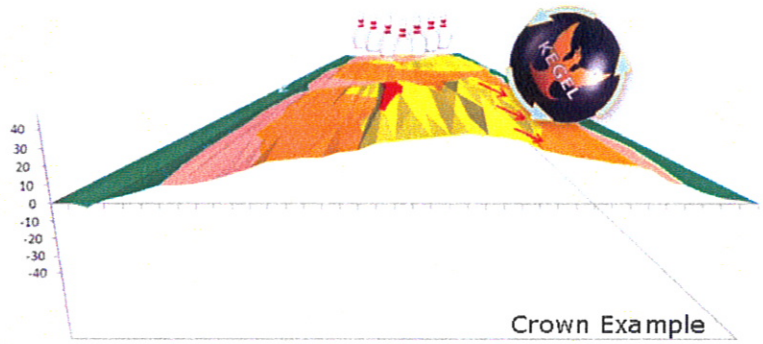
The majority, if not all, wood lanes are depressed, especially in the head area. The majority of synthetic lanes installed over wood lanes are depressed, especially in the front part of the lane. We have found that new synthetic lane installations are more random; some parts of the lane are depressed, some parts are crowned, some are high left, and some are high right. But they are still affected by humidity and temperature changes, which means the randomness remains, it's just different.

We have documented examples that show certain type lane structures can depress 30/1000" when weather changes occur. To show how much this affects the bowling ball, we have taken Kegel's adjustable lanes, shaped them, and performed many tests.

Our testing has shown that a bowling ball released at 18 mph on a lane that is depressed 40/1000" from the edge to the center, can cause the bowler to be over three boards left from that of the flat lane. Slower ball speed players and lighter balls are affected more. Faster ball speed players and heavier balls are affected less. This is in accordance with Newton's Laws of Motion.

Crowns and Ball Motion

To get an idea how a crown affects the energy of the bowling ball by its rotation, here is the same type graphical example as before:



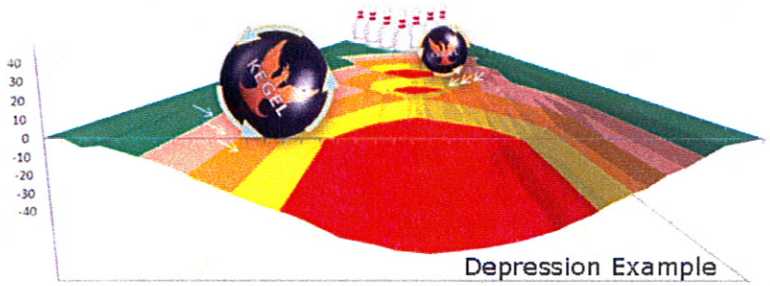
As you can see, now the bowling ball is rotating with the slope of the lane, which causes the bowling ball to lose less energy than it would if it was rotating against the slope of the lane. When a lane is crowned in this manner, high launch angles will be affected more than a bowler that plays "straighter up the boards". When lanes are shaped in this manner, ball motion is also more "skid snappy" because the bowling ball is retaining more energy.

The Race Track Effect

Because of this rotational effect and gravity, lanes that are depressed in the heads act like there is very little oil in the front part of the lane. Depressed heads are no different than driving your car on a banked curve. The reason for banked curves on the road, or race track, is that they reduce the vehicle's dependence on friction to navigate the curve.

It's no different on a bowling lane. Depressed heads keep the ball from "squirting" away from the pocket, or in other words, help the ball make its move towards the pocket, just like a banked race track helps the car turn the corner. That is, until the bowler lays the ball down on the other side of the depression.

Did you ever wonder why players that can get far to the left make the lanes look easy? The next graphic shows why; gravity is now working to their advantage, instead of against them.



The bowling ball now has a gravity "push to the right" in the front part of the lane, and a gravity "bank shot" once down the lane. Gravity wise, the lane is helping the ball get to the right early with energy retention, and then return to the pocket in the breakpoint area. Players that don't have the rev rate to get to the extreme left are at a tremendous disadvantage in this type of playing environment.

Notice that during this entire article, we have shown how lane shape affects the direction of the bowling ball, how lane shape affects the shape of the ball's motion, and how lane shape affects the energy loss of the bowling ball, yet we have not mentioned lane conditioner or the oil pattern once!

The next time you start chasing down a ball motion issue at your center, or even a pin carry issue, and you have performed the **Process Verification Procedure** on your lane machine and oil pattern, don't overlook the shape of your lanes. We have a relatively new saying at Kegel; "you can't fix a gravity problem with oil."

In conclusion, get to know your lanes; identify how they're shaped and how weather change affects their shape. Find out why some lanes score high, and why some lanes score low. It will save you a lot of headaches, and help you provide your customers with a high-quality playing experience all year round. And like always, if you have any questions or need help, call Kegel. We are just a free phone call away.

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