DT n.6

Tecnhical Pamphlets

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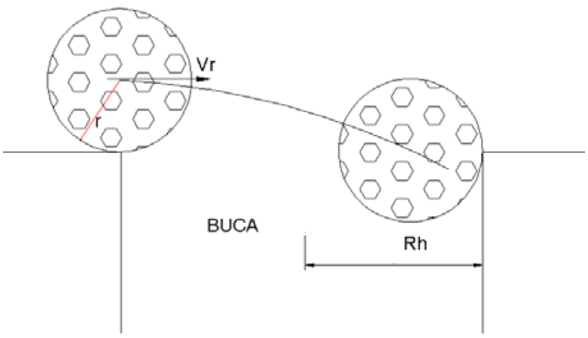
BALL SPEED LIMIT OF FREE CAPTURE IN THE HOLE

(flat green)

Often we are surprised when the ball now seems destined to fall into the hole and then "escapes" by turning on the edge of the hole, certainly if the direction of the ball was in the perfect center of the hole we would put forth the demand is not there. Yet even a ball in the perfect center of the hole could not get in and jump out.
So, which is the maximum speed of the ball to be pocketed certainly even if in the center hole? A design first.



From the figure, it can be assumed that the condition that the ball is "captured" by the hole is, since the time of fall of the ball:

$$t = \frac{2Rh - r}{vf}$$

where vf is the final velocity of the ball going into the hole,

$$\frac{gt^2}{2} < r$$

where g is the gravitational acceleration as always (9,81 m/sec^2).

It follows that : :

$$vf < (2Rh - r) \times \left(\frac{g}{2r}\right)^{1/2}$$

Substituting the values the formula is obtained:

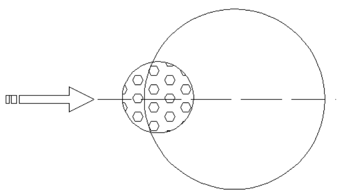
vf < 1,31 m/sec,

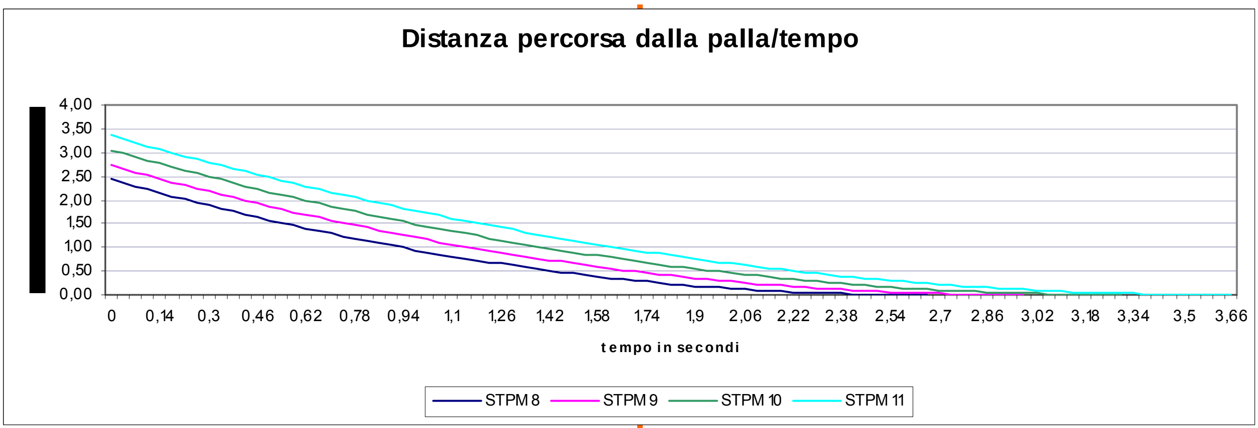
that expresses the " maximum speed capture free" , ie, one that allows the ball to fall freely in the hole without touching the opposite edge above the equator of the ball.

On a green with STPM 10 , flat course , a ball with initial speed of 1.83 m / sec, will travel 3.04 meters , and since the uniformly accelerated motion , slowing from the start to stop employ 3.35 sec .

Indeed , we must take into account that in the uniformly accelerated motion (in our case with negative acceleration) , the speed does not decrease with direct proportion to the distance traveled, but following a asymptotic curve that can be processed by applying the method of calculating the applicant. [see chart p. following]

The maximum speed of capture " free" expressed above ensures that the ball falls into the hole in the case in which the ball enters exactly in the dynamic center of the hole, and it is intuitive that this speed decrease as intervening declinations on this line.





Then , based on these elements we can successfully argue that a ball hit with an initial velocity of 1.83 m / sec in a green flat with STPM 10 will reach a hole placed 1.5 meters at a speed of 1.30 m / sec taking about 1 sec (960 msec) . In addition, it can be inferred that if the ball is pocketed , this will exceed the hole of 1.54 meters employing 2.37 seconds .

This discourse is a prerequisite for a practical and important that we will see later.

Now , we must say that the ball is not always addressed in the hole and not exactly for this reason is pocketed , and it is intuitive that as the pulling direction declines from the dynamic center of the hole, decreasing the chances of capture.

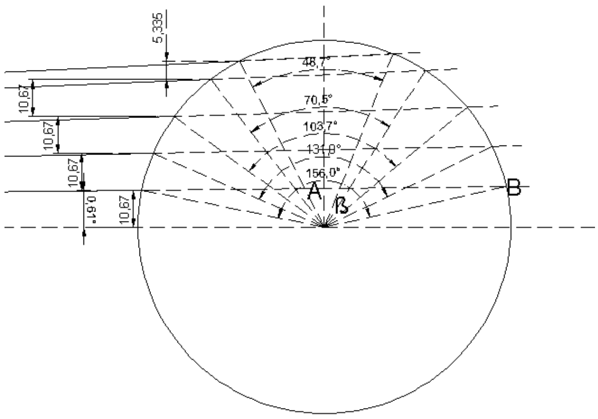
In the case where the ball does not enter exactly in the dynamic center of the hole, the calculation must take account of the fact that it is as if the pit restringesse , and necessarily the capture rate of the ball must decrease.

Because to calculate how much you must reduce Rh (AB in the drawings) , which may in fact be represented by a string inscribed in a circle , it is necessary to know the angle subtended to the string itself , and the chord length varies as a function of ' declination angle on a straight line to the center of the circumference of the hole, which can be overcome by approximating the possible strings is parallel .

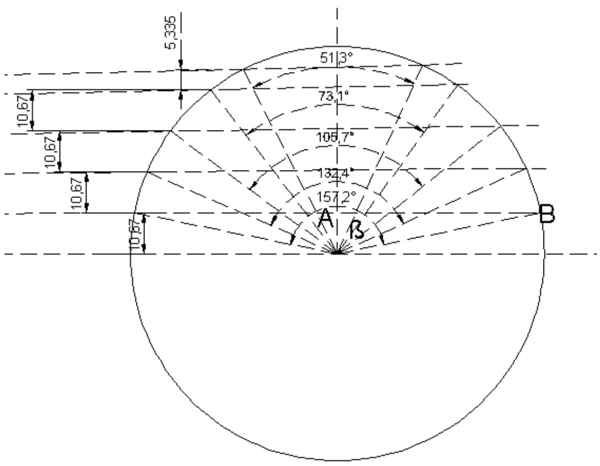
The result will be more correct , the greater is the distance of throw of the ball , being by definition parallel straight lines that join infinity.

Let us examine these cases:

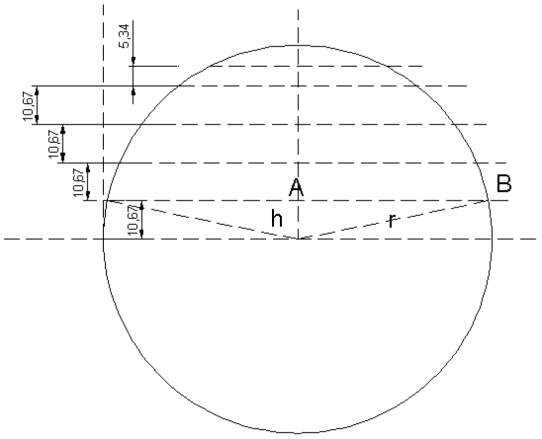
1. Hit the ball from a distance of 1 meter that goes in the hole with declination equal to ½ of the radius of the ball and its multiples;



2. Hit the ball on the distance of 2 meters and that goes in the hole with declination equal to ½ of the radius of the ball and its multiples;



3. Hit the ball from any distance, as if it came straight line parallel to the center of the hole, but with position equal to ½ of the radius of the ball and its multiples.



For the first two cases to calculate Rh apply the theorem of the rope:

$$AB = \frac{2Rh \times sen\,\frac{\beta}{2}}{2} = Rh \times sen\,\frac{\beta}{2}$$

For the third case, knowing h is easier to apply the Pythagorean theorem, in fact we have that AB (<Rh) is a catheter incognito of the right triangle, h is unknown (10,37 and the fractional or integer multiples) and the 'hypotenuse is also known because it corresponds to the radius r.

	Ball : 1 metre from the hole	Ball : e metre from the hole	Hit the ball from any distance without declination
mm out of centre(η)	Speed capture m/sec	Speed capture m/sec	Speed capture m/sec
10,67	< 1,28	< 1,28	< 1,28
21,34	< 1,16	< 1,17	< 1,18
32,01	< 0,96	< 0,98	< 1,00
42,68	< 0,62	< 0,65	< 0,68
48,01	< 0,35	< 0,39	< 0,41

Performed the necessary calculations we obtain that:

From the above table it is understood that the capture rate can be safely, considering our purpose, taken without regard to the declination of the entrance to the hole than the director of the center hole.

It follows that one can propose the following formula to calculate the maximum speed of capture of the ball for any distance from the hole:

$$v=\left(2\times\sqrt{(r^2-\eta^2)}-r\right)\times\left(\frac{9{,}81}{2\times r}\right)^{1/2}$$

[values expressed in meters]

where η represents the deviation input of the ball in the hole from the center.
So, to return to the speech a precise convenience we say that what has been said is the prologue to a very important aspect for all golfers : how much you should ideally exceed the pit to pit the ball and what would come to be exceeded in the case of a stroke just below the limit speed of capture ?

Until now, the sacred texts have identified this gap in different sizes depending on the distance from the ball from the hole. Dave Pelz identifies this distance in 17 " ≈ 43 cm , to have a high probability to pocket the return stroke in case you miss the hole with the first putt , but also to prevent the ball resend the green defects in the vicinity of the hole.

It becomes easy to understand that a ball hit to the distance from the hole of 1.54 meters with STPM 10 and initial velocity of 1.83 m / sec, if it does not fit into the hole, this will exceed 1.5 meters , which appears to be clear to all excessive . [see the table in Annex 5]

To ensure the distance of 43 cm over the hole, which remind equivalent to 3.2 revolutions of the ball, we will, in function of the STPM a speed equal to:

STPM 8 0,78 m/sec	**STPM 9** 0,73 m/sec
STPM 10 0,70 m/sec	**STPM 11** 0,64 m/sec

From this it follows that at this speed , 0.64 m / sec, the ball would be caught in the hole without hitting the rear edge, with a declination from the dynamic center for a maximum of 4.7 cm STPM of 11 (just over diameter of the golf ball : 4,267 cm), but for STMP lower the maximum declination would be reduced respectively to 4.3 cm, 4.1 cm and 3.8 cm.

This leads to mean that , and it is intuitive but not too much , that to overcome the hole of 43 cm , the ball reaches the hole at a speed which is inversely proportional to the value of STPM , namely that with a STMP of the ball 11 reaches the pit at a lower speed than with one of STPM 8 , increasing the chances to pocket , the speed being independent of the catch limit STPM.

Commonly you imagine , wrongly, that it is easier to pit on green lenses that do not fast because they forget that the travel speed of the ball along the path is controlled by a motion " uniformly accelerated " (decelerated in our case) and not speed constant .

In conclusion we can say that the higher the value the STPM and the greater the chance that a ball is captured from the hole with a shot that exceeds the pit of an identical distance .

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Note:

It is designed to capture the speed limit free, however it was found experimentally that the speed limit catches the ball that hits the upper portion of the opposite edge of the hole and even falls into the hole varies from 1.63 to 1.75 m/sec depending on the type of consistency of the edge of the hole.