4.5 — Thumb Measurements (Oval)

4.5.1 Selecting "Oval" thumb hole on the spec sheet

Selecting "Oval" thumb hole on the spec sheet

4.5.1 **KEY** oval

Drilling an oval thumb hole requires more setup information than a round hole. In addition to the standard thumb measurements, Spectre Cloud needs four oval-specific inputs to generate the correct drilling sequence: the **starting bit size**, the **oval width**, the **oval degrees**, and the **taper**. Together these four values define the shape, orientation, and profile of the finished oval hole so the drill press operator knows exactly where and how to make each cut.

□□ Starting Bit

The starting bit is the diameter of the initial round pilot hole drilled before any oval cuts are made. It must fit entirely within the narrowest dimension of the intended oval — typically the depth — so that all subsequent oval passes remove material outward from the pilot hole without cutting outside the intended oval boundary.

- □ Select the largest round bit that fits comfortably within the oval's narrowest dimension (usually the depth measurement).
- □ A larger starting bit means less material to remove on the oval passes, reducing the risk of tearout or an uneven finish.
- □ Do not select a starting bit larger than the oval's narrowest dimension — it will cut outside the intended oval shape before the oval passes begin.

- □ Do not select a starting bit so small that an excessive number of oval passes are needed — this increases drilling time and the risk of the ball shifting in the fixture.

Tip: A starting bit sized to the depth measurement (the narrower axis for most thumbs) is a reliable default. If depth and width are close in value, size down by `1/32"` to give yourself a clean margin on the oval passes.

↔ Oval Width

The oval width is the finished width of the thumb hole — the larger of the two oval dimensions, measured across the thumb at the point of insertion. This is the target dimension the oval passes will open the starting pilot hole out to.

- □ Oval width should include the appropriate fit allowance above the raw thumb width measurement — the same `1/32"` to `1/16"` clearance used for round hole sizing.
- □ The difference between the oval width and the starting bit diameter determines how much material the oval passes must remove on each side.
- □ Do not confuse oval width with the starting bit size — they are different values. The starting bit is always smaller than the oval width.

Verify with Spectre team: confirm whether Spectre Cloud also requires a separate oval depth entry field in addition to oval width, or whether depth is derived from the starting bit size and the width entry together.

□□ Oval Degrees

Oval degrees define the **orientation** of the oval cut — the angle at which the width axis of the oval is positioned relative to the thumb hole, using the hole as a 360° circle with `0°` / `360°` at the top, toward the fingers.

Because the thumb does not sit perfectly vertical in the hole — it rests at a natural angle unique to each bowler's hand — the oval must be oriented to match that angle rather than defaulting to a horizontal cut.

Degree value	Clock position equivalent	What it means
`0°` / `360°`	12:00	Oval width axis points directly toward the fingers — cuts made at top and bottom of the hole
`45°`	~1:30	Oval width axis rotated 45° clockwise from top

Degree value	Clock position equivalent	What it means
`90°`	3:00	Oval width axis runs horizontally — cuts made at left and right of the hole
`135°`	~4:30	Oval width axis rotated 135° clockwise from top — a common angle for right-handed bowlers whose thumb naturally rests toward the lower-right quadrant
`180°`	6:00	Oval width axis points directly away from the fingers

How to determine the correct oval degrees for a bowler

1. Ask the bowler to place their thumb into a round hole of approximately the correct size — either a fitting gauge or a previously drilled ball of similar sizing.
2. Observe the natural resting angle of the thumb inside the hole — specifically, which direction the thumb presses most firmly against the hole wall.
3. Identify the clock position that corresponds to that contact point — this is the direction the oval width axis should face.
4. Convert the clock position to degrees using the 0° = 12:00 convention and enter the value in Spectre Cloud.

Tip: For most right-handed bowlers, the thumb naturally rests toward the lower-right of the hole — oval degrees in the `120°`–`150°` range are common starting points. For left-handed bowlers, the natural resting angle typically mirrors this toward the lower-left — `210°`–`240°`. These are starting references only; always observe the individual bowler's thumb position directly. *Verify with Spectre team: confirm whether Spectre Cloud's degree convention is clockwise from 0° at top-toward-fingers, as described here.*

□□ Taper

Taper describes how much larger the top of the thumb hole is compared to the bottom. The thumb is not a uniform cylinder — it widens toward the base, and the amount of widening varies significantly between bowlers. A hole with the correct taper allows the thumb to seat fully at its natural depth without binding at the base or feeling loose at the tip.

- □ A bowler with a **meaty or thick thumb base** — where the thumb widens significantly below the first knuckle — requires **more taper**. Without it, the base of the thumb will bind against the narrower lower portion of the hole before the thumb is fully seated.

- A bowler with a **slender or tapered thumb base** — where the thumb stays relatively consistent in diameter from tip to base — requires **less taper**. Excess taper on a slender thumb produces a hole that feels sloppy at insertion depth.
- Taper is assessed visually and by feel during the fitting — observe how the bowler's thumb narrows or widens from the insertion point toward the base.

Verify with Spectre team: confirm the unit in which taper is entered in Spectre Cloud — whether it is expressed in degrees, as a measurement difference between top and bottom diameter (e.g. `1/16"` *larger at top than bottom), or as a categorical selection (e.g. none / light / standard / heavy). Also confirm the typical range of taper values entered in practice.*

Entering All Four Values in Spectre Cloud

1. In the spec sheet thumb section, confirm `Oval` is selected as the hole shape.
2. Enter the **starting bit** diameter — the largest round bit that fits within the oval's narrowest dimension.
3. Enter the **oval width** — the finished width of the oval hole including fit allowance.
4. Enter the **oval degrees** — the orientation angle of the oval width axis, measured clockwise from `0°` at top-toward-fingers.
5. Enter the **taper** value — the amount by which the top of the hole is larger than the bottom, per the bowler's thumb profile.
6. Review all four values before proceeding — an error in any one of these inputs will affect the drilling sequence generated by Spectre Cloud.

Tips for Oval Input Accuracy

- Take your time with oval degrees — it is the most judgement-dependent of the four inputs and the most common source of oval thumb fit complaints. When in doubt, observe the bowler's thumb in a round hole before committing to a degree value.
- Record your fitting observations in the **Notes** field alongside the entered values — e.g. `Thumb rests at approx. 4:30 position. Meaty base, standard taper applied.` This context is invaluable on future visits.
- For a bowler's first oval thumb fitting at your shop, consider scheduling extra time — the observation and measurement steps take longer than a standard round fitting.
- Do not estimate oval degrees without observing the bowler's thumb in a hole. The natural resting angle varies enough between individuals that a default assumption will produce a poor fit for a meaningful proportion of bowlers.

Related Sections

- 4.5.1 — Selecting "Oval" thumb hole on the spec sheet
- 4.5.3 — How the system calculates the oval cuts from your inputs
- 4.5.4 — Entering the span with an oval thumb
- 4.4.1 — Selecting "Round" thumb hole on the spec sheet
- Book 05 — Oval Calculator

Tip: An oval thumb hole, done well, is one of the most significant fit improvements you can offer a competitive bowler. The extra inputs and observation time are an investment in a result that round drilling simply cannot match for bowlers whose thumbs do not sit symmetrically in a circular hole.

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4.5.2 Entering Starting Bit, Oval Width, Oval Degree, and Taper

Entering Starting Bit, Oval Width, Oval Degree, and Taper

> 4.5.2 oval

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4.5.3 How the system calculates the oval cut from your inputs

How the system calculates the oval cut from your inputs

> 4.5.3 oval

Once the four oval inputs — starting bit, oval width, oval degrees, and taper — have been entered into the spec sheet, Spectre Cloud calculates the drilling instructions needed to produce the finished oval hole. Rather than requiring the operator to work out the geometry manually, the system outputs a set of **x-axis and y-axis offset movements** that tell the driller exactly how to reposition the ball relative to the drill bit to elongate the pilot hole into the correct oval shape.

⚙ What the System Calculates

The starting pilot hole is round — drilled straight down to the starting bit diameter. The oval cuts extend that hole along the line defined by the oval degrees entry, opening it out to the full oval width. Spectre Cloud resolves the oval degrees angle into two linear components — horizontal (**x-axis**) and vertical (**y-axis**) — so the driller can execute the cuts using the drill press's standard lateral adjustment controls rather than needing a rotary fixture.

- The **x-axis value** is the horizontal distance the ball must be moved relative to the bit — left or right — to position the cut correctly along the oval degrees line.
- The **y-axis value** is the vertical distance the ball must be moved relative to the bit — forward or back — to complete the movement along the same line.

- □ Together, x and y define a straight line through the center of the pilot hole at exactly the angle specified by the oval degrees entry — the finished hole will be elongated along this line to the full oval width.
- □ Taper is factored into the depth profile of the cuts — the system accounts for how much wider the top of the hole needs to be than the bottom when generating the offset values.

In plain terms: The system is doing trigonometry on your behalf. You enter an angle (oval degrees) and a target width — Spectre Cloud converts those into the horizontal and vertical movements your drill press can actually execute.

□□ How X and Y Relate to Oval Degrees

The relationship between the oval degrees angle and the x/y output values follows standard trigonometric decomposition. The oval width defines the total distance to travel along the oval degrees line; x and y are the horizontal and vertical components of that travel.

Oval degrees	Clock position	X component	Y component
`0°`	12:00	Zero — no horizontal movement needed	Full travel — all movement is vertical (toward/away from fingers)
`45°`	~1:30	Moderate horizontal movement	Equal to x — movement split evenly between axes
`90°`	3:00	Full travel — all movement is horizontal	Zero — no vertical movement needed
`135°`	~4:30	Moderate horizontal movement	Equal to x but in opposite vertical direction
`180°`	6:00	Zero — no horizontal movement needed	Full travel in opposite direction to 0°

Note: The x and y values output by Spectre Cloud are always positive distances paired with a direction indicator — the system tells you both how far to move and which way. Read both the value and the direction before making any drill press adjustment. *Verify with Spectre team: confirm how direction is indicated in the output — whether as +/− signs, labeled arrows, or explicit left/right/forward/back text labels.*

□□ How to Use the Calculated Output at the Drill Press

1. Drill the starting pilot hole straight down — no lateral movement, centered on the thumb hole position as marked on the ball.
2. Without removing the ball from the fixture, read the x and y offset values from the Spectre Cloud spec sheet output.
3. Move the ball along the **x-axis** by the specified distance in the specified direction.
4. Move the ball along the **y-axis** by the specified distance in the specified direction.
5. With the ball held at the offset position, make the oval cut — the bit will now remove material along the oval degrees line, elongating the pilot hole toward the full oval width.
6. Return the ball to center and make the mirror cut in the opposite direction along the same axis to complete the oval — the hole is now elongated symmetrically around the original pilot hole center.
7. Apply taper cuts as indicated — the system's taper calculation specifies how much additional material to remove at the surface relative to depth to match the bowler's thumb profile.

Verify with Spectre team: confirm whether the oval cut is made in two passes (one in each direction from center) or as a single continuous pass through center, and whether the taper instructions are output as a separate set of values or integrated into the main x/y offset sequence.

□□ Checking the Output Before Drilling

Before making any cuts, review the calculated x/y values against the inputs to confirm the output looks reasonable. This is a quick sanity check that catches data entry errors before they become drilling errors.

- □ If oval degrees is close to `0°` or `180°`, the x value should be close to zero and the y value should carry most of the travel — confirm this matches the output.
- □ If oval degrees is close to `90°`, the y value should be close to zero and x should carry most of the travel.
- □ If oval degrees is close to `45°` or `135°`, x and y should be approximately equal — confirm both values are similar in magnitude.
- □ The combined travel distance (the hypotenuse of x and y) should approximately equal half the difference between the oval width and the starting bit diameter — if it looks significantly larger or smaller, recheck the width and starting bit entries.

- If either x or y is zero when the oval degrees entry is between `10°` and `80°` (or between `100°` and `170°`), something has been entered incorrectly — a non-cardinal angle should always produce non-zero values on both axes.

Tips for Working with the Calculated Output

- Print or display the spec sheet at the drill press before beginning — having the x/y values visible throughout the drilling sequence prevents errors from misremembering a value mid-cut.
- Make small, controlled movements when repositioning the ball for oval cuts — drill press lateral adjustments on a ball fixture have little margin for overshoot.
- If your drill press uses a digital readout for lateral positioning, zero the readout after drilling the pilot hole so the x and y offsets can be dialed in directly from the Spectre Cloud output values.
- Do not estimate the x/y movements by eye — the precision of the oval depends on executing the calculated offsets accurately. A `1/32"` error in lateral positioning produces a visibly off-center oval.
- Do not skip the sanity check on the output values before cutting — a transposed oval degrees entry (e.g. `45°` entered as `54°`) produces x/y values that look plausible but will orient the oval incorrectly on the ball.

Related Sections

- 4.5.2 — Entering starting bit, oval width, oval degrees and taper
- 4.5.4 — Entering the span with an oval thumb
- 4.5.1 — Selecting "Oval" thumb hole on the spec sheet
- 4.4.4 — Entering vertical and lateral pitch for thumb
- Book 05 — Oval Calculator
- Book 06 — Drilling Your First Ball

Tip: The first time you drill an oval thumb hole using Spectre Cloud's calculated output, go slowly and check your positioning at each step. Once you have drilled a few oval thumbs using the x/y offset workflow, it becomes a fast and reliable part of the drilling sequence — but the first time deserves extra care.

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4.5.4 Entering thumb oval span and pitch information

Entering thumb oval span and pitch information

> 4.5.4 oval

For most spec sheets, span is measured and entered the same way regardless of thumb hole shape. Oval thumb holes introduce one specific scenario where the entered span requires an adjustment — when the driller chooses to make oval cuts in **both directions** from the pilot hole center. Understanding when this adjustment applies, and how to account for it, ensures the finished span matches the bowler's fitting measurement after all cuts are complete.

□□ Two Approaches to Making Oval Cuts

When executing the x/y offset cuts calculated by Spectre Cloud, the driller has a choice about where to place the material removal:

Option 1 — Cuts made at the bottom of the hole only

All oval material is removed from the side of the hole **away from the finger holes**. The top edge of the thumb hole — the edge closest to the finger holes — remains at the original pilot hole

boundary and does not move.

- Span is unaffected — the top of the thumb hole stays exactly where it was drilled, so the distance to the finger holes remains consistent with the entered span measurement.
- No span adjustment is needed in Spectre Cloud when using this approach.

Option 2 — Cuts made in both directions (bidirectional)

Oval material is removed from **both sides** of the pilot hole — including the side facing toward the finger holes. For example, at `45°` oval degrees, cuts are made at both the `4:30` position and the `10:30` position on the clock face of the hole.

- Produces a more symmetrically centred oval — some drillers prefer this approach for the finished appearance and feel.
- The cut at the top of the hole (`10:30` in the example above) moves the top edge of the thumb hole **toward the finger holes** — effectively shortening the span if no adjustment is made.
- If the finger holes were drilled first and no span allowance was added, the finished span will be shorter than the bowler's measurement requires.

The Span Allowance for Bidirectional Cuts

When bidirectional oval cuts are planned and the finger holes have already been drilled, the span entered in Spectre Cloud must include an allowance equal to the distance the top-of-hole cut will travel toward the finger holes. This ensures that after the cut is made, the effective span — from the finished top edge of the thumb hole to the finger holes — matches the bowler's measured span.

The allowance is determined by the **y-axis component** of the oval cut at the top of the hole — specifically, how much of the bidirectional cut travel moves in the direction of the finger holes.

- At `0°` oval degrees (cuts at 12:00 and 6:00), the top cut moves directly toward the finger holes — the full y-axis travel distance becomes the span allowance.
- At `90°` oval degrees (cuts at 3:00 and 9:00), neither cut moves toward or away from the finger holes — no span allowance is needed even with bidirectional cuts.
- At `45°` oval degrees (cuts at 1:30 and 7:30) or `135°` (cuts at 4:30 and 10:30), only the y-axis component of the top cut contributes to span encroachment — the allowance is the y-axis portion of the offset travel, not the full cut distance.

- □ Spectre Cloud's calculated x/y output gives you the y-axis value directly — use this as the basis for the span allowance when bidirectional cuts include a top-of-hole pass with a y-axis component toward the fingers.

Verify with Spectre team: confirm whether Spectre Cloud prompts the operator to specify bidirectional vs. bottom-only cuts and calculates the span allowance automatically, or whether the operator is expected to calculate and apply the allowance manually before entering the span value.

□□ Entering Span for an Oval Thumb in Spectre Cloud

1. Determine which oval cut approach the driller will use — **bottom-only** or **bidirectional**. Confirm this before entering the span, not after drilling.
2. If using **bottom-only cuts**: enter the span as measured — no adjustment needed.
3. If using **bidirectional cuts**:
   1. Review the y-axis value from the Spectre Cloud oval cut output for the top-of-hole pass.
   2. Add this y-axis value to the measured span before entry — this is the span allowance.
   3. Enter the adjusted span value in the span field.
4. Note in the **Notes** field which cut approach was used and whether a span allowance was applied — e.g. `Bidirectional oval cuts. Span adjusted +3/32" for top cut y-axis encroachment.`

Important: The span allowance only applies when the **finger holes are drilled first**. If the thumb hole is drilled first, the finger holes are positioned relative to the finished thumb hole edge after the oval cuts are complete — no pre-adjustment is needed. Confirm the drilling order before deciding whether to apply the allowance. *Verify with Spectre team: confirm whether Spectre Cloud tracks or prompts for drilling order (thumb first vs. fingers first) as part of the spec sheet workflow.*

□□ Span Adjustment — Quick Reference

Cut approach	Oval degrees	Finger holes drilled first?	Span adjustment needed?
Bottom-only	Any	Yes or No	□ No — top edge of thumb hole unchanged

Cut approach	Oval degrees	Finger holes drilledfirst?	Span adjustment needed?
Bidirectional	`90°`	Yes	□ No — top cut has no y-axis component toward fingers
Bidirectional	`0°` or `180°`	Yes	□ Yes — top cut moves directly toward fingers; full y-axis value is the allowance
Bidirectional	Any angle with y-axis component toward fingers	Yes	□ Yes — y-axis component of top cut is the allowance
Bidirectional	Any	No (thumb drilled first)	□ No — finger holes positioned after oval cuts complete

□ Tips for Oval Thumb Span Entry

- □ Decide on the cut approach — bottom-only or bidirectional — as part of the fitting conversation, before the bowler leaves the counter. Changing approach after the finger holes are drilled is too late to adjust the span.
- □ Document the cut approach and any span allowance in the Notes field every time. On a future visit when a ball is being cloned, this note prevents the next driller from applying or omitting an allowance incorrectly.
- □ If you are unsure which approach a previous driller used on a cloned spec sheet with no notes, measure the finished thumb hole on the existing ball — a symmetrical oval indicates bidirectional cuts; an oval that extends only to one side of the pilot center indicates bottom-only.
- □ Do not apply a span allowance when drilling thumb-first — the allowance only compensates for encroachment on already-drilled finger holes. Applying it unnecessarily will push the finger holes further from the thumb than the bowler's measurement requires.

Related Sections

- 4.5.2 — Entering starting bit, oval width, oval degrees and taper
- 4.5.3 — How the system calculates the oval cuts from your inputs
- 4.5.1 — Selecting "Oval" thumb hole on the spec sheet
- 4.4.3 — Entering bowler's span (Full and Cut to Cut)
- 4.3.2 — Entering span measurements (Full Span and Cut to Cut)
- Book 06 — Drilling Your First Ball

Tip: The span allowance for bidirectional oval cuts is a small detail that is easy to overlook — but a bowler who comes back reporting their ball feels slightly cramped after an oval thumb drilling is almost always experiencing the result of a missing allowance. Making it standard practice to note the cut approach on every oval spec sheet eliminates this class of complaint entirely.

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