3.1.3 Optional profile fields: PAP, axis tilt, axis rotation, rev rate, ball speed

Optional profile fields: PAP, axis tilt, axis rotation, rev rate, ball speed

> `3.1.3` fields

Beyond the three required fields covered in 3.1.2, a bowler profile in Spectre Cloud can store a rich set of **optional fitting measurements** that power the app's most sophisticated auto-suggestion features. None of these fields are required to save a profile or create a spec sheet — but the more completely they are filled in, the more useful Spectre Cloud becomes for that bowler over time. This page covers the five core performance measurements: **PAP**, **axis tilt**, **axis rotation**, **rev rate**, and **ball speed**.

Note: Additional optional fields — including hand flexibility, CLT, and delivery style — are covered in the following pages. The fields on this page are grouped together because they collectively form the **bowler dynamics profile** that drives layout suggestions and ball motion analysis.

□□ PAP — Positive Axis Point

The **PAP (Positive Axis Point)** is the point on the ball's surface that sits at the end of the bowler's initial axis of rotation at the moment of release. It is the single most important measurement in ball layout — every structured layout type in Spectre Cloud (VLS, 2LS, and Dual Angle) uses the PAP as its geometric anchor.

Why PAP Matters in Spectre Cloud

- Required for all structured layout calculations — without a PAP, layout fields on spec sheets must be entered manually.
- Required for **Auto-Suggest Layouts (2.6.10)** to fire — it is the minimum profile data needed for a layout suggestion.
- Stored as a coordinate pair — typically expressed as a measurement right/left of the midline and up/down from the ring finger. ⚠ *Verify with your Spectre team: confirm the exact PAP coordinate format used in Spectre Cloud — whether it is stored as two measurements (over/up) or in a different format.*

How to Measure PAP

PAP is measured from a ball the bowler has thrown — ideally one drilled to their current span and pitch — using a fresh ink or powder track to identify the ball's axis of rotation at the point of release.

1. Have the bowler throw several shots on a fresh surface to establish a clear, consistent track.
2. Identify the axis point — the location on the ball equidistant from both sides of the track.
3. Measure the distance from the PAP to a known reference point on the ball (typically the grip center or the pin).
4. Record the PAP coordinates in the bowler's Spectre Cloud profile.

Tip: PAP can shift over time as a bowler's release technique develops. For competitive bowlers, re-measure PAP at least once per season and update the profile — outdated PAP data will produce layout suggestions that no longer reflect the bowler's actual delivery.

Axis Tilt

Axis tilt is the angle between the bowler's positive axis and the horizontal plane at the point of release. It describes how much the ball is tilted on its axis when it leaves the bowler's hand — a higher tilt angle means a later, more angular backend reaction; a lower tilt angle produces an earlier, smoother arc.

- Typical range: **0° to 30°** for most bowlers, though values outside this range are possible.
- Two-handed bowlers typically have lower axis tilt than traditional thumb bowlers.
- Axis tilt enhances the quality of **Auto-Suggest Layouts (2.6.10)** — it helps the engine distinguish between layouts that work well for angular players vs. those that suit arc bowlers.
- Measured from the same throw used to establish PAP — the track width is a useful proxy for tilt when a precise measurement is not available. ⚠ *Verify with your Spectre team: confirm whether Spectre Cloud accepts axis tilt as a direct degree entry or whether it is derived from another measurement.*

Axis Rotation

Axis rotation is the angle between the bowler's positive axis and the vertical plane at the point of release. It describes how much the bowler rotates the ball through the release — a higher rotation angle produces more hook potential; a lower rotation angle produces a straighter, more rolled path.

- Typical range: **0° to 90°** — a 45° rotation is considered mid-range; competitive bowlers often fall between 45° and 75°.
- High rotation + high tilt = angular backend reaction; low rotation + low tilt = smooth, arcing motion.
- Axis rotation is a key input for **Auto-Suggest Layouts (2.6.10)** — together with tilt and rev rate it gives the engine the information needed to recommend layouts calibrated to the bowler's actual ball motion.
- Measured from the same throw used to establish PAP. ⚠ *Verify with your Spectre team: confirm whether axis rotation is entered as a direct degree value or calculated from a measurement taken at the fitter's bench.*

Rev Rate

Rev rate — revolutions per minute (RPM) — measures how many times the ball rotates on its axis per minute during its travel down the lane. It is one of the most commonly referenced indicators of a bowler's power and hook potential.

- Typical range: **150–500 RPM** for most bowlers. Recreational bowlers commonly fall between 150–250 RPM; competitive bowlers between 250–400 RPM; high-rev players above 400 RPM.
- Higher rev rate bowlers generally benefit from stronger layouts with more defined flare potential — the AI suggestion engine accounts for this.

- Rev rate can be measured using a dedicated rev rate app, a high-speed camera, or estimated from observation. An approximate value is useful even if an exact measurement is not available.
- Update rev rate as the bowler's game develops — rev rate can change significantly as technique improves, particularly for younger or developing bowlers.

Note: ⚠ *Verify with your Spectre team: confirm the unit and format Spectre Cloud uses to store rev rate — whether it is RPM, revolutions per second, or another unit — and the accepted input range.*

Ball Speed

Ball speed measures how fast the ball travels down the lane, typically recorded at the arrows (approximately 15 feet from the foul line) or at the pins. Speed is the counterpart to rev rate — the ratio between the two (rev-to-speed ratio) is a key determinant of ball motion style.

- Typical range: **14–19 mph** at the arrows for most adult bowlers. ⚠ *Verify with your Spectre team: confirm whether Spectre Cloud stores ball speed in mph, km/h, or offers both — and whether speed is recorded at the arrows, the pins, or is selectable.*
- Low speed relative to rev rate = high rev-to-speed ratio = more hook and earlier roll; high speed relative to rev rate = lower ratio = straighter, later reaction.
- Ball speed can be measured using lane-side speed monitors, a dedicated bowling app, or estimated from observation.
- Speed recorded in the bowler's profile is used by **Auto-Suggest Layouts (2.6.10)** alongside rev rate to calibrate layout recommendations to the bowler's rev-to-speed ratio.

How These Five Fields Work Together

PAP, axis tilt, axis rotation, rev rate, and ball speed together form a complete picture of how a bowler releases the ball and how it behaves on the lane. No single field tells the full story — the auto-suggestion engine uses all five in combination to produce layout recommendations that are genuinely tailored to the individual.

Field	What It Describes	Primary Use in Spectre Cloud
PAP	Where the ball's axis sits at release	Layout geometry anchor — required for all structured layouts

Field	What It Describes	Primary Use in Spectre Cloud
Axis tilt	How tilted the axis is at release	Distinguishes angular vs. arcing motion styles
Axis rotation	How much the ball is rotated at release	Hook potential and backend shape
Rev rate	How many revolutions per minute	Power level — influences layout strength recommendation
Ball speed	How fast the ball travels	Rev-to-speed ratio — balances rev rate recommendation

□□ Updating These Fields Over Time

All five fields can be updated at any time from the bowler's profile page. Updates take effect immediately and are used by the auto-suggestion engine from the next new spec sheet onward — existing spec sheets are not retroactively affected.

- □ Re-measure PAP at least once per season for competitive bowlers.
- □ Update rev rate and ball speed if the bowler reports a significant change in their game — a coaching programme, technique adjustment, or equipment change can all shift these values meaningfully.
- □ Axis tilt and rotation are less likely to change dramatically for established adult bowlers but should be re-evaluated if release technique is intentionally modified.

Related Sections

- 3.1.2 — Required fields: name, hand, grip type
- 3.1.4 — Optional profile fields: hand flexibility, CLT, delivery style *(if applicable)*
- 2.6.10 — Auto-Suggest Layouts: AI-based layout suggestion from bowler's profile
- 2.5.1.1 — VLS: Storm layout system for bowlers using their thumb
- 2.5.1.2 — 2LS: Storm layout system for two-handed bowlers
- 2.5.1.3 — PAL / Dual Angle system
- 4.x — Spec Sheet: entering layout values

Tip: If a bowler can only spare a few minutes for intake measurements, prioritise **PAP** above everything else — it is the single field that unlocks the most downstream functionality. The remaining four fields can be estimated initially and refined over subsequent sessions as the bowler's profile matures.

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