Chapter 1: Introduction - The importance of pedal fit.

The foot-to-pedal connection is the most critically important physical contact point between a rider and his or her bicycle for two reasons:

First, the cleat-to-pedal connection is the only body-to-bicycle contact point with a mechanical attachment. Unlike hand positions or seat position that can easily be repositioned for comfort when riding, feet are mechanically attached to the bike in a specific position. Because of this mechanical attachment, pedals are the most susceptible of all the contact points as the cause of either chronic pain or repetitive motion injuries as a result of improper fit.

Second, the pedal/cleat connection is the primary interface for the transmission of human energy into mechanical power. Therefore, any problems with or inefficiencies in this connection will typically result in a dramatic decrease in performance.

For these reasons, the sequence of fitting a bicycle to a rider should always begin at the foot-to-pedal connection.

The Speedplay Pro Fit Case is a comprehensive selection of tools that, when combined with the inherent fit capabilities of the Speedplay Zero Pedal System, can be highly effective in the optimization of the ergonomic connection between rider and bicycle. When used properly, you can maximize both the efficiency and comfort of cycling while reducing the potential for pain and injury. In the following materials, you will find an overview of the Speedplay Pro Fit Case, its components and their uses. Included is an outline for the Speedplay recommended fit process. This process was developed in conjunction with leaders in bike fit education and development at Bike Fit®, Faster®, Fit Kit®, Retul®, Serotta® (SICI), Specialized BG Fit®, Trek Bicycles® and others.
Chapter 2: Initial interview and evaluation.

The purpose of the initial interview and physical assessment is to begin to establish objectives for a successful fit, to learn what (if any) issues your client specifically wants you to address, and to get the most accurate reading of your client’s physical characteristics related to the fit. Following are key topics to address, with the goal of driving further conversation where appropriate and building a complete understanding of your client’s issues and needs:

- Rider history, expectations:
  - What are the reasons the rider is seeking fitting service?
    - for improved performance and/or comfort
    - to address a specific issue
    - some combination thereof
  - Does the rider have any recent injuries?
    - pain, aches
    - chronic conditions
    - diagnosed conditions, or surgeries? (Follow-up questions should include clarification of frequency, timing of occurrence, and length of time the symptoms have been experienced.)
  - Does the rider currently use or has the rider previously used any of the following?
    - shims
    - wedges
    - orthotics
    - insoles
    - other devices? (Follow-up questions should be asked regarding exact setup used, changes in setup, specific diagnosis of any leg-length discrepancy or condition, etc.)
  - Observe the rider’s pedaling style:
    - ankling pattern throughout pedal stroke
    - cadence when seated
    - cadence when standing
  - What type(s) of riding?
    - racing
    - comfort
    - endurance
    - terrain
  - Does the rider have any other needs, requests, or observations?

- Measurement and observation of foot size, shape, movement:
  - Measure the foot both weighted and unweighted with the Brannock device. Note length and width. (It is essential to ensure that the rider is using properly fitted shoes or that the shoes currently used can be adapted to fit properly.)
  - Estimate in-shoe volume as it relates to selected shoes, available shoes, and possible impact on footbed selection.
  - Measure forefoot tilt (valgus/varus). (The Forefoot Measuring Device®, available separately from BikeFit.com, is the most objective tool for assessing this.)
  - When the rider is pedaling, observe the natural position of the foot.
- Observe toe length/distance to first and last metatarsal heads to determine optimal position over the pedal spindle.
- Pronation or Supination?
- Measure Arch height weighted and unweighted – how high is the arch and how much does it collapse when weighted? (Both are indicators of the starting point for selecting/testing footbeds.)
- Assess the rider’s foot-splay angle (This will indicate setting for cleat rotation and spindle-length selection.)
  - toe-in
  - toe-out
  - neutral
- **Leg-length discrepancy:**
  - Leg-length discrepancy should only be addressed in bicycle fitting if it has been medically diagnosed as a structural discrepancy. If you suspect that you are observing a leg-length discrepancy during a bicycle fit, refer your client to a medical professional for evaluation.
  - If your client has a known, diagnosed leg-length discrepancy, this is the time to gather information about it from your client.
    - tibial discrepancy
    - femoral discrepancy
  - Does your client make any correction for the leg-length discrepancy in his or her street shoes, and if so, what is the correction?
  - Has your client made any correction for the leg-length discrepancy when cycling?
  - While the rider is pedaling, observe adaptations around the leg-length discrepancy.
    - Measure differences in left/right leg at the bottom of the pedal stroke to determine if the leg-length discrepancy is an issue that will need to be addressed or can be comfortably accommodated by the rider’s natural adaptation.
- **Stance:**
  - Assess the rider’s hips:
    - wide
    - narrow
    - average
  - Assess the rider’s stance on and off bike or ride:
    - bow-legged
    - knock-kneed
  - Other observations:
    - Recall foot splay, as it will also be a guide to selecting spindle length.

**Chapter 3: Individual Considerations (Address before cleat installation).**

- Shoe size – based on your measurements and observations, is the rider using the proper size shoe? Is there a more suitable model or brand for the shape of the rider’s foot (consider width, volume, length, ankle height, toe box needs, etc)?
- Does the rider need/use/want arch support to stabilize the foot? This is the proper time to try a variety of footbeds.
• Based on forefoot varus/valgus measurements, is the rider using the proper shoe? Would the rider benefit from a different shoe or from the use of wedges?

• Shimming for leg-length discrepancy:
  □ For tibial leg-length discrepancies, the generally accepted guideline is to shim half the distance of the discrepancy as a starting point, and then adjust for comfort and alignment.
  □ For femoral leg-length discrepancies, the generally accepted guideline is to shim one quarter of the distance of the discrepancy and then adjust cleat fore/aft to accommodate another quarter of the distance. In extreme cases, more accommodation may be needed, up to and including different crankarm lengths.
  □ When addressing leg-length discrepancy, it is advised to proceed with caution. Best practice is to only address a leg-length discrepancy if it has been medically diagnosed AND is causing a significant issue on the bike in terms of discomfort based on alignment.

Chapter 4: Cleat installation.

• Fore/aft positioning:
  □ Absent other indicators or requests, the cleat should be positioned slightly behind the first metatarsal head. As much as 1-1.5cm is acceptable/desirable for most riders.
  □ Typically, the observed preference for cleat positioning is either slightly farther back for riders with a low cadence or slightly farther forward for riders that prefer a higher cadence. Many triathletes prefer a farther rearward position.

• Lateral positioning:
  □ Center the cleat under the shoe laterally. The goal is to place the center of the cleat, pedal body, and spindle underneath the point of power transfer for maximum comfort/efficiency/pedal performance. Select the spindle length that best achieves this.
  □ For riders with excessive foot pronation, proper cleat position may involve moving the cleat slightly inward.
  □ For riders with excessive foot supination, proper cleat position may involve moving the cleat slightly outward.

• Spindle-length selection – for optimizing tread/stance width:
  □ Once the cleat is positioned optimally from side-to-side, spindle length should be selected to ensure the optimal tread/stance width for the rider. Spindle-length selection must also allow for sufficient shoe clearance from the crankarms and frame when pedaling.
  □ The selection of spindle length should be determined primarily by the rider’s hip width and natural stance when pedaling. The goal of spindle selection should be to position the pedal body directly beneath the knee’s thrust path when pedaling.
    □ Riders with a toe-in foot splay generally will use shorter spindles to accomplish this.
Riders with a toe-out foot splay will generally use longer spindles to accomplish this and to facilitate heel clearance relative to the bike and crankarms.

Larger riders who often have wide hips and overweight riders who often pedal with their knees out for clearance will generally benefit from longer spindles.

Smaller riders who often have narrow hips will generally benefit from shorter spindles.

Keep in mind that it is always preferable to optimize cleat position first and then adjust stance width by choosing the spindle length that best accommodates the selected cleat position.

Rotational adjustment:

- Observe the rider pedaling with fully-open float to get an idea of the rider’s natural range of heel movement (observe from both the front and the back with the rider seated and then standing).
- The inward heel stop should be set to prevent the heel from contacting the frame or crank.
- Outward rotational limits should be set to enable sufficient range of motion and should never be set to constrain the rider’s natural foot float. However, the stop should be set far enough inward as to allow for safe release from the pedals using the rider’s available, natural range of motion based on the rider’s inherent flexibility. A rider should never feel as though he or she must reach or twist beyond the natural range of motion to disengage.
- Absent specific needs/input/guidance, at least 25mm of heel movement should be allowed between the rotational limits when measured from the rearmost part of the heel. This is the best assurance against joint damage.
- Verify with the rider that the outward float limit is set so the rider is comfortable when pedaling and can disengage safely from the pedals.
Chapter 5: Speedplay Pro Fit Case components: instructions and illustrations.

With Speedplay Pedal Systems, you can adjust the foot/pedal interface in three ways:
1. Fore/aft cleat placement.
2. Lateral cleat placement.
3. Cleat rotation or float (Zero Model).

**Fore/Aft Cleat Adjustment Range:**
- Maximum forward position.
- Maximum rearward position.

**Lateral Cleat Adjustment Range:**
- Maximum outward position.
- Maximum inward position.
The Speedplay Pro Fit Case includes the following components (including related hardware):

1. Cleat Extender Base Plate Kit (P/N# 13330) offers the ability to place the cleats farther aft.
2. Multiple spindle lengths to adjust stance width while maintaining neutral, lateral cleat placement and to allow test rides outdoors/off of the trainer.
3. Varus/valgus cleat wedging to ensure neutral forefoot contact at the pedal (BikeFit Cleat Wedges® Available separately from www.BikeFit.com).
4. X/Zero/Light Action Cleat Leg-Length Kit (P/N# 13220) to accommodate a lower leg-length discrepancy.
5. Speedplay Determinator is an adjustable spindle-length pedal for quickly adjusting and assessing changes in stance width while the rider is on the trainer or a fitting bike. It is sold by Speedplay as an option when purchasing a Speedplay Pro Fit Case. (***)The
Speedplay Determinator is a professional fitting and assessment tool and is only intended for use with a bicycle on a trainer, a fitting bike, or other stationary bicycle.

Use of the Speedplay Pro Fit Case components:

**Speedplay Cleat Extender Base Plate Kit (P/N# 13330):** This cleat part replaces the standard Speedplay 3-hole base plate and allows you to place the foot farther forward or rearward over the pedal when using a 3-hole shoe sole. Typically, riders prefer a fore/aft cleat position between the 1st and 5th metatarsal joints (bumps at the base of the big and little toe). In some cases when a rider needs more stability on the pedal or suffers from extreme hot foot issues, you may want to adapt the cleat farther back. Also, some shoes are drilled with the cleat holes too far forward and will require the Speedplay Cleat Extender Base Plate simply to accommodate basic cleat installation and positioning. In rare instances, a rider will require a farther forward cleat position than is allowable with his or her shoe sole. The Speedplay Cleat Extender Base Plate is useful in this situation as well.

**Custom-Length Spindles:** Speedplay’s Pro Fit Case includes five pairs of custom Zero pedals in each of the following available spindle length options: 50mm, 53mm, 56mm, 59mm, and 65mm. The ability to adjust rider stance width by using custom-length spindles is of paramount importance when determining proper bicycle fit and is an option exclusive to Speedplay. Speedplay’s selection of custom spindle lengths enables a bike fit specialist to quickly and accurately determine a rider’s optimal stance width. Rider stance width that has been optimized for biomechanical efficiency with the correct spindle length results in
improved power and ensures long-term rider comfort. The custom Zero pedals in the Speedplay Pro Fit Case allow the rider to test various spindle lengths on a trainer, stationary bike, or on the road.

**Speedplay Determinator Pedals:**
Determinator pedals are a novel device that provides fitters with the ability to quickly make stance-width determinations by using a special set of Zero pedals equipped with telescopically-adjustable spindles. Rather than taking the time to replace pedals, the adjustable-length spindles of Determinator pedals allow the fitter to quickly adjust stance width simply by loosening and re-tightening a collet on the Determinator’s spindle. Each indentation on the Determinator spindle corresponds to an available Speedplay spindle length (see markings). Once the correct stance width is determined, the proper pedals/spindles may be ordered. Important: The Speedplay Determinator is a professional fitting and assessment tool and is only intended for use when riding indoors on a trainer, fitting bicycle, or other stationary bicycle. It is not intended for outdoor riding.

**Varus/Valgus wedging:** The Cleat Wedges® (available separately from BikeFit.com) included in the Speedplay Pro Fit Case are valuable tools for optimizing the foot/pedal interface. If you have not been trained in the proper use of wedges, approach this adjustment with caution. The Forefoot Measuring Device® (available separately from BikeFit.com) is an objective tool that can be used to correct a varus or valgus forefoot issue. The use of wedging is only recommended after arch support has been addressed and proper foot beds have been selected. The use of more than two wedges is rarely recommended, and this decision should rely heavily on rider feedback and preference. The goal is to give the rider the sensation of even lateral support across the ball of the foot while pedaling. If the rider feels as though the foot is tilted inward or outward when engaged in the pedals or if it feels like there is uneven pressure on the inside or outside of the foot bed, start with one wedge and make changes gradually. The wedge should not be used to change the canting angle of the foot, but rather to provide support for the foot when it is in its natural lateral position. Varus wedging is achieved by placing the cleat wedge with the thick side on the inside of the shoe. Valgus wedging is achieved by installing the shim with the thick part on the outside of the shoe. 90% of the population has a varus forefoot issue, roughly 2% have a valgus forefoot issue, and the balance have a forefoot that would be considered neutral. Therefore, most people can benefit from some degree of cleat wedging. Rider comfort and safety should guide your decision regarding wedging.
Leg-Length Discrepancy Shims: Cleat shims are used to compensate for a medically diagnosed leg-length discrepancy. The shims are used between the cleat and shoe to add lift (1/8" or 3.175mm thickness each) for the shorter leg. Do not make any leg-length adjustments in the case of a pelvic rotation as this can vary from day to day. Pelvic rotation should be addressed by a medical professional rather than by a bike fit specialist.
Chapter 6: Post-fit evaluation and follow up:

- Rider comfort and safety is the ultimate guide. Following initial setup, it is essential to consult the rider for feedback. The new position should be evaluated and adjusted based on rider feedback such as discomfort, difficulty of use, or other concerns.
- Notes to give the rider: Any changes to the foot-to-pedal interface or converting from a fixed-position pedal to a floating system may require up to a 2-week period of adjustment and transition.