

## 94 Get Set: Pointers on Bike Set-up



*Optimising the position on the bike is an absolute prerequisite to achieving your potential in this discipline. The ultimate aim is to achieve a position that is as efficient and as aerodynamic as possible.*

The goal in set-up is to find a cycling position in which power is maximally converted into motion. Scientific and empirical research has shown that a correct position on the bike is determined by several fundamental factors: friction, efficiency, power maximization and comfort. A further benefit of optimising the sitting position on the bike is a reduced potential for injuries.

### POWER MAXIMISATION

The purpose of power maximisation is to achieve a position in which the percentage of effective power yielded by the cyclist is as large as possible. Only the power that is exercised vertically on the pedal arm (Diagram 1) is effective. When the pedal is positioned at the lowest or

upper 'dead' point, the effective power that results is practically negligible. This means that especially when the crank is in the 90° position (maximum leverage), the adjustment of the bike must be such that the power that is exercised is exactly under a 90° angle on the crank. This also means that the forward and backward adjustment of the seat plays an important role. If the seat is placed too far back, it will result in a pedal position that corresponds with position 2 in Diagram 1. If, however, the seat is placed too far forward, the pedal will correspond with position 3 in Diagram 1.

### SEAT HEIGHT

In general, an increase in seat height will increase the power. But this will lead to a loss of cadence, which, in turn, affects

the level of efficiency of the cyclist. A high position of the seat is recommended only for short-term efforts that require a lot of power, such as off-road cycling, mountain biking, and uphill time trials.

### COMFORT

**Seat.** Clearly, a seat should fit comfortably. In principle, the seat should be placed horizontally. If the seat is pointed downwards ('negative seat tilt'), the cyclist will tend to slide forwards. This is very uncomfortable, not only because the narrower front part of the seat gives too little support, but also because the arms, wrists and hands are subjected to too much pressure as a result of the cyclist's attempt to maintain a normal position on the seat.

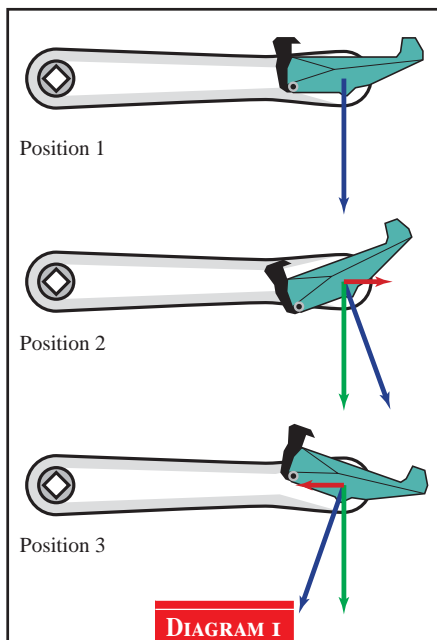


DIAGRAM 1  
The power that is exercised exactly under a 90° angle on the crank is effective.

### Scott Millar's Set-Up Tip: Seat Height

The method generally used by Bike-Right for seat height adjustment is as follows: measurements are done at the bottom of the pedal phase (crank arm parallel with seat tube) with the foot in position correctly on the pedal, and the seat positioned on the seat pillar in the middle of the rails. The foot angle from horizontal should be between 8° and 12°, and the knee angle should be between 140° and 145° (Diagram 2). There may be exceptions to this, depending on athletes' flexibility or injury status.

DIAGRAM 2  
Determining seat height.

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**Handlebars.** The handlebar width should correspond with the width of the shoulders.

**Pedals.** Together with the cycling shoes, the pedals form a conduit through which the cyclist transfers movement to the bike. For comfort, it is important that shoes and pedals offer sufficient stability, enabling the movement of the knee to remain in line-of-force with the hip and foot. This explains why the shoe-pedal link should be stable in itself. The pedal should also be sufficiently wide because the entire front part of the foot must be supported.

**Neck and shoulders.** When the distance from the seat to the handlebars is too long, the sitting position will be too stretched. This situation can lead to complaints related to increased tension on the muscles in the neck extensors.

## KNEE AND UPPER LEG

**Bike adjustment.** A seat adjusted at the wrong height can injure the knees,

particularly where the kneecap (patella) and the upper leg (femur) make contact. Having the seat too high results in a force that moves the kneecap laterally in the stretching phase of the knee. This eventually causes pain at the outer side of the kneecap. The phenomenon is reinforced by the position of the legs.

**Physical causes.** If supination or pronation of the foot occurs during cycling,

the knee will no longer be in a line-of-force position and will deviate laterally from the ideal line. This leads to lateral pressure on the knee with an increased risk of knee injury and loss of power. These complaints can be partly overcome or prevented by opting for a shoe-and-pedal system in which the front part of the foot maintains a certain lateral latitude, or by using an orthopaedic arch support.

### Seat Specifics

How should the optimal seat position (forward and back on the seat pillar) be determined? When the seat is adjusted at the correct height and pedal and crank are positioned horizontally, the perpendicular line from the kneecap should go straight through the pedal axle. Research shows that there is increased stability of the seat position when this perpendicular is approximately 2 cm behind the kneecap.

Determining the seat angle by measuring only the upper-leg length does not suffice. The seat position should be measured while the cyclist is positioned on the bike. The sitting position on the seat is strictly individual, as it is influenced by the width of the pelvis and the shape of the seat. The position on the seat determines the position of the knee during the cycling movement; thus, the position on the seat influences the seat angle.

### Jenny Rose on Bikes – Size Is Critical

If there's one area that frustrates me totally, it's seeing my athletes being sold bikes that are too big for them. Would you buy a pair of running shoes 2 sizes too big? Well, it's even more important that you get the right-sized bike for your body, especially because bikes are very expensive and you want to use one for years.

The top tube is the bar that goes from the seat to the handlebars. The length of this is expressed either in inches or centimetres. The length of this top tube is essential to your comfort.

I'll use myself as an example:

- I'm 1.71 m or 5 feet 7 inches and have a reasonably long upper body
- Note: some lucky people have short upper bodies and longer legs. They require even shorter top tubes than one would expect for their overall height. My bike has traditional geometry and the top tube is 51 cm long – equivalent to a 'small' in the compact frame.

As a rule of thumb, if you are shorter than me, you will require a shorter top tube, naturally. So if you are 1.65 m, you should buy a bike with a 48 to 49 cm top tube or an XS in the compact frame.