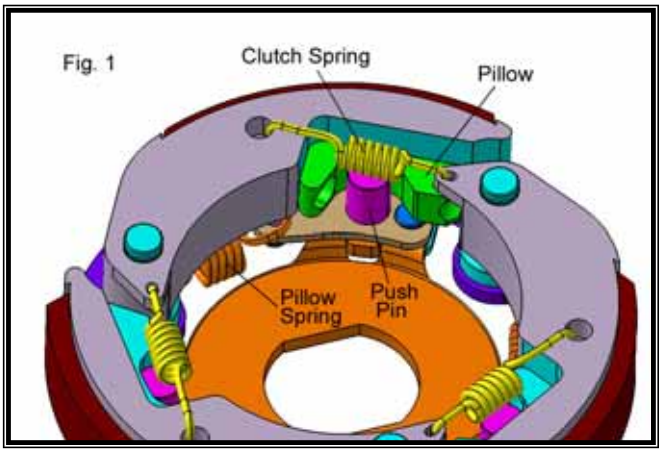
Dr.Pulley® HiT Clutch

1. The Source of Grip Force is different

The strength of grip force of a conventional clutch is determined totally and only by the centrifugal force and the friction coefficient of the wear pad on the clutch weight. The grip force of a conventional clutch is sometimes so weak that makes the clutch slip in the bell and so the bell becomes blued. Therefore, the usable life of clutch/bell system becomes shortened and the transmission efficiency of clutch is poor.



The strength of grip force of HiT clutch [Fig.1, perspective view] is determined not only by the centrifugal force and the friction coefficient of clutch weight, but most importantly by the compression mechanism—push pin & pillow system--of the HiT. The push pin can receive the torque from the engine and then compresses the clutch weight to grab the clutch bell very tightly. Thus, the grip force of a HiT clutch will be much stronger (at least 30% higher) than that of a conventional clutch. Therefore, the clutch slippage becomes much less, the bell no more gets blued, the usable life of the HiT clutch/bell system becomes longer and the transmission efficiency of HiT clutch is excellent.

2. Grip Force vs. Pillow Angle for Two/Four-Wheel Vehicle

The strength of grip force provided by the HiT is effected by the contact angle [defined by the degree of pillow, such as 25, 30, 35, 40 or 60 degree] between the push pin and the contacting surface of pillow. A pillow with higher angle can provide stronger grip force to reduce or even eliminate the clutch slippage.

2.1 Pillow Installed

The low rev torque of two-wheel vehicles is usually less than that of four-wheel vehicles. The strength of the low rev torque of two-wheel vehicle might not be stronge enough to drive a vehicle with a very solid engaged clutch (i.e., a HiT clutch with little or no slip) and there might be some vibration at takeoff if the engagement is too strong and abrupt (i.e., a HiT installed with large-angle pillow.) So,

- For two-wheel CVT vehicles or scooters, the pillow installed in the HiT clutch can be 25 to 40 degree. Normally 35 degree pillows are installed unless specified;
- For four-wheel CVT vehicles, ATV, Buggy or GoKart, the pillow installed in the HiT clutch can be 45 to 60 degree. Normally 45 degree pillows are installed unless specified.

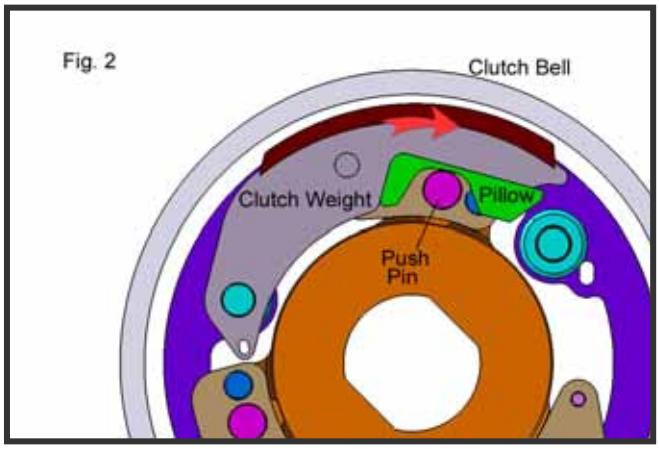
3. The Structure of HiT

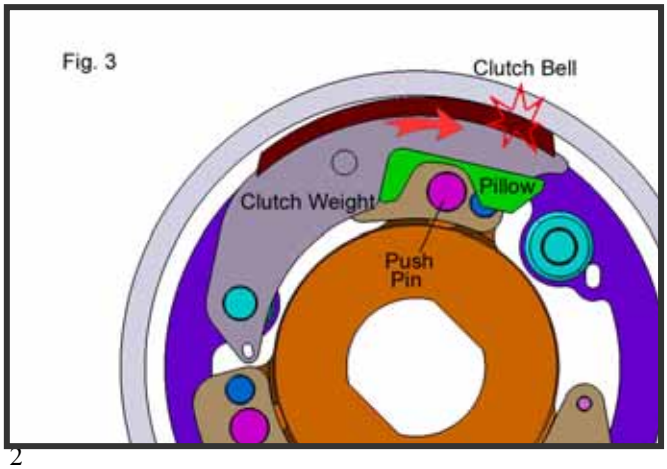
There are two types of springs installed in a HiT Clutch [Fig.1,perspective view].
One is the well-known clutch spring, used to determine the rev at which the clutch weight is going to engage (i.e., initial clutch-in) with the clutch bell/outer.

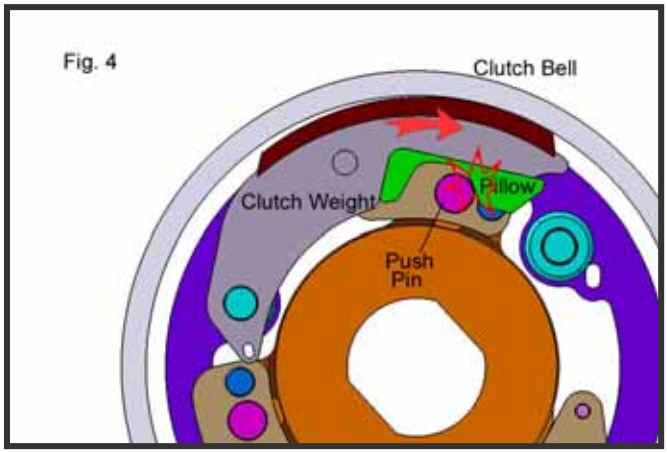
The other is the pillow spring (only in the HiT clutch), used to determine when the Push Pin can receive the torque transmitted from the engine and thrust against the Pillow to push/compress the clutch weight to grab the clutch bell/outer very tightly.

3.1 Operation of HiT

The clutch weight is driven to rotate [Fig.2, the rev is not high enough, so the clutch weight and the bell is in non-contacting state.] When the rotating speed of HiT Clutch is high enough to make the centrifugal force of clutch weight overcome the tension of clutch spring, the clutch weight will centrifugally fly outward to touch the clutch bell to proceed the initial slippery clutch-in [Fig.3, the clutch weight is slippily contacting with the bell, and the push pin is unactuated.] ,The friction resistance is produced between the clutch wear pad and the inner surface of clutch bell during the stage of slippery clutch-in.







When the friction resistance is higher than the predetermined distortion strength of pillow spring, the pillow spring will be deformed or extended, and the Push Pin will thrust into the Pillow [Fig.4, the push pin is actuated and pressed against the pillow] to compress the clutch weight to grab the clutch bell/outer very tightly.

Thus the Grip Force of HiT is much higher than that of conventional clutch.

3.2 Tuning of HiT

3.2.1 Rev of clutch-in and clutch-stall

Suppose the weight of clutch weight and the strength of clutch spring of both Conventional clutch and HiT Clutch are the same, it is understood that

a) the rev of initial engaging/clutch-in with the outer for both Conventional clutch and HiT clutch should be the same;
ex. Suppose the rev of both clutches is 3000 rpm [engine rev]

b) the rev of clutch-stall (i.e., clutch no more slips vs the clutch outer) of both clutches will be different,

: For Conventional clutch, its rev of clutch-stall is fixed;
ex. Suppose the rev is 4000 rpm [engine rev]

In that case, the feature of Conventional **clutch** is clutch-in at 3000 rpm and clutch-stall at 4000 rpm

: For HiT Clutch, through the description above or the mechanism showed on the following webpages
http://www.unionmaterial.com/images/HiT-Clutch-Funtion.png
http://www.unionmaterial.com/images/HiT-Clutch-Feature.png
it's understood the rev of clutch-stall can be further adjustable with different PILLOW springs. That is,

a.) with soft pillow spring, the actuation of push pin is early,
ex. The rev of clutch-stall might become about 3400 rpm;
b.) with harder pillow spring, the actuation of push pin will be postponed a little bit late,
ex. The rev of clutch-stall might become about 3500 rpm;
c.) with hardest pillow spring, the actuation of push pin will be postponed much late,
ex. The rev of clutch-stall might become about 3800 rpm
[still less than 4000 rpm of the Stock clutch]

Therefore, the feature of **HiT clutch** is clutch-in at 3000rpm and clutch-stall at different rev (3400, 3500 or 3800 rpm) which depends on the strength of the Pillow spring.

3.2.2 Selection of Pillow Spring and Clutch Spring

When the tuning of HiT is required [refer to the table below], **select the clutch spring first** and then **secondly determine the pillow spring** by trying different pillow springs with the selected clutch spring.

	Problem	**Possible Causes**	**Solutions**
1.	Powerful takeoff but unable to jump into the air*.	Engine power not strong.	Tune the cylinder.
		Actuation timing too late.	Replace with softer pillow spring.
		Engaged rev too low.	Replace with harder clutch spring.
2.	Powerful takeoff but no riding comfort.	Actuation timing too early.	Replace with harder pillow spring.
		Engaged rev too high.	Replace with softer clutch spring.
3.	Powerful takeoff but having vibration.	Actuation timing too early.	Replace with harder pillow spring.
		Engaged rev too low.	Replace with harder clutch spring.
4.	Smooth takeoff but no obvious solid engagement.	Belt slippage** happened in the front driving pulley.	Replace with heavier roller.
		Belt slippage happened in the rear driven pulley.	Replace with harder torque spring.
		Belt slippage happened in the pulley.	Replace with a new belt.

*Warning! It's dangerous to actuate the throttle fully and suddenly when softer pillow spring and harder clutch spring are used at the same time, as the vehicle might jump into the air abruptly to cause serious damage or injury.

**The belt slippage will happen in the pulley due to the solid engagement and little slippage with the clutch bell. Occurrence of abnormal surface temperature of pulley can be taken as checkpoint to see if the belt slippage exists.