



# Total Suspension Integration





# THE BRAIN BEHIND OUR BRAIN

A Word from Mike McAndrews (a.k.a 'Mick'), the Man Behind our Line of Integrated Suspension Components Including the FlowControl Brain.

The simple way to explain the benefits of the FutureShock fork and AFR shocks my team and I have developed is to tell you straight that these suspension components, when ridden in the frames they were designed in conjunction with, will provide you with more control and efficiency than anything else on the market. You'll steer more precisely, ride through rough terrain with more control and pedal more efficiently. We accomplished this by tirelessly innovating the chassis, springs and dampers of the fork and shocks and by developing them in conjunction with the frames that they're a part of.

*The FutureShock Fork and AFR shocks will provide you with more control and efficiency than anything else on the market.*

I've spent the better part of my life working hard to enable riders on two wheels (Motocross and mountain bikes) to ride with more control through tuning and advancing suspension technology. After being a Motocross race tuner for top pros like Jeff Ward & Bob Hannah, I started my own motorcycle suspension tuning company. My vision was to give privateers the same sweet, custom-tuned performance as the pros. My childhood friend, Paul Turner, would often talk about bicycle suspension and eventually started the pioneering company RockShox. I was still in the Motocross world when Paul got his start, but I later joined RockShox, working for 6 years as the head of R&D. Eventually I came to Specialized, headed up the engineering department and initiated Brain Technology. I moved around a little after that, working for Fox Racing Shox and teaming back up with Turner at Maverick, but now I'm back with a good crew at Specialized.

Whether it was helping Ward win a championship or my neighbor get to the bottom of our local singletrack faster,

I've always felt a fundamental calling to help all types of riders get more out of every ride. That's why I came back to Specialized. Here I can work with the best people in the world, a group with a proven track record of taking dreams and turning them into reality.

My guys and I are focused on suspension, and we work closely with the bike engineers and designers at Specialized on a common goal: to advance a specific kind of riding through appropriate technology. No bike brand in the world other than Specialized can properly develop all the elements of a suspension bike. By developing the chassis and suspension together, Specialized can control the entire ride. That's why I came back: here my suspension work will make the biggest difference in the ride and the life of a rider.

When I came back to Specialized I told Founder and President Mike Sinyard that I was going to make this chapter of my career the very best ever. I've been around for a long time, but I'm more motivated than ever and have the team and tools to do my best work ever.

*At Specialized I am culminating all my experience into the development of forks and shocks that are integrated into frames as a part of a whole so that riders like you can have the best ride of your life.*

So go take one for a ride, and let us know if we have succeeded!

Mike McAndrews,  
Director of Suspension Engineering,  
Specialized Bicycles



Mick today in the Specialized Suspension Lab; with Champion Moto-Cross racer Jeff Ward (middle photo); with other Kawasaki factory mechanics (right photo).



Mick's work paying off: Sauser and Killeen take #1 and #2 at the 2006 World Cup at Mont Ste. Anne using Mick's new rear shock!

# Specialized Suspension 2007: Total Integration

Adding proprietary forks and shocks to our time-tested FSR suspension makes for the most integrated, most controlled ride available. Pursuing our vision to be the Best Cycling Brand in the World means that we must strive to make each rider's time on a bike better. To do that we must continue to innovate and develop bikes and equipment that better enable riders to have the experience they want. The more control we have over the design and development of

each part of a bike, the greater the impact we can have on each person's ride. This desire to deliver the best, most purpose-specific ride is what led us to develop our own, fully integrated suspension components. By developing custom suspension as an integral part of a complete bike, our 2007 Enduro SL, Stumpjumper FSR and Epic bikes, serve their intended experiences better than any other bikes in the world.

## Our FutureShock Fork and AFR Shock (Active Functional Response) Rear Shocks Provide:

- MAXIMUM CONTROL
- Optimal Bump Force Management
  - Travel and Impact Matching
  - Unsurpassed Steering Precision
  - Terrain Specific Damping
- UNSURPASSED EFFICIENCY
- Light Weight
  - Terrain Specific Damping
  - No Pedal Interference



2007 Enduro SL Pro with FutureShock E150 fork and AFR rear shock





# FEELING THE FAHRWERK

The Germans Have a Word for the Essence or Feeling of All the Critical Attributes of a Vehicle. They Call it “Fahrwerk” (say “far-verk”).

On a full-suspension mountain bike, the critical categories that determine the bike’s fahrwerk are the fork, shock, rear suspension linkage and chassis. To truly improve every rider’s experience we integrate and focus all of those elements into a machine purpose-built to pursue a particular experience.

## ALL MOUNTAIN



## ENDURO SL

All Mountain riders have a desire to ride the whole mountain and love every inch of it. Revolutionized for 2007, the Enduro SL redefines the boundaries of All Mountain riding. The E150 Fork, AFR Shock and 150mm of unparalleled FSR travel ensure quick climbs and shredding descents.

## XC TRAIL



## STUMPJUMPER FSR

For XC Trail riders it’s all about feeling the flow over rough terrain, finding thrills and adventure in new places while covering as much ground as possible. The Stumpjumper FSR models are most at home on rocky trails, buff berms and snaking singletrack. Because they balance a light chassis and efficient suspension with neutral geometry, the Stumpjumper family delivers a sweet combination of technical trail competence and cross country efficiency.

## COMPETITIVE XC



## EPIC

Winning a World Cup, smoking a friend to the top of a local mountain or trying to best a personal lap time, Competitive XC riders are driving to get from Point A to Point B as fast as possible. These riders seek a nimble bike that is extremely light and exceedingly efficient. Proven at every level of competition, the Epic with incredibly efficient FlowControl Brain suspension technology, is the fastest suspension bike in the world.

# UNDERSTANDING THE RIDE

### Acute Rider Insight is the First Step in the Creation of Everything We Do

The frame, suspension and critical components of the Enduro SL, Stumpjumper FSR and Epic are developed together to provide the rider with the best experience possible. This integration of development ensures a balanced, experience-optimized bike, one that has been perfectly designed and manufactured for its intended application.

Different types of riding demand different attributes from a fork or shock. Before we begin to work on any project, our design and engineering team develops a complete understanding of the experience that a particular bike is being created to fulfill. That understanding allows us to tune critical components (including the frame, fork chassis, spring and damper) for an optimized experience-centric ride.

<b>RIDER BENEFIT</b> Widest application All Mountain bike	<b>RIDER BENEFIT</b> Most efficient XC Trail bike	<b>RIDER BENEFIT</b> Fastest Competitive XC bike
<b>RIDER MOTIVATION</b> Adventure	<b>RIDER MOTIVATION</b> Fun/Adventure	<b>RIDER MOTIVATION</b> Competition
50% climb / 60%* descend	50% climb / 50% descend	80% climb / 20% descend
Stable geometry	Neutral geometry	Very nimble geometry
<b>FORK CHASSIS</b> Maximum steering precision at minimum weight	<b>FORK CHASSIS</b> Balanced weight and steering precision	<b>FORK CHASSIS</b> Light weight
<b>SPRING RATE</b> Optimized to handle big and small impacts	<b>SPRING RATE</b> Slightly rising for optimal travel to impact	<b>SPRING RATE</b> Progressive to avoid bottoming
<b>SHOCK DAMPING</b> Spike Valve tuned to minimize yaw in cornering, yet provide max travel in high-velocity impacts	<b>SHOCK DAMPING</b> FlowControl Brain seamlessly shifts from firmly efficient to fully active depending on terrain	<b>SHOCK DAMPING</b> FlowControl Brain seamlessly shifts from hard-tail firm to fully active depending on terrain
<b>FORK DAMPING</b> Spike Valve tuned to minimize yaw in cornering, yet provide max travel in high-velocity impacts	<b>FORK DAMPING</b> Supple	<b>FORK DAMPING</b> Taut and efficient
150mm Rear Travel	120mm Rear Travel	100mm Rear Travel

\* 110%? Yup, the new Enduro SL climbs as well as an SJ FSR, yet descends more capably.



# 2007 ENDURO SL

MAXIMUM CONTROL • INCREDIBLE EFFICIENCY • UNSURPASSED STRENGTH • MINIMAL WEIGHT

## The Integration of All Mountain

The development of any suspension part or component always begins with the demands of the experience that it is being designed for. In the case of the 2007 Enduro SL, the suspension, like the rest of the bike delivers maximum control, incredible efficiency, unsurpassed strength and minimal weight.

### 1 AFR Shock

Proprietary Spike Valve enhances a rider's control in two ways:

- Increases stability in corners
- Allows maximum travel on large or high-speed impacts

State-of-the-art seals ensure extremely low maintenance and high reliability

### 2 FSR

Fully active, fully independent system delivers maximum comfort, control and efficiency

### 3 LOW CG

The new Enduro SL features an extremely low center of gravity and centralized mass, to enhance maneuverability

### 4 ROCKER

Rocker design allows for optimal pivot placement and a water bottle inside the main triangle. The Rocker also allows maximum seat post adjustment.

### 5 FACT 10m Composite

The top-of-the-line S-Works Enduro SL weighs about 27 lbs. thanks, in part, to a proprietary FACT 10m carbon front triangle

## FutureShock E150 Fork

Highest performance 150mm travel fork in the world. At around 4.5 lbs., it boasts precise handling and the most effective bump-force management available.

6 Integrated Lowers and thru-axle for incredible torsional rigidity and steering precision

7 Double Triple-Clamp design with integrated stem to decrease weight and improve steering precision

8 Attitude Adjustment travel adjust system quickly lowers the front end of the bike by 40mm for optimized climbing performance

9 Proprietary Spike Valve enhances a rider's control in two ways:

- Increases stability in corners
- Allows maximum travel on large or high-speed impacts

10 State-of-the-Art Seals ensure extremely low maintenance and high reliability

11 Dual Geometry Settings



# FutureShock E150

## The Details On The Most High Performance 6-Inch Travel Fork Available

**Dual Triple-Clamp Design with Integrated Top Crown/Stem**  
By employing a dual triple-clamp design, the E150 can be both lighter and stiffer than a single crown. A dual triple-clamp design changes the force on the steerer tube at the lower crown from primarily a bending load to primarily a sheer load. Far less material is required to handle the sheer load, so the fork can be much lighter. We reduced weight even more by integrating the stem into the top crown.

- Integrated Fork Chassis and Axle**
- Our integrated approach to design results in a torsionally rigid, but light weight fork chassis and 25mm thin-wall axle with increased stiffness and minimal weight.
  - The gossamer in-line arch reduces weight while minimizing torsional flex. This svelte design is possible because the axle handles load differentials between the legs, not the arch as in other designs.

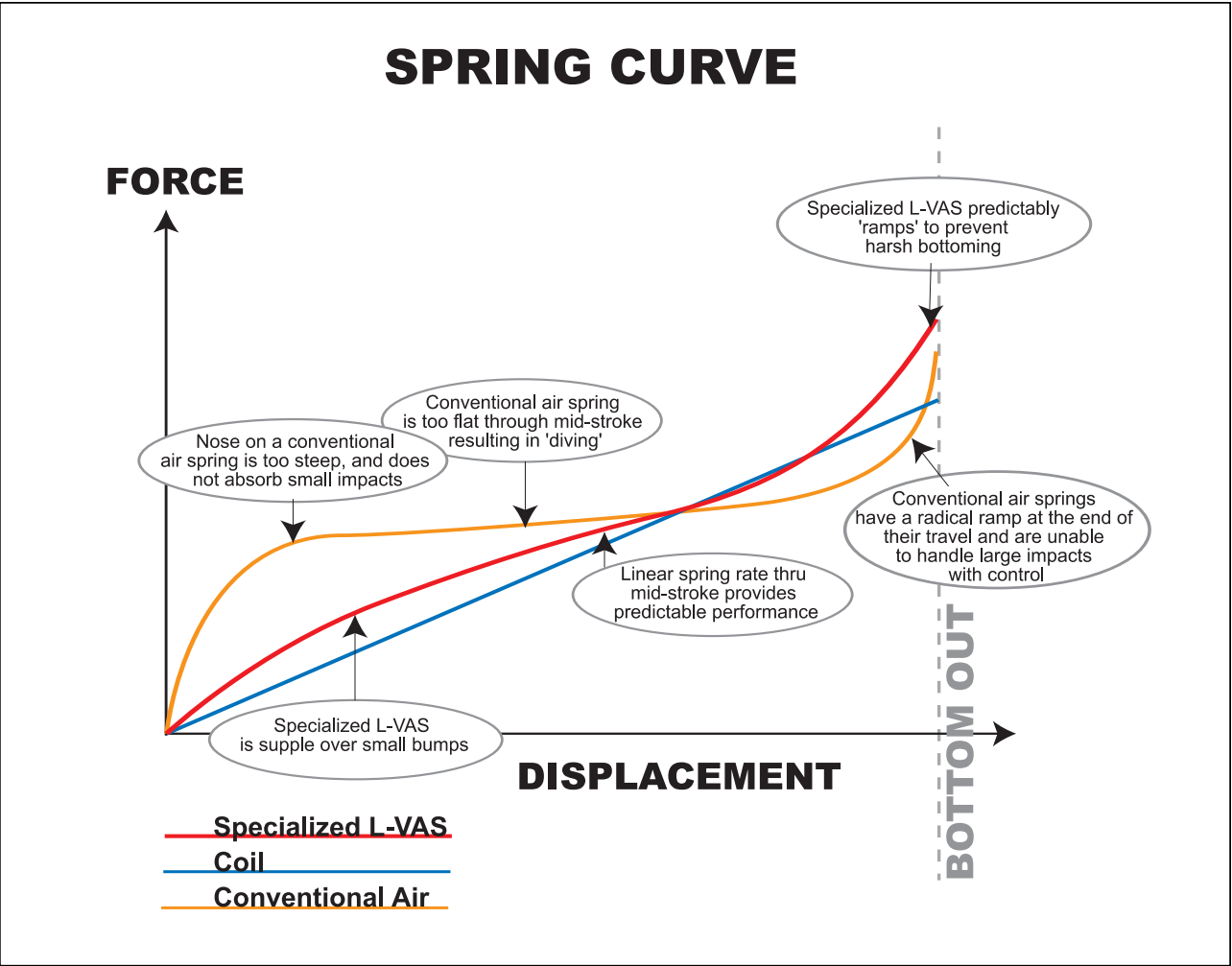


# L-VAS (Large Volume Air Spring)

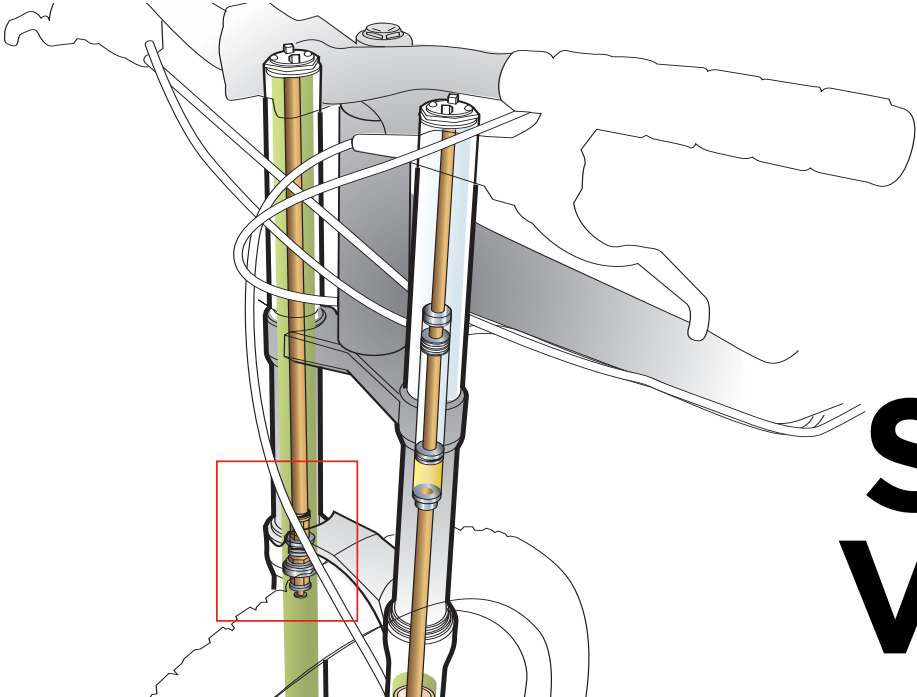
## Our Proprietary L-VAS Spring Ensures Optimal Performance for Any Impact

Air springs are light. Coil springs are supple and linear. By relying on a large volume, low-pressure air spring, assisted by a negative coil spring, we've achieved an optimal spring curve with very light weight.

- The L-VAS exhibits an optimal spring curve including:**
- Reduced “nose,” so small bumps are absorbed.
  - Eliminated “hammock” for a consistent feel through the mid-stroke.
  - Progressive “ramp” easily handles large impacts without premature bottoming or excessive ramping.







# SPIKE VALVE

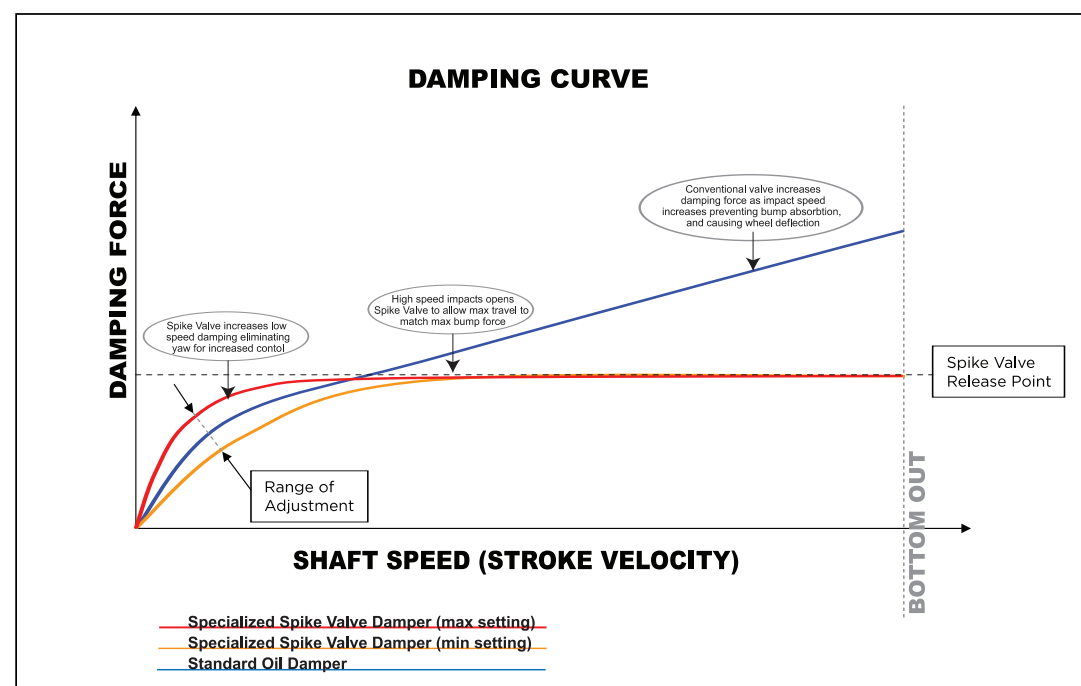
Patents Pending

## Proprietary Spike Valve Increases Control Over the Full Range of Impacts

Found in the E150 fork and Enduro AFR rear shocks, the Spike Valve (a reference to Mike McAndrew's old motocross nickname "Spike") is a breakthrough that enhances control in two ways:

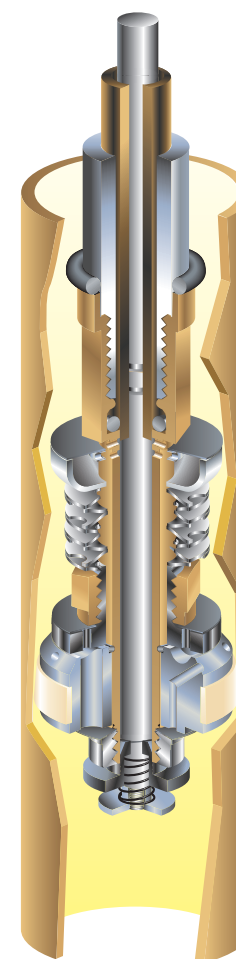
1. **Slow speed forces** (pedaling, turning yaw) do not overly compress the fork, which provides greater stability.
2. **High speed impacts** (like drop-offs or high-speed bumps) that "spike" the compression loads open the Spike Valve, which immediately dumps oil so that maximum travel can be achieved.

The Spike Valve combines a traditional shim stack with a revolutionary "pop-off" valve that work in harmony to minimize compression under slow speed forces, yet allow significant flow to cope with high-speed impacts.



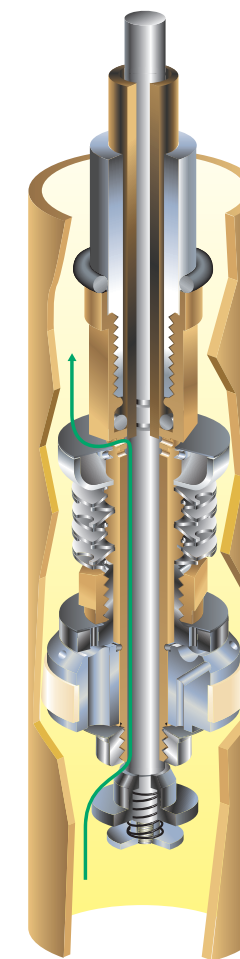
# CONSTANT CONTROL

## How the Spike Valve Responds To Different Types of Impacts



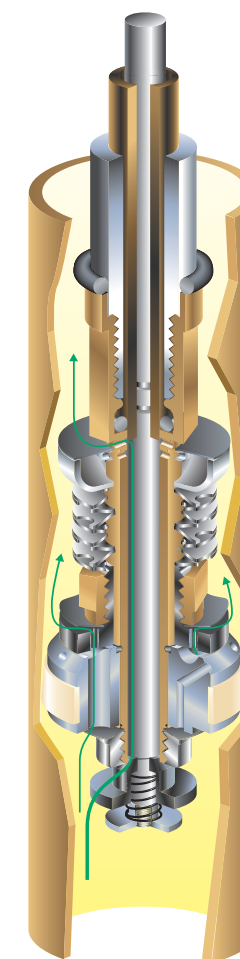
### RIDER OSCILLATION/ SMALL HIT Low-speed port closed

Under super low-speed compression, the Spike Valve prevents unwanted suspension movement



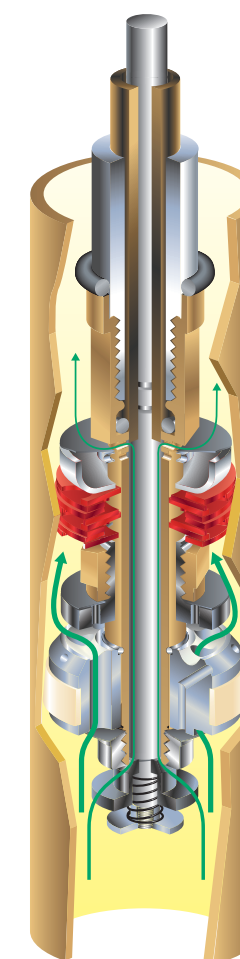
### RIDER OSCILLATION/ SMALL HIT Low-speed port open

By opening the low speed port, a small amount of oil can flow freely through the damper. By adjusting this port, the rider can adjust damping force to decrease 'wallow,' thereby increasing control.



### INTERMEDIATE HIT Low-speed port open Shim stack open

In addition to low speed oil flow, intermediate impacts deflect the speed-sensitive compression valve shim stack, matching compression to bump force.



### LARGE HIT Low-speed port open Shim stack open Spike valve open

High-speed impacts release the Spike valve, and it immediately dumps oil to allow maximum travel. Again, bump force is matched by damper performance.



# AFR SHOCK (Active Functional Response)

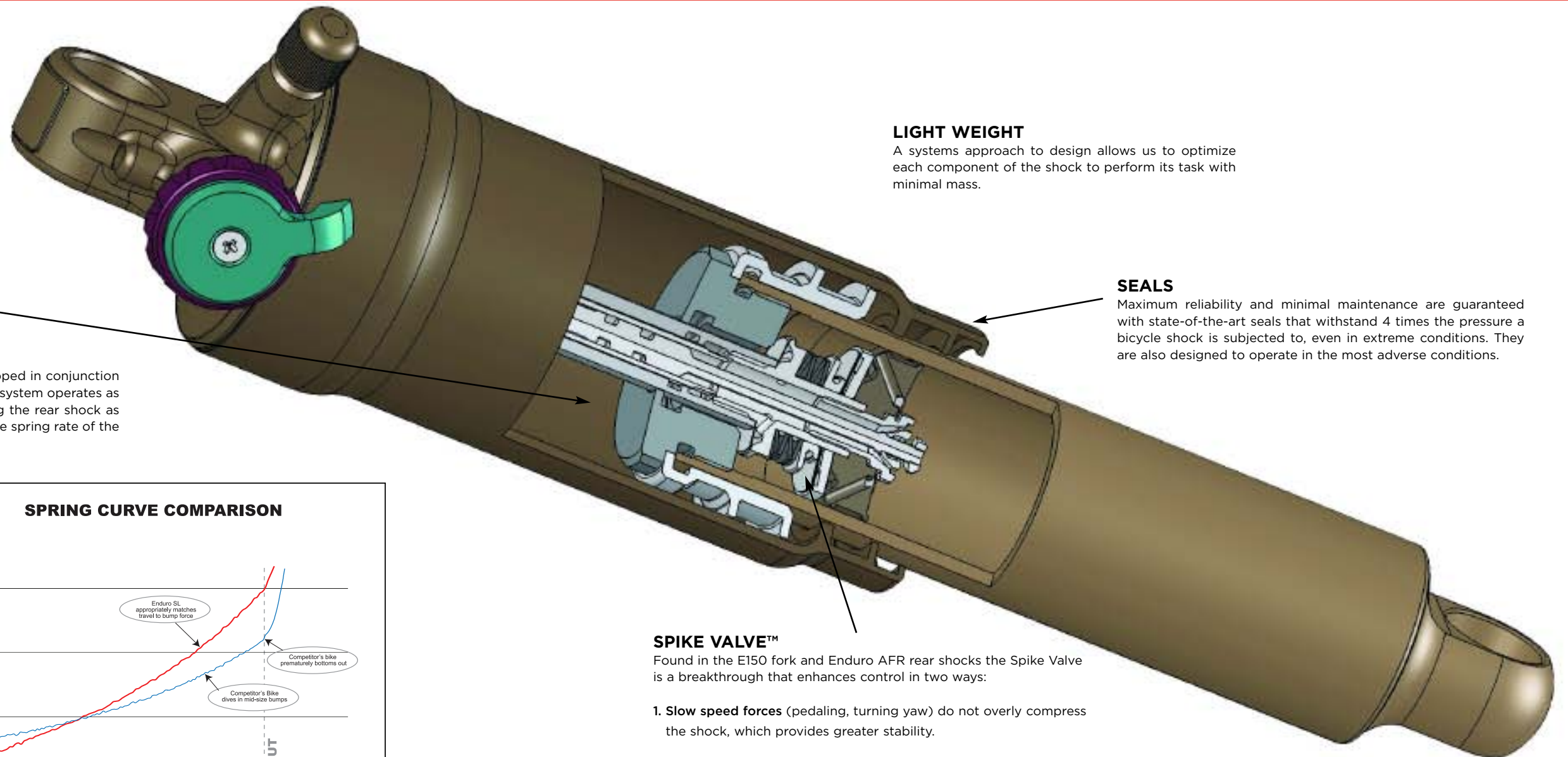
One Smart Damper, Three Applications:  
All Mountain, XC Trail and Competitive XC

The AFR shock exhibits an optimal spring curve including:

- Reduced “nose,” so small bumps are absorbed.
- Eliminated “hammock” for a consistent feel through the mid-stroke.
- Progressive “ramp” easily handles large impacts without premature bottoming or excessive ramping.

## TELEMETRY AND FULL INTEGRATION

AFR Shock valving and air spring rate volumes are developed in conjunction with the bike they are integrated into to ensure the whole system operates as required for each bike’s specific purpose. So by designing the rear shock as an integrated part of the frame, we can perfectly match the spring rate of the shock to the telemetry of the suspension linkage.



## LIGHT WEIGHT

A systems approach to design allows us to optimize each component of the shock to perform its task with minimal mass.

## SEALS

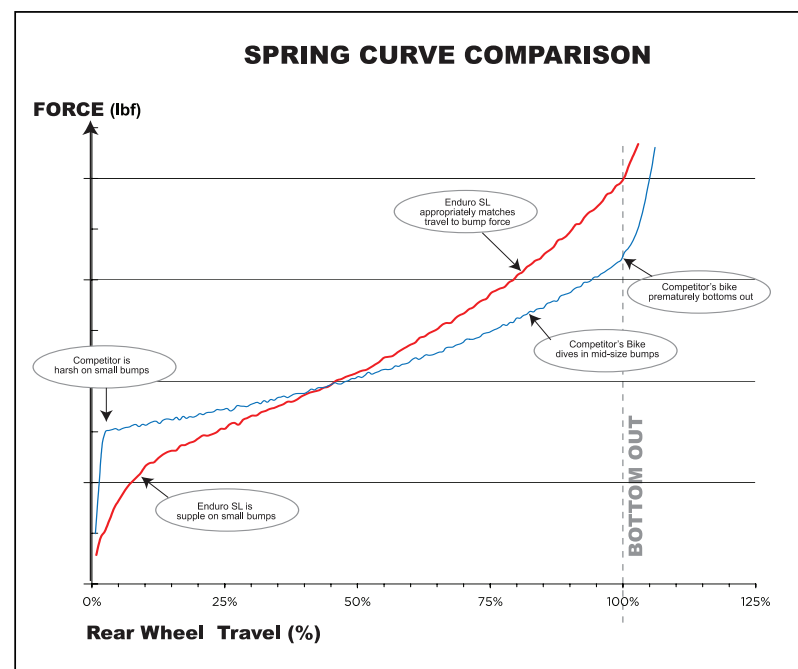
Maximum reliability and minimal maintenance are guaranteed with state-of-the-art seals that withstand 4 times the pressure a bicycle shock is subjected to, even in extreme conditions. They are also designed to operate in the most adverse conditions.

## SPIKE VALVE™

Found in the E150 fork and Enduro AFR rear shocks the Spike Valve is a breakthrough that enhances control in two ways:

1. **Slow speed forces** (pedaling, turning yaw) do not overly compress the shock, which provides greater stability.
2. **High speed forces** (like drop-offs or high-speed bumps) that “spike” the compression loads open the Spike Valve, which immediately dumps oil so that maximum travel can be achieved.

PATENT PENDING





# THINK FAST!

## Revolutionary FlowControl Brain Technology Enables our Stumpjumper and Epic Models to be the Fastest, Most Efficient Bikes on the Trail

New for 2007, our FlowControl Brain technology adds some I.Q. points to our already intelligent Brain damper, boosting both control and efficiency.

The Stumpjumper FSR and Epic are already designed to be efficient and provide maximum control to the rider. But the FlowControl Brain enhances both experiences like no other because it senses the terrain that is being traversed and instantaneously changes the compression of the shock from firm for maximum pedaling efficiency, to fully active for unsurpassed bump control.

In order to suit each experience perfectly, the factory tuning of the firm mode on each FlowControl Brain is customized for Stumpjumper and Epic models:

Since the Epic is an all-out race machine, it is tuned to allow for “Hardtail Firm” adjustment while riding over smooth terrain.



World Cup winner Christoph Sauser riding the S-Works Carbon Epic with FlowControl Brain.

A trail bike like no other, the Stumpjumper never settles into a hardtail firm mode, instead it has a “Trail-Tuned” firm setting while riding over smooth terrain and moves to fully active immediately upon hitting the rough stuff.



Ned Overend on a S-Works Carbon Stumpjumper FSR.

## FLOW CONTROL BRAIN SENSES ALL

Boosted Control and Efficiency Makes Riding an Intuitive Stream of Consciousness

The Original Brain, pioneered by Specialized and Mike McAndrews back in 2002, was and is the first and only bicycle suspension that could sense the terrain and automatically change the compression from firm (on smooth terrain) to active (in rough terrain). The original Brain worked with an inertial valve that stayed closed until a bump caused its ballast to move relative to its shaft, thus opening a compression flow port and allowing the suspension to compress. After a period determined by a hydraulic “timer,” the ballast was then closed by a spring and the suspension returned to firm.

Instead of using a hydraulic timer, the new FlowControl Brain relies on the rebound flow of the shock’s oil to close the compression valve instantaneously. This new configuration allows the FlowControl Brain to move between active and firm modes seamlessly, resulting in:

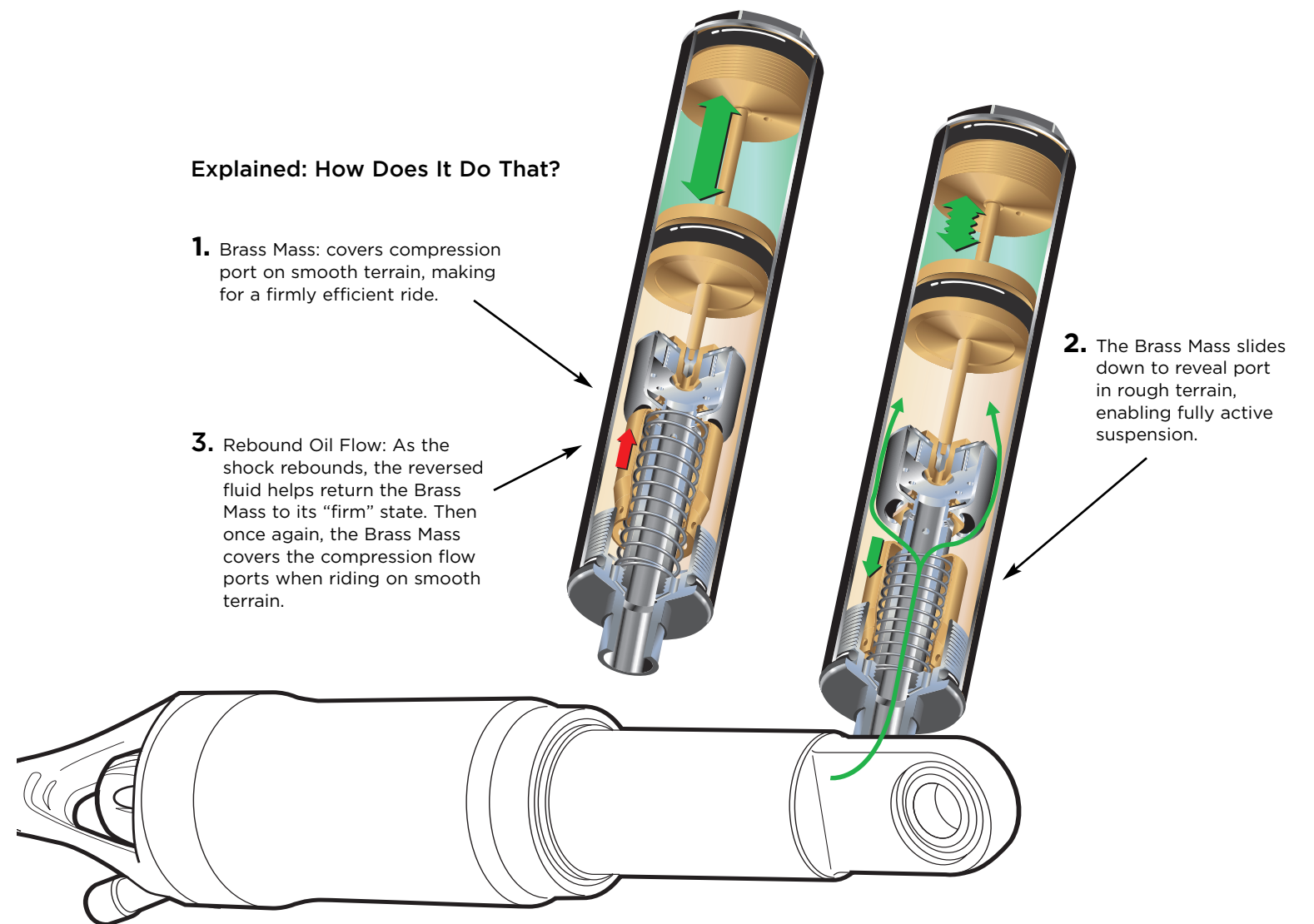
- Superior efficiency: the FlowControl Brain instantly returns to firm mode.
- Superior control: there is a seamless transition to active mode when a rider encounters rough terrain.

### Explained: How Does It Do That?

**1.** Brass Mass: covers compression port on smooth terrain, making for a firmly efficient ride.

**3.** Rebound Oil Flow: As the shock rebounds, the reversed fluid helps return the Brass Mass to its “firm” state. Then once again, the Brass Mass covers the compression flow ports when riding on smooth terrain.

**2.** The Brass Mass slides down to reveal port in rough terrain, enabling fully active suspension.



### FlowControl Brain

Patents # 6,722,678, 6,991,076



# SPECIALIZED SUSPENSION: WHAT AND WHERE

## What Have We Learned About Specialized Suspension? Total Integration Makes It Better

Specialized front and rear suspension has been developed as part of the complete bike to deliver the most integrated and controlled ride available.

**Total Integration Provides Maximum Control**

- Optimal Bump Force Management
- Travel and Impact Matching
- Unsurpassed Steering Precision
- Terrain-Specific Damping

**Total Integration Provides Unsurpassed Efficiency**

- Minimum Weight
- Terrain-Specific Damping
- Optimized Telemetry



S-Works



S-Works



S-Works



Pro



Pro



Pro

**Enduro SL (All Mountain)**  
Equipped with a FutureShock E150 fork, custom AFR Shock rear shock and all new chassis, the 2007 Enduro SL is the lightest, most efficient bike of its kind, offering more control than ever before.

**Stumpjumper FSR (XC Trail)**  
Thanks to its custom AFR Shock rear shock with FlowControl Brain and a revolutionary chassis, the 2007 Stumpjumper is the lightest, most efficient and best handling XC Trail bike available.

**Epic (Competitive XC)**  
Already the winner of a World Cup, the 2007 Epic has a custom AFR Shock rear shock with FlowControl Brain that makes it the fastest Competitive XC bike in the world.



# HERE’S WHAT THEY’RE SAYING

*“We’re not going into the suspension business. Our business is to make the best bikes in the world, and we feel we are limited as to the type of bikes we can make by what’s available in the market. Therefore, we’ve gone on our own to produce the highest performance six-inch travel fork on the market.”* **Mike McAndrews, Specialized Suspension Director**

## Enduro SL

*“The Enduro definitely goes uphill about as well as the shorter-travel Stumpjumper. The built-in platform in the AFR shock was admirably adept at combating excessively jerky body motions...when pointed downhill, though, the extra travel and overwhelmingly planted feel of both ends inspired confidence through an ugly technical section, and the steering precision of the E150 was exceptional...The new Enduro is a rather unique package that offers lots of big-bike capabilities coupled with impressively light weight, leaving it with few peers in the marketplace.”* **www.cyclingnews.com, Aug 1/06**

*Even on loose, wet stuff, a bit of confident steering and you were going where you wanted to go. The Spike Valve (named after Mick’s motocross nickname of Spike, apparently) seemed to be doing its job as I got full travel without noticing the fork wallowing around the mid-stroke due to lack of air pressure.* **www.singletrackworld.com, Jul 12/06**

*On the way up, the E150 fork’s lockdown feature helped the bike plot a straight course...The light weight and handy low-speed compression lever on the rear shock paid dividends too - we didn’t feel like we were having to work substantially harder than riders on Stumpjumper FSRs and even reeled in a few Epics...The front end of the Enduro felt great. The 25mm axle, dual crowns and direct-mount stem all combine to give great steering accuracy. This isn’t a bike that’s readily knocked off line, but when you want to head off in a new direction it’s there with an alacrity that belies the relatively relaxed angles.* **www.bikemagic.com, Jul 10/06**

## Epic

*“The new Brain finally fulfills its original promise with a completely seamless transition from locked to active modes and it is now virtually impossible to confuse the new, smarter unit. In addition, the new shock also imparts a better and more consistent overall feel to the Epic’s rear end. It took a while, but I can finally say with confidence that the Epic really is everything it’s cracked up to be.”* **www.cyclingnews.com, Aug 1/06**

*“Having ridden the Epic on some inappropriate terrain, as well as on more groomed trails and tarmac climbs, I’m very impressed. The on/off motion is instantaneous and going from bumpy descent to full-on road sprint is easy.”* **www.singletrackworld.com, Jul 12/06**

*“The ’06 Epic was our Editor’s Choice for best performance XC bike and even with that approbation Specialized will release this ’07 version that rides unequivocally better thanks to the new rear shock.”* **www.bicycling.com, Jul 11/06**

## Stumpjumper FSR

*“The Stumpjumper FSR is clearly intended to be Specialized’s most versatile off-road offering, and our test rides confirmed as such. It is decidedly less edgy than the Epic with pleasantly neutral handling for all-day adventures, yet the surprisingly efficient pedaling platform for its nearly five inches of rear wheel travel certainly doesn’t rule it out for cross-country racing or 24 hour events.”* **www.cyclingnews.com, Aug 1/06**

*“[The Stumpjumper FSR] is a great bike to ride and still my personal favourite from the line.”* **www.singletrackworld.com, Jul 12/06**

## Registered trademarks

AFR / FutureShock / Trail Tuned / L-VAS



## PERFORMANCE MOUNTAIN / SUSPENSION DEVELOPMENT TEAM

Joe Buckley, Brian Lampman, Brandon Sloan, Ron Powers, Mike McAndrews, in the front Fern Hernandez, (not pictured Jan Talavasek)





Christoph Sauser Winning the 2006 World Cup in Mont Ste. Anne,  
on an S-Works Carbon Epic with FlowControl Brain.

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