Motorcycle Suspension

Why Suspension Matters

- Keeps tires in contact with the road
- Controls weight transfer during braking, acceleration, and cornering
- Improves rider comfort and safety
- Directly affects handling and lap times
- Prevents rider fatigue

Core Goals of Suspension

- Maintain traction
- Absorb bumps and irregularities
- Control chassis movement
- Provide predictable feedback to the rider

Main Suspension Components

Front:

- Fork tubes
- Springs
- Damping cartridges
- Fork oil

Rear:

- Shock absorber
- Spring
- Linkage (on many bikes)
- Swingarm interaction

Suspension Terminology

- **Compression:** Suspension moving inward

- **Rebound:** Suspension extending back
- **Preload:** Initial spring tension
- **Sag:** Amount suspension compresses under weight
- **Damping:** Control of suspension speed

Springs Explained

- Support the motorcycle and rider weight
- Determine ride height
- Too soft → excessive dive/squat
- Too stiff → poor traction and harsh ride
- Spring rate must match rider weight and use

Preload Adjustment

- Adjusts ride height, not stiffness
- Sets proper sag
- Helps balance front vs rear
- Incorrect preload causes instability

Understanding Sag

Static Sag: Bike only **Rider Sag:** Bike + rider

Typical Targets:

- Street: ~30–35% suspension travel
- Track: ~25–30%

Why it matters:

- Ensures suspension works in its optimal range

Compression Damping

Controls how fast suspension compresses.

Too Soft:

- Excessive dive
- Bottoming out

Too Stiff:

- Harsh ride
- Loss of grip over bumps

Rebound Damping

Controls how fast suspension extends.

Too Fast:

- Bouncy or unstable feeling

Too Slow:

- Suspension "packs down"
- Reduced traction

Weight Transfer

- Braking loads the front suspension
- Acceleration loads the rear
- Suspension tuning manages chassis attitude
- Balanced setup improves confidence

Common Handling Problems

- Front-end dive under braking
- Rear squat on acceleration
- Mid-corner instability
- Headshake or wobble
- Harshness over small bumps

Setup Order (Golden Rule)

1. Set tire pressures

2. Set sag
3. Adjust rebound
4. Adjust compression
5. Test ride and repeat

Street vs Track Setup

Street:

- Comfort + compliance
- Wider adjustment window

Track:

- Precision
- Faster damping control
- Reduced movement

Suspension Upgrades

- Springs matched to rider weight
- Cartridge kits
- Performance shocks
- Improved fork oil and valving

Benefits:

- Better grip
- Increased confidence
- Reduced fatigue

Maintenance

- Fork oil changes (every 15–25k km typical)
- Shock servicing
- Seal inspection
- Linkage lubrication

Neglected suspension loses performance quickly.

Tuning Tips

- Make one change at a time
- Record settings
- Small adjustments matter
- Test on familiar roads

Real-World Case Study (Optional)

- Before setup: symptoms
- Changes made
- Rider feedback
- Performance improvement

Key Takeaways

- Suspension is the foundation of performance
- Proper sag is critical
- Damping controls movement speed
- Setup is personal and iterative