The background of the slide features a faded, grayscale image of bicycle gears, showing the teeth and circular shapes of the sprockets.

Bicycle Mechanics and Repair Decal

Mechanical Engineering 98/198

Spring 11

Lecture 7

Aleksey Shepelev

Jim Gao

Nick Koo

Henry Yi

Allen Gurdus

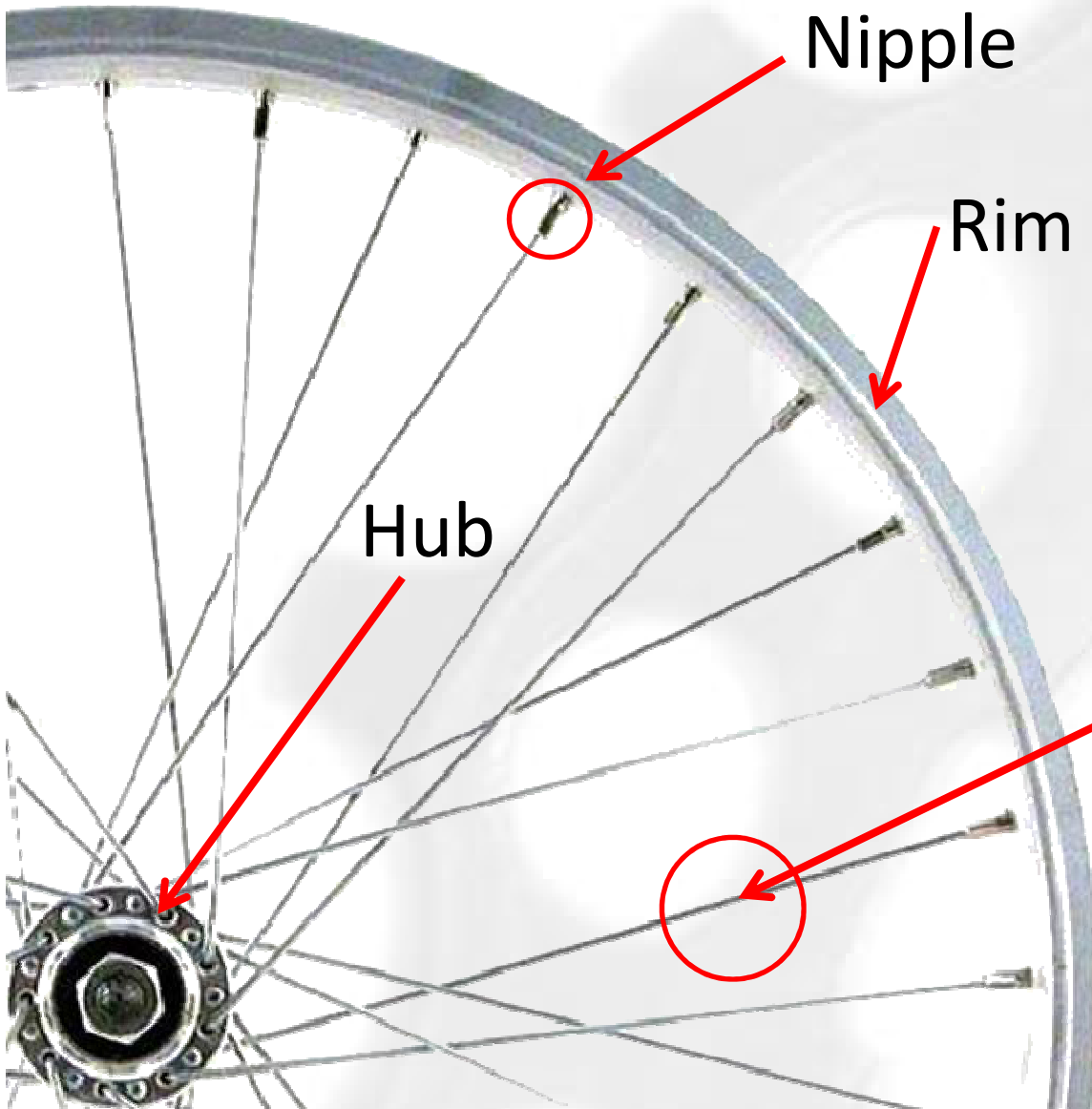
Components

Nipple

Rim

Hub

Spokes



Types of Wheels



Road bike wheels
27" or 700c



Mountain bike wheels
26"



BMX wheels
20" or 24"

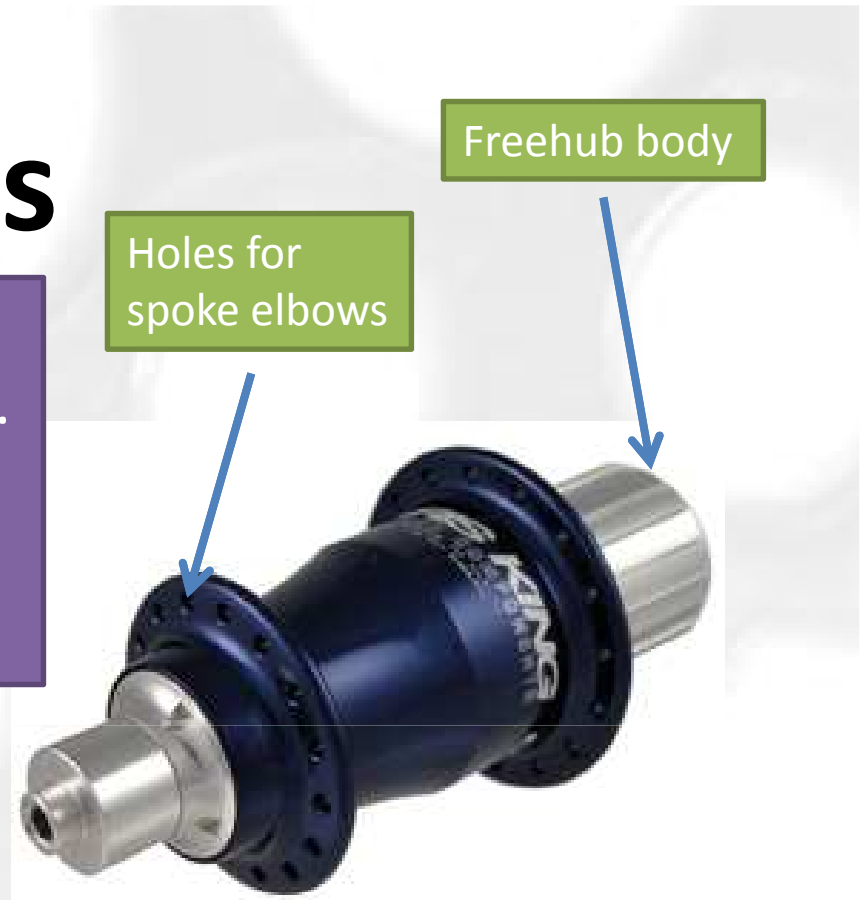
Rims

- “Clinches” tire.
- Tensions spokes uniformly.
- Provides surface for brake pads.



Hubs

- Tensions spokes uniformly.
- Provides axis in which wheels rotate.
- Rear hubs are threaded for a freewheel or contain a freehub body for a cassette.



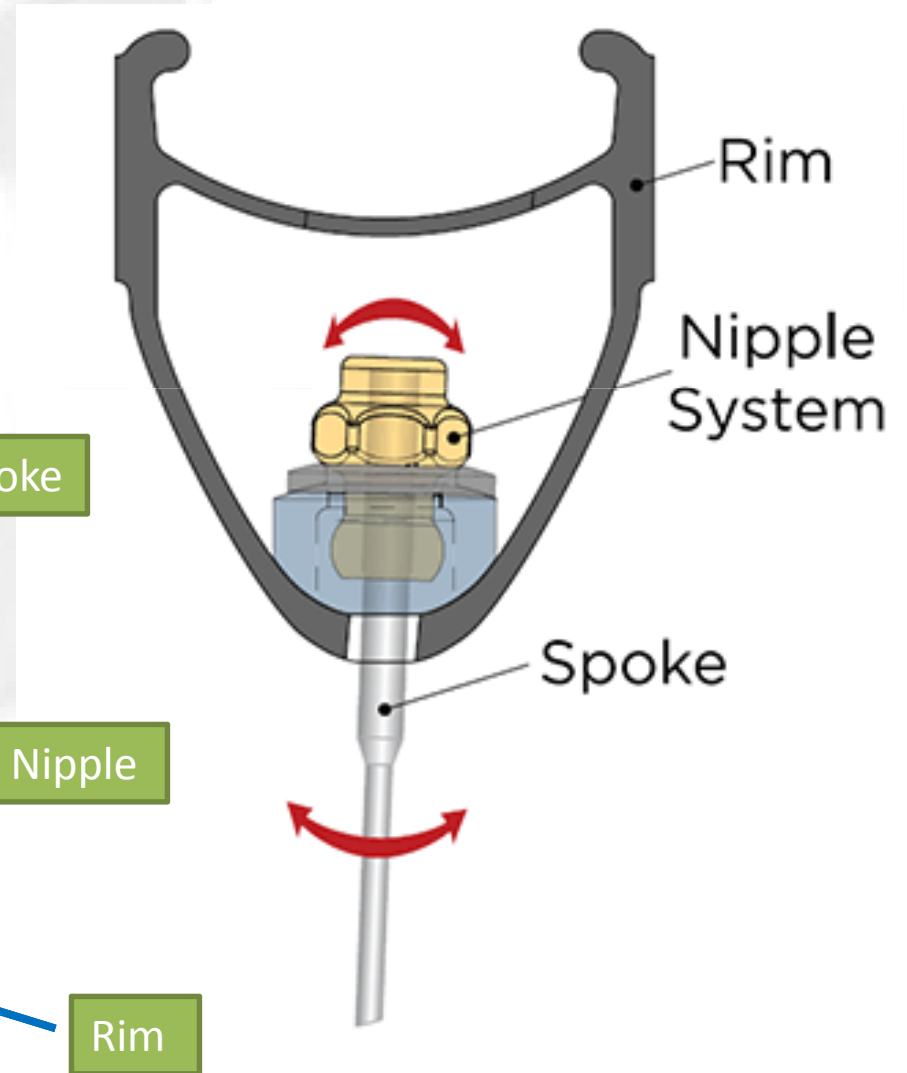
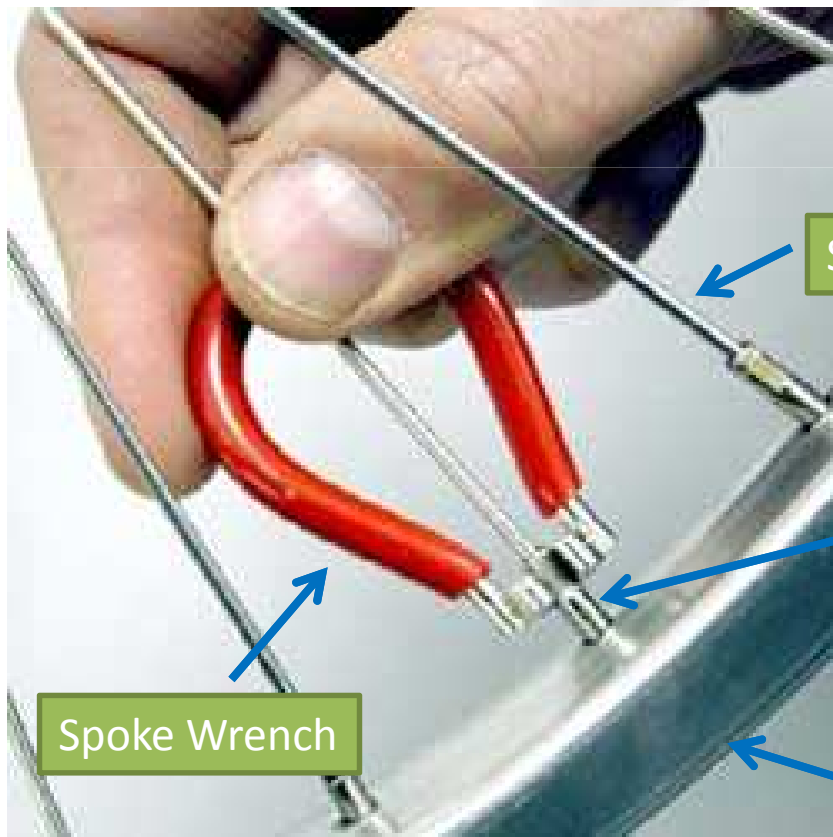
Spokes

- Tensioned uniformly throughout the wheel.
- Connected to the hub and rim.
- Supports weight and other forces placed on the rim.
- Threaded end connects to rim.
- “Elbow” end connects to hub.



Nipples

- Connects spokes to the rim.
- Allows for tensioning of spokes.



Compression



Good in compression

Poor in tension

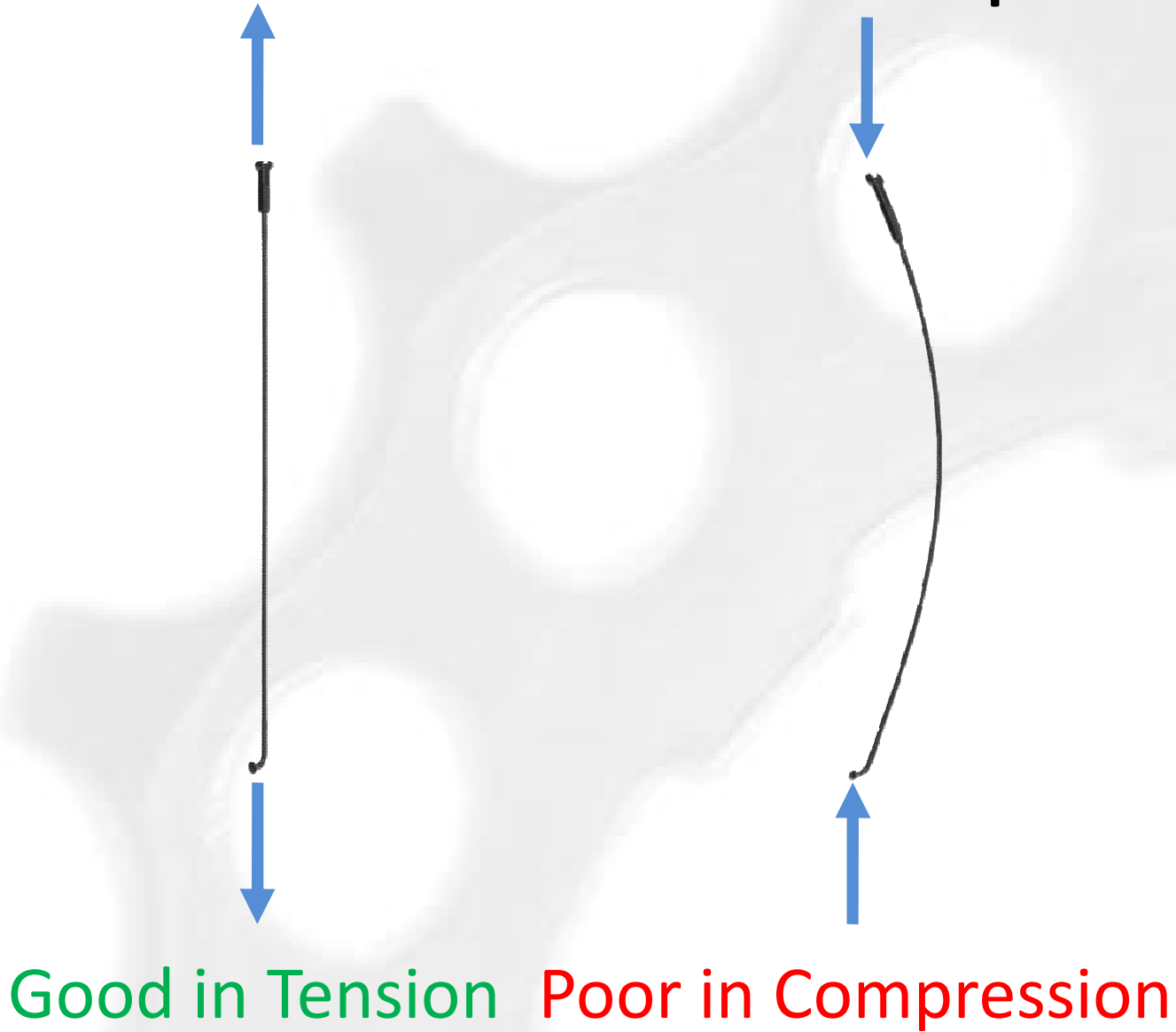
Tension



Good in tension

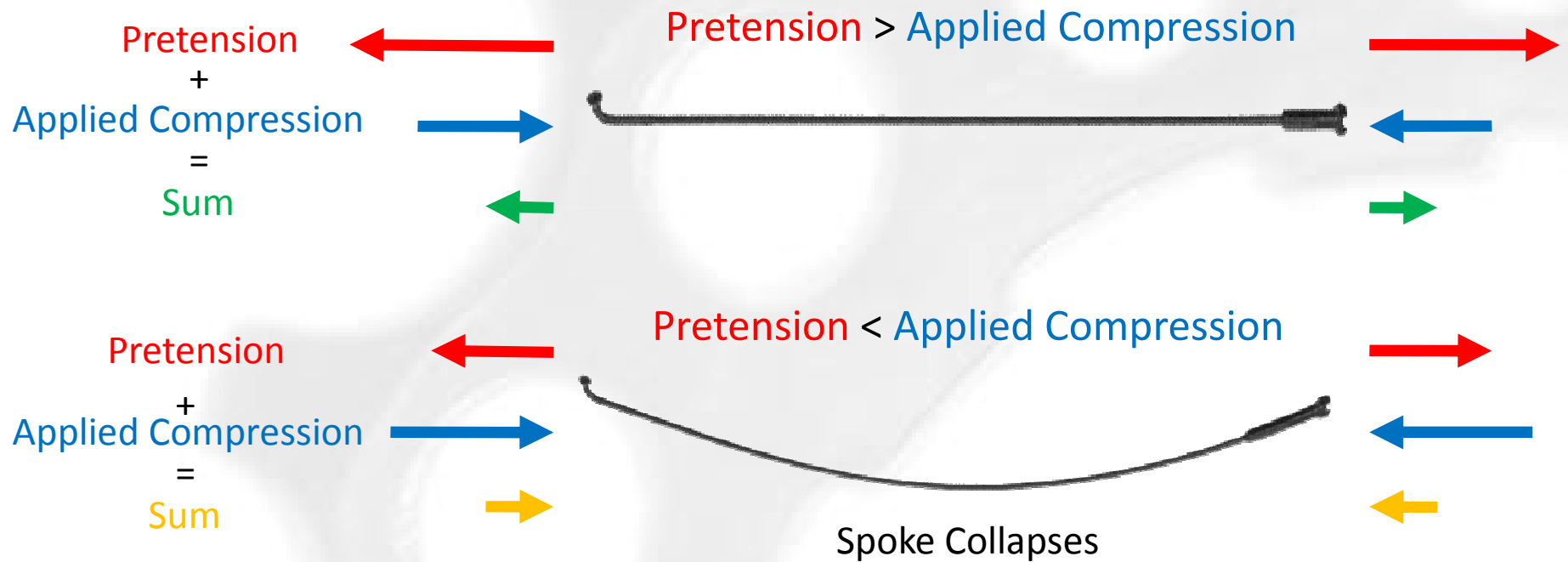
Poor in compression

Spoke in Tension and Compression



Spoke Pretension

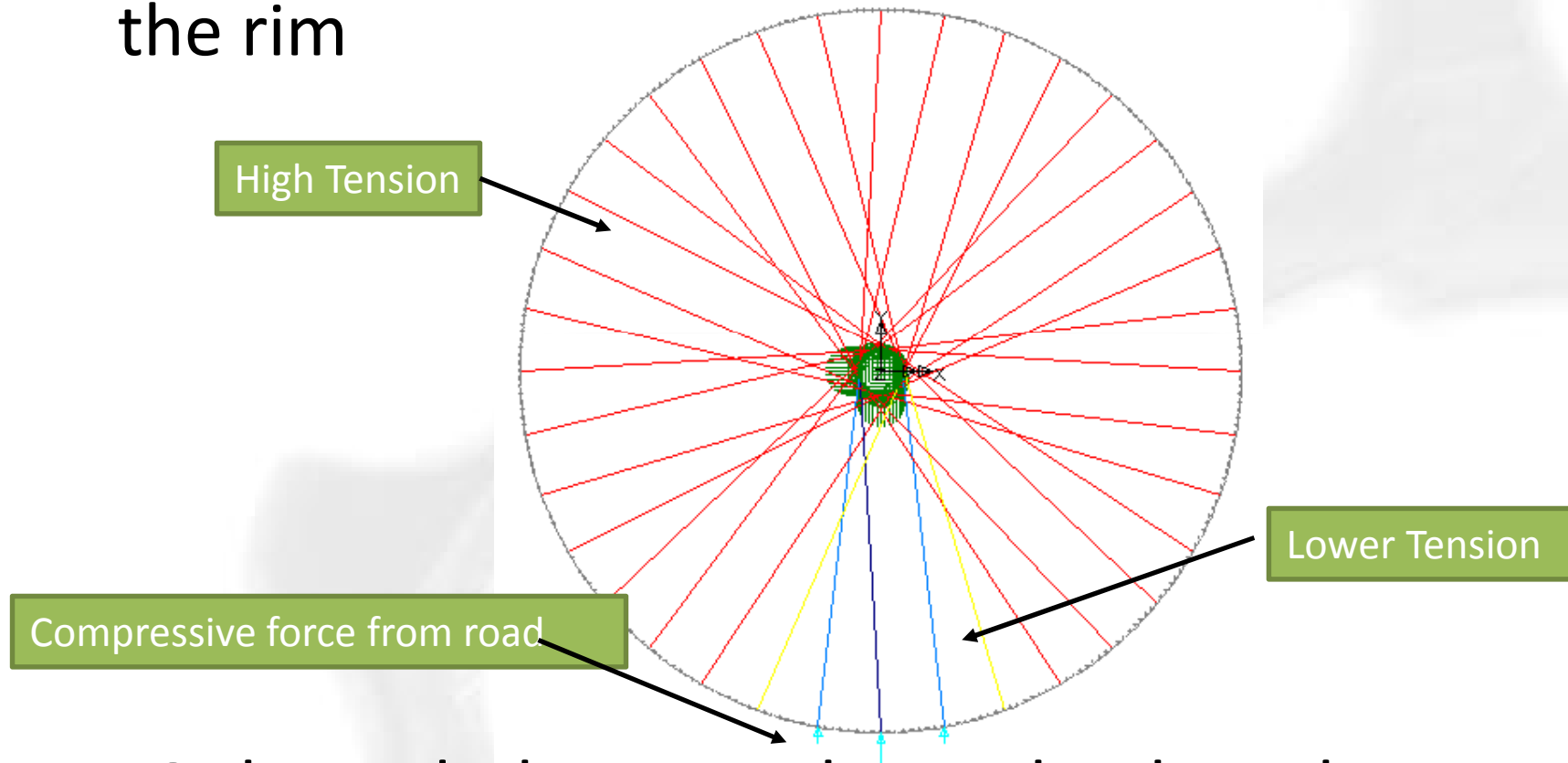
If the spoke is pretensioned, the tension has to be overcome when the spoke is compressed



The greater the pretension, the greater the applied compression can be

A Wheel Stands on its Spokes

The wheel does not hang from the top part of the rim



Only works because the spokes have been pretensioned

Advantages of High Spoke Tension

The greater the spoke tension, the greater the compressive forces the wheel can withstand



Carry greater loads



Take bigger hits

Righty-tighty, Lefty-loosey

Tighten

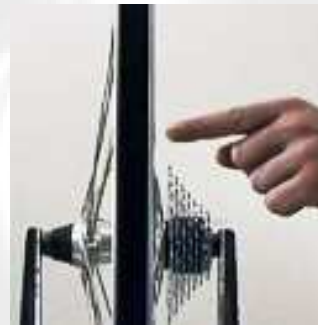
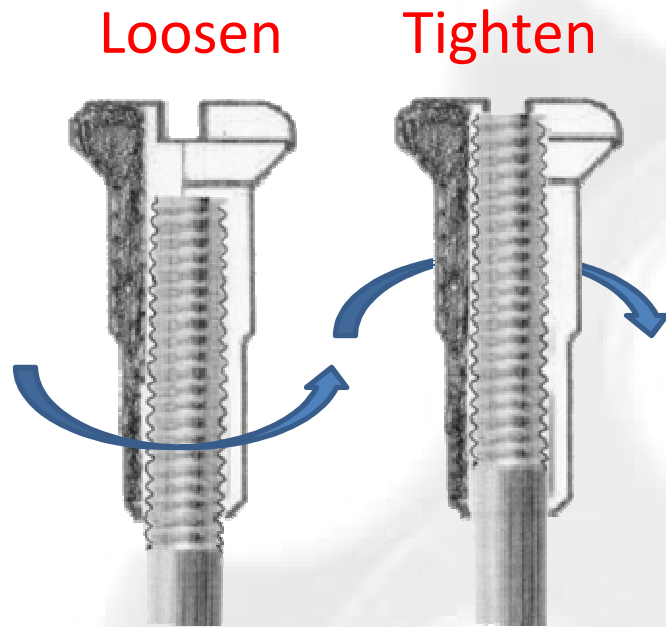
Loosen



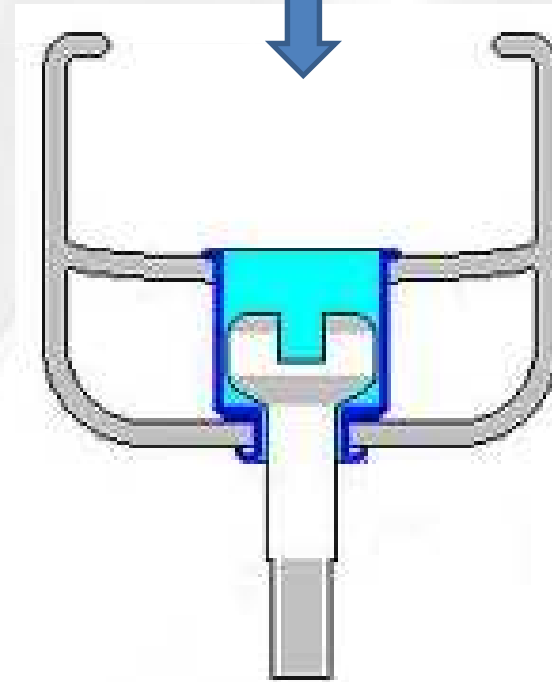
Righty-tighty

Lefty-loosey

Spoke and Nipple



View direction



As you are looking into the rim, turn clockwise (righty) to tighten and counterclockwise (lefty) to loosen

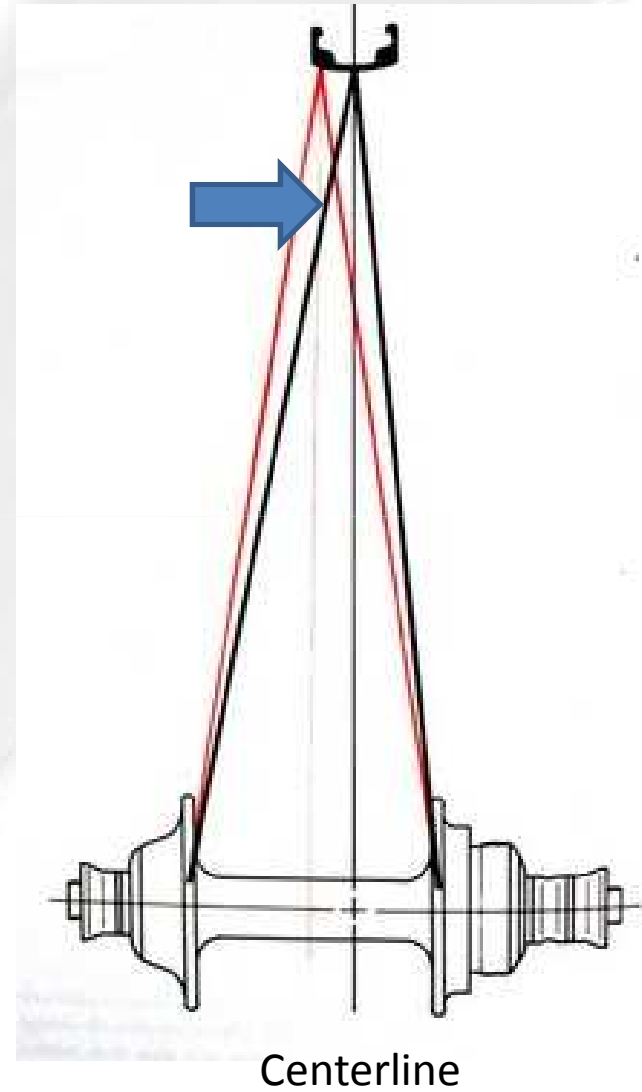
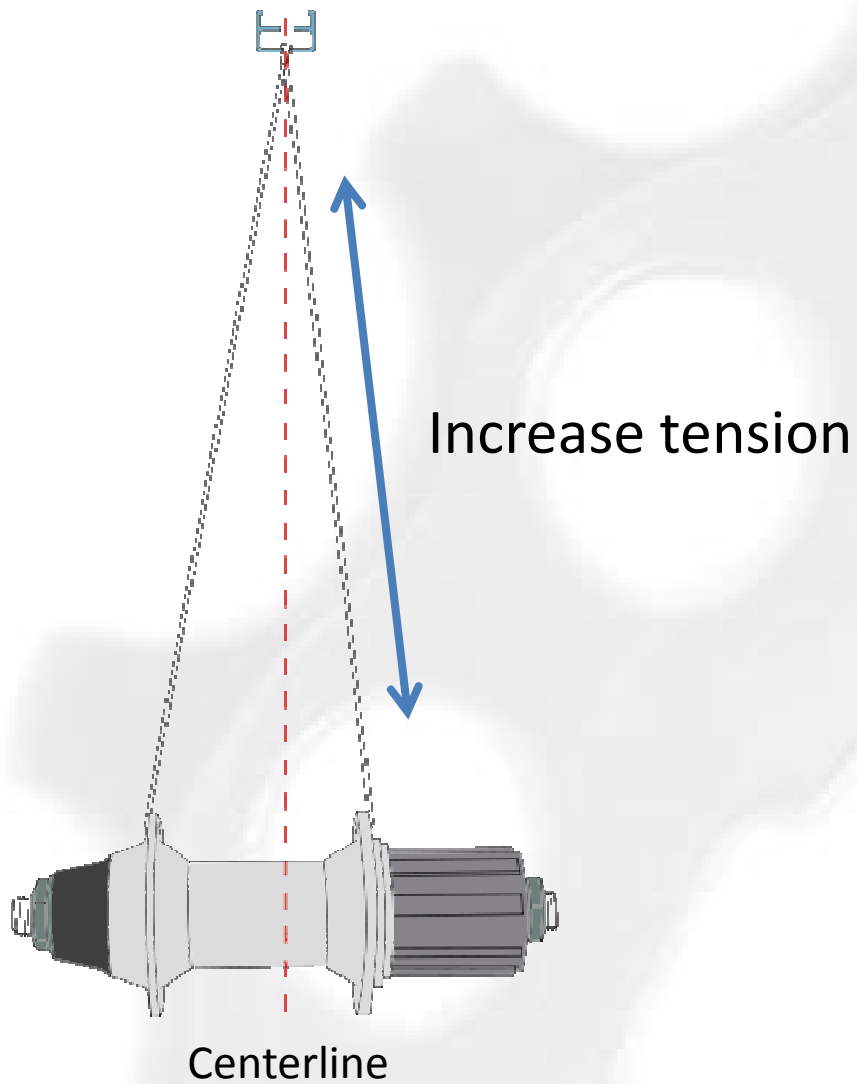
Spoke Wrench



- Spoke wrench fits onto nipples
- Try different slot sizes until you get a snug fit on the nipple



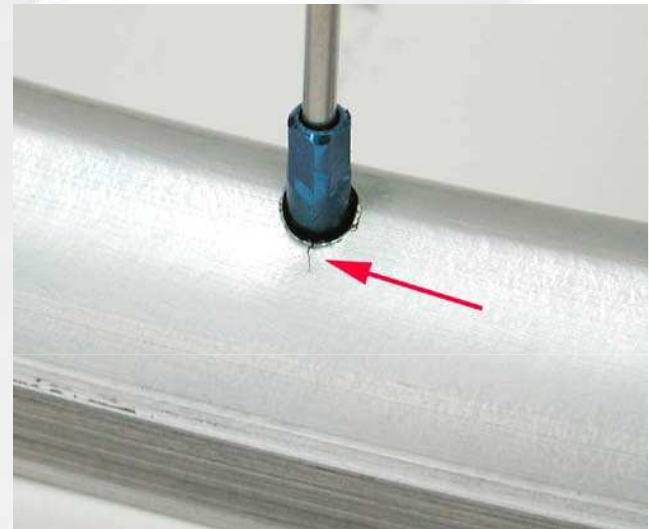
How it all fits together



Cautions



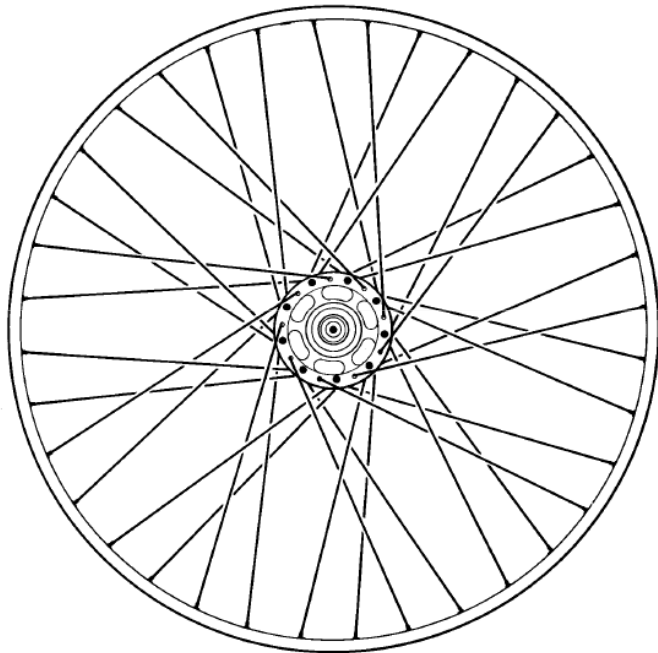
Too little spoke tension allows the wheel to deform



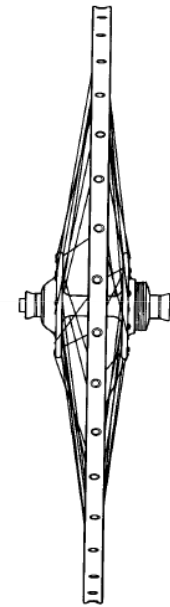
Too much spoke tension cracks the rim

A True Wheel

Wheels with no imperfections are called “True”



Perfectly round



Perfectly straight and
in line with bike.

An Untrue Wheel

Wheels go “out of true” over time due to

Potholes

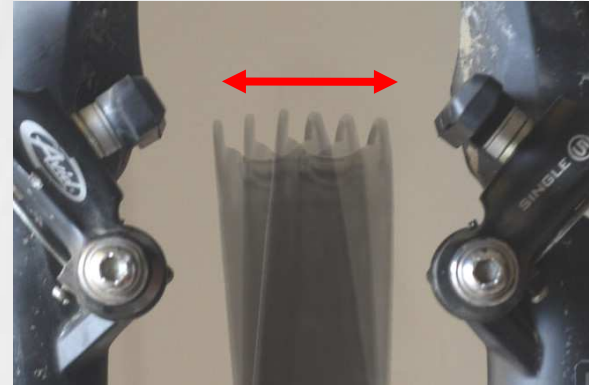
Crashes

etc...



Common Problems

Wobble – the rim deviates left and right



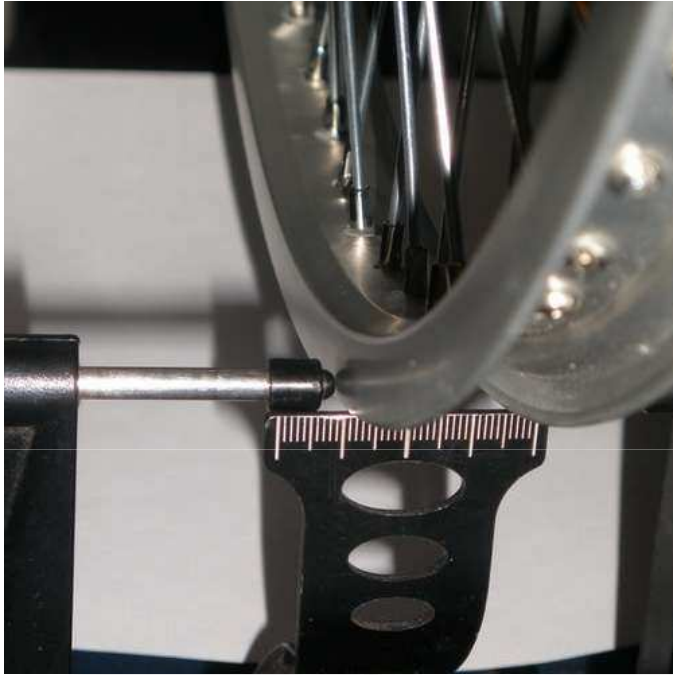
Hop – the rim pops up and down and is no longer a perfect circle



Dish – the rim is not in line with the bike but is offset to the side



Truing Basics

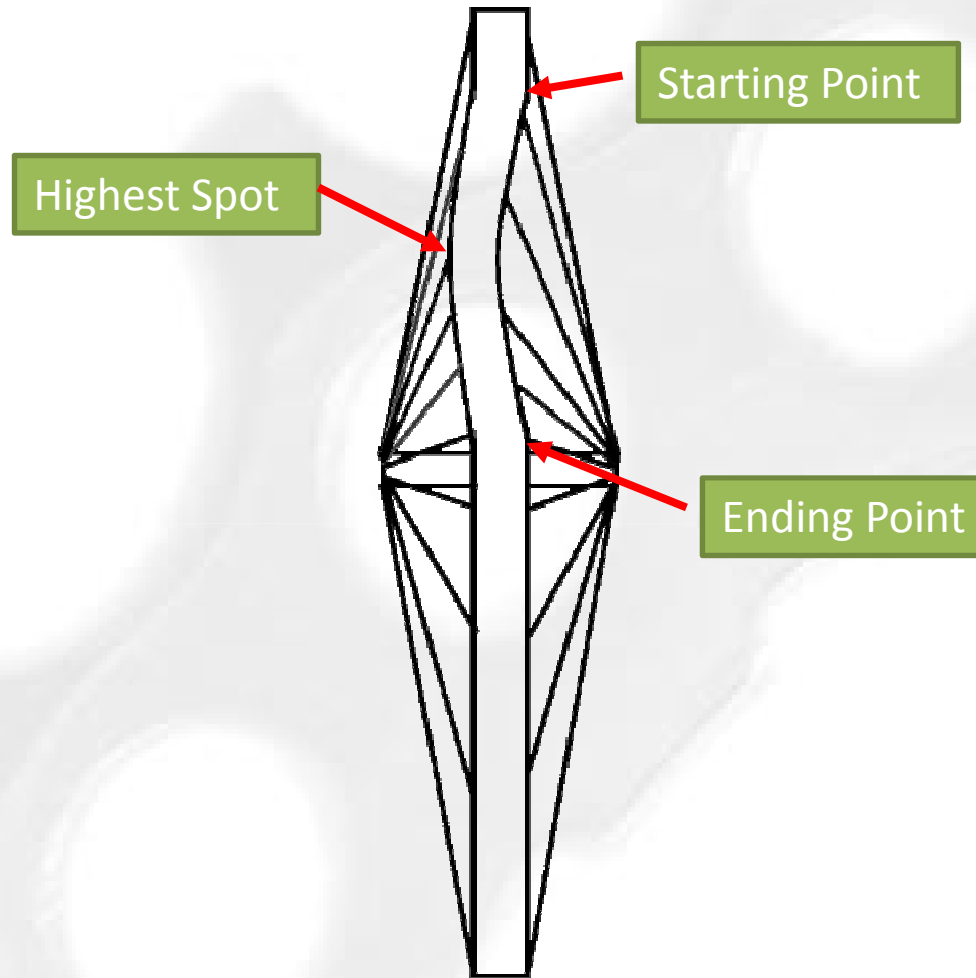


Spin the wheel and find horizontal or vertical deviations



Tighten or loosen spokes to bring rim back into line

How to Fix a Wobble (Lateral Truing)

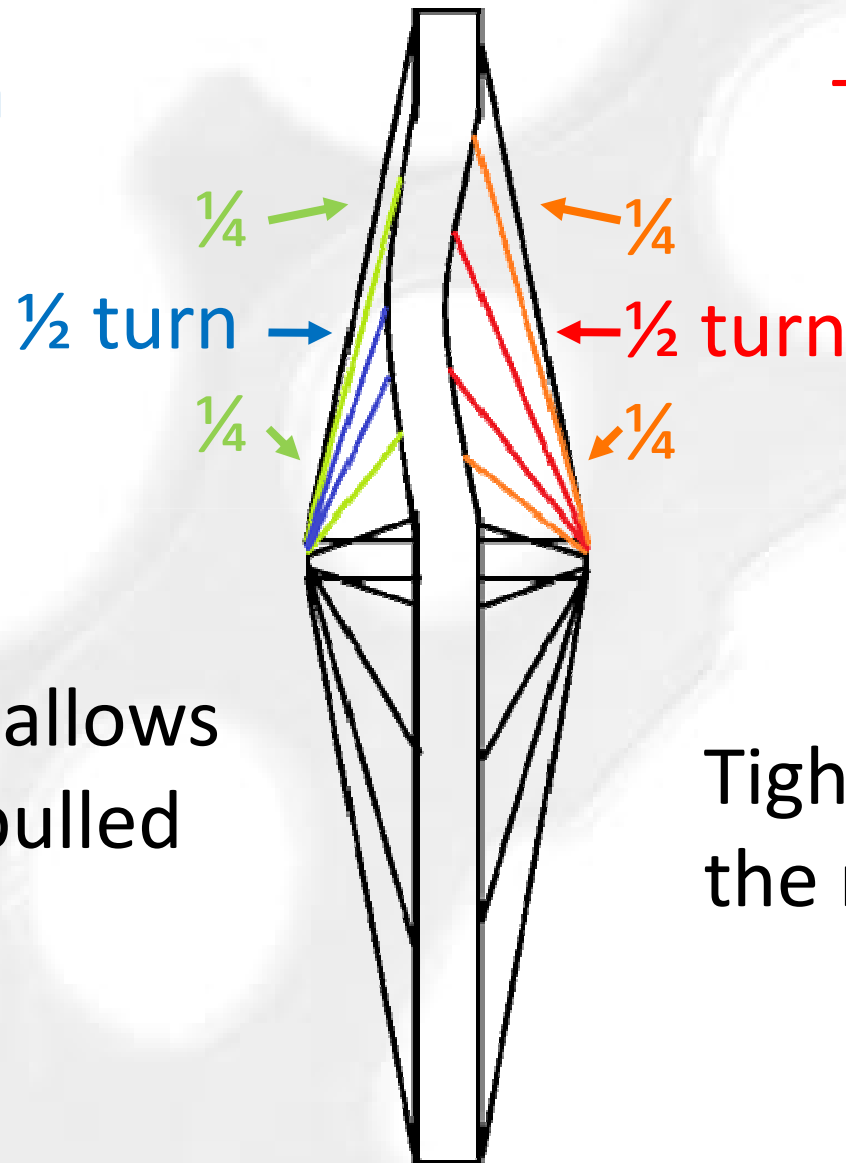


Inspect the wheel. Make sure no spokes are broken or missing

How to Fix a Wobble (Lateral Truing)

Loosen

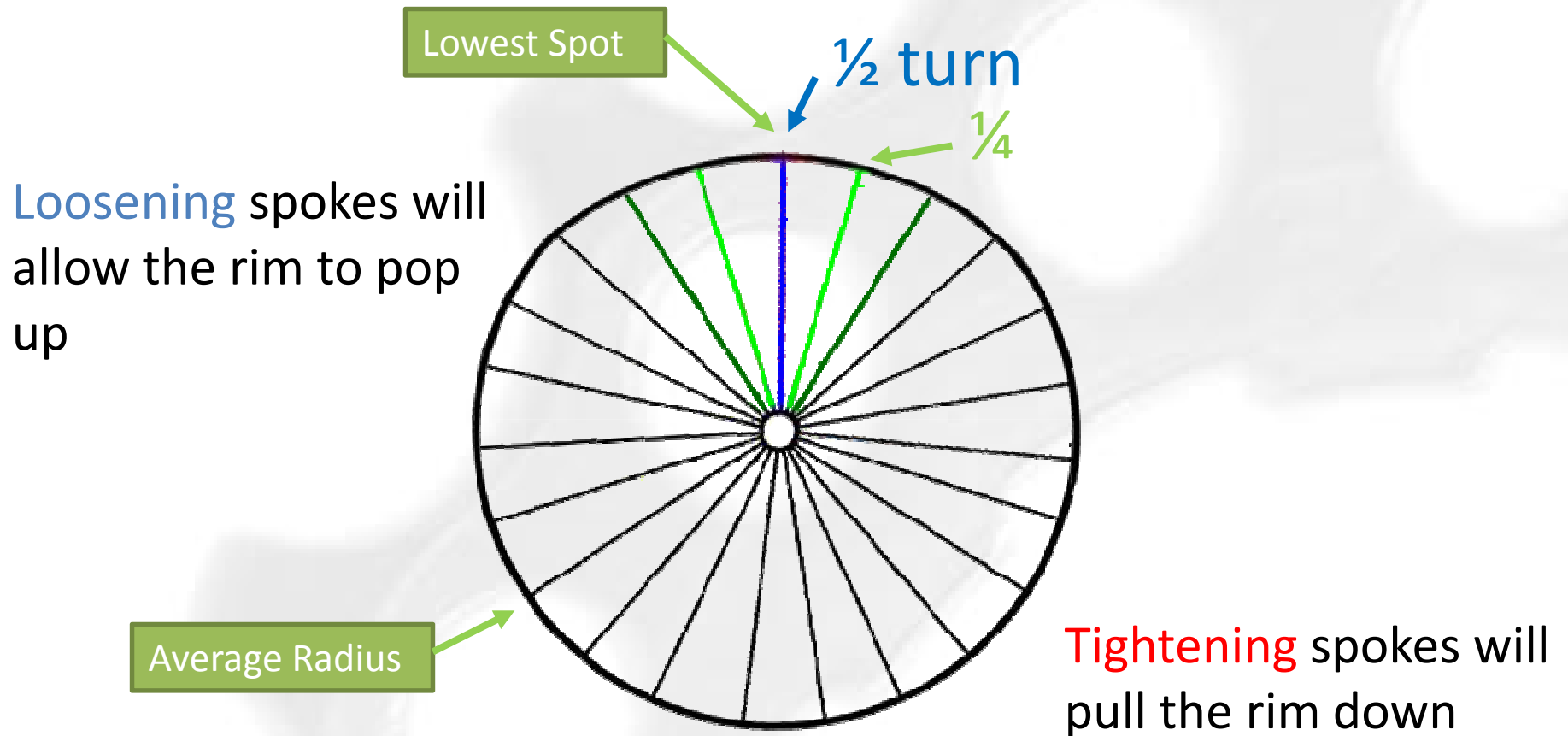
Tighten



Loosening allows rim to be pulled back

Tightening pulls the rim back

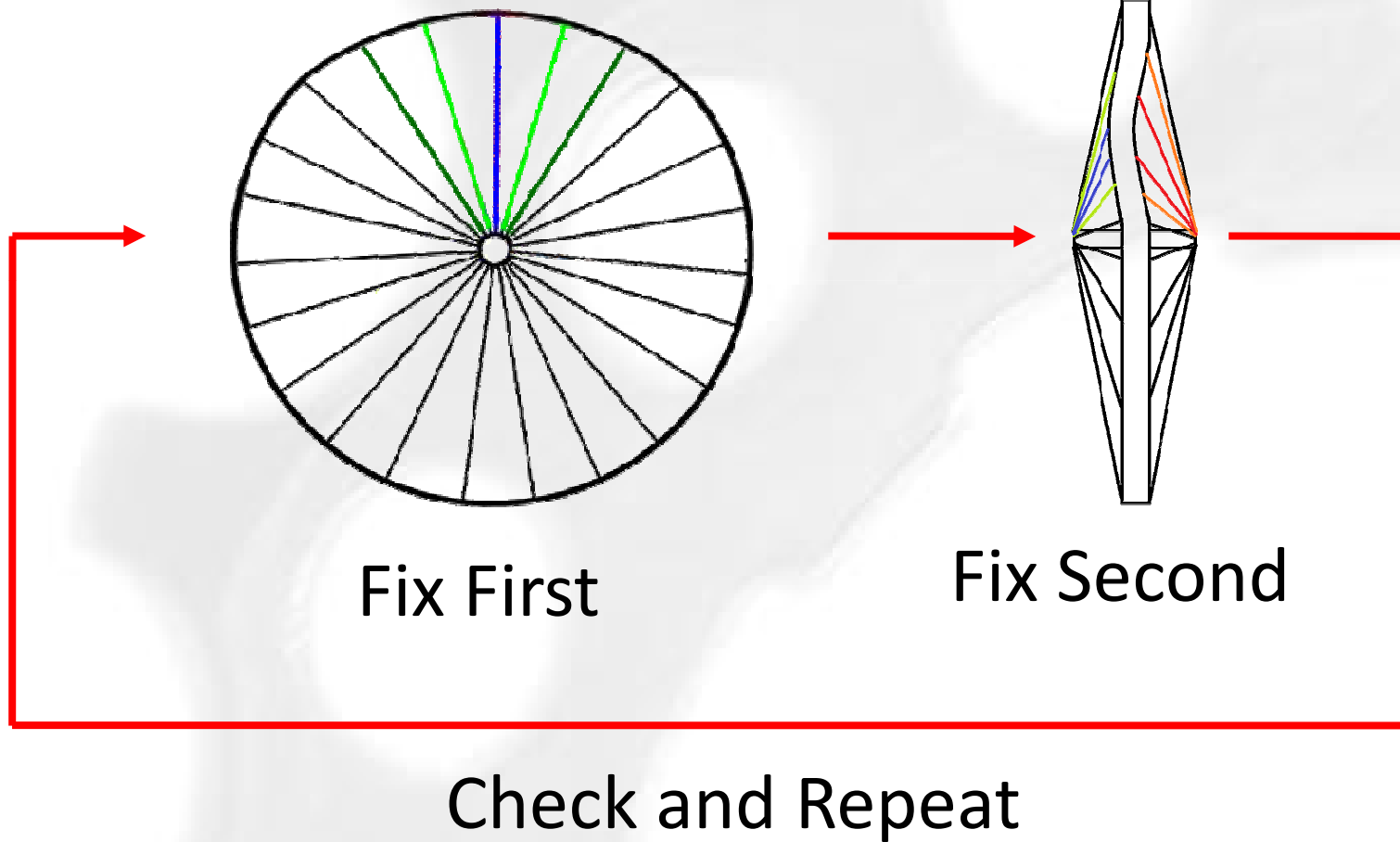
How to Fix a Hop (Vertical Truing)



Locate the lowest and highest points and the extent of the deviation.

Compound Problems

Hop and wobble? Fix the worst problems first



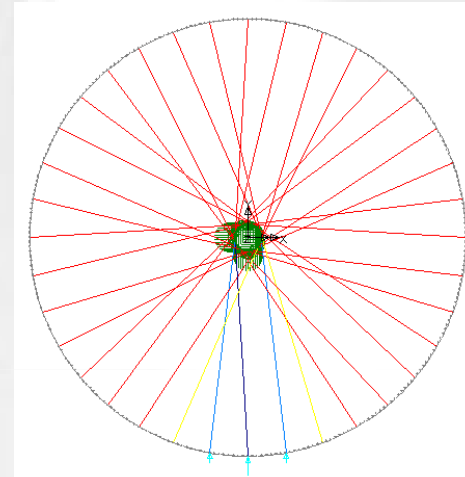
How to Replace Spokes

- Remove broken spoke and rim tape
- Remove gears if necessary
- Replace nipple if needed
- Pull spoke through hub
- Cross spokes like other spokes
- Thread into nipple and tighten
- Grease the threads!!!



Riding on a Bent or Broken Spoke

Broken spokes = decreased tension



Wheel will go out of true easily and will not be as strong

Replace missing/broken spokes ASAP and check spoke tension regularly.