Technical Manual

Spoke Extraction and Insertion

TOOLS/SUPPLIES REQUIRED:

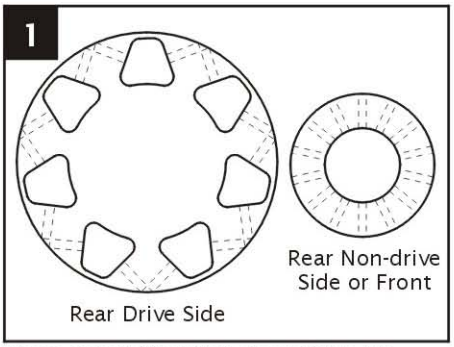
- Replacement Spoke
- Loctite 262 (No substitutions)
- Acetone
- Pipe Cleaner
- Butane Lighter
- Vice Grips
- Variable Speed Reversible Drill (optional)
- Masking Tape

IMPORTANT:

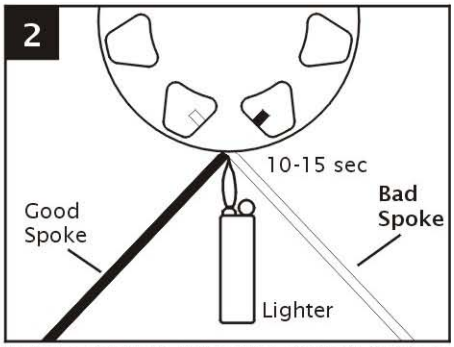
Spoke extraction and insertion is not difficult, but done incorrectly, can render a hub useless. Before you begin, read all instructions carefully, including the supplemental notes at the end of this section. If you do not have the necessary supplies, contact Velomax for a spoke replacement kit.

EXTRACTION

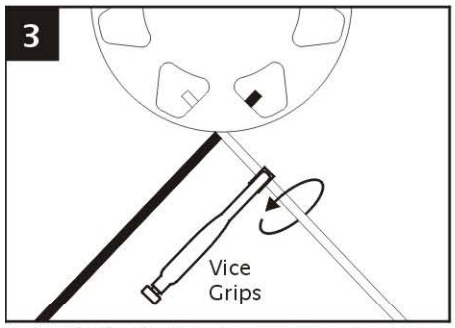
Read instructions through before starting



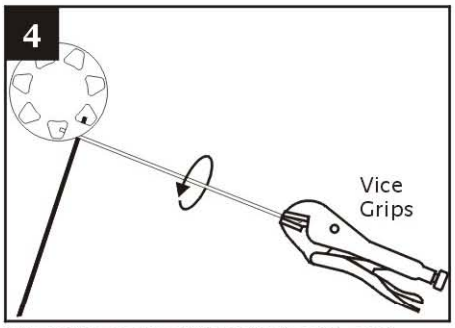
These general instructions apply to ALL Velomax Hubs: Rear Drive Side, Rear Non-Drive Side, and Front. For simplicity, a Rear Non-Drive Side is shown as the example.



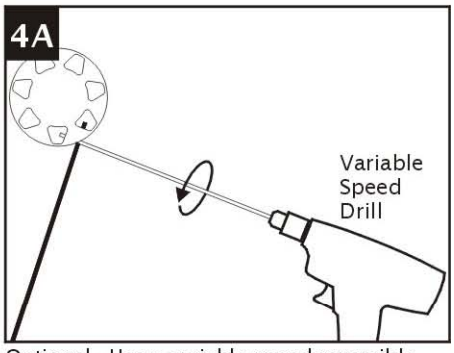
Using a cigarette lighter (or similar), hold an open flame directly on the hub where the spoke is threaded in. This will soften the thread locker to allow easier extraction. This will not harm the hub.



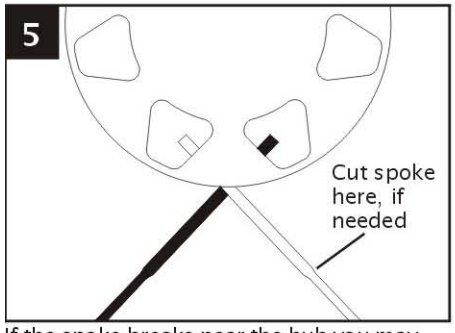
Grasp the broken spoke with vice grips near hub and SLOWLY turn the spoke counter-clockwise 1/4-1/2 turn to break the bond of the threadlocker. **IMPORTANT** - *Do not twist the spoke back and forth. Use caution not to bend spoke during removal.*



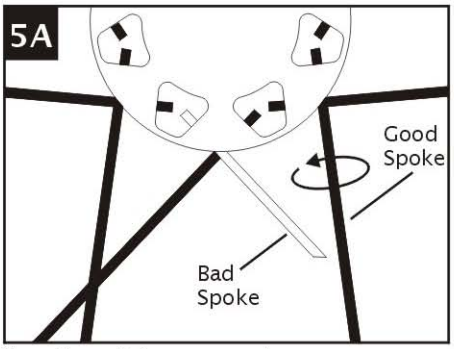
Grasp the spoke at the nipple end, and SLOWLY unthread from the hub by turning counter-clockwise. *Optional - use variable speed reversible drill as shown in Step 4A.* If spoke breaks near hub, skip to Step 5 - otherwise, skip to INSERTION.



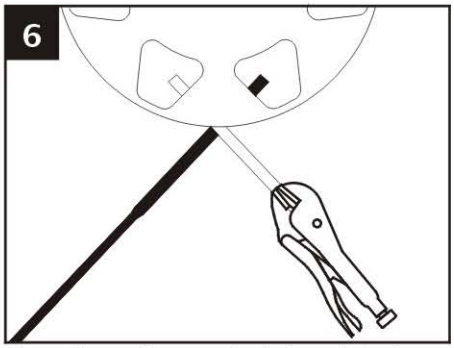
Optional - Use a variable speed reversible drill and SLOWLY unthread spoke from the hub. If spoke breaks near hub, skip to Step 5 - otherwise, skip to INSERTION.



If the spoke breaks near the hub you may need to cut the spoke and grasp it on the thicker butted section near the hub. NOTE - if the spoke has broken flush with the hub and cannot be grasped externally, skip to Step 7.



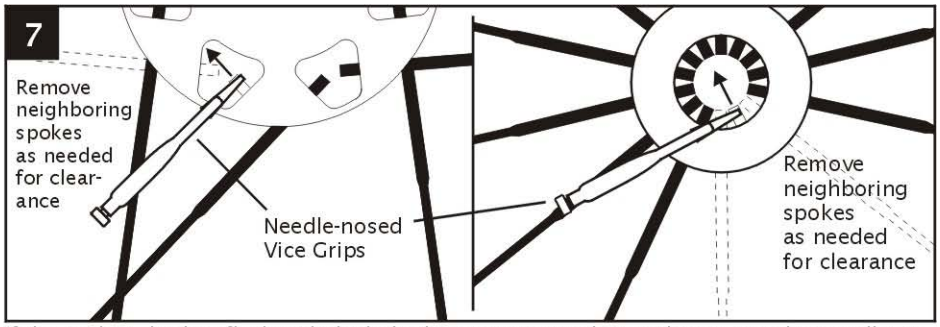
Sometimes it is necessary to remove a neighboring spoke to gain access to the broken spoke.



Grasp the spoke near the hub and slowly unthread. Optional - use a variable speed reversible drill and SLOWLY unthread the spoke from the hub. If successfully extracted, skip to spoke insertion.

Technical Manual

Spoke Extraction and Insertion



If the spoke is broken flush with the hub, the remaining stub must be extracted internally. Remove axle and bearings to gain access (see appropriate Hub Disassembly & Assembly). Remove neighboring spokes if necessary to gain access to the internal spoke stub. Using needle-nosed vice grips, slowly thread the spoke INTO the cavity. Be patient. **IMPORTANT: Attempting to remove the spoke by threading it back outside the shell can cause irreparable damage to the hub.**

INSERTION

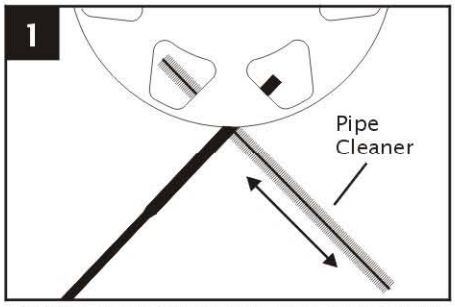
IMPORTANT:

Read all notes at the end of this section before proceeding.

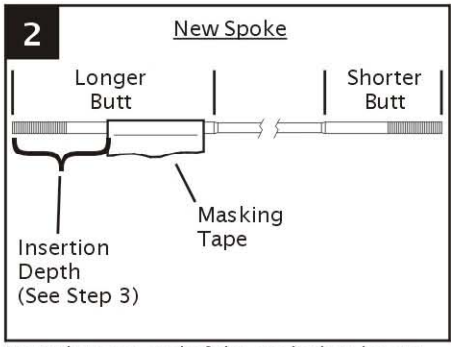
Spokes must be inserted to the proper depth.

Spokes must be the same thickness as originally supplied.

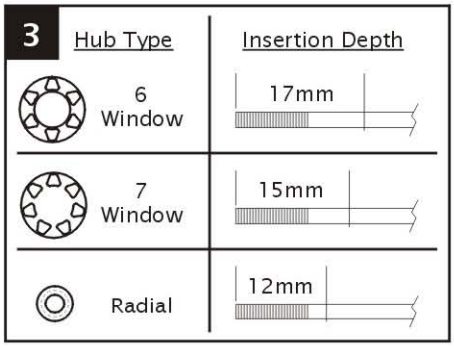
See "Velomax Technical Manual for Wheel Truing" before truing.



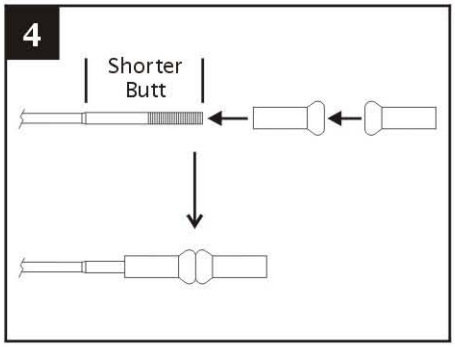
Dip pipe cleaner in acetone and thoroughly clean thread bore. IMPORTANT- prior to spoke insertion, all parts must be *surgically clean.* Alternate - use a new spoke dipped in acetone to chase the Loctite from the threads. *Take care not to allow acetone to enter hub and contaminate bearings.*



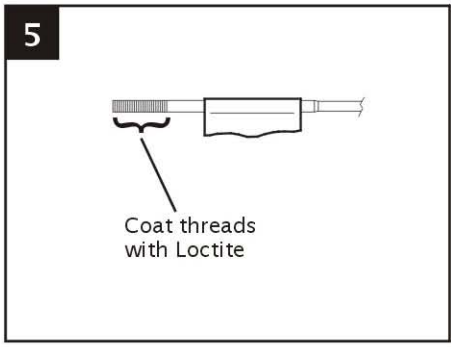
Note that one end of the spoke has longer butting than the other. The longer side will thread into the hub. Mark the insertion depth indicated in Step 3 using masking tape.



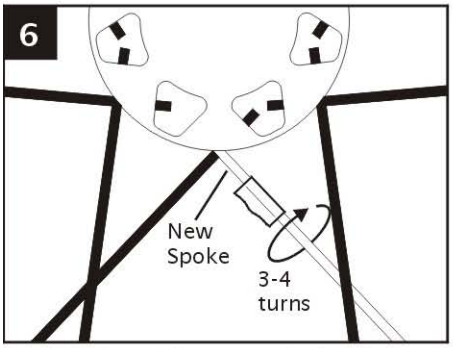
Spoke Insertion Depth Diagram. Use this diagram as an *actual-size* reference for marking the insertion depth on your spoke EXACTLY.



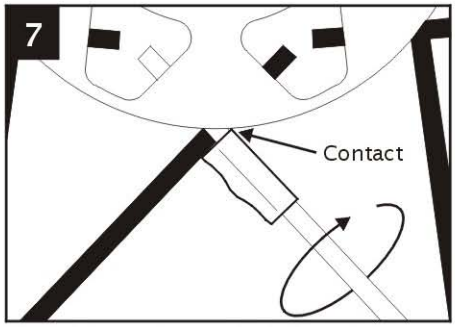
In order to drive the spoke, use 2 nipples to construct a jam-nut arrangement on the nipple (shorter butted) end of the spoke. **IMPORTANT: Never grab a new spoke with pliers.**



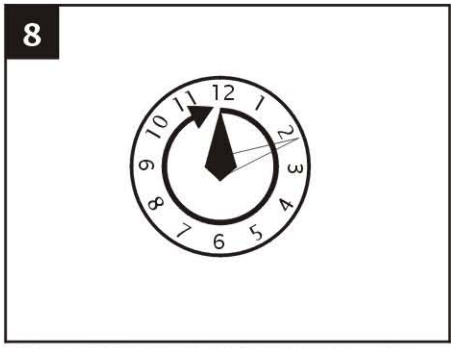
Evenly coat the threads with Loctite 262 (*no substitutions*).



Carefully thread the new spoke into hub. Thread by hand approximately 3-4 turns. Be careful not to cross thread. **IMPORTANT: Never grab a new spoke with pliers.**



Thread the spoke into the hub until the masking tape just contacts the hub. DO NOT OVER OR UNDER-INSERT. Tightly grasp the spoke and remove the two jam- nut nipples, insuring that the spoke does not unthread. Remove tape and wipe away excess Loctite.

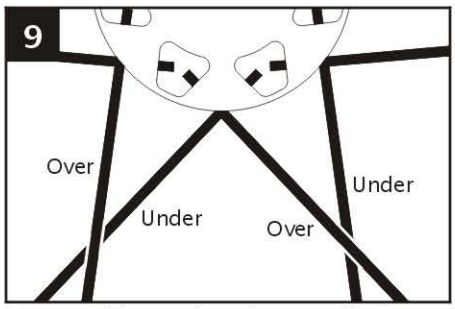


Allow minimum of 12 hours to cure before truing. If not allowed to properly cure, the Loctite will not fully crystallize and will have insufficient hold.

VELOMAX WHEEL SYSTEMS

Technical Manual

Spoke Extraction and Insertion



Tangential (crossed) spokes must be interlaced. Take note of the interlacing pattern of the existing spokes. After insertion, simply twist one spoke around the other so that the new spoke conforms to the existing pattern. *Spoke removal is not necessary to interlace.*

To make sure everything was done right, check the following:

1. For Drive Side Rear, visually determine that the spoke end (visible inside hub flange windows) are all the same length.
2. For Radial spokes, you can remove the axle / bearings to see the spoke ends inside the hubs. All spokes should protrude the same amount.
3. Clamp the wheel in the dropout and insure that it spins without binding. If the wheel binds, the spoke is too deep and is touching the axle.

Supplemental notes on Spoke Extraction and Insertion follow below.

SUPPLEMENTAL NOTES ON SPOKE EXTRACTION AND INSERTION

Replacement of individual spokes is simple if the directions are followed closely. Take your time and follow all instructions carefully.

Velomax spokes thread all the way through the hub shell and protrude approx-imately 3.5 millimeters into the inside of the hub shell cavity. This is done so that if the spoke shears flush with the outside of the hub, it can be removed from the inside.

Spokes are retained in the hub by use of a thread locker. Extreme care must be used when removing the spokes. Failure to follow directions can result in a spoke shearing inside the hub.

Loctite products come in many different formulations that have varying torque characteristics. COLOR OF LOCTITE DOES NOT INDICATE HOLDING STRENGTH. The thread bores of the hubs are precisely tapped to match the torque characteristics of the specified thread locker. Use only the Loctite specified by Velomax. DO NOT USE SUBSTITUTES. They will not work.

Loctite primer promotes full cure of the thread locker. Without primer, the holding strength of the thread locker is greatly reduced. Spokes supplied by Velomax have already had primer applied. The correct primer is Loctite Primer T or Primer N.

Use of the improper thread locker, insufficient cleaning, preparation or omission of primer can result in a spoke that is not properly bonded into the hub. If this happens, the spoke can rotate at the hub during truing.

IMPORTANT - Initially, you must un-thread the spoke VERY SLOWLY. The thread locker allows slow movement, and may seize up if you try to remove the spoke too quickly. The spoke will free up after a few rotations. Forcing the spoke to rotate quickly can result in a spoke that shears off inside the hub. Take your time.

During removal, SLOWLY un-thread the spoke. If there is significant resistance, stop, reheat the area and try again. *Hint - if the spoke does not want to initially disengage, grasp it close to the hub with vice grips and initiate rotation slowly.*

Sometimes, instead of un-threading, the spoke will break where it goes from thin to thick near the hub. If this happens, don't worry, just complete the extraction by grasping the spoke near the hub. NOTE - you may have to remove a neighboring spoke for clearance.

When cleaning the hub with acetone, use it sparingly and avoid allowing it to drip inside the hub. Contamination of the bearings can occur if they are subjected to acetone.

Replacement spokes can be economically obtained from Velomax, or a standard double-butted spoke of the right dimensions can be made into a Velomax spoke. Using a Phil Wood spoke machine or a Hozan threader, simply cut and thread the head end of a conventional spoke. Consult technical specifications at the end of this section for proper spoke length and gauge. Always use spokes of the same specifications as originally supplied.

Always use new spokes. Do not attempt to re-use old spokes.

NEVER grab a new spoke with vice grips, pliers, etc. Even a small nick in a spoke is a stress riser that can cause eventual failure.

If you need to back out a new spoke, generously wrap the area below the nipple threads with tape and grasp lightly with pliers. If you leave a mark on the spoke, remove it and use a new spoke.

Do not over insert. Spokes that are inserted too deep in the hub can contact the axle, resulting in the wheel binding and axle / spoke damage. On MTB front hubs, over insertion can trap the bearing within the hub shell.

Thread lockers work by slowly forming crystalline structures. It's sort of like having grains of sand between the spoke threads and the hub threads. If disturbed before fully curing, the crystalline formation stops prematurely and the bond of the spoke will be insufficient to retain it from rotating during subsequent truings. Allow thread locker to cure a minimum of 12 hours.