The background of the slide features a faded, grayscale image of bicycle gears. The gears are arranged in a way that they appear to be part of a larger mechanism, with some teeth visible and others partially obscured. The overall tone is light and technical.

Bicycle Mechanics and Repair Decal

Mechanical Engineering 98/198

Spring 11

Lecture 8

Aleksey Shepelev

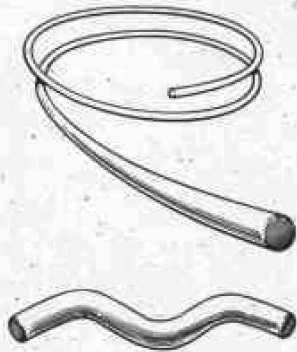
Jim Gao

Nick Koo

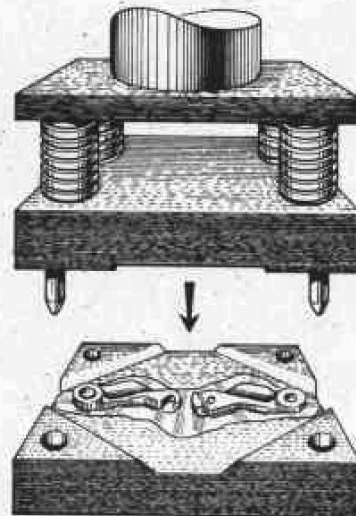
Henry Yi

Allen Gurdus

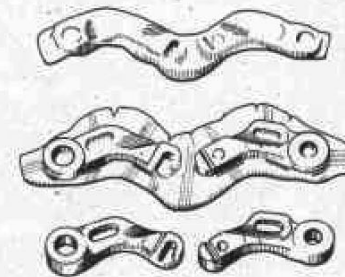
Cold-Forging



DIA-COMPE #986
CANTILEVERS BEGIN AS
BAR STOCK 6061-T6
ALUMINUM. FIRST,
THEY'RE CUT, BENT, AND
PREPPED FOR FORGING...



...THEN SMASHED TWICE. IN THIS CASE,
THE SECOND AND FINAL SMASHING
COMPLETES THE SHAPE.



TOP: AFTER THE FIRST
STOMPING.
MIDDLE: AFTER THE SECOND
STOMPING, SHOWING EXCESS.
BOTTOM: EXCESS REMOVED,
READY FOR FINISHING.

Thinner, lighter, stronger, more accurately made and more expensive than parts made by other methods such as casting

Cold – Forging a Hub



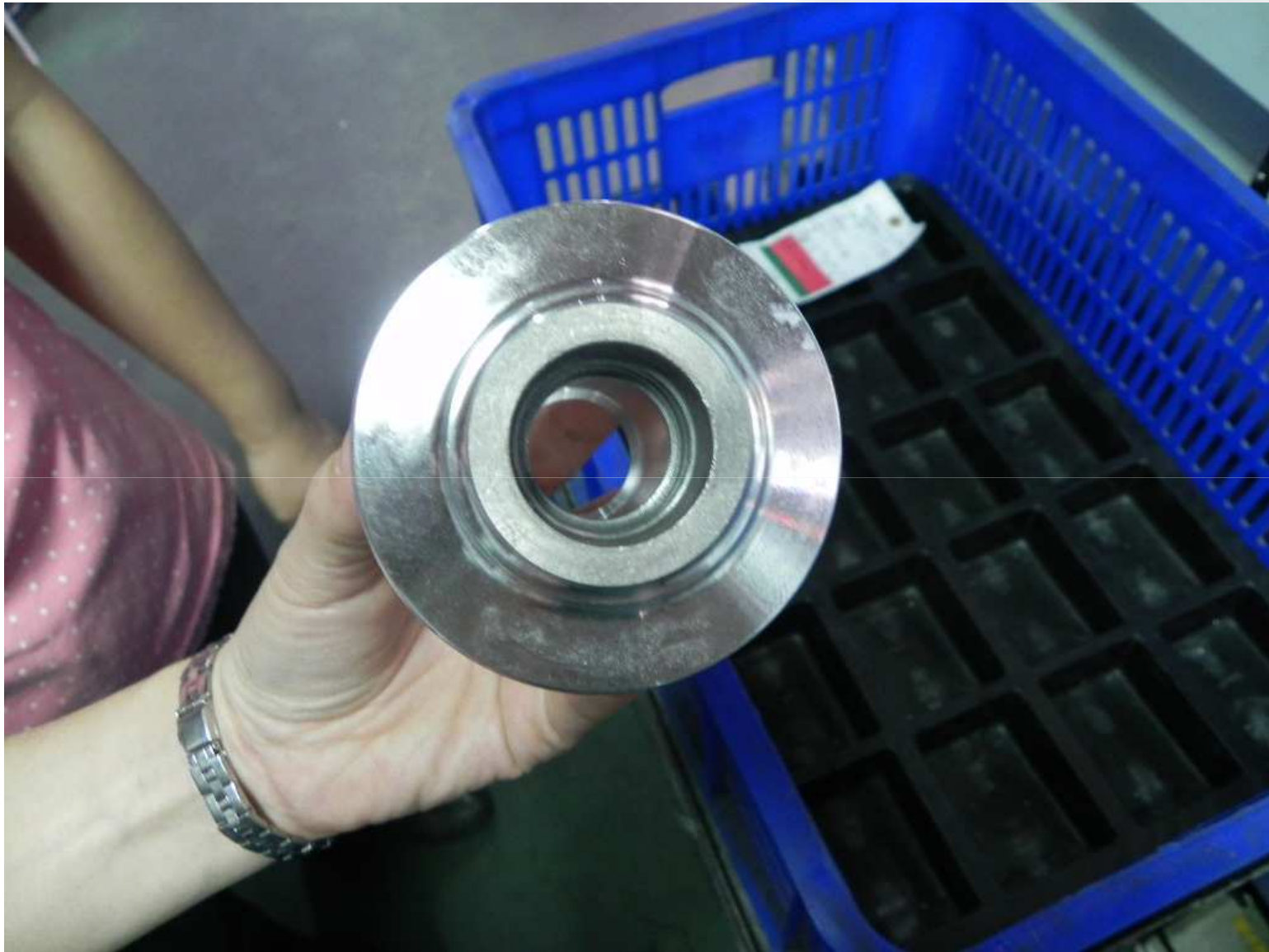




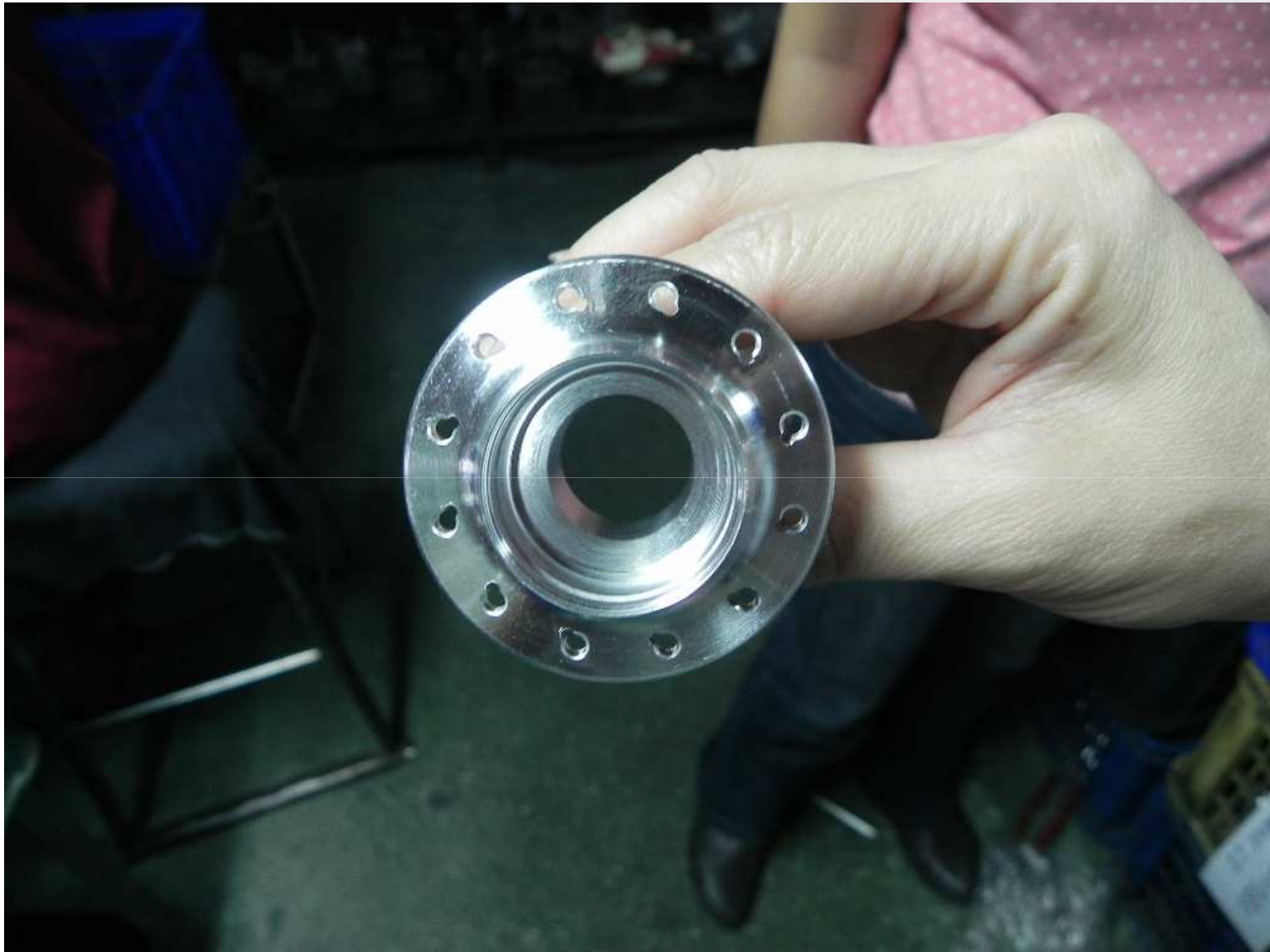


<http://www.satincesena.net/>

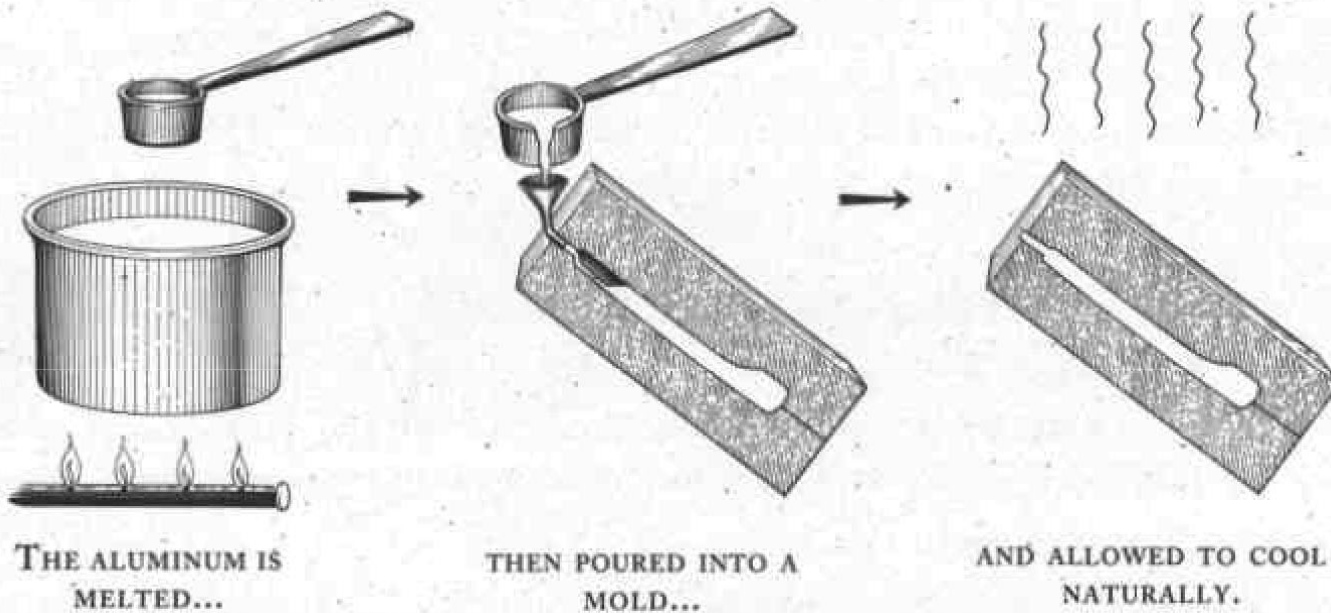








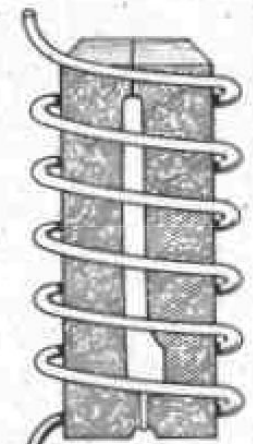
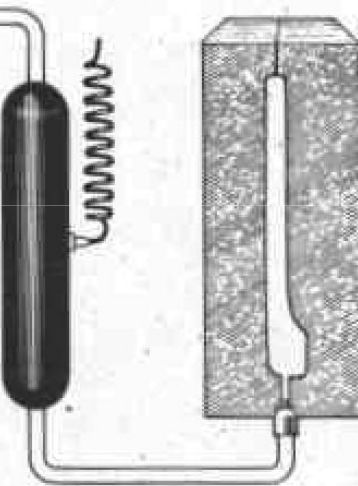
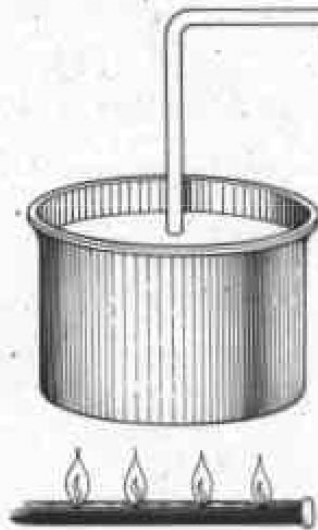
Gravity-Casting



Gravity-cast parts are not as strong as cold-forged parts, although they are often indistinguishable by look.

Melt-Forging

THE ALUMINUM
IS MELTED AND
THEN FORCED
INTO A MOLD
UNDER HIGH
PRESSURE...



AND COOLED
QUICKLY WITH
WATER.

Melt-forged parts are not as strong as gravity-cast parts or cold-forged parts, but are still strong and affordable.

Investment Casting



Step No. 1

Make a metal mold, then pour wax into it to make replicas

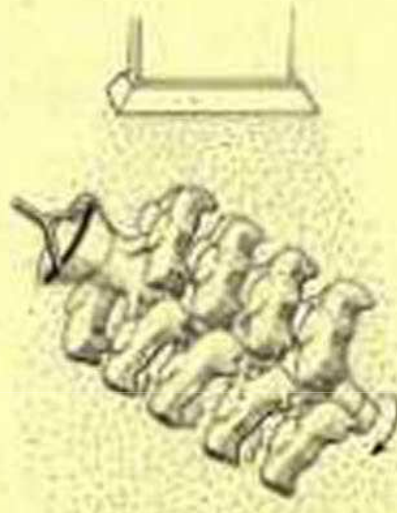


Step No. 2

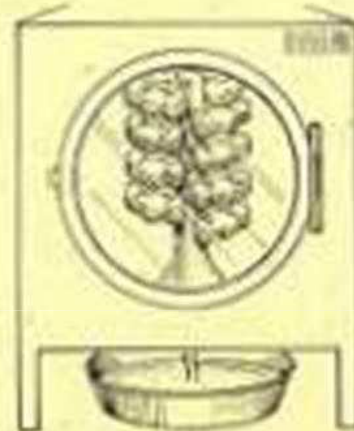
Hang the wax fakes onto a "tree," so you can...



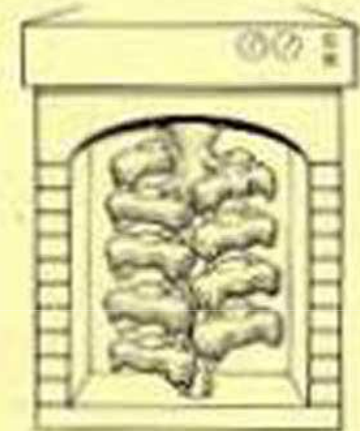
Step No. 3
...dip them all into a
ceramic batter until...



Step No. 4
...a porous, heat
resistant crust forms



Step No. 5
Then heat the wax and
let it drain out a hole



Step No. 6
Turn the molds upside
down (rightside up?)...



Step No. 7

...and pour in the molten metal-CrMo, in the case of this fork crown. When it has set...



Step No. 8

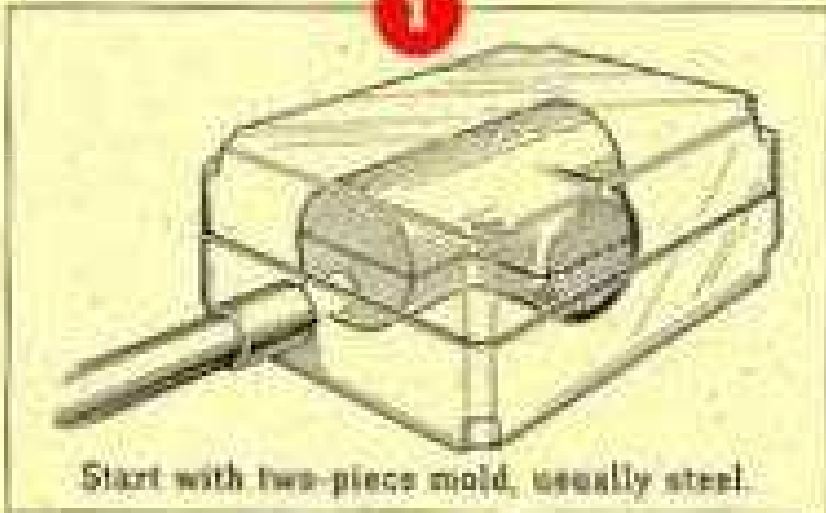
...break off the crust and inspect your castings for voids, where the metal may not have flowed

Remove the castings, heat treat to restore ductility(see Heat-treatment at Home, in next year's catalogue). Machine thenew parts as necessary.

Bulge-Forming (Hydroforming)

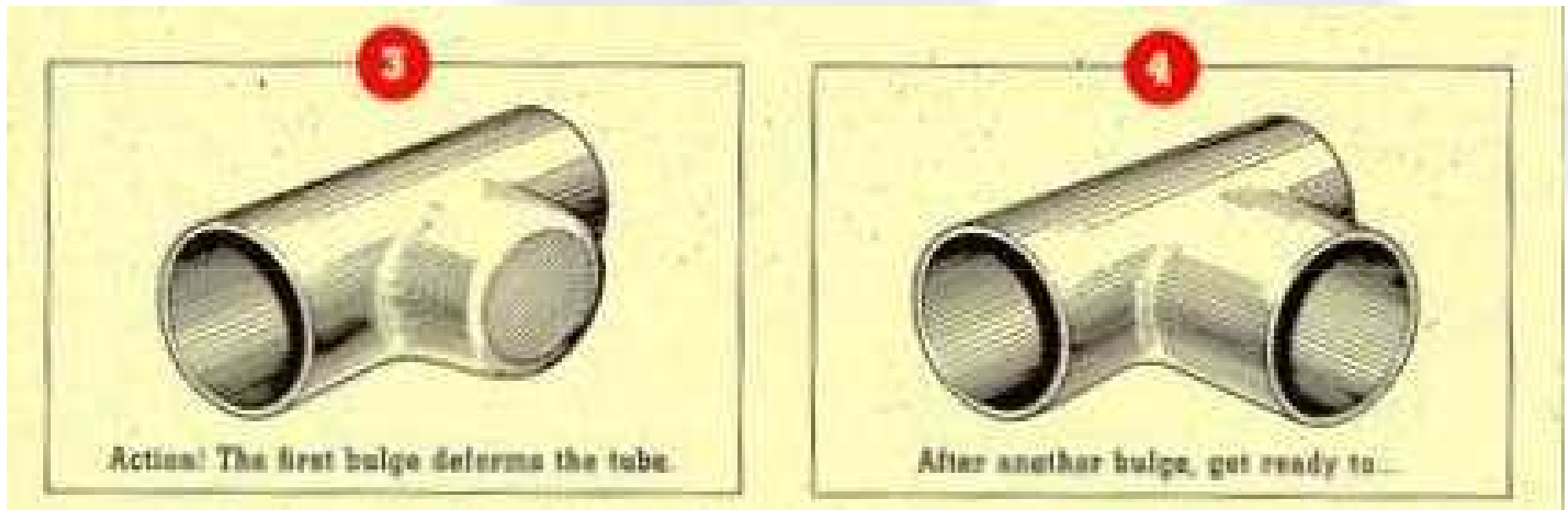
Bulge-Forming for the Do-It-Yourselfer

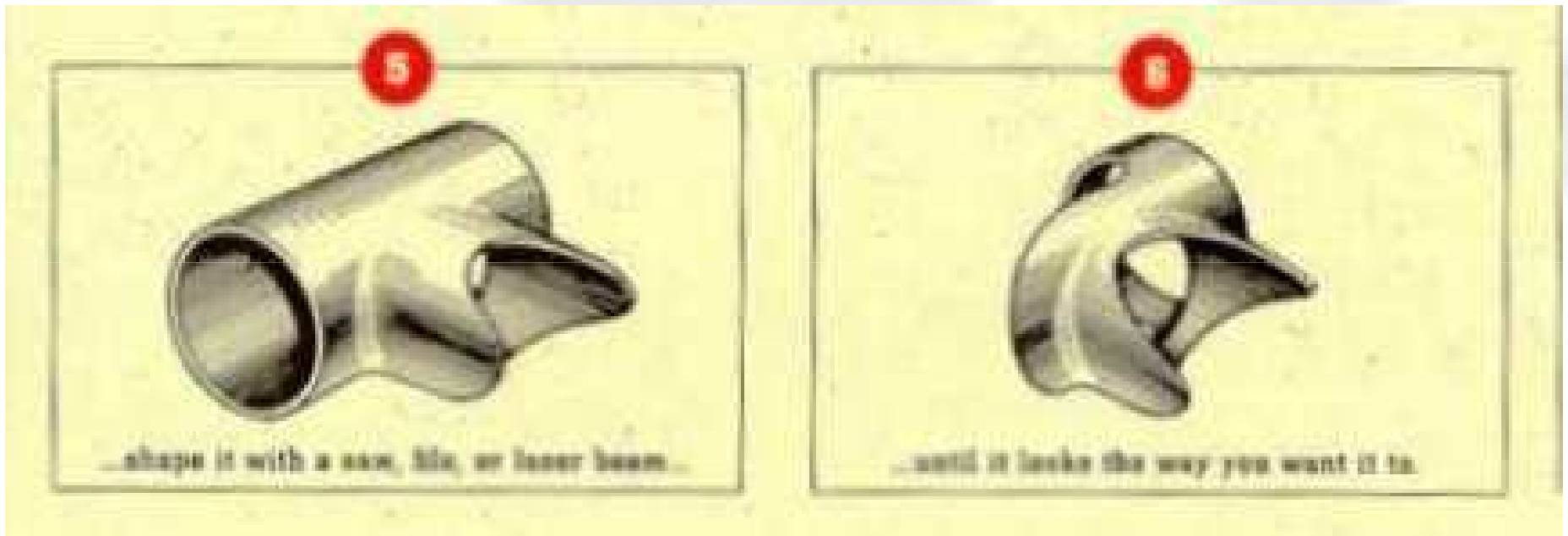
1



2









Marin Bikes

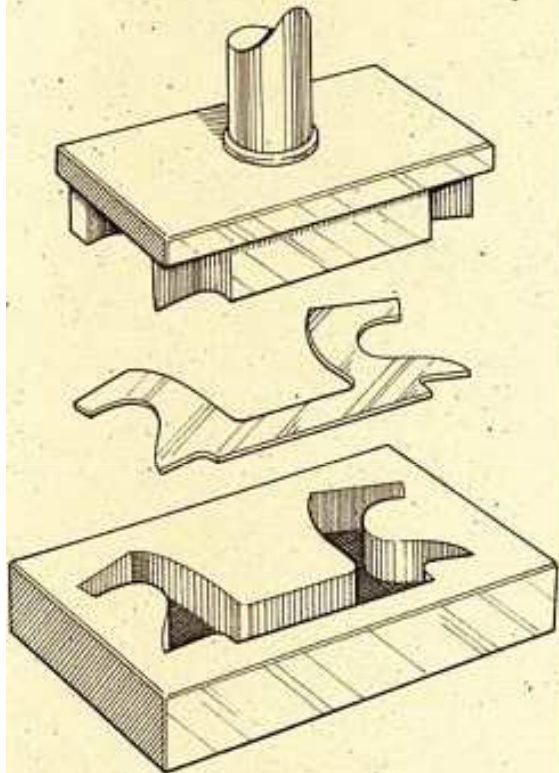


A bulge-formed frame tube, this one from a bike we sell in Japan. If we can figure out how to reduce the weight to levels acceptable here in the U.S., there may be a BF-1 in your future (or at least in ours).

1993 Bridgestone Catalog

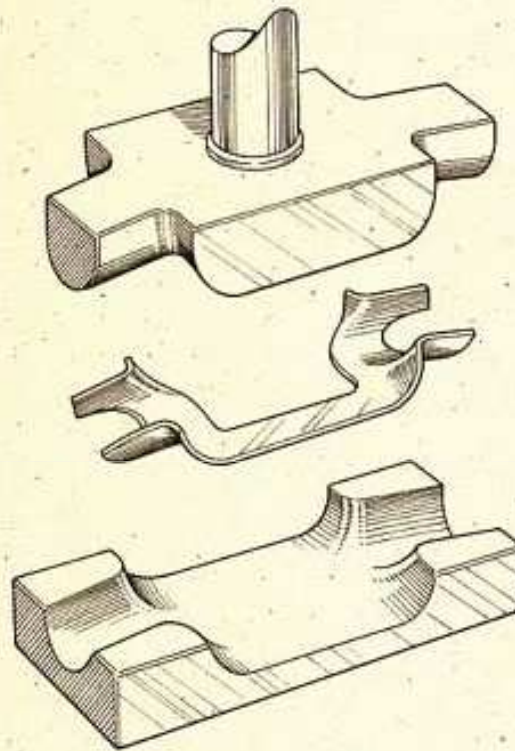
<http://www.sheldonbrown.com/bridgestone/index.html>

Stamping



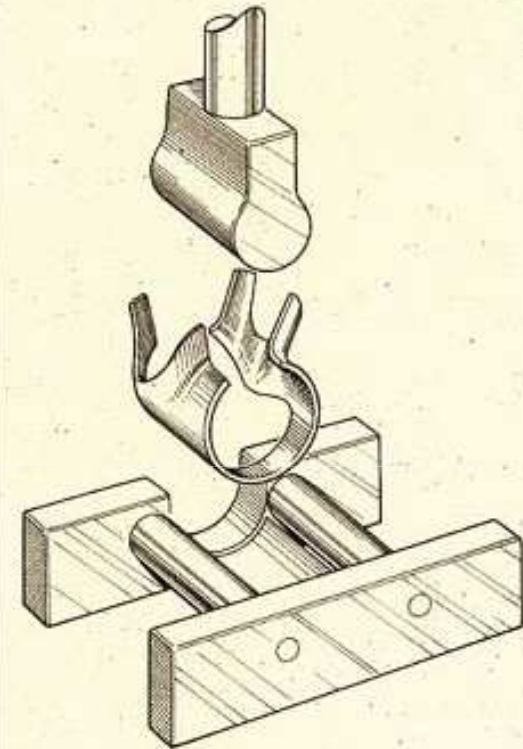
STAMP NO. 1

GET A TOOL STEEL DIE AND A FLAT SHEET OF STEEL BETWEEN 1.2MM AND 2.0MM THICK. STAMP OUT YOUR SHAPE, USING 30 TO 80 TONS OF FORCE.



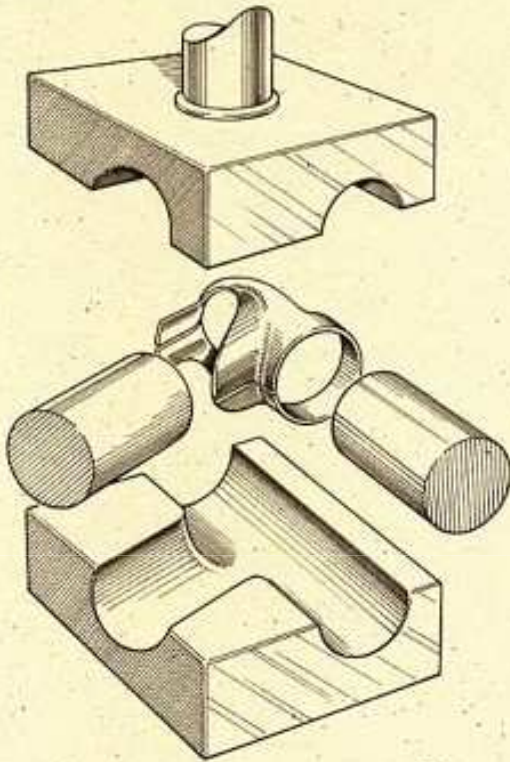
PUNCH NO. 1

THEN PUNCH THE SHEET STEEL WITH ANOTHER 30 TO 50 TONS, DRAWING IT OVER AN APPROPRIATE FORM, TO PREPARE IT FOR...



PUNCH NO. 2

...YOUR BENDING PUNCH. THIS PUNCH IS COATED WITH RUBBER TO PROTECT THE METAL. THE EDGES ARE NOW CLOSER TOGETHER.



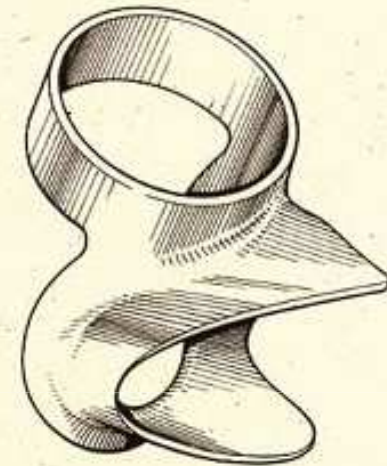
Punch No.3

THEN SLIDE IN A SOLID BAR TO LIMIT THE DEFORMATION, AND PUNCH IT ONCE MORE WITH 30 TONS OF FORCE. NOW THE EDGES SHOULD ALMOST TOUCH.



WELDING

BUTT-WELD THE EDGES TOGETHER, BEING CAREFUL TO LEAVE NO GAPS. THE BORES SHOULD BE ROUND, SO THE FRAME TUBE FITS WELL. THIS HELPS IN BRAZING.



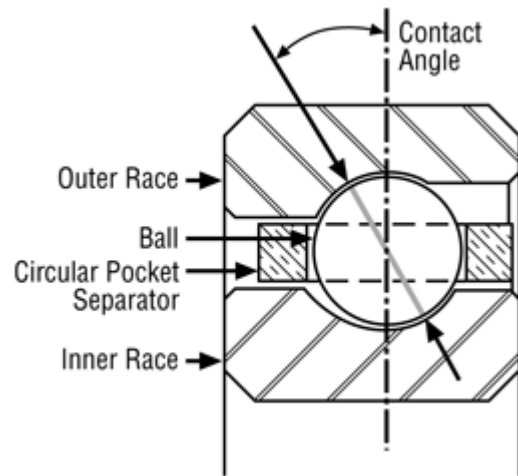
FINISHED.

FILE THE WELD. THE FRAMEBUILDER SHOULD NOT HAVE TO DO MUCH WORK ON THIS LUG, BUT IT'S NICE TO LEAVE A LITTLE EXTRA METAL THERE TO WORK WITH.

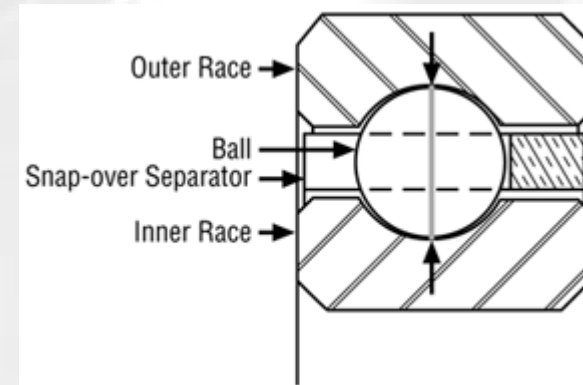
Components - Hubs



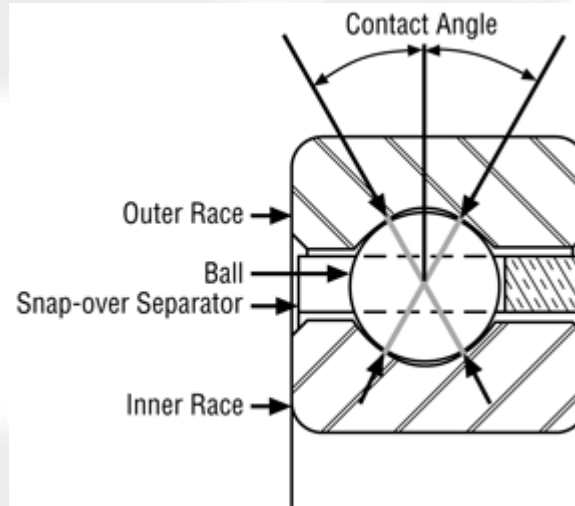
Types of Ball Bearings



Angular contact



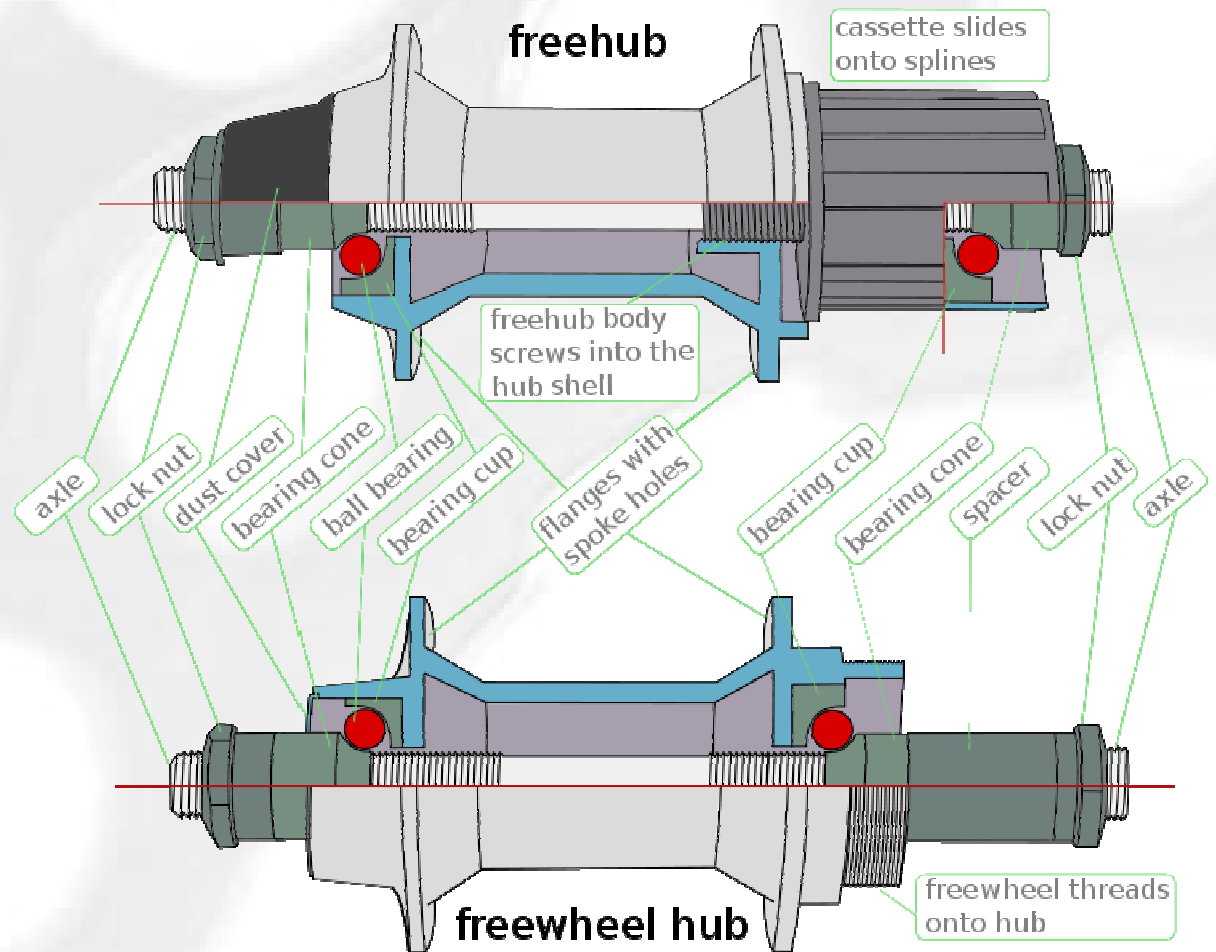
Radial contact



Four point contact

Angled Contact Bearings

- Allows wheel to spin about axle
- Radial and lateral load bearing



Hub Bearings

Cup and cone assembly



Sealed Bearings



Takes High Radial Force



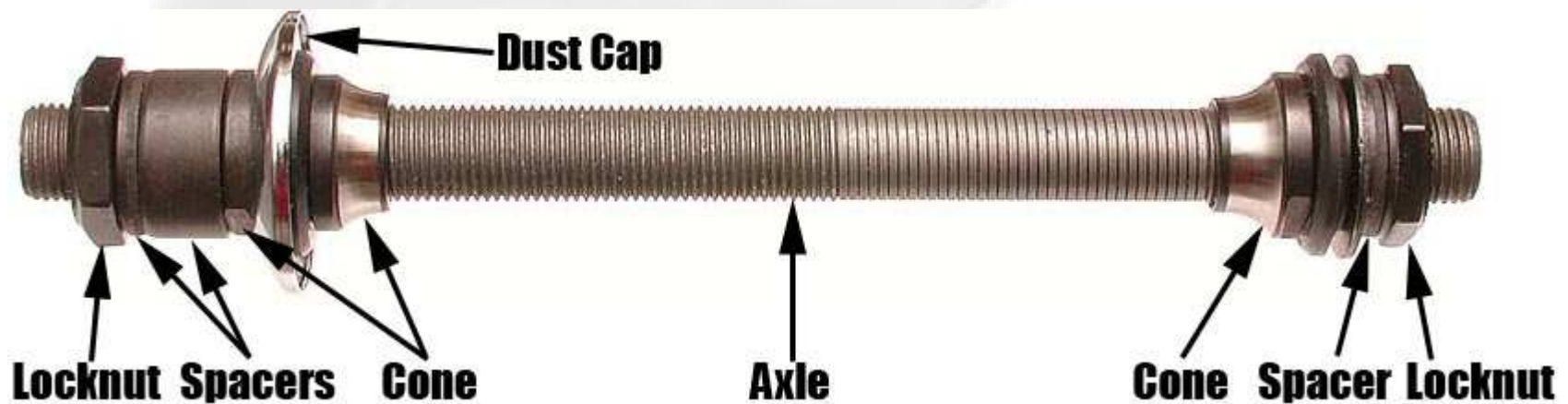
Reduces Gunk Buildup on ball bearings



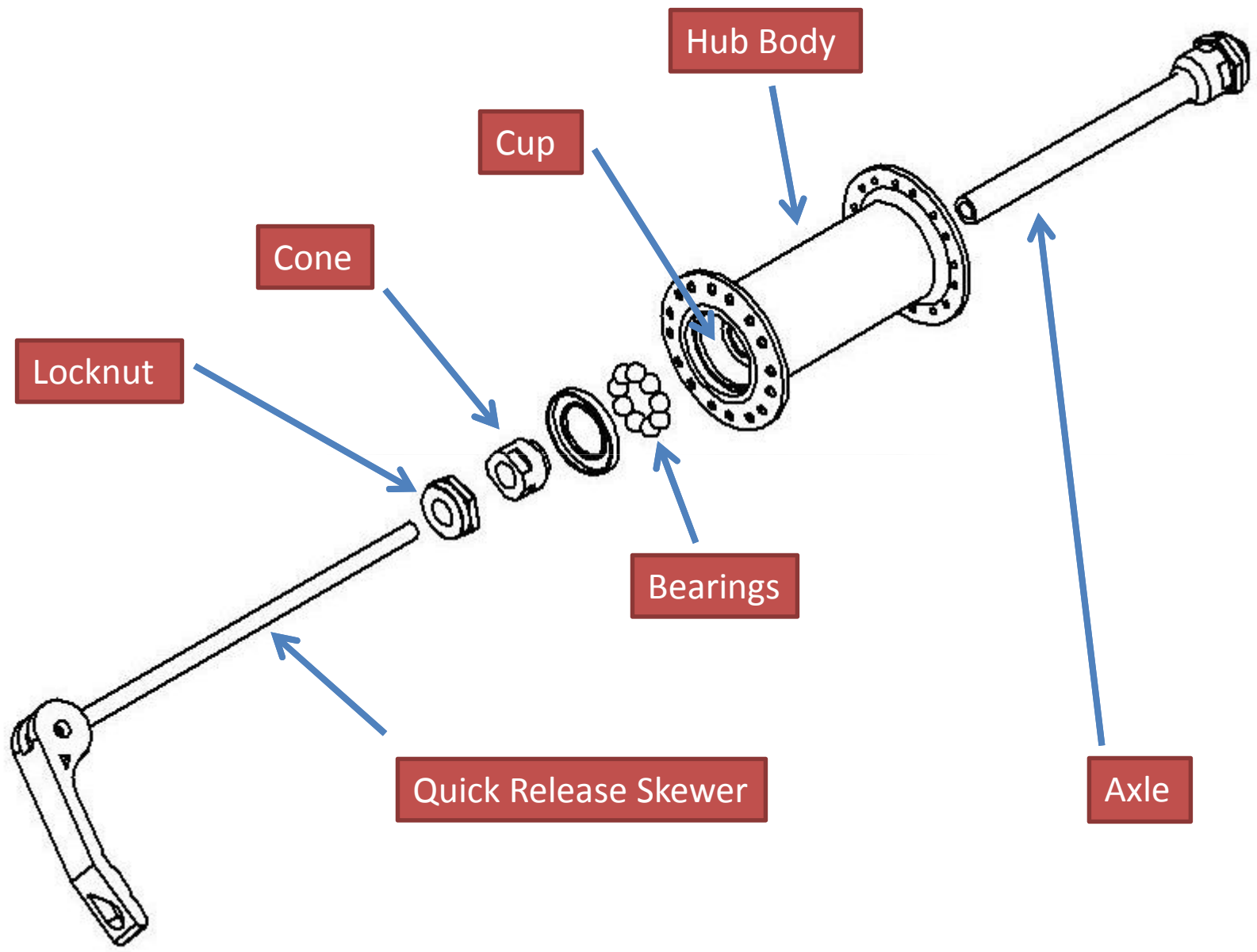
- Axle rotates on bearings so they roll with as little friction as possible.
- Bearings are sometimes sealed
- Bearings should always be greased.
- Always try to replace bearings when opening a hub, bottom bracket or headset. They are cheap!

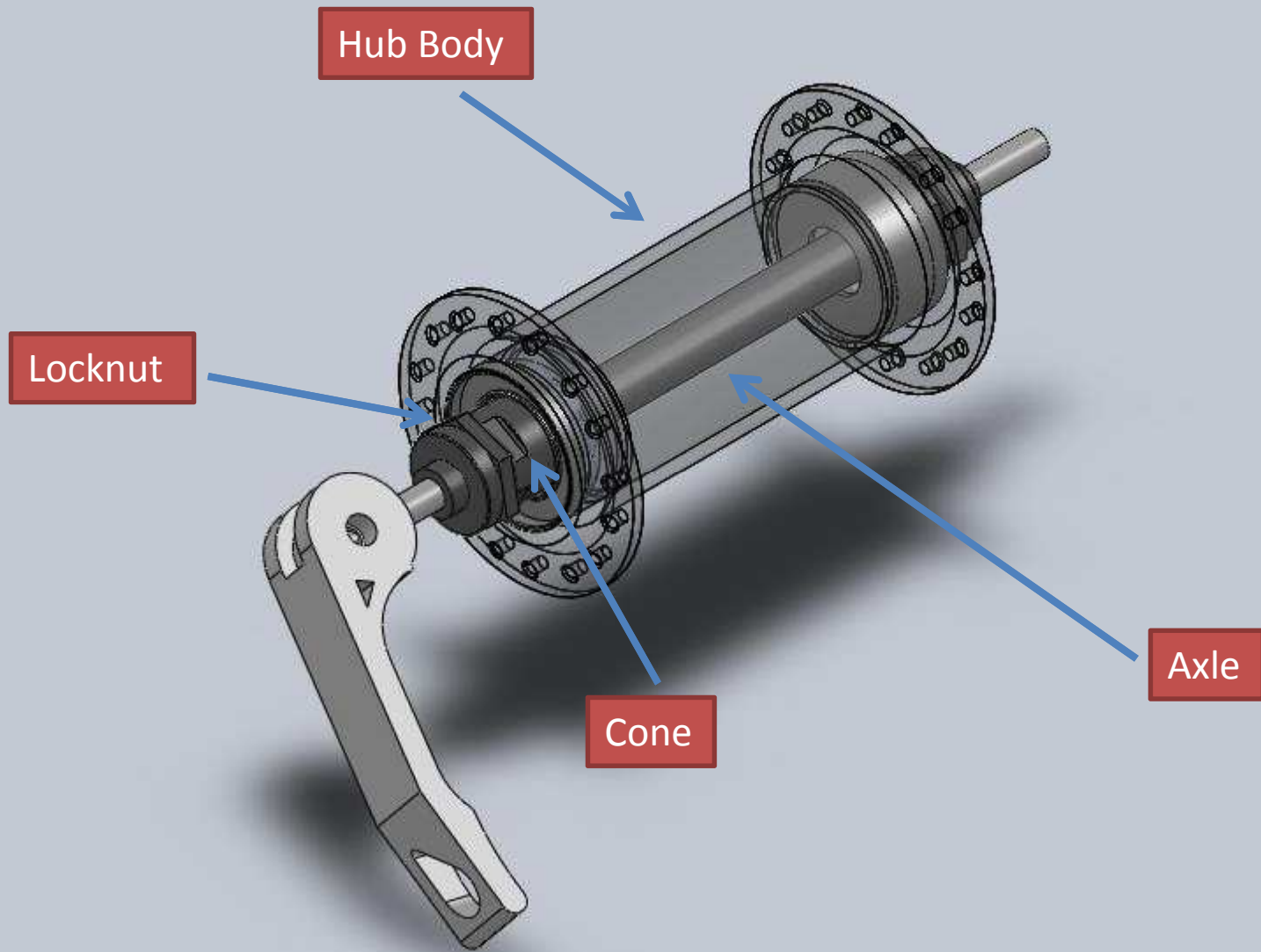


<http://mtobikes.com/tight-hubs/>



http://www.sheldonbrown.com/gloss_an-z.html





Tightening Cones

