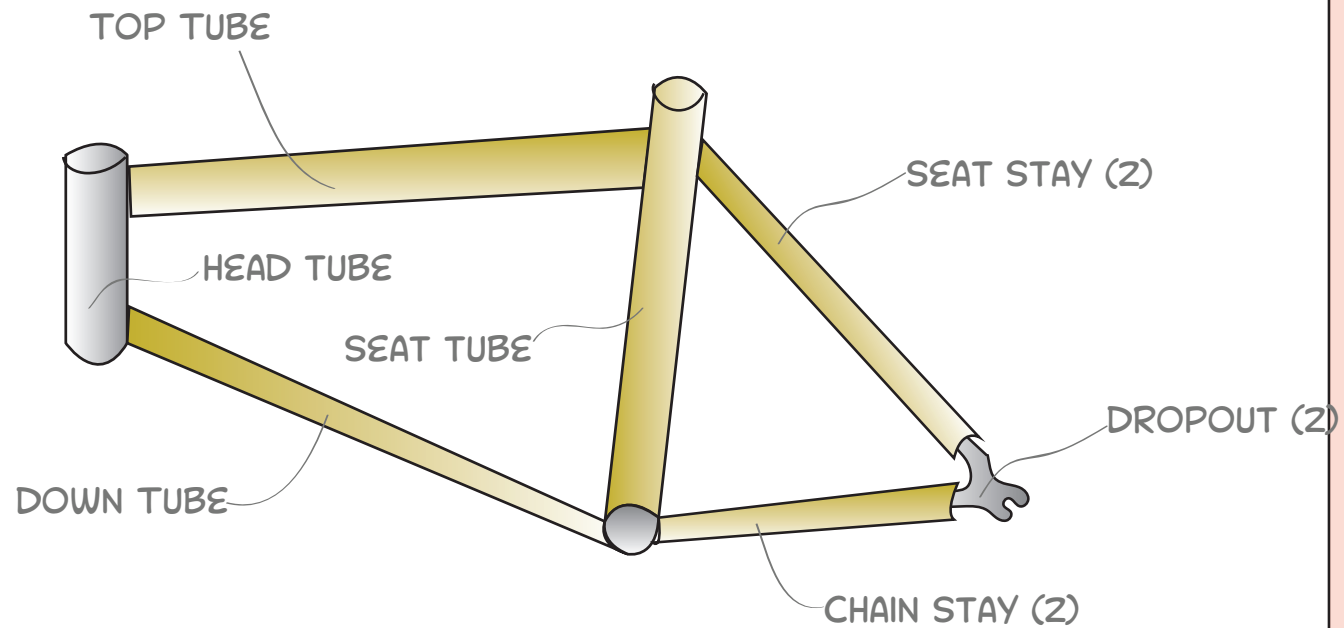




MAKING YOUR BAMBOO BICYCLE

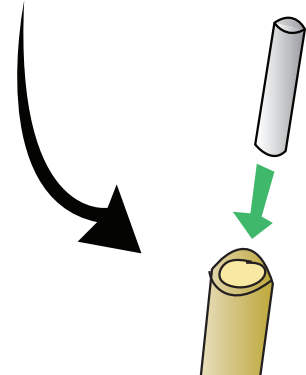
an illustrated workshop guide by geena chen

SELECT BAMBOO

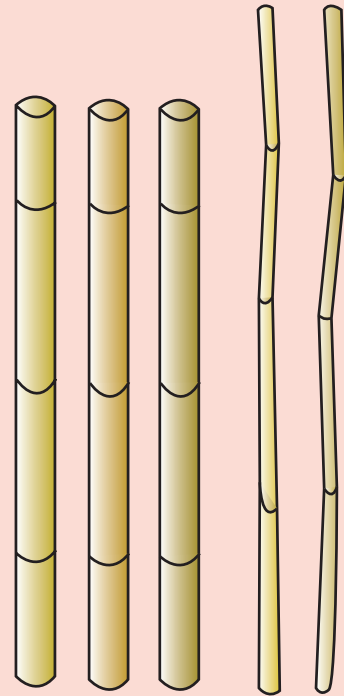


CHECK THREE THINGS WHEN SELECTING:

- 1 DO YOU LIKE IT?
- 2 NO CRACKS AND NO HOLES!
- 3 ONE END OF YOUR SEAT TUBE MUST BE BIG ENOUGH TO FIT YOUR SEAT SLEEVE. TRY IT OUT TO MAKE SURE!



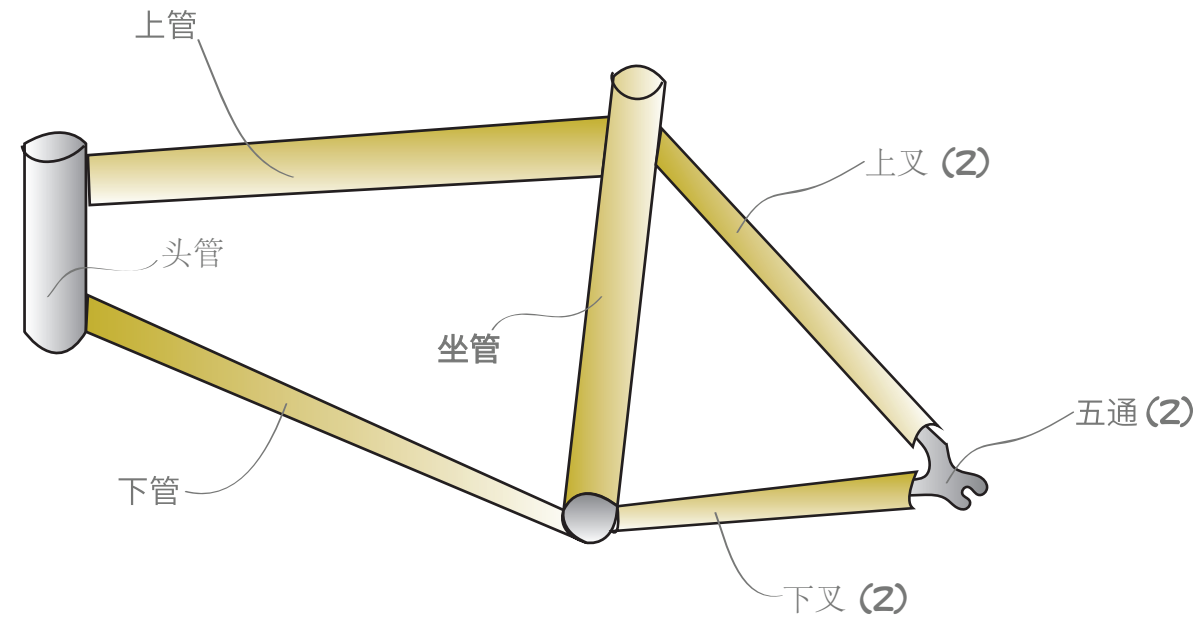
WHEN YOU'RE FINISHED, YOU SHOULD HAVE:



3 THICK BAMBOO POLES
 TOP TUBE
 DOWN TUBE
 SEAT TUBE

**2 LONG THIN POLES OR
 4 SHORT BAMBOO POLES**
 LEFT SEAT STAY
 RIGHT SEAT STAY
 LEFT CHAIN STAY
 RIGHT CHAIN STAY

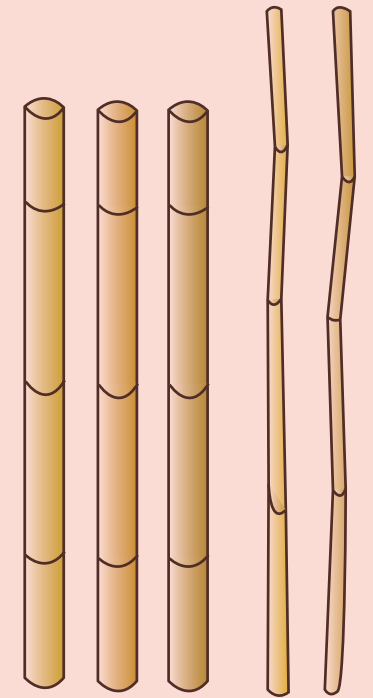
挑选合适的竹子



挑选的时候请注意三点:

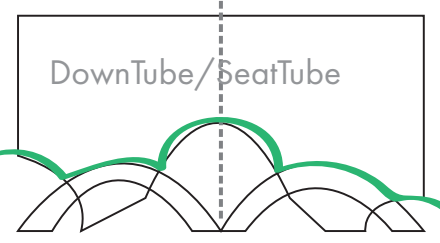
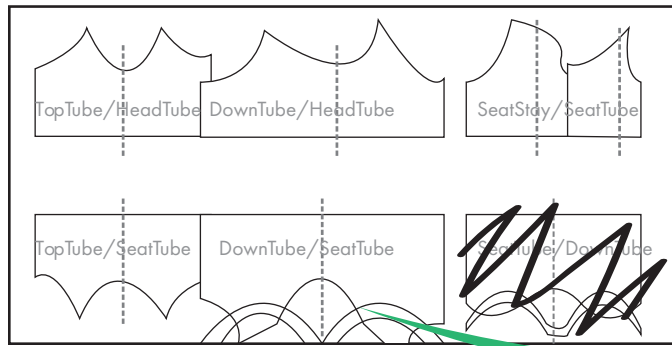
1. 你喜欢它吗?
2. 没有开裂也没有洞
3. 先试着把坐管套插到坐管中, 以确保坐管的一端足够大, 装得下坐管套

完成后, 应该有:



三根粗竹子
 上管
 下管
 坐管
 两根又细又长的竹竿
 或者四根短竹竿
 左上叉
 右上叉
 左下叉
 右下叉

MEASURE BAMBOO



FOR SHAPES WITH MULTIPLE LINES, CUT ALONG THE INNERMOST LINES AS SHOWN ABOVE.

1 CUT OUT THESE 5 SHAPES ON YOUR PERSONAL CAD DRAWING SHEET

2 **HEAD TUBE AND DOWN TUBE:** WRAP EACH PAPER AROUND CORRECT TUBE, MEASURED TO THE CORRECT LENGTH. MAKE SURE TO LINE UP BOTH DASHED LINES -- THIS LINE WILL BE THE TOP OF YOUR TUBE.

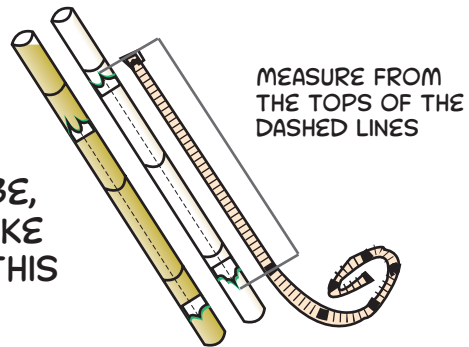
3 **SEAT TUBE:** ONE END OF YOUR SEAT TUBE WILL BE A STRAIGHT CUT. MAKE SURE THIS SIDE CAN FIT YOUR SEAT SLEEVE. MEASURE THE SPECIFIED LENGTH AND DRAW A STRAIGHT LINE AROUND THE TUBE. WE WILL MAKE THIS SIDE INTO A "FISH MOUTH."

HOW TO DRAW A FISH MOUTH

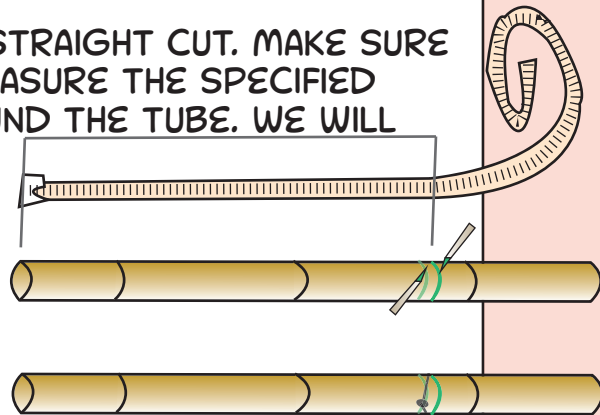
1) APPROXIMATELY 1 CM ABOVE THE LINE YOU MEASURED, DRAW ANOTHER LINE AROUND THE BAMBOO.

2) DRAW 4 DOTS ALONG THE LINE, APPROXIMATELY EQUALLY SPACED.

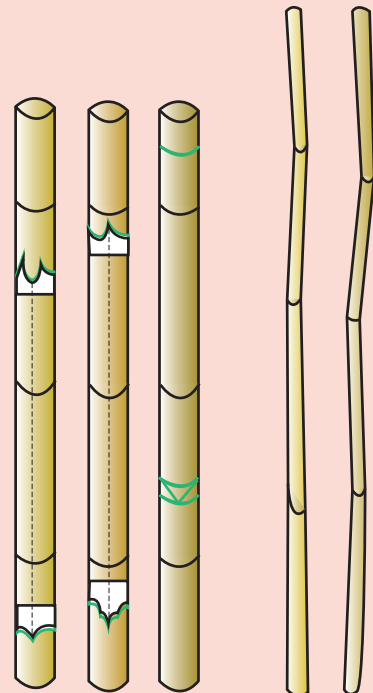
3) USING THE DOTS AS A REFERENCE, DRAW A ZIGZAG AROUND THE BAMBOO AS SHOWN IN THE BOTTOM VIEW.



MEASURE FROM THE TOPS OF THE DASHED LINES

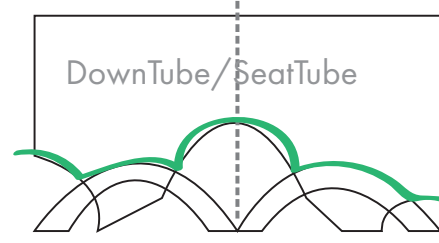
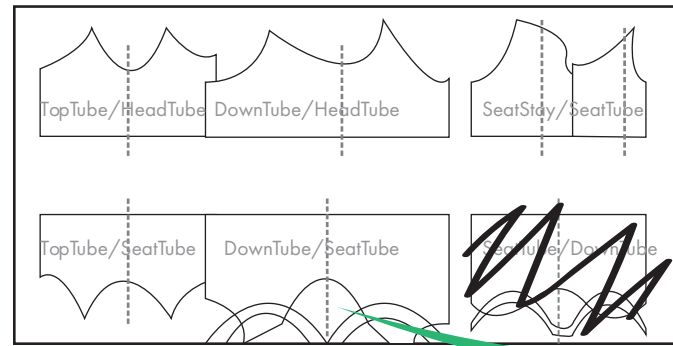


WHEN YOU'RE FINISHED, YOU SHOULD HAVE:



WORKSHOP ASSISTANTS WILL WORK ON YOUR STAYS TO SAVE TIME, USING THE SAME PROCEDURE AS YOU. IF YOU ARE CURIOUS ABOUT WHAT THEY ARE DOING, FEEL FREE TO ASK THEM!

测量竹子

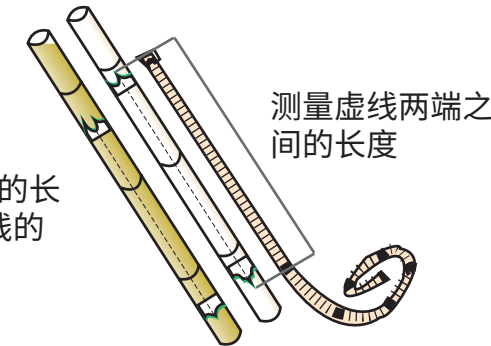


这张图纸会有很多条曲线, 如图所示, 沿着最内侧的曲线剪即可。

1 把你的图纸上的前五个图形剪下来

2 **头管和下管:** 把每一张图纸都裹在正确的竹子上, 量好正确的长度。请确保图纸上的虚线在一条直线上, 有虚线的一面朝上。

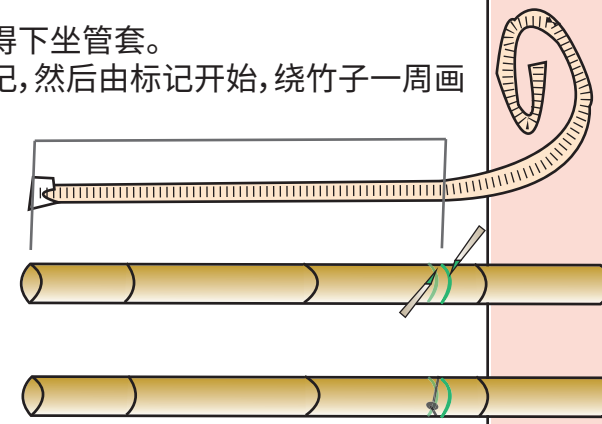
3 **坐管:** 你的坐管的一端会被平着锯掉, 确保这一端可以装得下坐管套。从这一端沿着竹子量出你的坐管的特定长度, 做标记, 然后由标记开始, 绕竹子一周画一个环。我们会把这一端做成“鱼嘴”形状



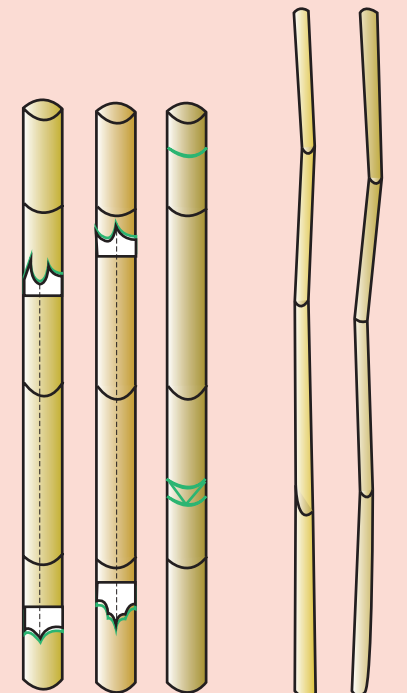
测量虚线两端之间的长度

如何画一个鱼嘴

1. 在你测量的那个环的外面约1厘米处再沿竹子画一个环
2. 沿着这个环平均分布地画4个点
3. 如下图所示, 以这些点作为参考, 绕竹子一周画“之字形”



完成后, 应该有:



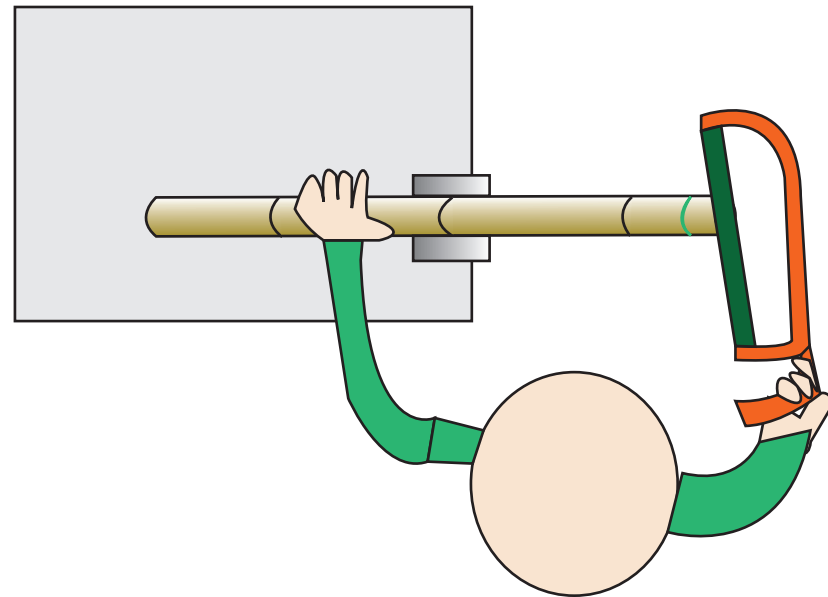
WORKSHOP ASSISTANTS WILL WORK ON YOUR STAYS TO SAVE TIME, USING THE SAME PROCEDURE AS YOU. IF YOU ARE CURIOUS ABOUT WHAT THEY ARE DOING, FEEL FREE TO ASK THEM!

工作坊助手会帮你加工上叉和下叉, 加工程序与你们相同, 如果你很好奇他们在做什么, 放心去问吧!

SAW BAMBOO

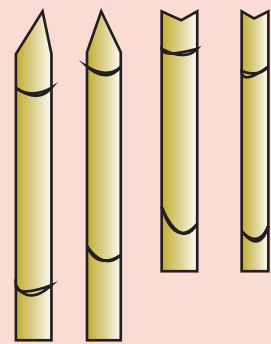
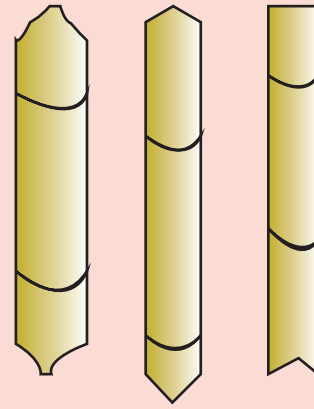
1 START WITH THE STRAIGHT CUT OF YOUR SEAT TUBE TO FAMILIARIZE YOURSELF WITH THE SAWING MOTIONS

2 NEXT TRY SAWING THE FISH MOUTH SIDE OF YOUR SEAT TUBE. START SAWING AT THE CORNER, AND ANGLE YOUR SAW SLIGHTLY IN ORDER TO CUT THE REQUIRED SLANT, LIKE A V SHAPE. ONCE YOU'VE CUT TO THE END OF THE V, TURN THE BAMBOO OVER IN THE CLAMP AND REPEAT.



3 CONTINUE SAWING THE REST OF YOUR TUBES AS CLOSE AS POSSIBLE TO THE LINES YOU'VE DRAWN. THIS WILL MAKE IT EASIER FOR MITERING LATER.

WHEN YOU'RE FINISHED,
YOU SHOULD HAVE:

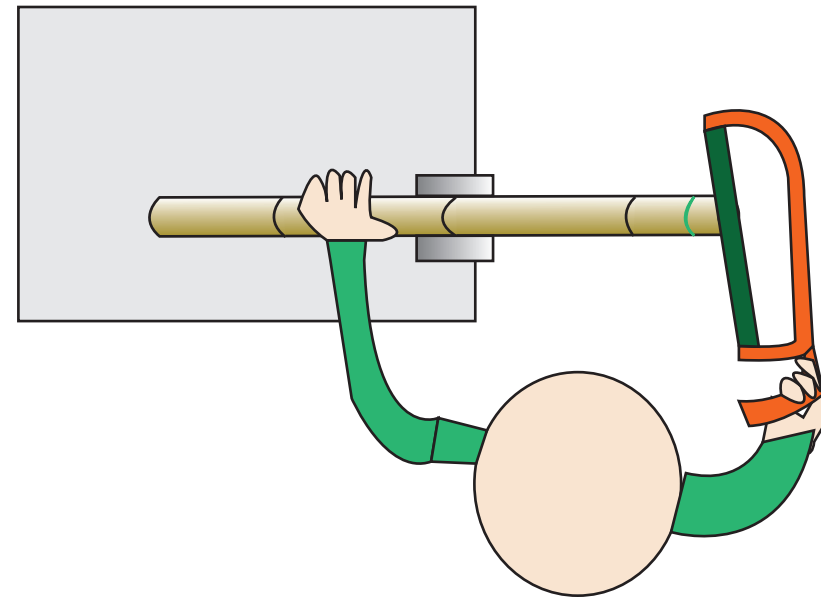


YOUR SEVEN TUBES, SAWED AS
CLOSE AS POSSIBLE TO THE
LINES YOU'VE DRAWN

锯竹子

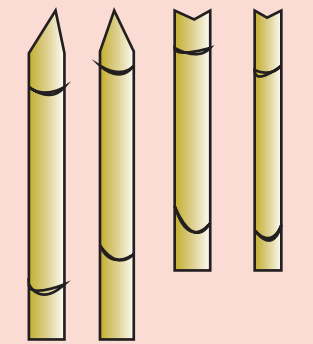
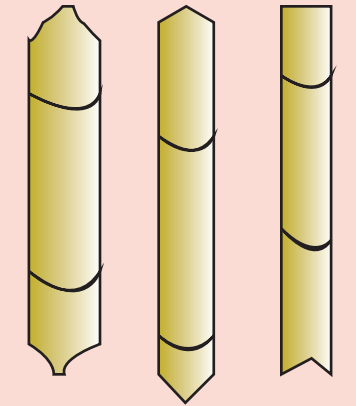
1 从你的坐管的平锯开始, 让自己熟悉锯的动作

2 接下来尝试锯坐管的“鱼嘴型”的那边。由鱼嘴的顶尖开始锯, 把你的锯子稍微倾斜一个角度, 这样才可以锯出来符合要求的倾斜角, 就像一个V形。当你锯到V形的底端的时候, 把竹子在固定夹中转到另一面, 固定好, 重复上述动作。



3 继续锯其余的竹子, 请尽量贴近你之前画的曲线, 这会让接下来的打磨更加容易

完成后, 应该有:

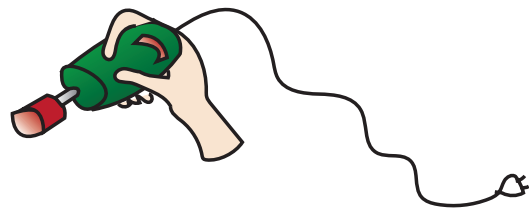


你的七根竹管已经沿着曲线锯好了

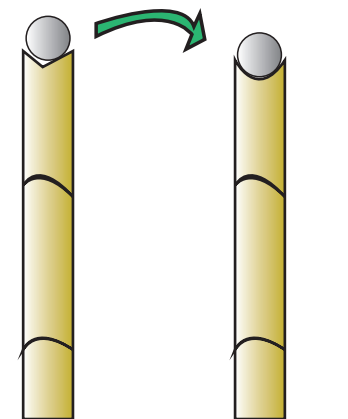
MITER BAMBOO

EVERYONE MUST WEAR THEIR SAFETY GOGGLES DURING THIS STEP!

USE YOUR DREMEL AT SPEED "3" OR ABOVE!

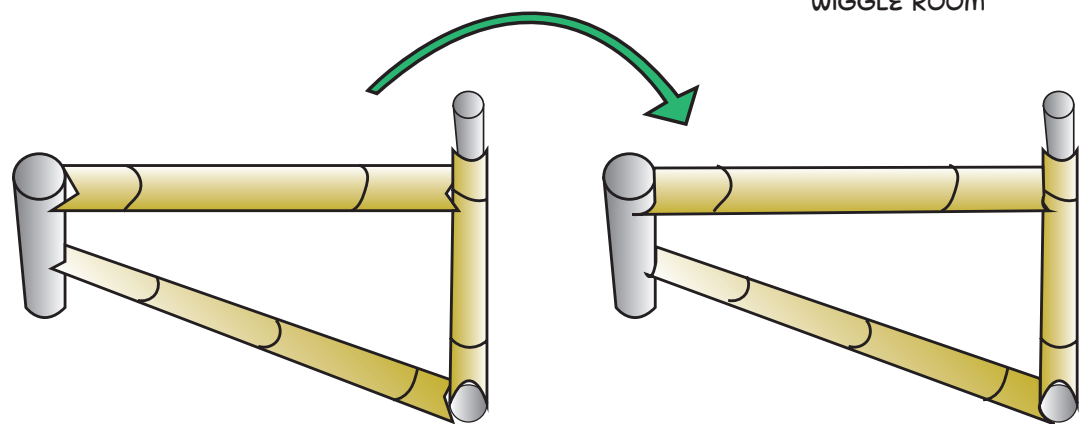


1 START WITH YOUR SEAT TUBE. PLACE YOUR BOTTOM BRACKET ON THE FISH MOUTH REGULARLY AS YOU SMOOTH OUT THE LINES OF THE FISH MOUTH TO FIT THE BOTTOM BRACKET SNUGLY.



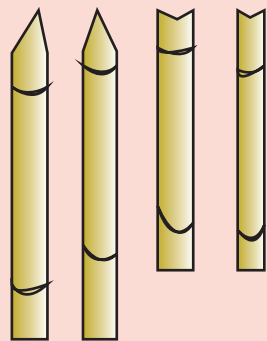
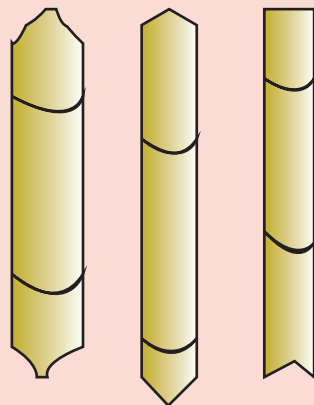
JAGGED CUTS SHOULD TURN SMOOTH AND TAPERED SO THAT THE BOTTOM BRACKET FITS WITHOUT TOO MUCH WIGGLE ROOM

2 REPEAT FOR BOTH ENDS OF THE DOWN TUBE AND THEN BOTH ENDS OF THE TOP TUBE. REMEMBER TO TEST THEIR FITS ON YOUR JIG **OFTEN** TO AVOID GETTING RID OF TOO MUCH MATERIAL!



ALWAYS TEST OUT YOUR NEWLY MITERED PIECES ON THE JIG! MITER BOTH ENDS OF A TUBE AT ONCE RATHER THAN ONE AT A TIME IN ORDER TO GET A MORE ACCURATE FIT.

WHEN YOU'RE FINISHED, YOU SHOULD HAVE:



YOUR SEVEN TUBES, SMOOTHLY CUT ALONG YOUR LINES

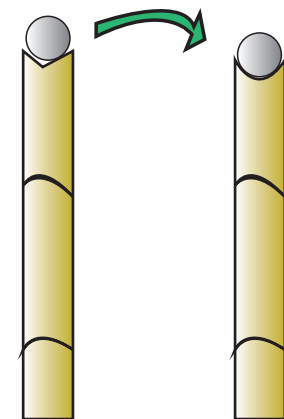
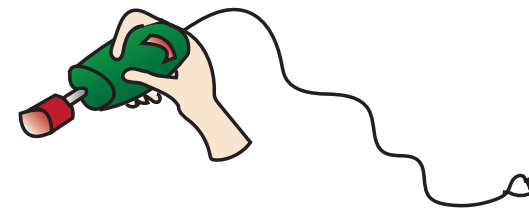
打磨竹子的切口

进行这一步骤时, 每个人都必须戴上护目镜!

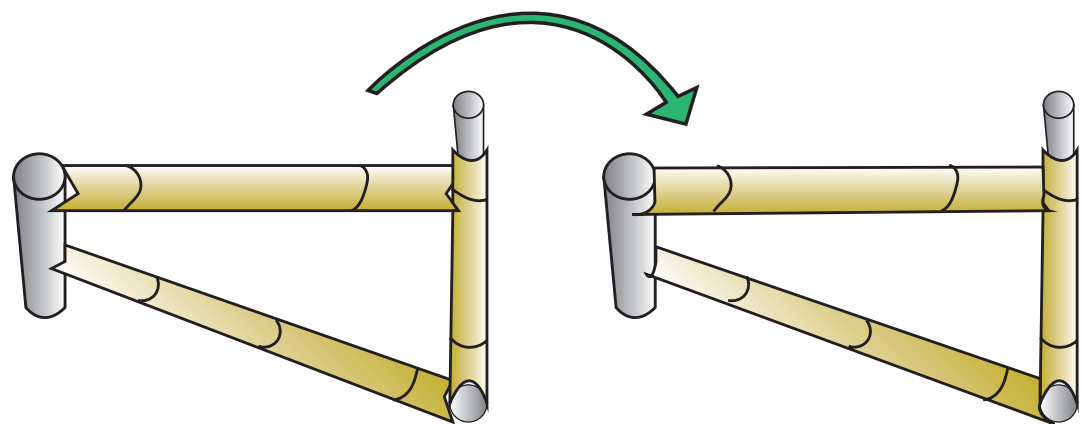
把你的电磨调到3档或以上!

1 从你的坐管开始 把你的五通放在鱼嘴上, 有规律的打磨出鱼嘴的形状, 使它完全与五通贴合

2 在你的上管和下管的两端都重复①中的做法。记得经常把竹子放到你的工装上测试它们是否合适, 以避免磨掉过多材料!

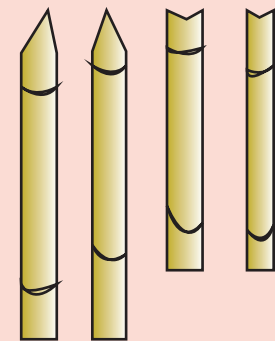
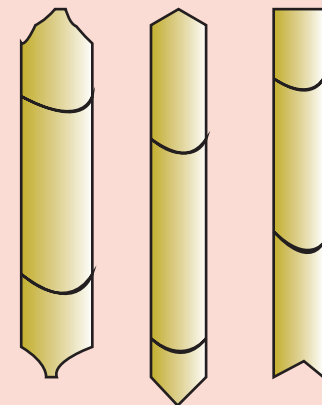


锯齿形的切口应该变得光滑、更细更薄, 这样使五通不会来回晃动。



时常在你的工装上检验你打磨的竹子。为了使您的竹管更准确地贴合, 在打磨某一根竹子的时候, 竹子的两端都要磨好, 不要只磨好一端就换另一根竹子来磨。

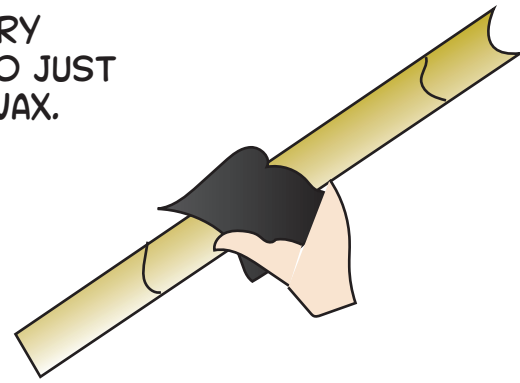
完成后, 应该有:



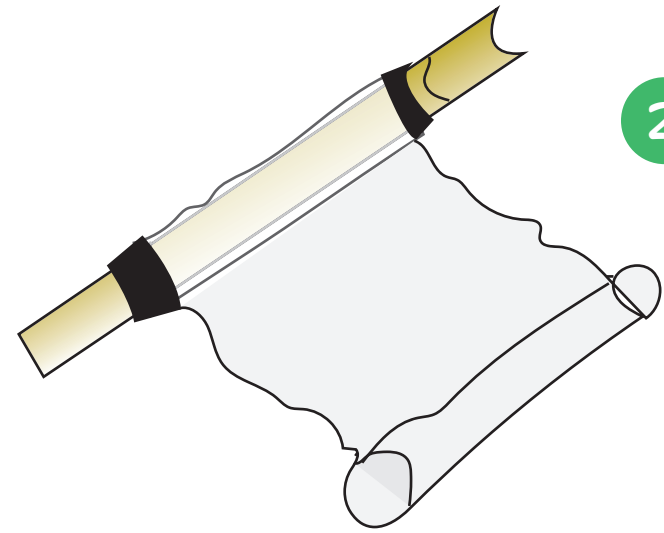
你的7根管子, 都沿着画线有平滑的切口。

PREP BAMBOO

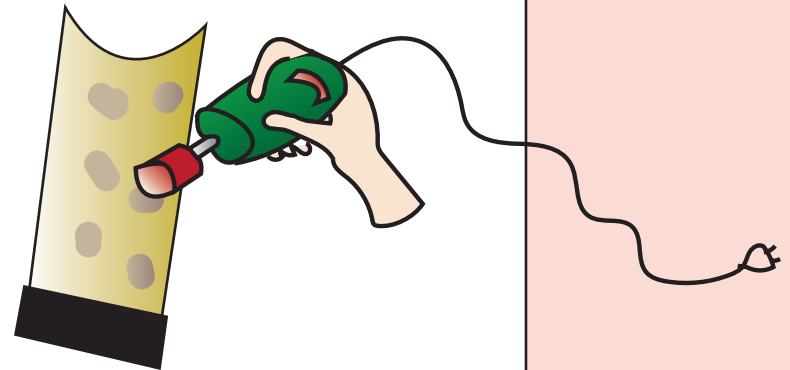
- 1** LIGHTLY RUB SANDPAPER OVER EVERY SURFACE OF EACH PIECE OF BAMBOO JUST TO REMOVE THE OUTER LAYER OF WAX.



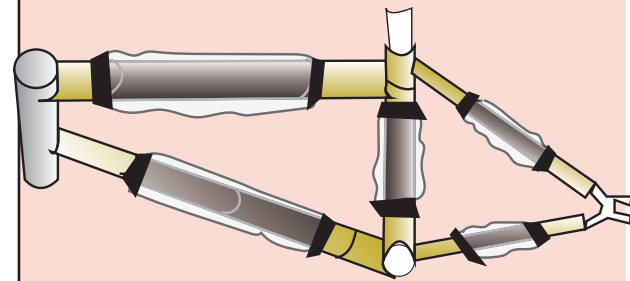
- 2** TAPE A SARAN WRAP LAYER OVER EACH PIECE OF BAMBOO, LEAVING ABOUT 10 CM (4-5 INCHES) AT EACH END.



- 3** USING YOUR DREMEL, PRESS LITTLE GROOVES OR DENTS INTO THE BAMBOO THAT IS NOT COVERED IN SARAN WRAP. THIS WILL HELP MAKE YOUR JOINTS STRONGER DURING THE WRAPPING PART!

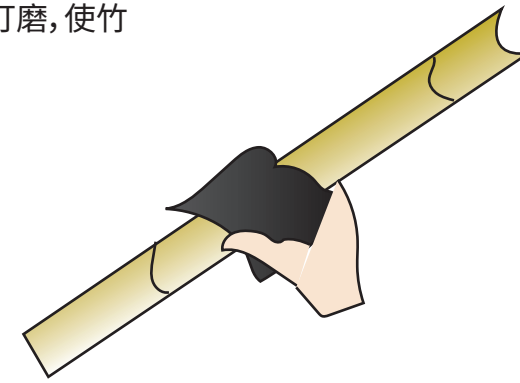


WHEN YOU'RE FINISHED, YOU SHOULD HAVE:

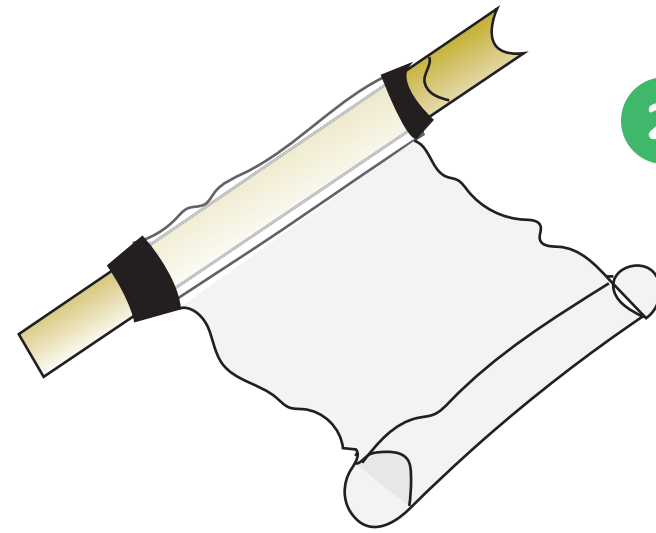


预处理竹子

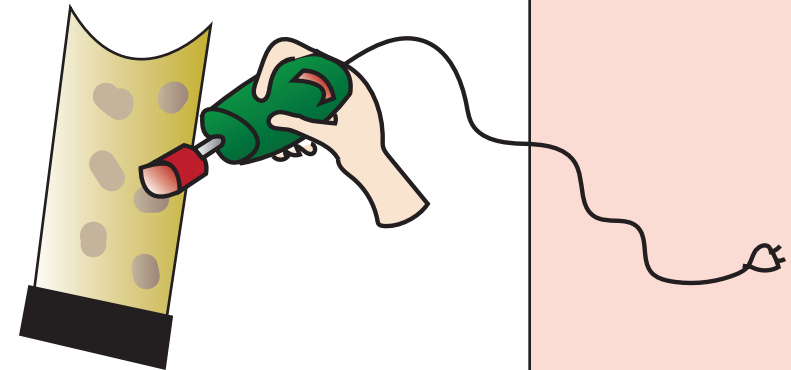
- 1** 用砂纸轻轻的把每一只竹管的每一个表面都打磨,使竹子表面的蜡质脱除。



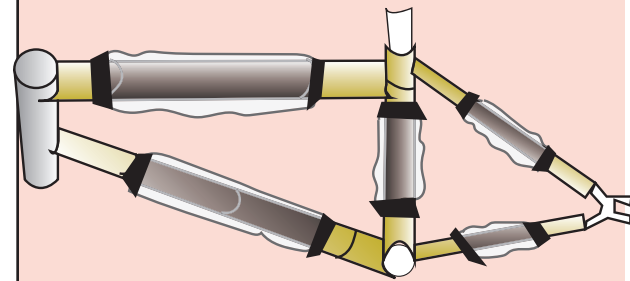
- 2** 每只竹管离两端10cm (4-5英寸) 之间的部分都用保鲜膜裹好。保鲜膜两端用胶带缠紧。



- 3** 使用电磨在没被保鲜膜包裹的竹子上按压,磨成一个个沟和凹痕。在下一步骤中,这会使你的车架接口更加结实!



完成后, 应该有:



TACK BAMBOO



PUMPING GLUE

PUMP GLUE IN A 1:1 RATIO. MAKE SURE YOU GET A FULL PUMP AND MIX THE GLUE WELL!

PAIR UP WITH A PARTNER AND WATCH THE WORKSHOP LEADER CAREFULLY FOR THIS LAST STEP! LOTS OF TIMING, TEAMWORK, AND COORDINATION ARE NEEDED FOR TACKING.

ORDER OF TUBES:

1. SEAT TUBE
2. DOWN TUBE
3. TOP TUBE
4. RIGHT CHAIN STAY
5. LEFT CHAIN STAY
6. RIGHT SEAT STAY
7. LEFT SEAT STAY

WHO WILL FINISH FIRST?

WHEN YOU'RE FINISHED,
YOU SHOULD HAVE:

粘竹子



倒胶水

把胶水1:1混合。一定要确保你每一次都把它按到底,并且混合充分。

和一个工作坊助手组成小组,仔细学习工作坊领导人今天这最后一步的讲解。在这一步,我们需要非常多的时间、团队协作还有互相帮助。

管子的顺序:1.坐管

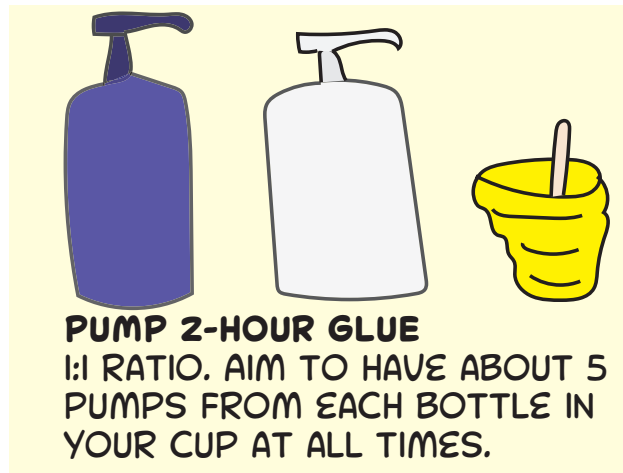
- 2.下管
- 3.上管
- 4.右下叉
- 5.左下叉
- 6.右上叉
- 7.左上叉

看看谁先完成吧!

完成后,应该有:

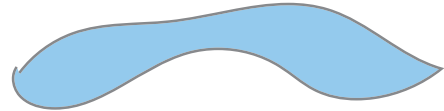
DAY 2: WRAPPING BASICS

IN THE FOLLOWING SECTIONS WE WILL WRAP EACH LUG OF YOUR BIKE. EACH LUG REQUIRES THE COMPLETION OF **THREE** STAGES. PLEASE FAMILIARIZE YOURSELF WITH THE RULES OF THESE STAGES BEFORE PROCEEDING.



1 FIBERGLASS TO PROTECT AGAINST CHANGES IN WEATHER

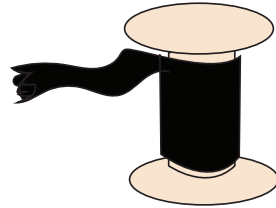
SOAK EACH FIBERGLASS STRIP IN GLUE BEFORE YOU APPLY IT TO YOUR LUG.



2 CARBON FIBER THE MAIN SOURCE OF STRENGTH

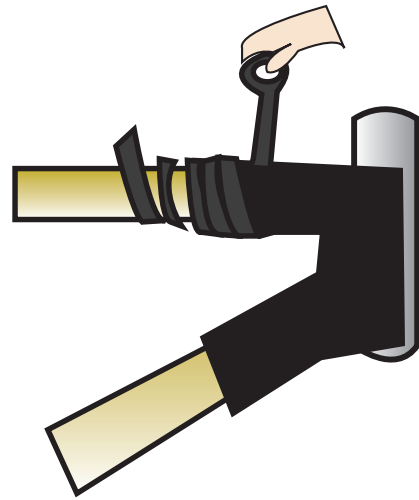
THREE ESSENTIAL RULES:

- 1. WET:** KEEP YOUR CARBON FIBER TOTALLY COVERED IN GLUE AS YOU WRAP
- 2. TIGHT:** AS YOU WRAP, PULL THE CARBON FIBER AS TIGHT AS YOU POSSIBLY CAN. THIS OFTEN REQUIRES MAKING A FIST AND PUTTING YOUR WHOLE ARM INTO THE MOTION.
- 3. LOTS OF X'S:** WHEN IN DOUBT, OR WHEN FREESTYLING, MAKE AS MANY X'S ON THE LUG AS YOU CAN TO STRENGTHEN IT.
- 4. REPEAT EACH WRAP AT LEAST 7 TIMES.**



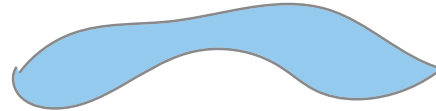
3 TAPE TO SQUEEZE OUT EXCESS GLUE

TAPING IS THE FINAL STAGE OF EACH LUG. FOR THIS STEP, MAKE SURE TO USE ONE CONTINUOUS ROLL OF TAPE! TIGHTLY WRAP UP YOUR ENTIRE LUG USING THE NON-STICKY SIDE OF THE TAPE ON THE INSIDE OF THE WRAP AND THE STICKY SIDE FACING OUT.



1 玻璃纤维 应对由温度引起的热胀冷缩

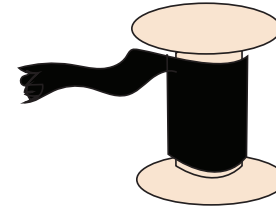
在你把玻璃纤维条贴在关节处之前, 把每一条都放在胶水中浸透。



2 碳纤维 力量的主要来源

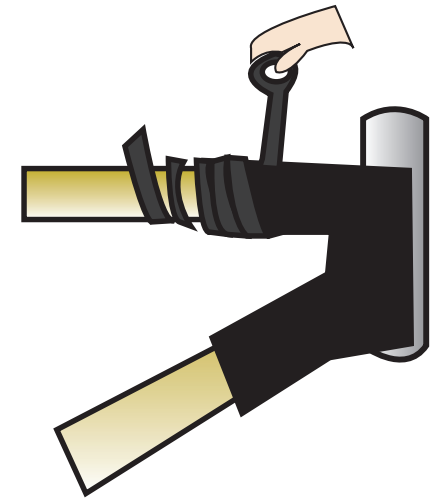
四条核心原则:

- 1. 湿润:** 在你缠绕关节时, 请使你的碳纤维完全浸润在胶水中
- 2. 紧实:** 在你缠绕关节时, 请把纤维尽你所能的拉紧。这可能会需要你握拳并用整个胳膊的力量来拉动碳纤维绳。
- 3. 多做交叉:** 在你不确定的时候, 或者在自由缠绕时, 请在关节处多做交叉, 这可以增加车架的强度。
- 4. 每个关节处的缠绕至少重复7次**

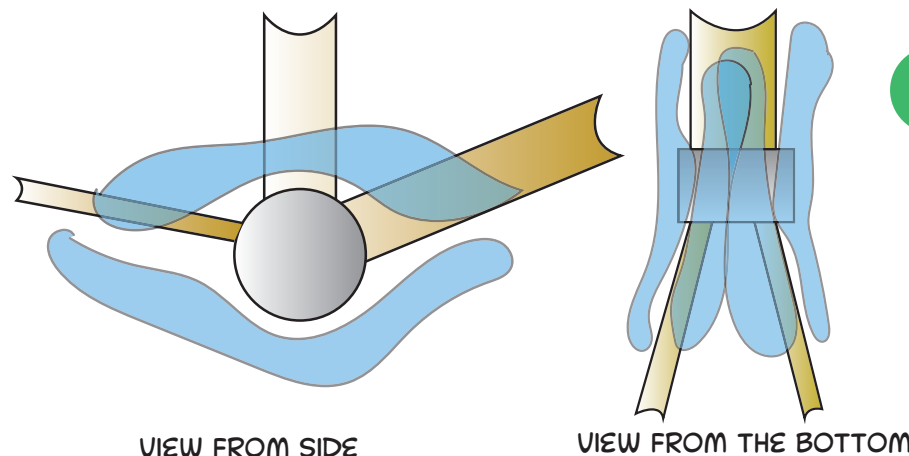


3 胶带 挤出多余的胶水

用胶带包裹是每一个关节处的最后一步。在这一步请确保使用的是一条完整、连续的胶带。胶带不粘的一面向里, 粘的一面向外, 把关节处紧紧缠绕起来。



WRAP BOTTOM LUG | 缠绕底部关节

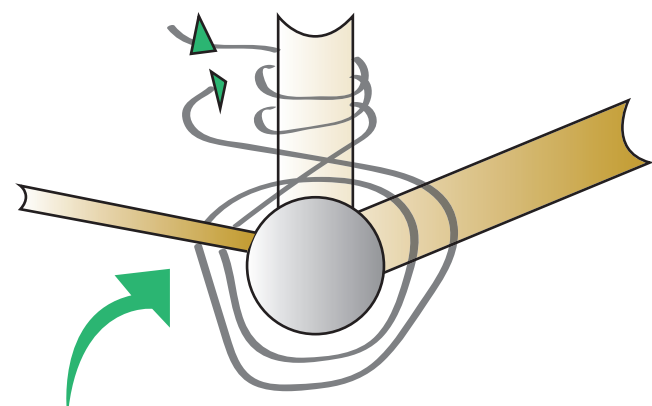
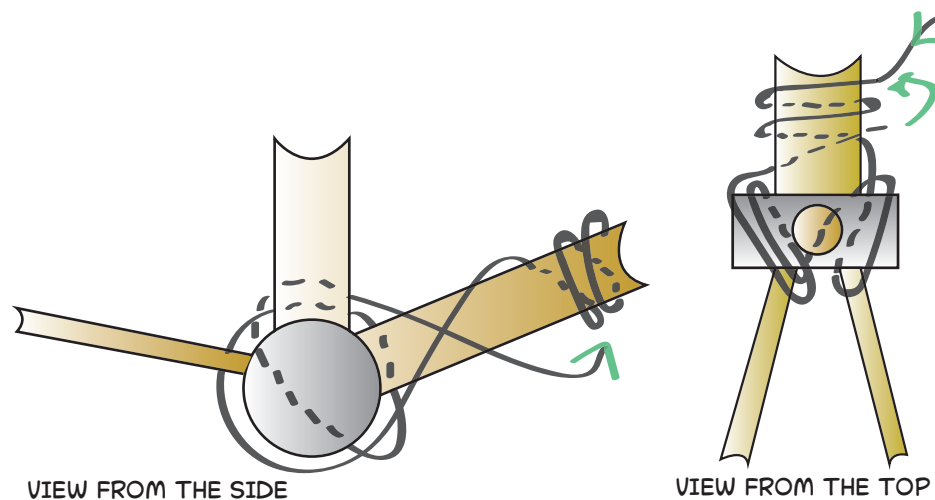


- 1 FIBERGLASS (4 STRIPS)**
- OVER BOTTOM BRACKET:**
1. DOWN TUBE TO LEFT CHAIN STAY
2. DOWN TUBE TO RIGHT CHAIN STAY
- UNDER BOTTOM BRACKET:**
3. DOWN TUBE TO LEFT CHAIN STAY
4. DOWN TUBE TO RIGHT CHAIN STAY

玻璃纤维 (4条)

经过五通的上方:
1. 下管到左下叉
2. 下管到右下叉
经过五通的下方:
3. 下管到左下叉
4. 下管到右下叉

- 2 SEAT TUBE TO BOTTOM BRACKET ON ONE SIDE.**
在一侧由坐管缠到五通
- 3 REPEAT ON THE OTHER SIDE OF THE BOTTOM BRACKET**
在另一侧重复上述步骤

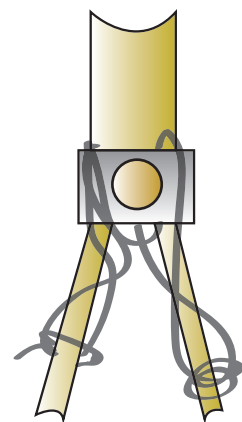


WRAP **INSIDE** OF THE CHAIN STAY, NOT THE OUTSIDE!
从下叉的内侧穿过, 而不是外侧

- 4 DOWN TUBE TO BOTTOM BRACKET: TRY TO GET AN X ON BOTH THE TOP AND BOTTOM OF THE DOWN TUBE!**
- 由下管缠到五通: 在下管的上方和下方都要形成交叉!

- 5 CHAIN STAYS TO BOTTOM BRACKET: X'S ON EACH STAY, AS WELL AS ON THE BOTTOM BRACKET**

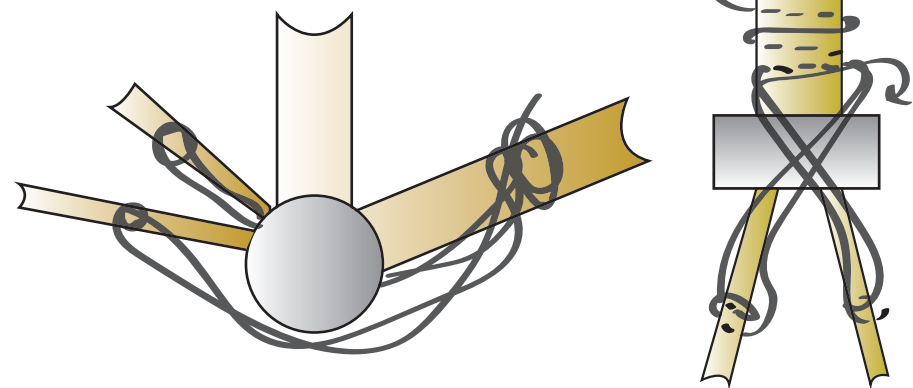
从下叉到五通: 每一个下叉上都要做交叉, 五通上也是。



- 7 BASKET WRAP**
CONNECT THE DOWN TUBE TO THE CHAIN STAYS UNDER THE BOTTOM BRACKET. THIS CREATES A "BASKET" UNDERNEATH THE BOTTOM BRACKET WHICH HOLDS THE RIDER'S BUTT!

篮子缠法

从五通下方连接下管和下叉。这一步在五通下方形成一个“篮子”, 就是它支撑着骑车人的臀部!

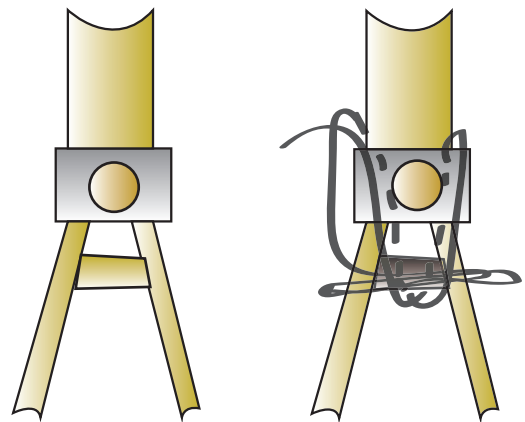


- 9 TAPE! 缠胶带**

- 6 BRACE**
THE BRACE STABILIZES YOUR CHAIN STAYS. AN ASSISTANT WILL USUALLY CUT THE PIECE FOR YOU, AND YOUR JOB IS TO WRAP IT IN UNTIL IT IS TOTALLY COVERED. USE A CARBON FIBER PATCH TO COVER THE BACK OF THE BRACE TO THE BOTTOM OF THE BOTTOM BRACKET. THE REST IS A FREE FOR ALL: WRAP HORIZONTALLY AS WELL AS IN A "V" TO SECURE THE BRACE.

支撑块

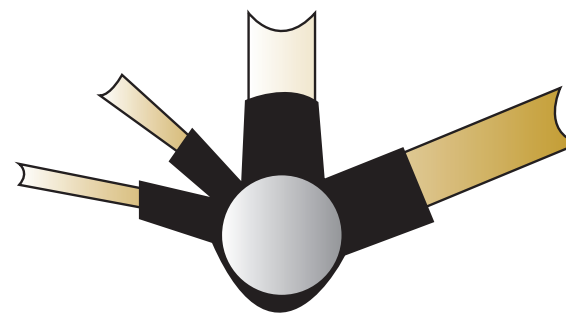
这个支撑块帮你强化了下叉。工作坊助手会帮你锯下这块支撑物, 你的工作是缠绕它, 使它完全被包裹, 并完全固定在下叉上。使用一块碳纤维补丁从支撑块裹到五通。接下来就是自由缠法, 水平地缠成V形以保护支撑块。



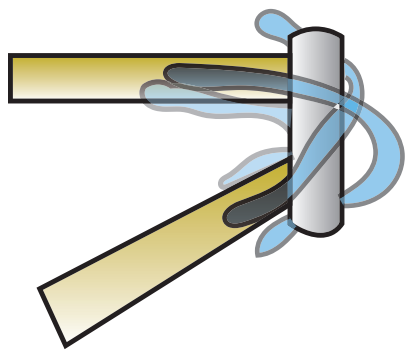
- 8 COVERAGE**
USE CARBON FIBER PATCHES WITH COPIOUS AMOUNTS OF GLUE TO COVER UP ANY LAST SPOTS ON THE BOTTOM LUG. WRAP TIGHTLY AND WETLY WITH CARBON FIBER UNTIL YOU ARE SATISFIED WITH YOUR LUG!

覆盖

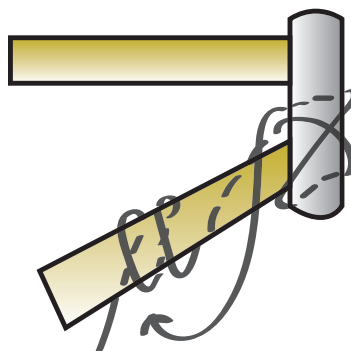
使用碳纤维补丁及大量的胶水来覆盖在缠绕中被遗漏的部分。使用碳纤维紧紧地缠绕, 注意湿润, 直到你对这个关节满意。



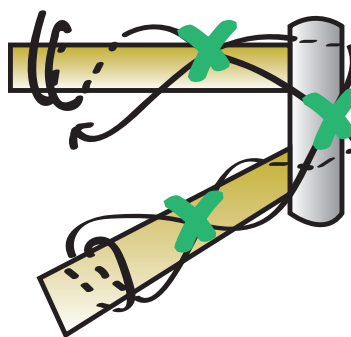
WRAP HEAD LUG | 缠绕头部关节



1 FIBERGLASS (4 STRIPS)
MAKE AN X ON THE OUTSIDE AND INSIDE OF THE HEAD TUBE



2 HEADTUBE TO DOWNTUBE
LOCK OFF ON THE DOWNTUBE, MAKE AN X ON THE FRONT OF THE HEAD TUBE AND ONE SIDE OF THE DOWN TUBE, AND REPEAT.



3 HEADTUBE TO DOWNTUBE AGAIN
SAME WRAP, BUT THIS TIME GET ONE X ON THE OTHER SIDE OF THE DOWN TUBE.

4 FRONT X'S
LOCK OFF ON TOP TUBE AND DOWN TUBE, GOING BACK AND FORTH TO CREATE X'S ON THE TOP OF TOP TUBE, FRONT OF HEAD TUBE, AND TOP OF DOWN TUBE

5 BACK X'S
THIS WRAP IS THE SAME AS THE LAST ONE, BUT YOU MUST MAKE THE X'S ON THE OPPOSITE SIDES FROM THE LAST ONES. ONE SIMPLE WAY TO ACHIEVE THIS IS TO REPEAT THE LAST WRAP, EXCEPT GO THE OPPOSITE DIRECTION WITH THE CARBON FIBER.

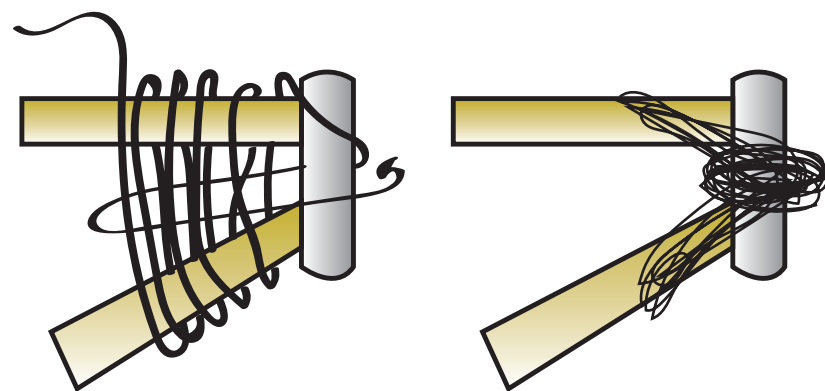
1 玻璃纤维 (4条)
在头管的外侧和内侧都做交叉。

2 头管到下管
锁住下管, 在头管处及下管的一侧做交叉, 重复多次。

3 同样是头管到下管
相同的缠法, 但是这一次交叉改在下管的另一侧。

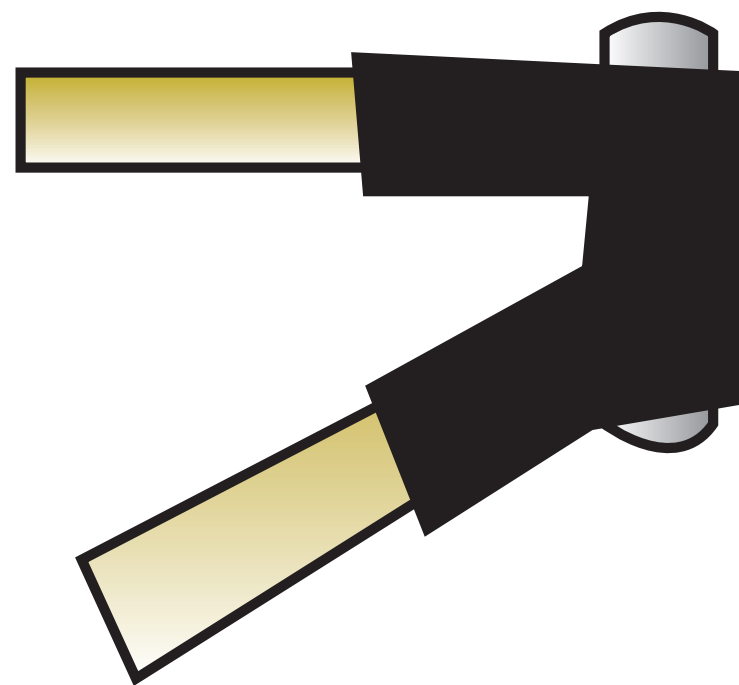
4 前交叉
锁定上管, 绕过头管, 锁定下管, 照这样往返多次, 在上管的上方, 头管的前方, 下管的上方, 都形成了交叉。

5 后交叉
这一步和上一步很相像, 但是你必须要在相反的方向缠成交叉。一个简单的方法是, 使用碳纤维重复上一步的做法, 但是采用完全相反的方向。



6 SQUEEZE
START BY WRAPPING 5 LOOSE (BUT TAUT) WRAPS AROUND THE TOP TUBE AND DOWN TUBE. GET THEM VERY WET. THEN, USING THE SAME SPOOL OF CARBON FIBER, WRAP THEM AS TIGHTLY AS POSSIBLE ONTO THE HEAD TUBE.

6 挤压
由绕着上管和下管缠绕五圈宽松并整齐的碳纤维绳开始。把它们沾得非常湿。之后用同一轴碳纤维, 把它们尽可能紧的绑到头管上。



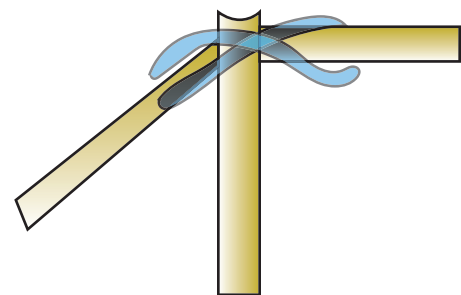
7 COVERAGE
USING PATCHES WHERE NEEDED, COVER UP THE ENTIRE LUG WITH CARBON FIBER UNTIL YOU ARE SATISFIED WITH HOW IT LOOKS. REMEMBER TO KEEP EVERYTHING WET!

7 覆盖
如果需要的话, 使用碳纤维补丁, 把整个关节覆盖起来, 并用碳纤维缠好, 直到你对它的外观满意。一定要记得保持一切材料湿润!

8 TAPE!

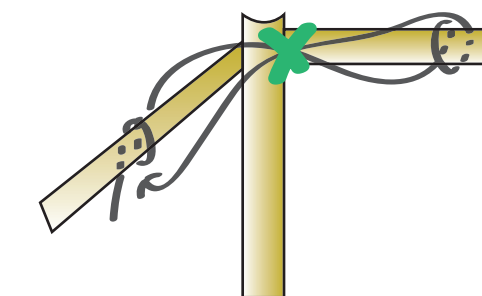
8 缠胶带

WRAP SEAT LUG | 缠座管关节



1 FIBERGLASS (4 STRIPS)
MAKE AN "X" ON BOTH SIDES, WRAPPING ON BOTH THE INSIDE AND OUTSIDE OF THE TOP TUBE AND SEAT STAYS.

玻璃纤维 (四条)
在关节的两侧都做交叉, 上管和坐管的内侧外侧包裹住都要。

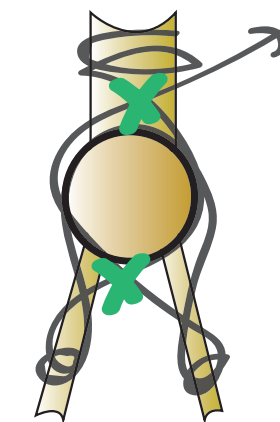
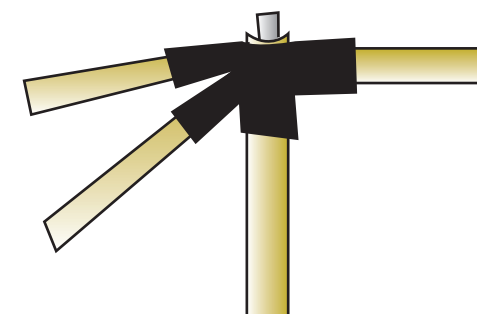
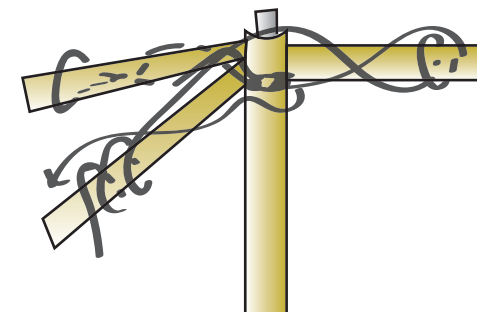


2 RIGHT SEAT STAY TO TOP TUBE
LOCK OFF ON RIGHT SEAT STAY AND TOP TUBE, MAKING AN X ON THE RIGHT SIDE OF THE SEAT TUBE IN THE PROCESS.

右上叉到上管
锁住右上叉和上管, 缠绕过程中, 在坐管的右侧形成交叉。

3 LEFT SEAT STAY TO TOP TUBE
REPEAT THE LAST WRAP FOR THE LEFT SEAT STAY, MAKING AN X ON THE LEFT SIDE OF THE SEAT TUBE IN THE PROCESS.

左上叉到上管
在左上叉处重复上一步, 缠绕过程中, 在坐管的左侧形成交叉。



4 BACK AND FORTH
LOCK OFF ON TOP TUBE AND BOTH SEAT STAYS. THIS WRAP IS A LITTLE BIT OF A FREE FOR ALL, AS LONG AS YOU CAN FIGURE OUT A WAY TO GET X'S ON BOTH THE FRONT AND BACK OF THE SEAT TUBE IN THE PROCESS.

来回缠绕
锁住上管和两侧的上叉, 这里的缠法很自由, 只要你在坐管的前后都形成交叉即可。

5 COVERAGE
USING PATCHES WHERE NEEDED, COVER UP THE ENTIRE LUG WITH CARBON FIBER UNTIL YOU ARE SATISFIED WITH HOW IT LOOKS. REMEMBER TO KEEP EVERYTHING WET!

覆盖
在你需要的时候使用碳纤维补丁, 把整个关节覆盖起来, 并用碳纤维缠好, 直到你对它的外观满意。一定要记得保持一切材料湿润!

6 TAPE! 缠胶带