

Hot Callus Pipe

Design by David Pierce

Written by Alex Tanke

Overview

The popular, Dax designed, hot callus pipe designs on the forums are not powerful enough to get the pipe to the low 80Fs (84 typical) required to get good graft success. 2 weeks is a typical callus pipe duration for persimmon and pecan. David Pierce designed a callus pipe that is very effective, consistent in temperature across the length of the pipe, and works at temps far below 60F ambient temps at least into the 30Fs.

Design

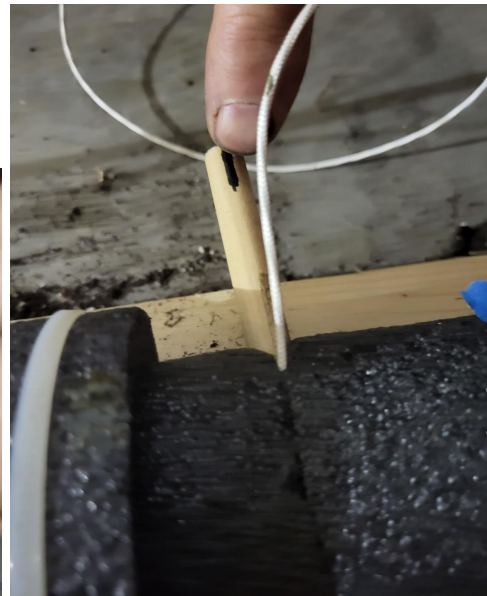
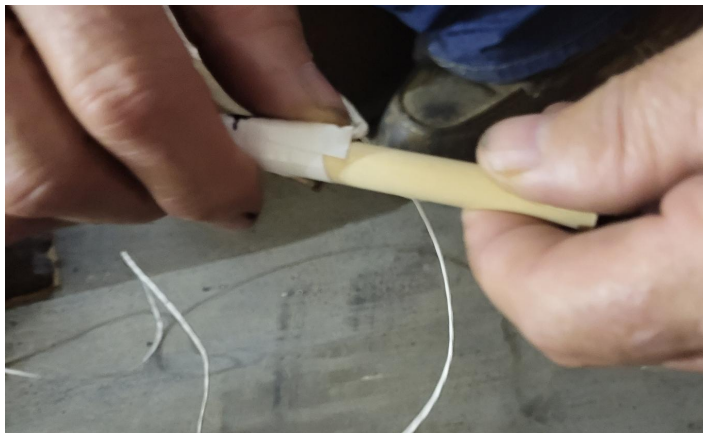
Temperature regulation is done with an **Inkbird Temperature controller ITC-100VH** (\$26). This controller functions by turning on the heater for varying duty cycles so that the temp is always very near the target temp rather than waiting to hit a low temp to turn back on like inkbird brewers thermostats. This will be set anywhere from 80F-84F for most species from Peaches, Oaks, Hickories, and Mulberries to Persimmons according to David.



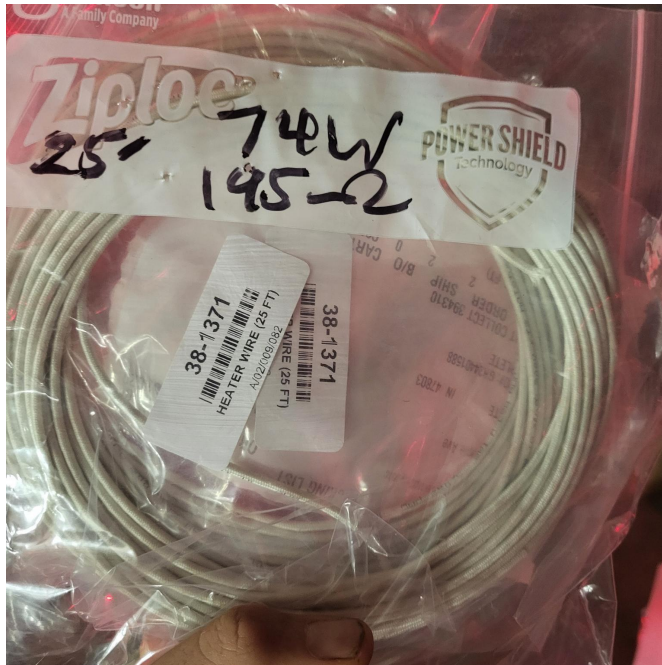
The controller operates a **Inkbird SSR-25 DA Relay** (\$10) in order to deliver the full needed amount of power to the heater cable.



The temperature is read via an **Inkbird K Sensor** which is attached to a stick the size of a typical graft, wrapped in parafilm and banded like a typical graft and rotated in the hot pipe such that the sensor is on the side of the piece of wood (at the middle distance from the heating wire). All three of the above pieces are sold as a kit from Inkbirds website.



The relay powers a heating cable intended to defrost commercial freezer doors. The part number and part name is **38-1371 - HEATER WIRE (25 FT)** (\$56). This wire is run through the hot pipe and back. Do not use less than 20 ft of heater wire because any less could create enough heat to start a fire if the controller is malfunctioning and runs the heater on full blast.



The controller has an autotune setting that sometimes works well and sometimes does not. The autotune determines that optimal settings to regulate the temperature for your situation. David found the best settings to be approximately M50=37, P=1250, t=250, Ctl=30, SN=21.

After power on, the instrument will enter the setting mode. You can use "←"Key (or "→"Key) to set the value. After finishing, press "Enter"Key and enter next function setting. PV/SV screen will be in normal display after setting.

Note: If there are modified operations in setting mode, the instrument will save current value automatically after no operation for more than 10 seconds, and return to normal status.

my Final

Function Setting	Description	Setting Range	Unit	Remarks	Factory Default
HI AL	Upper Alarm Limit	-1999~+9999	1℃		9999
Lo AL	Lower Alarm Limit	-1999~+9999	1℃		-1999
dHAL	Maximum Deviation Alarm	0~9999	1℃		9999
dLAL	Minimum Deviation Alarm	0~9999	1℃		9999
dF	Hysteresis	0~200.0	0.1℃		0.3
Ctrl	Control Output	0: ON/OFF 1/3: PID 2: Self-adjustment			3
M50	Integral	0~9999	0.1℃	0: Cancel 37	1000
P	Differential	0~9999	0.01S/℃	1250	500
t	Hysteresis Time	1~9999	S	250	120
Ctl	Control Period	1~120	S	30	4
Sn	Input Sensor	0~42		Table 1	0

Hisdon = more
stability →
30-60? →

Mine James
0.0 0
3
37
31/37
1800 1280
252 300
36 30
21 21

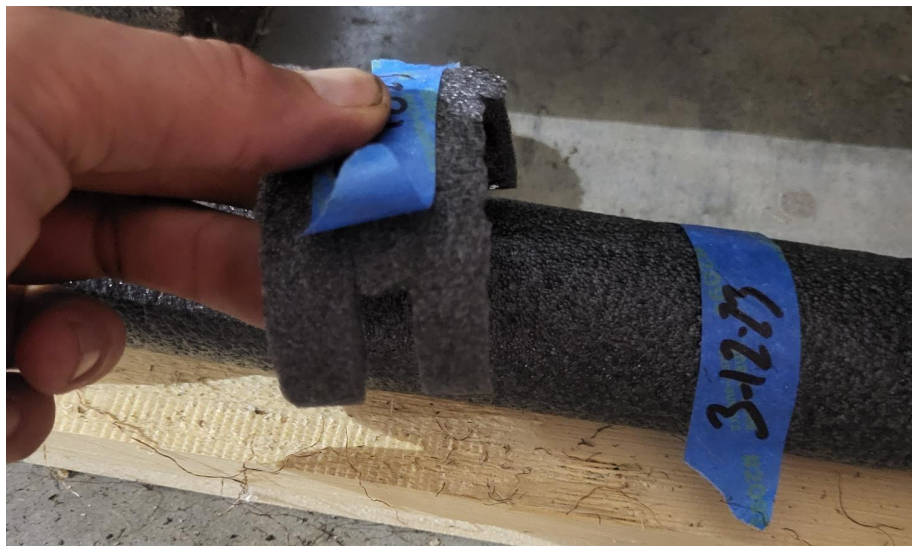
Inkbird Tech. Co., Ltd. www.link-bird.com

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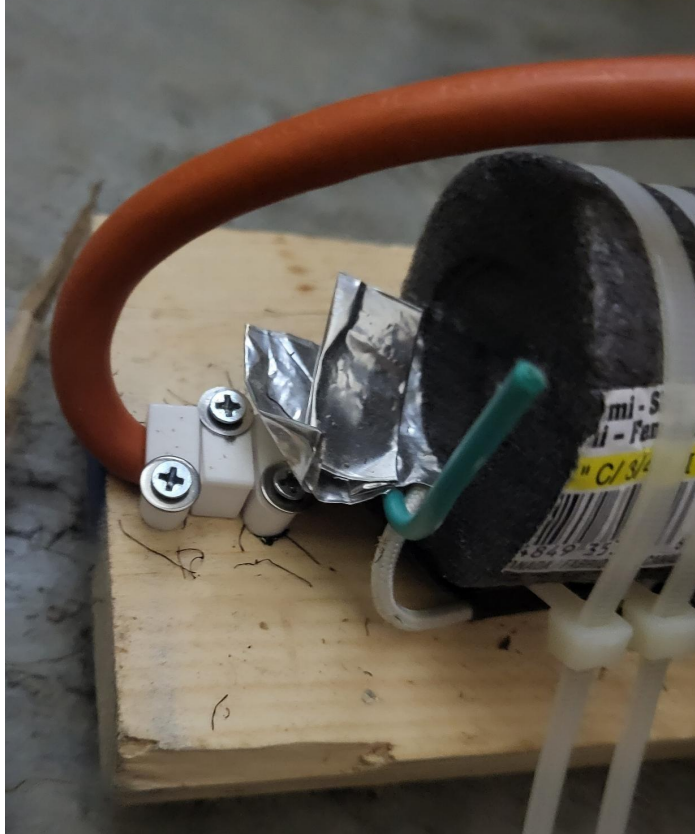
The hot pipe is built from a **Pipe Insulation Tube 1" C / 3/4" I** size I don't really know what this means but I'm sure it'll get you where you need to go in the store.



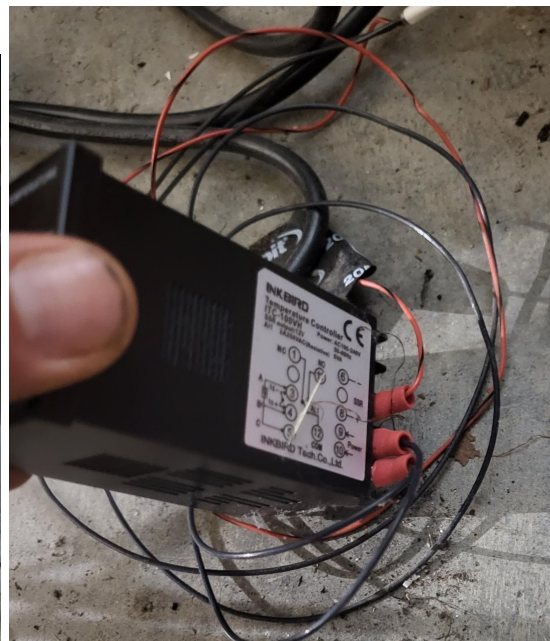
If you are grafting trees of large caliper, it will help keep the temps consistent around the whole graft union to make an extra insulator piece to put over the pipe where the large graft is inserted.



Use 1" Aluminum Insulation Tape to cover the heater wire through the tube and reduce the intensity of the hot zone on the bottom of the pipe and prevent foam from melting over time.



Other than that, I don't have any more tips. Dax's callus pipe may give more detailed construction advice in the rest of the mechanical sense so you can look into that if desired. Below are some photos that give little hints into the wiring for the controller.



Best wishes. I hope this is helpful. And note that I have not built this setup and do not hot pipe graft myself but wanted to share David's great research and engineering for those who are interested so they don't have to spend as much money as he did finding the optimal pipe design.