Re: Ticket #3594 QCLAS coolant tubings melted

Ouma Turry Atieno

Wed 12/07/2023 14:50

To:Aerodyne Research <support@aerodyne.com>;

Cc:Harris Eliza Jean <eliza.harris@sdsc.ethz.ch>; Barthel Matti <matti.barthel@usys.ethz.ch>; Agredazywczuk Phillip <phillip.agredazywczuk@sdsc.ethz.ch>;

1 attachments (250 KB)

tdlwintel error.jpeg;

Hi Rick,

Thank you for your response. I am happy to answer all the questions you may have.

Your account of the possible turn of events sounds about right. I checked through my messages to the team and here is a day-to-day account:

1. 4th July- We have power issue, TDWintel crashes but the QCLAS is still getting power from the UPS, so still in operation. I did not look at the chiller as we were more concerned with the TREX (preconcentration unit) at this point.
2. 5th July- I notice the chiller indicates 'pump fail' the coolant liquid is depleted at this point. We turn everything off.
3. 6th July- We finalise distributing the power, so we switch on the system to test it. Diode 'Flow' shines blue, Laser 1 and 2 diode do not go on, TDLWintel throws an error-(attached). We notice the leak at the back of the QCLAS computer.
4. 7th July-We open the casing to find the melted tubing.

In my email earlier I said the diode 'Flow' went blue-as per normal when we turn on the switch on the back panel, next to the power code. I did not indicate that it changed from red to blue-sorry if this caused any misunderstanding.

Best regards,
Turry

From: "Mike Moore (Aerodyne Research)" <support@aerodyne.com>
Reply to: Aerodyne Research <support@aerodyne.com>
Date: Wednesday, 12 July 2023 at 12:43
To: Ouma Turry Atieno <turry.ouma@sdsc.ethz.ch>
Cc: Harris Eliza Jean <eliza.harris@sdsc.ethz.ch>, Barthel Matti <matti.barthel@usys.ethz.ch>, Agredazywczuk Phillip <phillip.agredazywczuk@sdsc.ethz.ch>
Subject: Ticket #3594 QCLAS coolant tubings melted

Hi Eliza, et al.,

Apologies for the late response, I was preoccupied in the lab the last couple of days.
I did give the issue some thought, but there were things that conflicted with my expectations as far as an explanation goes; i.e., I'm not quite sure how the series of events played out. When I saw this in the past, the overheating event was caused by a failure of 1) the chiller and 2) the flow switch. That is, the flow switch internal plunger had become stuck in place and thus gave a 'good' signal even when there was no flow. However, that doesn't seem to be the case for you, hence my still trying to think through what may have happened.

Turry mentioned that the flow indicator LED changed from red to blue which would imply that the flow switch is still working, which throws a wrench in my initial theory - since it would instead be blue even without flow if the flow switch plunger were stuck.

Under practically all circumstances, if the chiller continues to control temperature (which implies good coolant flow, also), I would expect that the thermal runaway you must've experienced could not take place - even if TDLWintel were to crash and leave the current on; the coolant takes away all of the excess heat.
It's probably asking a lot that you might remember such specifics, but what was the state of the chiller after the power issue? Did you notice the screen was off? Was the pump fail error on the screen right away when visiting the instrument after the power issue? Could the series of events be broken down a bit more? Again, I know that's asking a lot, but the more granular information I have, the better chance we have of understanding what may have happened and give me some confidence in giving you the go-ahead.

At present, I'm thinking: power issue (brown out?) lead to chiller pump failure and TDLWintel crash; with TDLWintel crashed, everything remained in operation despite no coolant flow. In this state, overheating would take place and the tubing melted. When it was found, the chiller was restarted and coolant was sprayed in the optics cavity until the leak was discovered. And that was when you emailed us. There are assumptions in there, which may be shot down when you follow up and I'll have to go back to the drawing board!

But, to address the questions in your email:

- If you turn the instrument on, I would make sure it's personally attended to for some trial period just to make sure nothing goes wrong. Maybe don't run it without someone physically there, at least for now. Keep an eye on chiller screen for any issues, check inside the optics chamber before and after (check the tubing; feel the laser housings, see if they're getting warm). Basically, if you're going to run it, do so with an abundance of caution.
- Yes, a heating event like that implies that the temperatures would've been significant (to melt the PE tubing). I'd be worried about the laser, itself, but also the peltier element inside the laser housing. Assuming the laser survived, the peltier element temperature differential range could be effected; i.e., you won't be able to cool the laser down. [I don't recall off-hand what the temp they ran at was, but a damaged peltier is not good, regardless.]

- If it's just dust, you might just blow some dry, clean air around to knock the dust particles off the mirror. If it *is* from the coolant, and it's a bit worse, you might try ethanol with a lens wipe, as you mention. If you take a picture of a couple of the ones you think are representative, I can take a look and give you my opinion.
- I guess I addressed your last question first; see above!

Best,
Mike

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On July 11, 2023 at 10:28:17 AM UTC, Eliza Harris eliza.harris@sdsc.ethz.ch wrote:

> Dear Rick,
>
> Just an update on our QCLAS issue: We replaced the melted tubing and the Oasis chiller, so the cooling of the laser box works once more.
>
> We haven't yet turned the QCLAS on though. Should we just try this or is there a particular way we should go about it? I am most worried about the lasers: Will the overheating likely have damaged them significantly?

We noticed the mirrors and lenses are dirty. Not actually sure if that is from the leaked fluid or if they are just dirty. Should we clean these, or will this be too problematic for the alignment? If we can clean them, how should we do this? Just with fine tissue usually used for optical elements?

And then, we would of course like to avoid this problem again. We still have no idea why it occurred. It seems like, either the lasers overheated, which melted the tubing, and the Oasis pump failure resulted (the manual says this error comes when you have a problem with the flow circuit). Or the Oasis pump failed for some reason, so the lasers were not cooled, and thus overheated and melted the tubing. There was not visible problem in the tubing or anything, and the laser had been working some days in the field before the overheating. Any ideas?

Cheers,

Eliza

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Dr. Eliza Harris
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From: Ouma Turry Atieno
Sent: 07 July 2023 15:03
To: Aerodyne Research
Cc: Harris Eliza Jean; Barthel Matti; Agredazywczuk Phillip
Subject: Re: Ticket #3594 QCLAS coolant tubings melted

Hi Rick,

Yes, this is FD-065.

Apart from what I have shared below, the instrument was working fine at the labs, and even after we initially moved it to the greenhouse. We had an issue with power earlier, not being well distributed. TDLWintel crashed. Then we saw a leak from one of the tubes, and the oasis cooler indicated 'pump fail'. We turned off the entire system, replaced the oasis cooler and restarted the QCLAS, the flow diode went blue, but the lasers 1 & 2 did not go on. We opened the casing and found the leakage and the tubes melted.

We have left it completely off - no power to TILDAS.

Thanks,

Turry

From: "Mike Moore (Aerodyne Research)" <support@aerodyne.com>
Reply to: Aerodyne Research <support@aerodyne.com>
Date: Friday, 7 July 2023 at 14:50
To: Ouma Turry Atieno <turry.ouma@sdsc.ethz.ch>
Cc: Harris Eliza Jean <eliza.harris@sdsc.ethz.ch>, Barthel Matti <matti.barthel@usys.ethz.ch>, Agredazywczuk Phillip <phillip.agredazywczuk@sdsc.ethz.ch>
Subject: Ticket #3594 QCLAS coolant tubings melted

Hi Turry,

This is FD-065, correct?

I have encountered this a couple of times.
What was the state of the instrument prior to this occurring? There are several possible ways to leave it:

Completely off - no power to TILDAS.

TILDAS on, chiller off, TDLWintel closed.

TILDAS on, chiller on, TDLWintel closed.

TILDAS on, chiller on, TDLWintel open (system is operating).

Knowing this will give me a better idea of what may have happened and what steps we might want to take.

Best,
Mike

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On July 7, 2023 at 10:48:41 AM UTC, Turry Ouma turry.ouma@sdsc.ethz.ch wrote:

Hello,

We have QCLAS coolant tubing melted and the cooling agent split inside the machine (see images attached). Did you ever encounter this?

We noticed that the TDLWintel crashed and tried to restart the QCLAS but the lasers did not start so we opened it up today and found this. Prior to this, we saw an error display ‘pump fail’ on the Oasis cooler connected to the QCLAS.

Kindly advise how to proceed other than let everything dry and replace the tubing.

We should also mention that we have recently moved the instrument to a greenhouse, so this could be a contributing factor.

Best regards,

Turry

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Turry Ouma
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