Radak & OLED Furnace Technical Information

Updated: 9-26-2011

The following pages contain information gathered on Radak & OLED furnaces during laboratory testing. All furnaces were configured with Type-C thermocouples and installed in a vacuum system evacuated to $<5x10^{-6}$ Torr. Data was logged via National Instruments LabVIEW software and DAQ hardware.

Figures 1, 2, 3, and 4 attempt to show the **maximum** power requirements of the furnace while it is ramping up to temperature. For Radak furnaces an appropriate ramp rate for most processes is 100C per minute; for OLED furnaces a typical ramp rate may be 50C per minute for most processes. This information may be particularly useful for customers wishing to build or use their own power supply with the furnace.

Figures 5 and 6 show average cool-down times for Radak and OLED furnaces.

Figures 7 and 8 give an example of the effects of tuned vs. un-tuned PID temperature control. The example emphasizes the importance of tuning your PID parameters to achieve smooth process control. An auto-tuning feature is included in all of our Power Controller II series – the autotune function should be performed at your process temperature (i.e. deposition temperature) to achieve best results. Follow the instructions provided with your Power Controller II series.

We hope you find the following information useful as a rough guide only when thinking about your particular process. **Please note that different system configurations will produce different results: factors such as crucible/source material combinations and complex or long wire runs will significantly affect performance.**

Please feel free to contact the Luxel technical support team regarding your specific application: Luxel@luxel.com

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515 Tucker Ave
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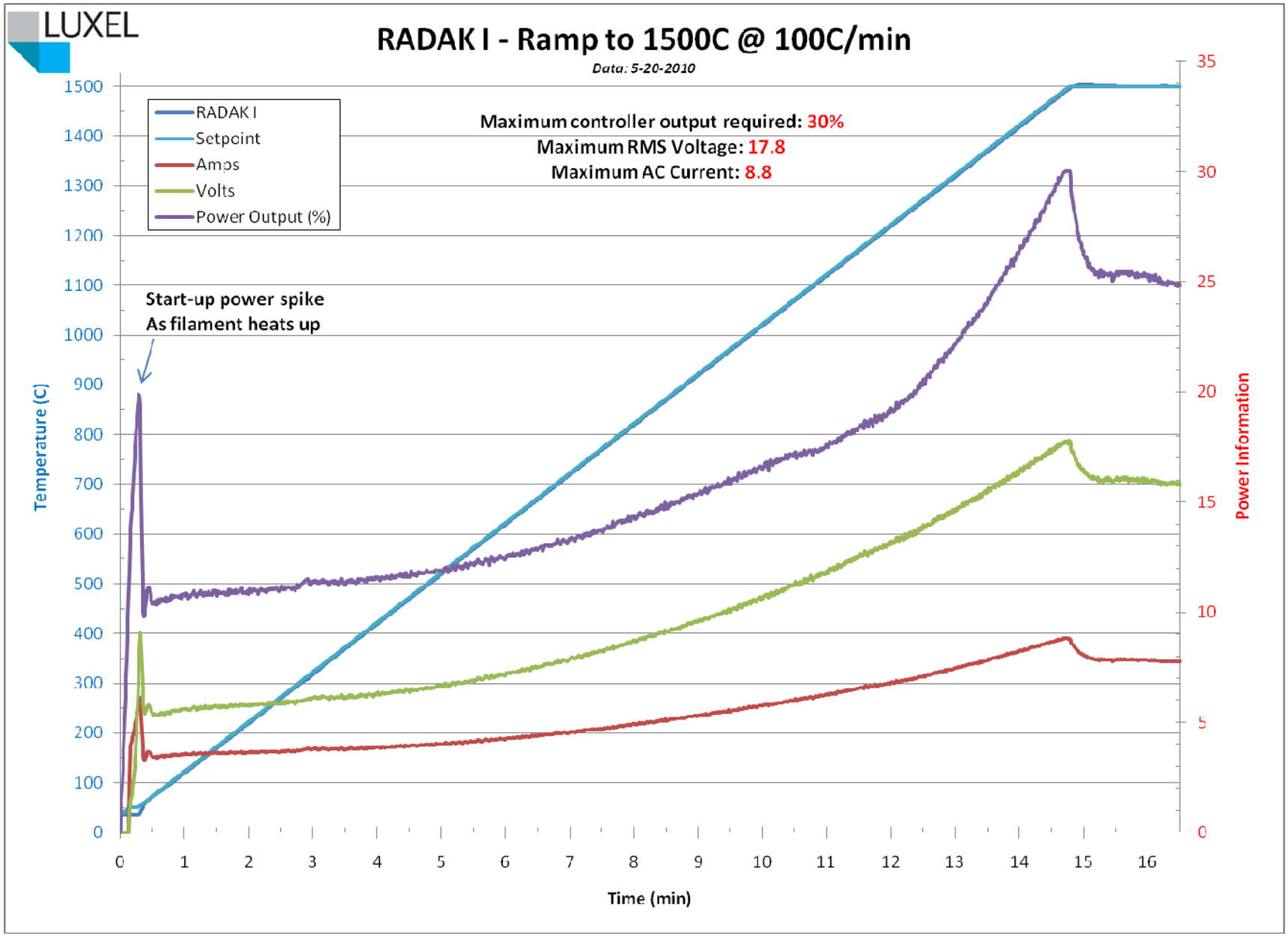

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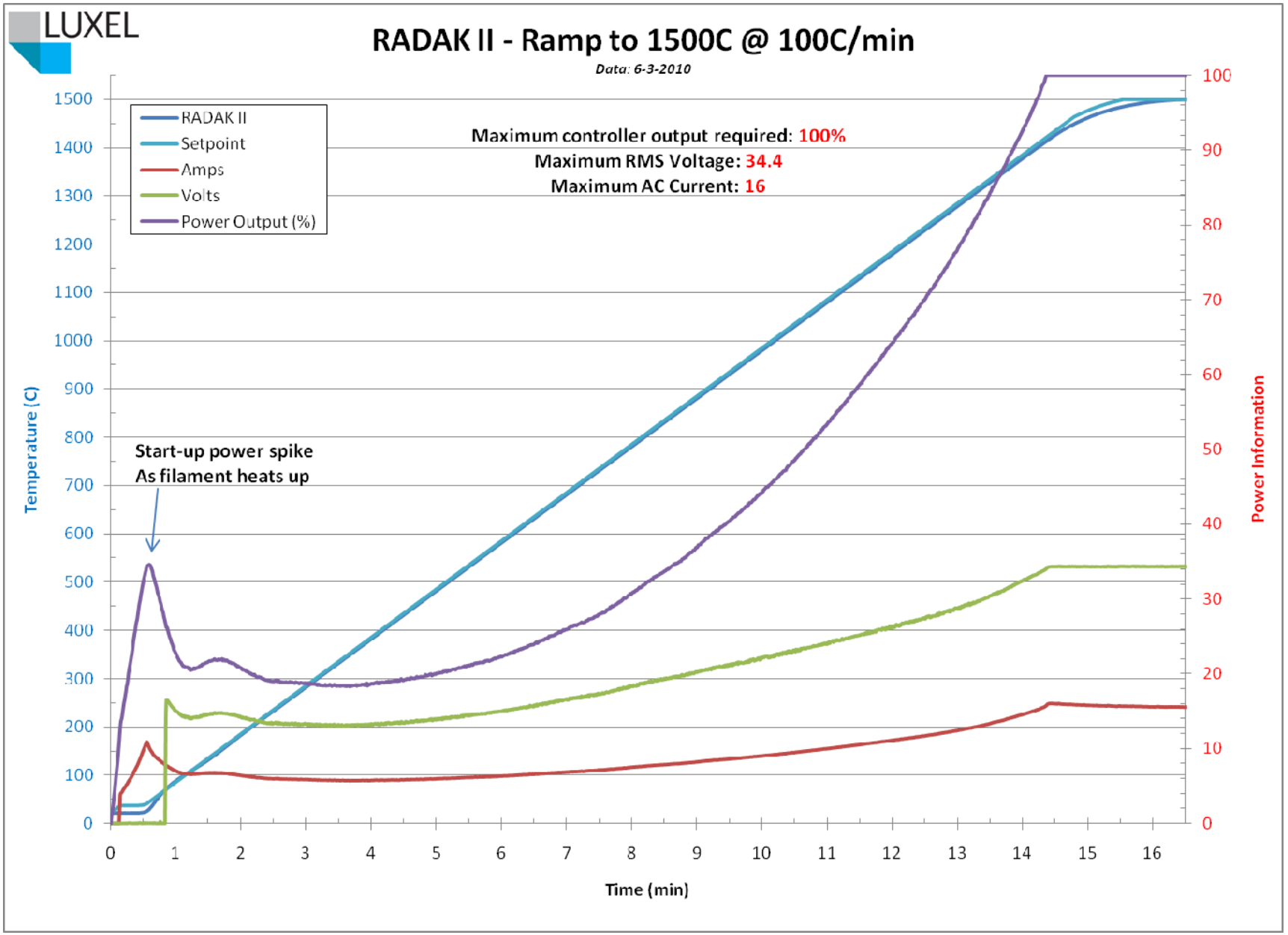
LUXEL
RADAK II - Ramp to 1500C @ 100C/min
Data: 6-3-2010
RADAK II
Setpoint
Amps
Volts
Power Output (%)
Maximum controller output required: 100%
Maximum RMS Voltage: 34.4
Maximum AC Current: 16
Start-up power spike
As filament heats up
Temperature (C)
Power Information
Time (min)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
10
20
30
40
50
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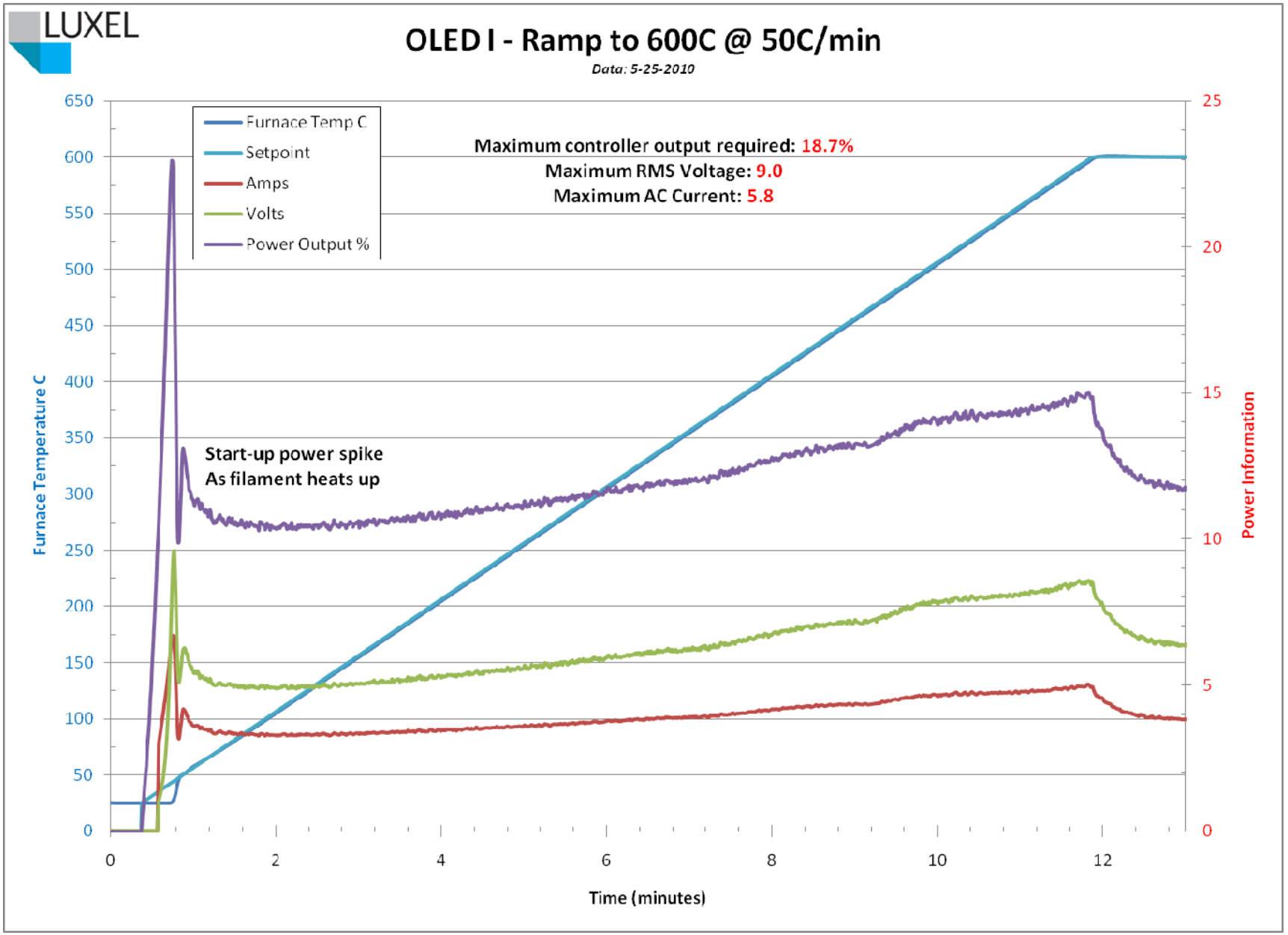

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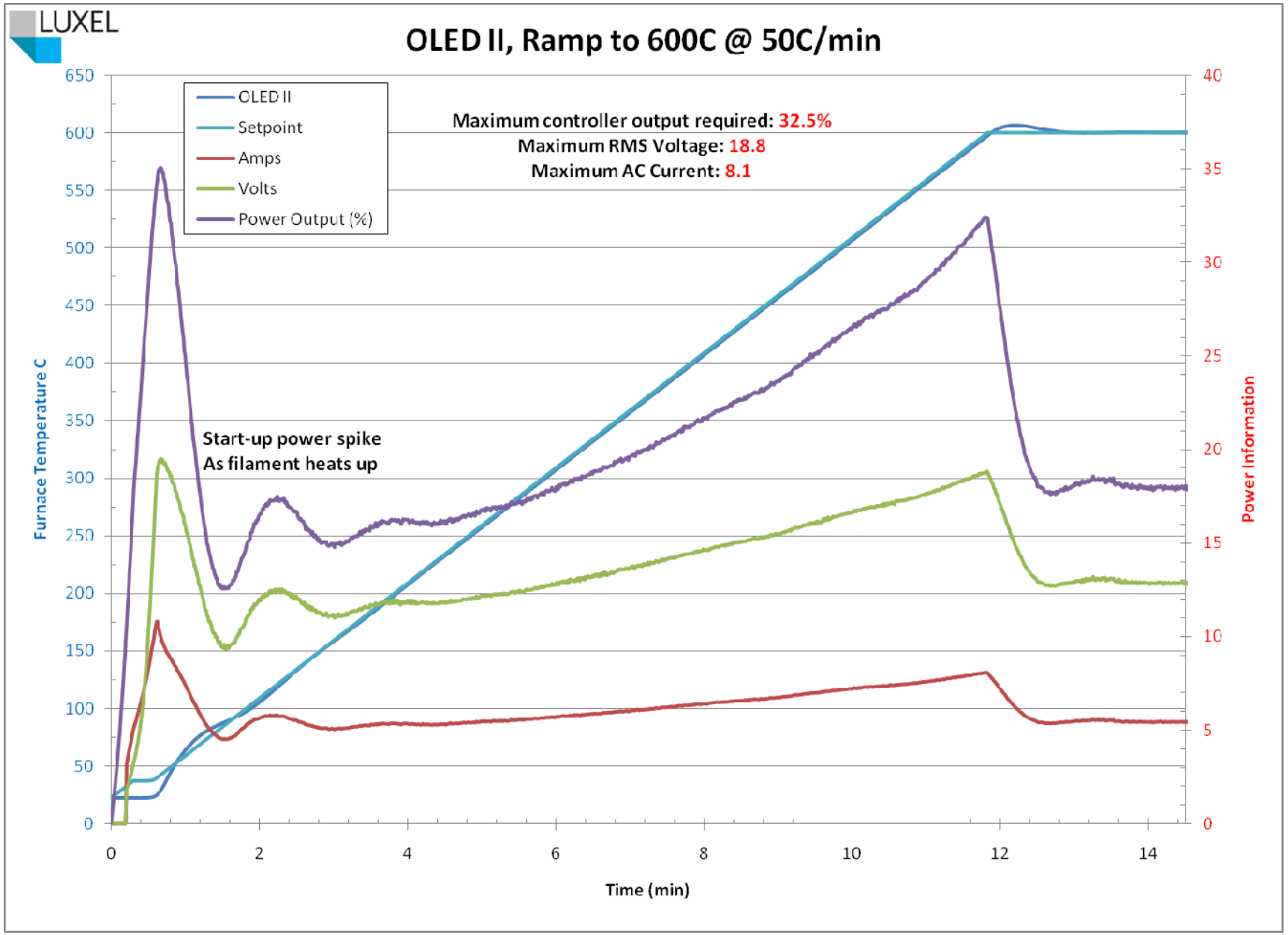

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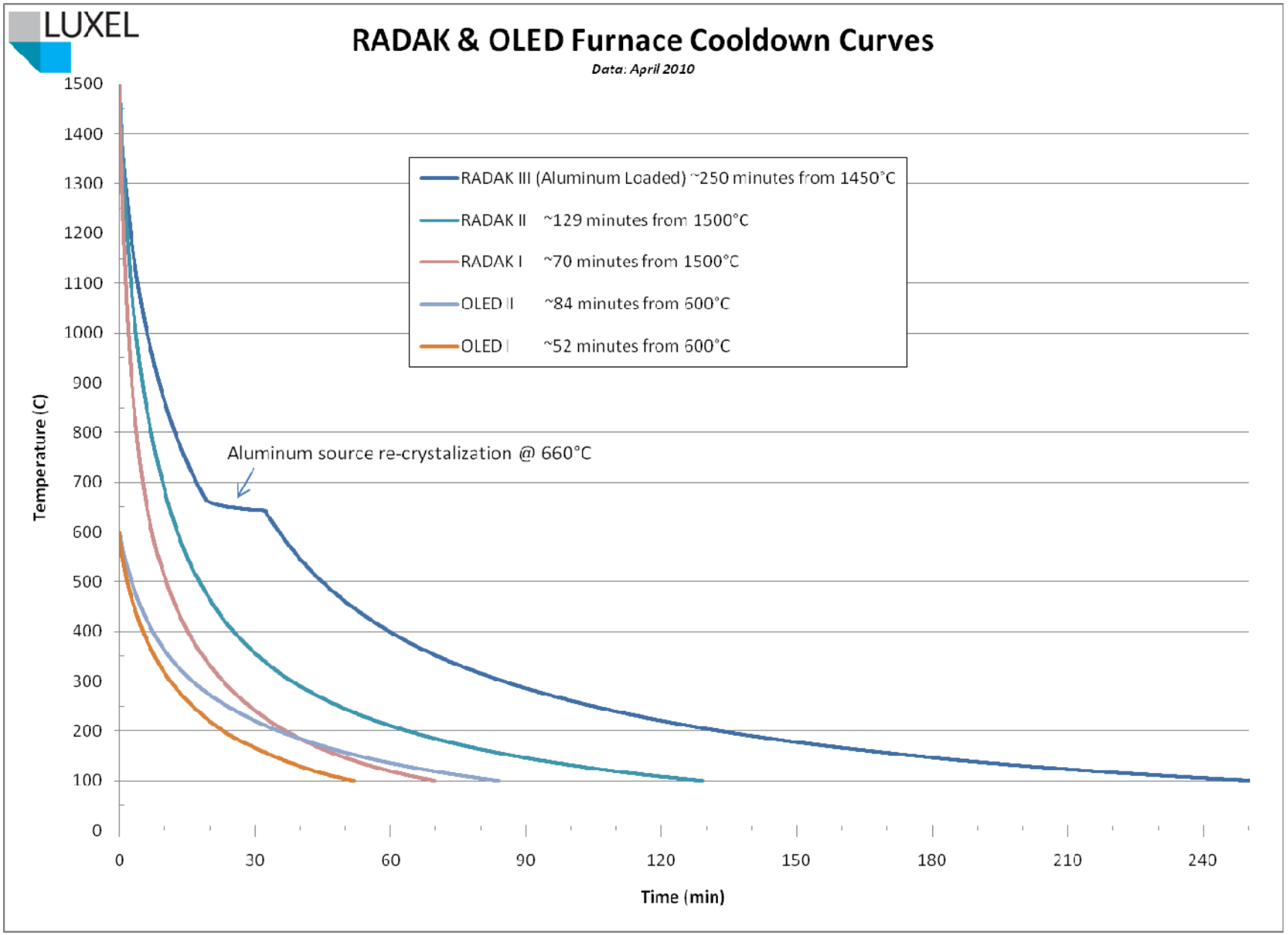

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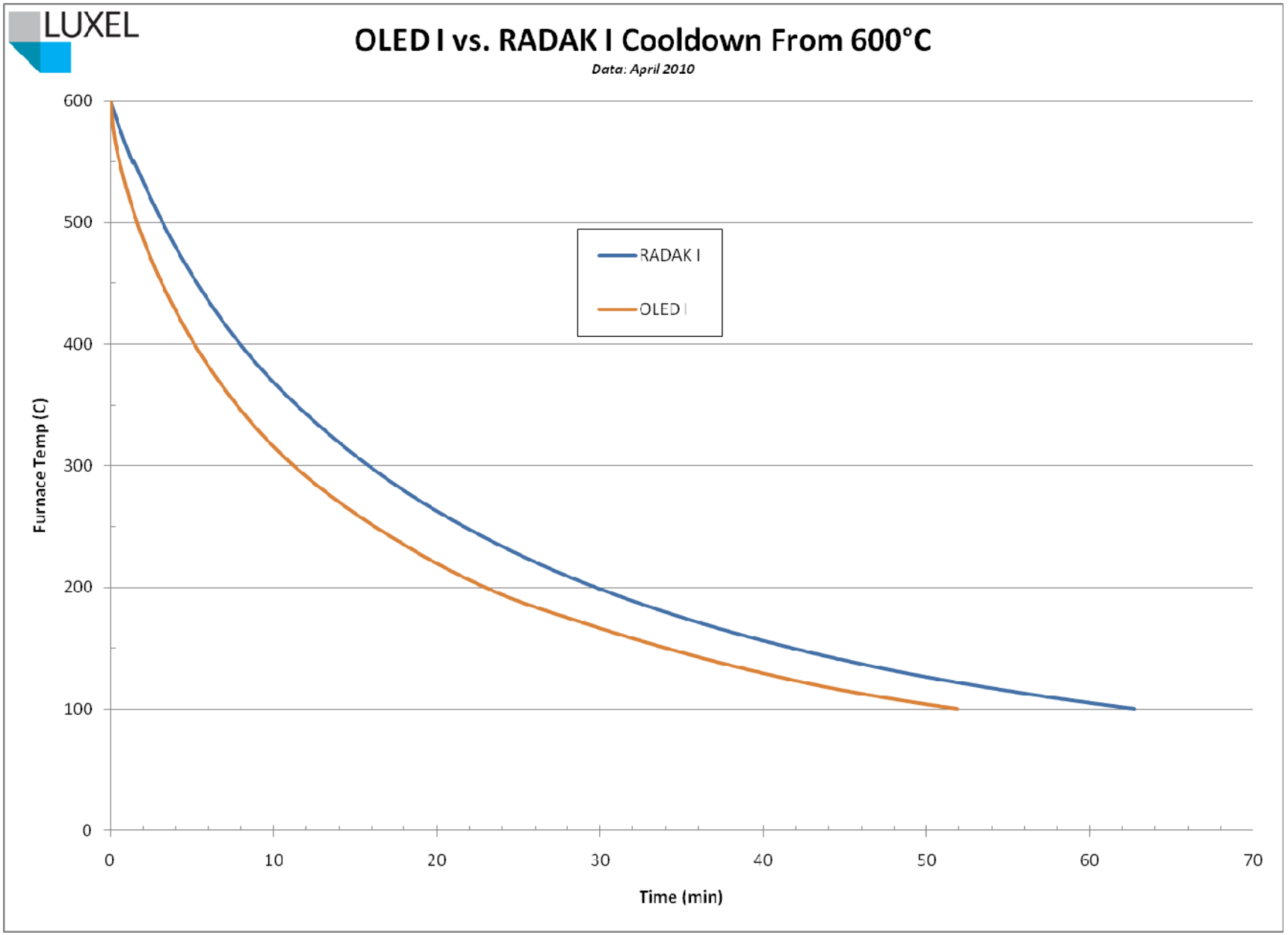

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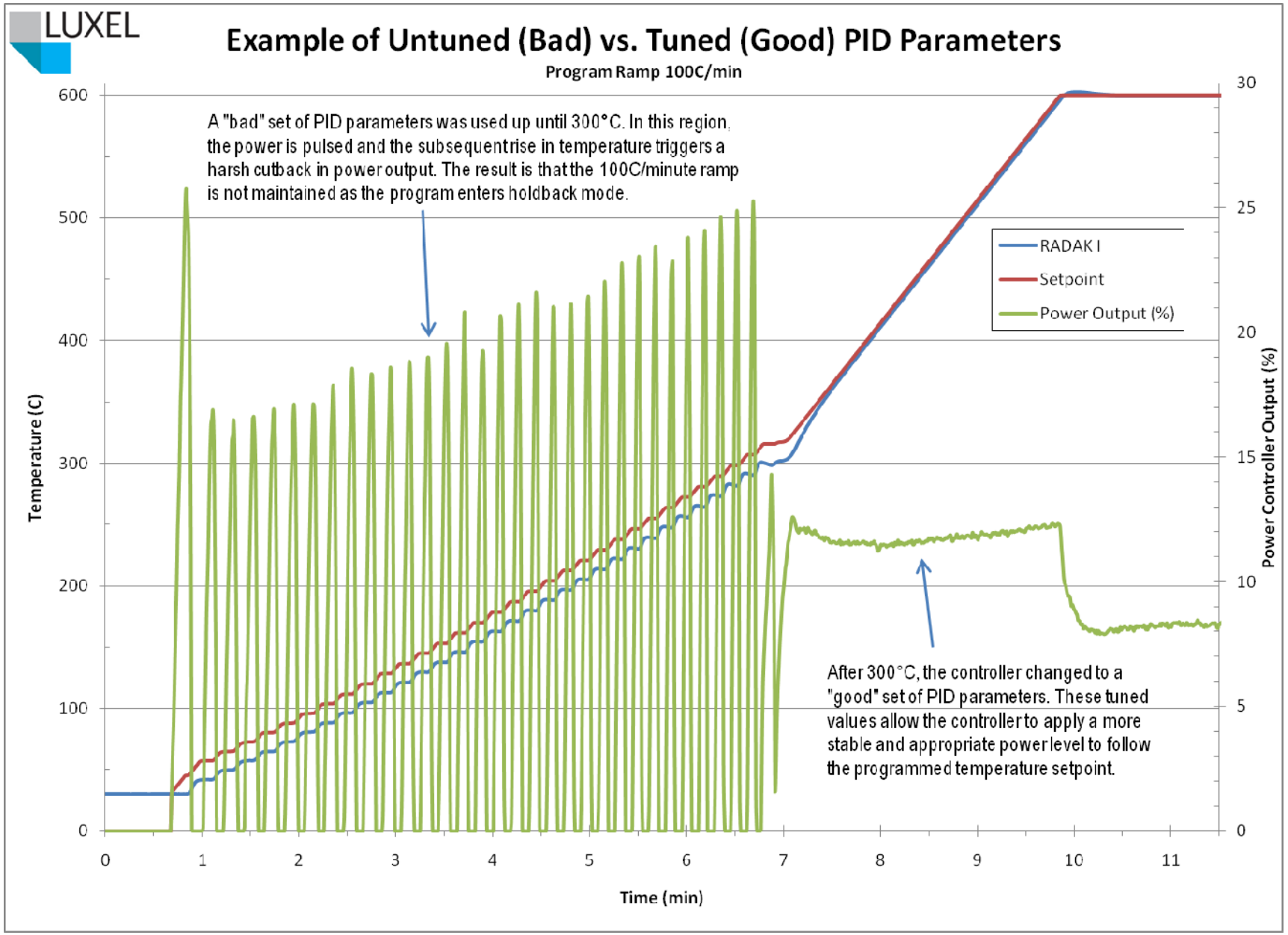

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EXAMPLE RADAK PID PARAMETERS:

	PID Parameter Name	Parameter Value
	Gain Scheduler Setpoint	300
Example Un-Tuned PID Values	Proportional Band Set 1	15
	Integral Time Set 1	30s
	Derivative Time Set 1	15s
	Manual Reset Set 1	0
	Cutback High Set 1	15
	Cutback Low Set 1	20
Example Tuned PID Values	Proportional Band Set 2	141
	Integral Time Set 2	11s 137ms
	Derivative Time Set 2	1s 856ms
	Manual Reset Set 2	0
	Cutback High Set 2	225
	Cutback Low Set 2	225

These table values were used to generate the data plotted on the previous page.

Follow the tuning instructions in the power controller manual to produce the most appropriate PID values for your operating range.

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