From: Dario Schioppa <dschioppa@tesla.com>
Sent: 24 October 2023 20:42
Subject: Annex 7 - Feedback

Dear colleagues,

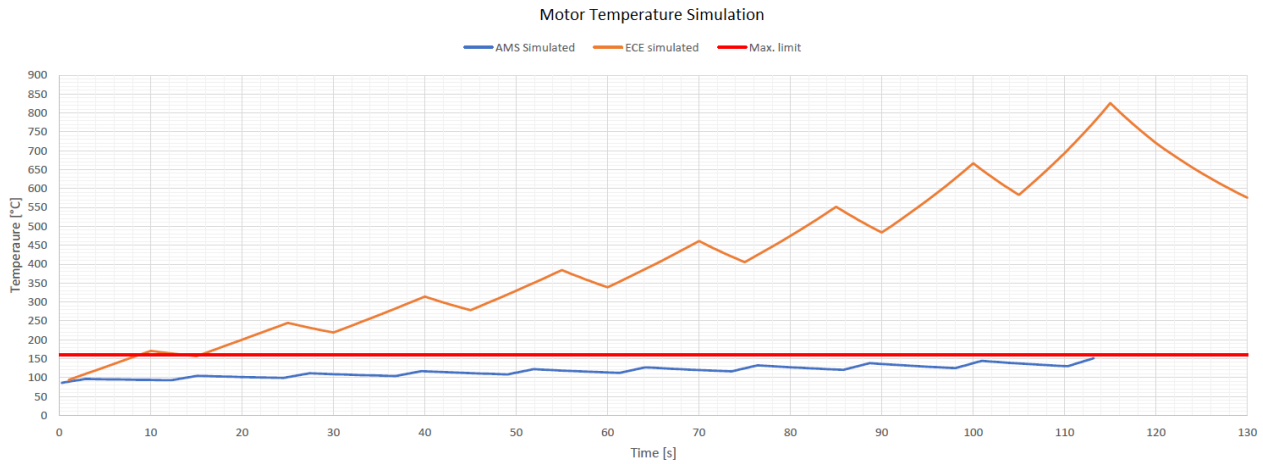
On behalf of Tesla and AVERE I appreciate the opportunity to attend the workshop in Brussels. As the chairman recommended, I would like to share evidence that 8+1 cycle currently exceeds common industry performance requirements for what concerns the thermal sizing of certain electrical components in an EMB system. AMS is adopted as a term of comparison, but fundamentally any other performance procedure would also serve the purpose.

First off, inspection of the simplified summary parameters of the 2 cycles will yield that electrical components would be subject to a more severe duty cycle. For example, for an EV currently in production:

	AMS*	**8+1****	
T_on [s]	28	90	Time the device is powered and actively clamping
T_off [s]	85	35	Time the device is powered but at rest
Ttot [s]	113	125	Total cycle time
Duty cycle [%]	25	72	
Avg clampforce [kN]***	X	Higher than X	

*= 10 repetitions from 100km/h to 0km/h at maximum deceleration. 2second rest at standstill between each cycle. Wide open throttle accelerations.
**=GRVA draft of 2nd October 2023 amended for 10second full-throttle applies
***=considering GRVA doesn't currently allow SW limitations to clampforce and the test is static, the clampforce would be the maximum achievable by the EMB device (inclusive of fade headroom) while clampforce during AMS would be limited by anti-blocking systems and tire capability.

Further confirmation comes from thermal simulations conducted on any electrical component. In the example that follows, the motor windings of the EMB would experience the following temperatures when subject to 8+1 static test:



Max limit = what a design engineer may identify as a reasonable temperature specification for electrical components after conducting harsh performance cycle simulations.

My recommendation to rectify the current situation is to adopt all of the following:

- Decrease duty cycle with increased breaks between applies, the duration of which may be left up to the discretion of the manufacturer to avoid permanent HW damage
- Allow SW limitations that either restrict the clampforce to the one necessary to achieve Type-0 performance or at least avoid using fade clampforce headroom in static conditions
- Parametrize duration of full throttle event based on actual vehicle V_max and achievable deceleration

I would like to invite everyone to conduct this simulation independently, using a very harsh performance requirement of their liking.

Thank you for you attention,

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