



# Overheating 101

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# Overheating 101



- What is overheating?
- Skills required to overheat
- How to do it
- Heat damage and how it works
- How to repair heat damage
- Tips to reduce heat damage and overheat longer!

# What is overheating?



- The act of pushing a module beyond its normal limits for a short period of time, obtaining better performance.
- As you overheat your module becomes damaged by heat damage.
- If you overheat for too long, your module will eventually burn out (be forcibly offlined) and you will not be able to use it.
- Also known as overloading (terms interchangeable).

# Overheat bonuses



Propulsion modules: +50% speed boost



Shield / armour hardeners: +20% damage resistance



Warp jammers (scram/point): +20% range



ECM jammers: +20% jam strength



Armour repairers/shield boosters: -15% duration AND +10% amount repaired/boosted



Autocannons, blasters, pulse lasers: +15% damage



Artillery, railguns, beam lasers, missile launchers: +15% rate of fire

*(not all modules mentioned here – examples only)*

# Skills required



- Only one skill required: Thermodynamics 
- Prerequisites: Power Grid Management 4, Capacitor Management 3, Science 4.
- Thermodynamics 1 only required to overheat modules.
- Reduces heat damage by 5% per level (allowing you to overheat for longer).

# How to overheat?



Residual heat gauges  
(low – mid – high)

Neutralisers inactive but have heat  
damage from turrets

Active & overheated turrets



Pre-overheated but **not**  
active microwarpdrive

Active but not overheated  
invulnerability field

Damage control can't be  
overheated

- Click the tiny green arc at the top of active modules to toggle overheat.
- The overheat modifier defaults to Shift+*<module keybind>* but can be rebound to Ctrl, Alt, etc.

# When to overheat



- Overheat whenever you can!
- Overheat stuff that's important to you: if you're trying to catch a fleeing target, overheat tackle mods. If you need to kill something fast, overheat your weapons.
- **When you're about to die – overheat EVERYTHING!** (Even if it doesn't work and you die, you leave a load of damaged or broken modules in your wreck that the looter needs to repair before being able to use/sell! Ha ha!)

# Heat damage

Residual heat gauge at zero...



...and at maximum.

Burnt out module

- Ship: Thrasher (Minmatar destroyer) with 7 autocannons; overheated the middle gun.
- Every module in the rack takes heat damage from even a single overheated module
- Modules further away (in the fitting window) from the overheated module less likely to take heat damage.
- Residual heat gauge acts as a 'multiplier' – more heat in the rack; more chance for modules to take damage.

# Heat damage



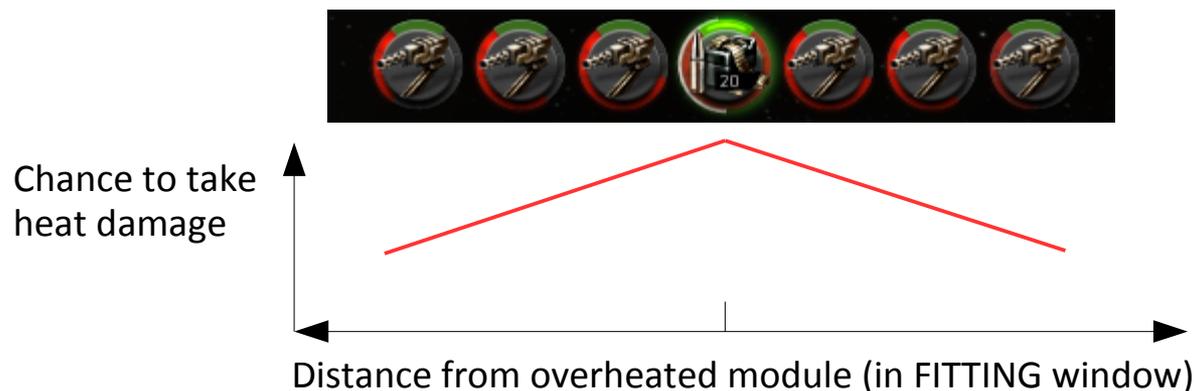
- Same ship, overheated one gun at a time. Lower ammo count = lasted longer.
- Heat damage is random, in that sometimes modules further away from an overheated source can take more heat damage.
- It is also random in that the overheated module itself won't last the same number of cycles each time your overheat it.
- Values for overheating duration given in EFT/Pyfa are a rough average:

Modules				Heat
<b>Low slots</b>				
✓  Damage Control II	30	1	0	25.9%
Adaptive Nano Plating II	0	1		51.8%
Small Armor Repairer II	6	6	-10.5	1m 40s

# Heat damage



- Active and overheating modules have the highest *chance* to suffer the heat damage specified in their Show Info.
- The closer another module is (in the fitting window) to an active and overheating module, the higher *chance* it has to suffer the heat damage specified in the overheated module's Show Info.
- Just like ECM electronic warfare – another chance-based mechanism – heat damage can be very unpredictable.



# Heat damage



Average remaining rounds: 121.3



Average remaining rounds: 124.1

- Jaguar (Minmatar assault frigate) with three turrets and one energy vampire – overheated all turrets
- Putting a 'spacer' module in between overheated modules allows you to overheat for a little longer.
- However you have a good chance of that module burning out as well.
- Putting that module at one end means your turrets take heat damage faster, but the 'spacer' module will not burn out.

# Heat damage



- Empty slots or offline modules behave similarly, and allow you to overheat for much longer. They do not contribute to the 'residual heat' gauge. *(However offline modules will still take heat damage and need repairing.)*
- This also means that if you overheat many modules, as modules burn out and offline, the rest start to last much longer.
- Mid- and low-slot modules generally have a higher heat damage value (especially propulsion modules) than turrets/launchers and will burn out faster.
- This means you are less likely to get 'average' results like the ones illustrated here, more likely to get more 'extreme' results.



# Grouped weapons



- First test: one overheated group plus one or more other (*not* overheated) module(s).
- Result: all turrets in the group burn out at the same time.
- Second test: one overheated group plus one or more other *overheated* module(s).
- Result: turrets in group burn out at different times (group cannot be activated once any turret is burnt out).

Grouped weapons deal identical heat damage to other modules in the same group, and thus burn out together. However other (non-grouped) modules will deal normal heat damage to weapons in a group, thus causing them to burn out at different times.

Tip: group your turrets/launchers into two groups, not all into one. This will prevent them all burning out simultaneously when you overheat them.

# Repairing heat damage



- Damaged and burnt out (offlined) modules can be repaired in a station with a Repair Shop. 

- Higher meta level modules cost more to repair – T2 modules cost noticeably more to repair than T1 modules; faction modules cost by far the most.

- Before undocking, you must online broken modules again!



Repairshop

Repair Facilities

Repair Cost: 209,200 ISK  
Avg: 100.0 % Damaged

Type	Damage	Cost	
 1MN Afterburner I	0/40 (HP) - 100.0%	6,800 ISK	
 1MN Afterburner II	0/40 (HP) - 100.0%	40,800 ISK	
 Gistii B-Type 1MN Afterburner	0/40 (HP) - 100.0%	161,600 ISK	

Pick New Item   Repair All

- This is the only way to repair broken (burnt out) modules.

# Nanite Repair Paste



- Damaged modules can be repaired whilst in space by having Nanite Repair Paste in your cargohold. 
- Right-click the damaged module and select Repair from the menu.
- You do not need any skills to repair modules like this (not even Thermodynamics).
- Whilst repairing modules, no module on any rack can be overloaded. You cannot repair and activate a module at the same time. You *can* repair and reload a module at the same time.
- Like station repair costs, higher meta level items require more paste to repair – again most noticeably with faction items.
- You can cancel a repair partway through, and the module will be partially repaired.

# Nanite Repair Paste



- Two skills improve your in-space repairs.
- **Nanite Operation** reduces the amount of paste required by 5% per level, thus reducing the amount of paste you need to carry.
- **Nanite Interfacing** increases the amount repaired per second by 20%, thus reducing the time taken to repair your modules (it does not change amount of paste required).
- Passive modules take heat damage too and can be burnt out!
- If you hide passive modules on your overview, you might want to show them again if you overheat a lot.

# Tips to reduce heat damage



- Train up Thermodynamics!
- Arrange racks to spread out overheating modules so you can overheat longer (downside: the modules in between will probably burn out).
- Don't group turrets/launchers into one big group – use two groups and overheat them together, then if one burns out ungroup and continue firing individually.
- Repair modules at the first opportunity – do not leave things damaged between engagements.
- Fly strategic cruisers...

