Failed Cooling Systems

Radiators

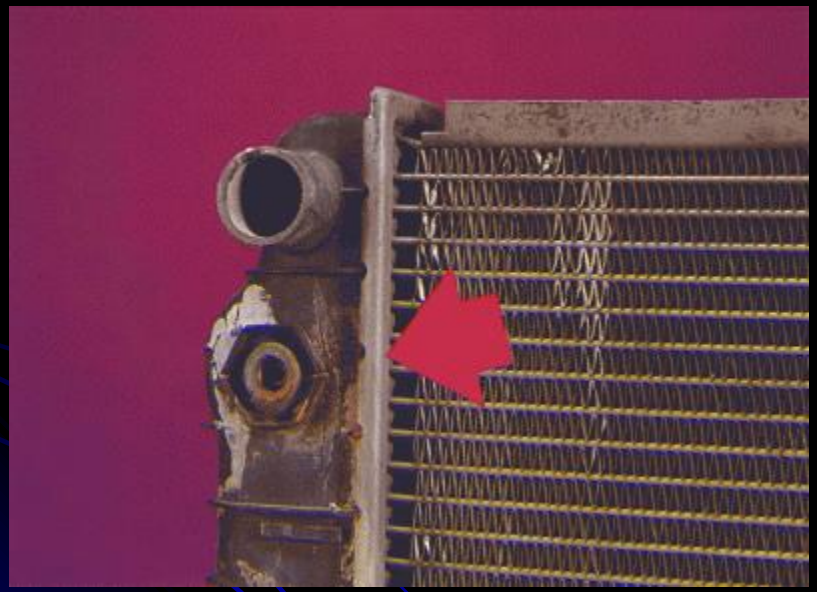
Belts

Hoses

Thermostats

Clutches

Cracked plastic tank

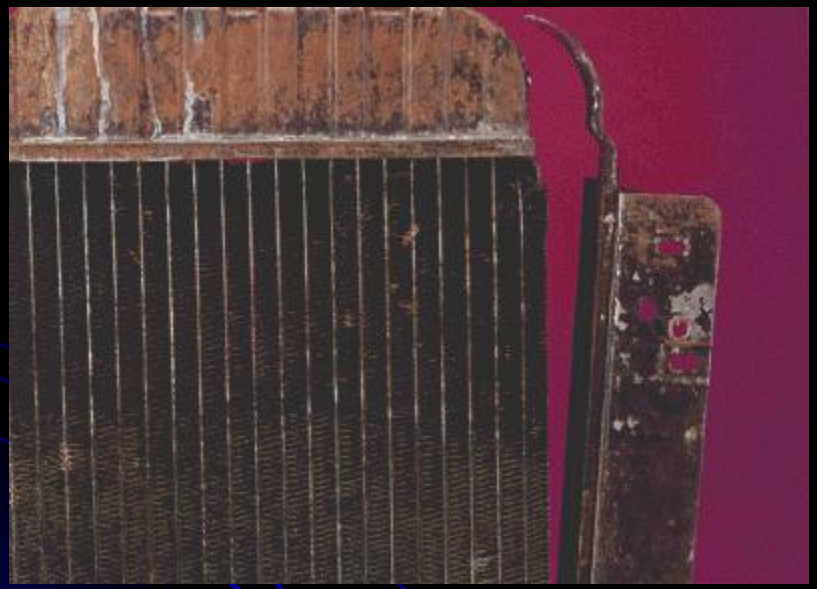


- High stresses in the cooling system.
- Over-pressured from incorrect/malfunctioning radiator cap
- Incorrect mounting in vehicle.
- Over-torqued fasteners
- Repaired by replacing radiator

Damage from Fan

- Incorrect fan or water pump for application
- Driving in high water (causes fan to pull into radiator)
- Wreck damage
- Repaired by replacing radiator

Over Pressurized



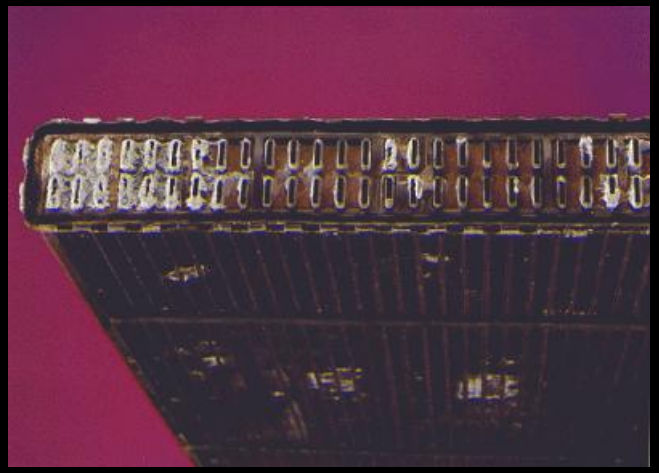
- Incorrect radiator cap
- Faulty radiator
- Overheated engine
- Incorrect installation causing undue stress
- Repaired by replacing radiator and cause of excessive heat and pressure.

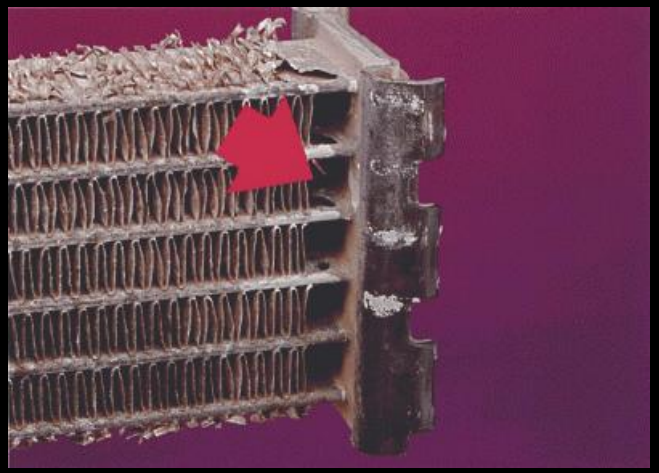
Internal Deposits

- lack of maintenance
- Not enough coolant used in the 50/50 mixture
- Concern: overheating engine
- Diagnosis: thermostat is opening correctly and fan is pushing air. Perform water pump flow test.
- Repaired by flushing system and replacing radiator.

Electrolysis

- Electrolysis requires erosion of metal to occur. This leaves the metal thin causing leaks or blockage.
- Caused by different metals in the system reacting with one another to produce voltage.





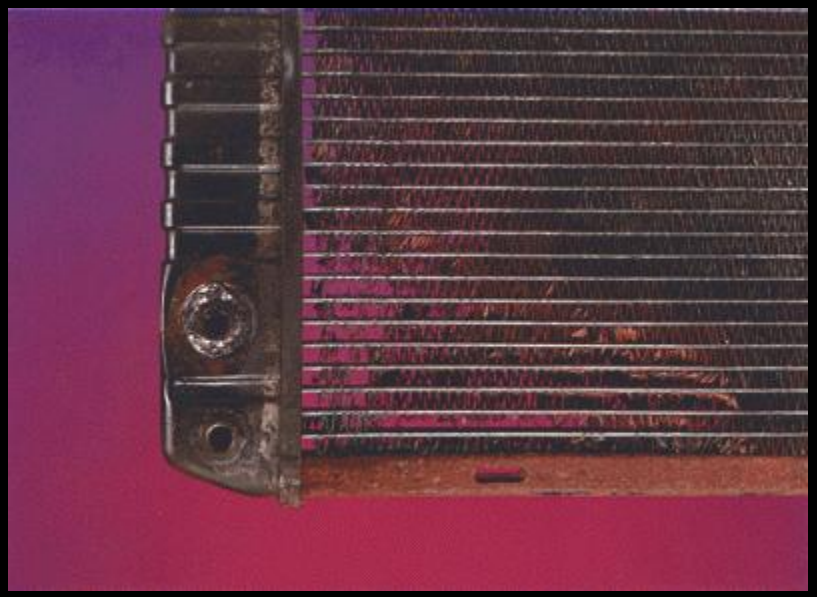
Electrolysis

- Common to newer vehicles using more aluminum and plastic
- Aluminum is not dense
- Plastic is a good insulator of current
- Hard tap water (mineral rich)
- High coolant flows causing static electricity.
- Dissimilar metals reacting essentially creating a battery.

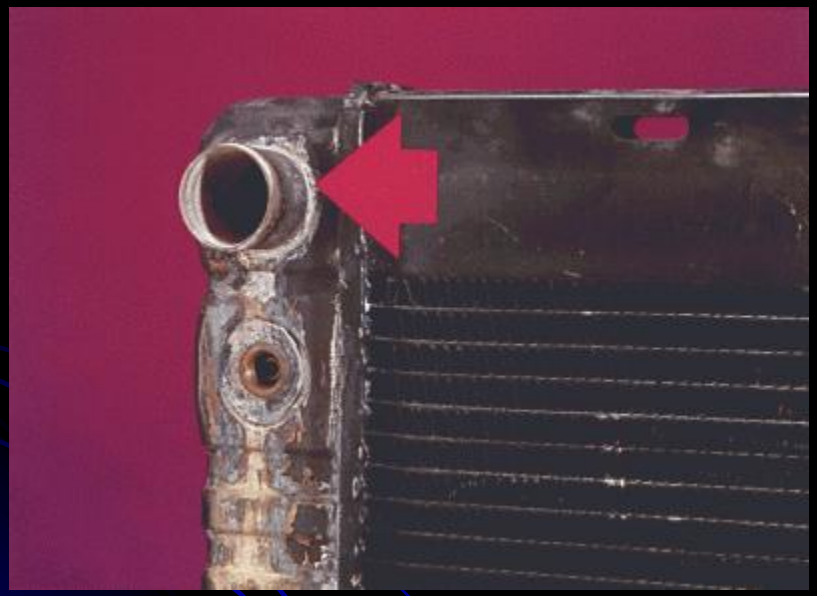
- Repaired by replacing the leaking component.
- Completely flushing the system with an actual flush kit.
- Filling the system entirely with a 50/50 mix of coolant and water
- The addition of ground straps to the components in the system to remove the stray voltage

Fin Deterioration

- Creates an inefficient heat transfer path
- The erosion of the fin material in between the coolant tubes.
- Mechanical erosion (sand, dust)
- Chemical erosion (road salts, cleaners)
- Repaired by replacing radiator



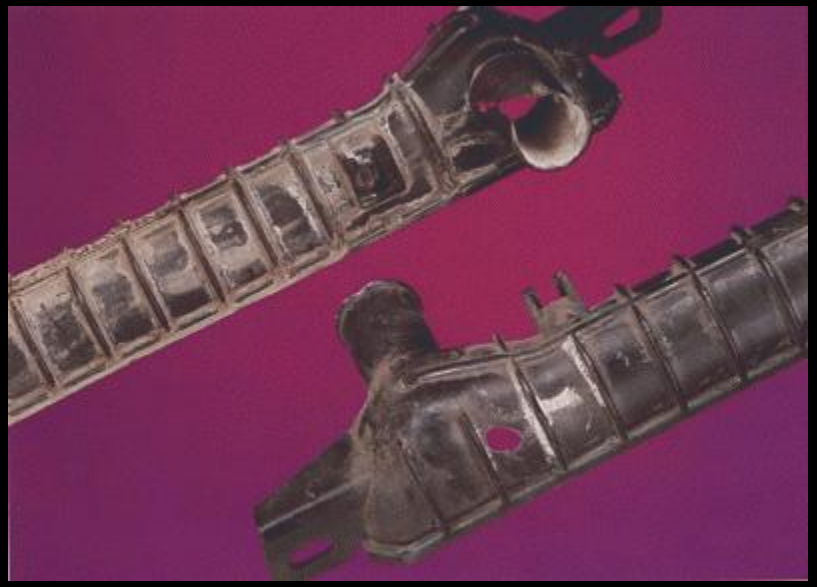
Bonding Failures



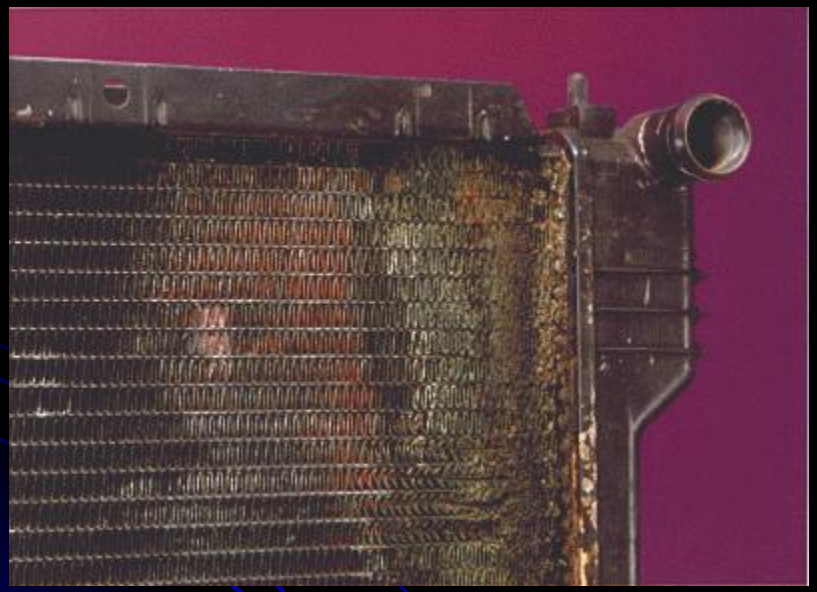
- Happens on brass type radiators (soldered assembly)
- Caused by excessive pressure and temperatures (simply melts the solder)
- Repaired by replacing radiator

Steam Erosion

- Caused by systems constantly run low on 50/50 mix. This allows steam to form and cook away the plastic material.
- Happened on early designed, older plastic radiators.
- Repaired by replacing radiator.



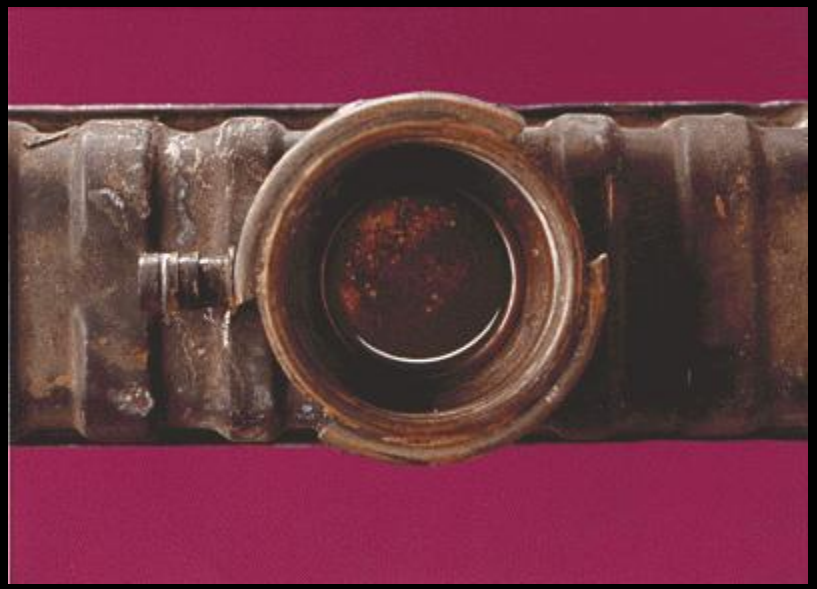
Tube to Reservoir Leak



- Due to bonding failure (solder or mechanical)
- Repaired by replacing radiator.

Contamination

- Question: Where can oil contamination come from in the cooling system?
- Intake gaskets
- Head gasket
- Crack in block/head
- Water to oil cooler
- Transmission cooler
- Repair???



Serpentine belt (fan belt)

- Causes:
  - Age of belt
  - Tension of belt too high or too low.
  - Excessive heat in engine compartment

Repaired by replacing belt.

Gasket/hose leaking

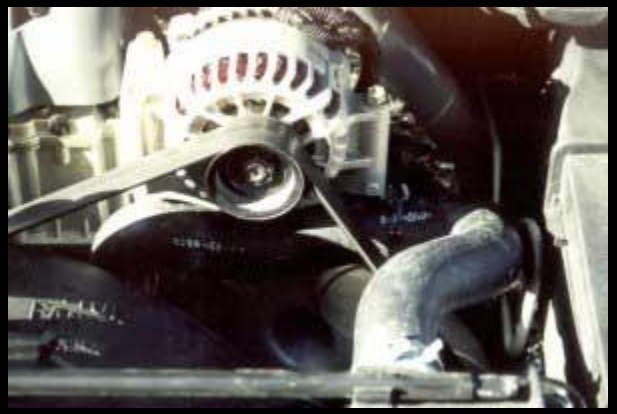
- Caused by age and condition of cooling system. Or correct installation.
- Repaired by replacing gasket or hose. (occasionally re-torquing of clamp is sufficient)

Failed Thermostat

- The bridge is broken
- Caused in part by electrolysis and poor construction.
- Repaired by replacing thermostat

Mechanical Hose Damage

- Improper routing of hoses (radiator, heater, or bypass)
- Radiator hoses are designed to be installed in only one position.



Or this will happen

- The fan damaged this hose because it was on incorrectly.

Malfunctioning fan clutch

- The fan clutch may be locked up. This will cause reduced performance and excessive noise
- The fan clutch may not be able to drive fan (freewheels). The thermostatic clutch has failed.
- Caused by a loss of lubrication from clutch bearings or impact on clutch housing.
- May be caused by a loss of the silicone fluid or also an impact to the clutch housing.