

E-MOP

How it works?

- Magnetizable particles form a weak molecular bond with oil
- Pulsed electromagnets trap and guide oil that has been rendered magnetic
- Oil recovery rate is directly proportional to changing magnetic field (the gradient)
- Magnets capture and separate the oil and the particles with efficiency > 98%
- Water is the transport medium

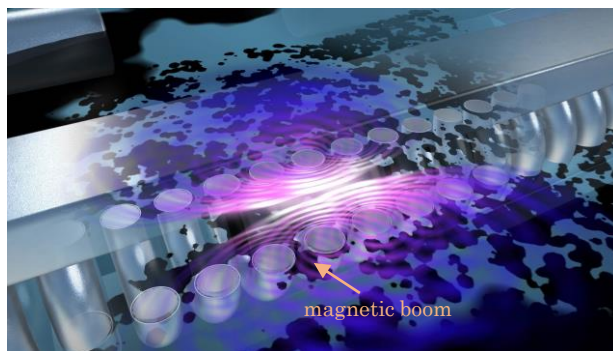
Main features

- Innovative – separates oil and water at the micron scale
- Efficient – preferentially target oil, not water
- Recovers spilled oil at cold temperatures
- Works with low to high viscosity oils
- All magnetic particles are reusable
- System can be scaled to small or large spills
- Water waves enhance efficiency

Electromagnetic Boom Technology

- Recover and separate oil from water
- Remove oil from non-porous surfaces
- Magnetically confine and manipulate oil
- Oil spill response
- Engineering applications

An electromagnetic-based approach for oil-spill remediation designed to use environmentally benign micron-sized magnetite (Fe_3O_4) particles. The system targets oil on water by trapping the particles in a colloidal mixture. The process is dominated by weak molecular forces. These forces allow for the magnetic separation of the particles after the oil and particles are removed from water and other surfaces. The nature of the bond is sufficient to target oil specifically at the micron scale.



Horizontal cross section through the electromagnetic boom – Illustrates magnetic field gradient along the axis



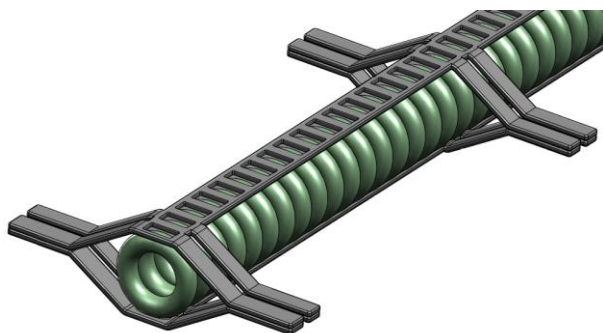
Passive boom

Passive boom technology

- Standard booms are passive devices that are used in conjunction with skimmers and chemicals to remove oil from water.
- The skimmers rely on surface tension forces and mechanical action to collect the oil.
- Standard methods collect large amounts of water.

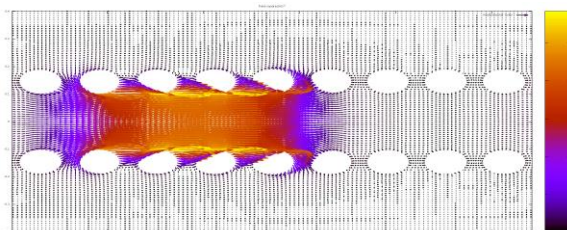
Electromagnetic boom

- Traps oil and moves it along its axis
- Does not collect water
- Designed to be autonomous
- Controllable flow rate
- High efficiency



Magnetically active boom

A group of thin solenoid magnets are pulsed in a phased sequence with a time dependent current. The current, gradually grows stronger axially and is distributed along the boom. This creates a magnetic field gradient that attracts the magnetizable oil. Solenoid modules can be coupled to extend the system.



Magnetic model

Magnetic oil flow



Magnetic oil testing