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## Securing a vehicle mounted camera system

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## Securing a vehicle mounted camera system

### ABSTRACT

Vehicle mounted camera systems are typically hosted by structures that are bolted in or clamped onto the roof of the vehicle. However, to mount these structures, modifications to the vehicle, e.g., drilling holes, are necessary. This is infeasible in certain locations, e.g., in countries that do not allow even minor modifications to vehicle body or structure. This disclosure describes techniques to mount a camera system using bolting and bonding mechanisms that do not make changes to the vehicle body or structure.

### KEYWORDS

- Vehicle mounted
- Camera system
- Roof mounting
- Roof racks
- Roof bonding

### BACKGROUND

Most vehicles do not have built-in structures to support vehicle mounted camera systems or withstand the additional load placed by such camera systems, which can weigh more than 30 kilograms with a high center of gravity. Also, in some locations, local regulations do not allow a vehicle to be modified in a manner that makes even minor changes to the vehicle body, e.g., drilling of holes to support a new structure.

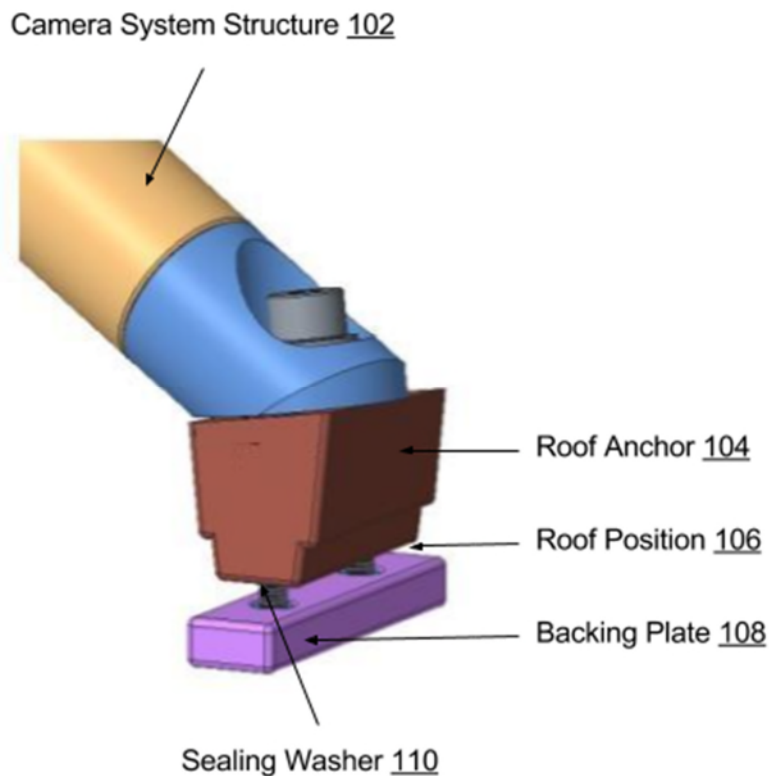
Although existing commercially available roof racks can be used for mounting camera systems onto the roofs of vehicles, these racks may not be strong enough to bear the loads generated by the camera system. Specifically, the high center of gravity of the camera system

generates large moments on the mounting points, which may be low strength and low stiffness, spot welded areas that cannot sustain large loads.

Alternatives include, for example, clamped roof racks. These racks are not suitable for mounting camera systems because of potential poor installation. Also, in some cases, clamped roof racks are prone to loosening up over time.

### DESCRIPTION

The described techniques enable a camera system to be mounted on to the roof of a vehicle with minimal modification to the vehicle and no changes to the vehicle structure. The first mechanism involves a bolted structure to mount the camera system on to the vehicle roof. Another mechanism uses bonded anchors to secure the camera system on the roof of the vehicle.

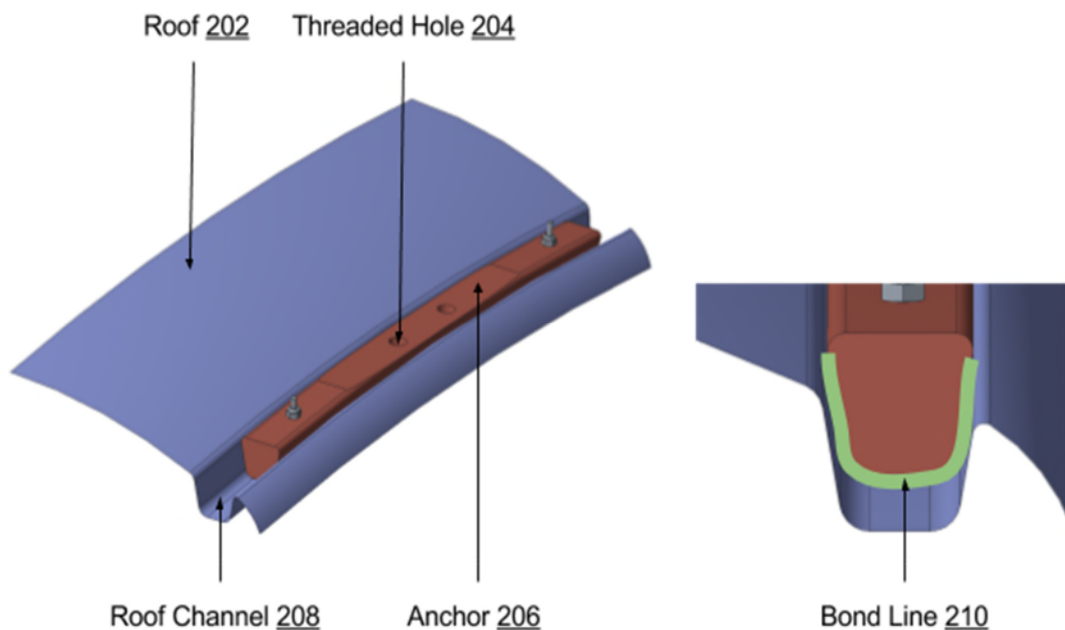


**Fig. 1: Example bolted mechanism**

Bolted Mechanism: Fig. 1 illustrates a sample bolted mechanism mounted on a vehicle roof (106) using roof anchors (104) to support the camera system structure (102). The camera system structure is secured to the roof through anchors located on the four corners of the roof. Anchors are installed from outside the vehicle and bolted in through pre-existing holes in the roof channel to a backing plate (108) inside the vehicle. The backing plate spreads the load across the roof structure.

The anchors, which can be made of a plethora of materials, have threaded holes to bolt in the camera system. Rubber sealing washers (110) are placed between the anchor and roof to maintain a weatherproof seal at the bolted joints.

This system does not require removing any material from the roof to install the anchors and is considerably stronger than the existing commercially available roof mounting systems. This technique is particularly suited for vehicles that have pre-existing holes for bolting.



**Fig. 2: Example bonded mechanism**

Bonded Mechanism: In another technique, a vehicle mounted camera system is secured to the roof through bonded anchors. At four different locations on the roof, anchors matching the geometry of the roof channel are bonded into the existing roof channels. Fig. 2 illustrates a sample mechanism with anchors (206) bonded into the roof channel (208). The anchors have threaded holes (204) on the top side for bolting in the camera system.

The anchors, which can be made of aluminum, are of a curvature that matches the shape of the roof channel (208) to maintain a consistent bond line (210) thickness. An impact resistant structural adhesive is used for bonding these anchors to the roof channel.

This approach does not require removing any material from the vehicle roof and can be applied to any vehicle with a roof channel. The bonding technique works even if a vehicle does not have pre-existing holes or where existing threaded interfaces (e.g., studs) are not strong enough to support the camera system.

## CONCLUSION

Techniques described enable mounting of a camera system on to the roof of a vehicle using bolting or bonding techniques without making changes to the vehicle body or structure. While bolting is suitable when the vehicle roof has pre-existing holes for mounting the camera system structure, bonding can be applied to any vehicle with a roof channel, even if the vehicle does not possess holes or threaded interfaces for bolting the structure in.