



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

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INVESTIGATION: EA02-034 DATE OPENED: 12/3/02
 SUBJECT: Overheating Front and Rear Brake Components
 PROMPTED BY: PE-02-046
 PRINCIPAL ENGINEER: Sonny Murianka *SM*

MANUFACTURER: International Truck and Engine Corporation
 MODELS: All models equipped with the Bosch Zero Offset Pin Slide (ZOPS) Disc Brake Caliper Brake System.
 MODEL YEARS: 1998-2003 VEHICLE POPULATION: Approximately 100,000 Vehicles

PROBLEM DESCRIPTION: Allegation of front and rear brake components overheating, caliper lockups, smoke, and/or wheel fires.

FAILURE REPORT SUMMARY

	ODI	MANUFACTURER	TOTAL
COMPLAINTS:	0	6,611	6,611
CRASHES:	0	7*	7
FIRES:	0	69	69
# INJURIES:	0	0	0
FAT CRASHES	0	0	0
# FATALS	0	0	0

Included in the 69 wheel fires are 15 alleged wheel fires on school buses.
 There are 7 alleged crashes which ODI is working to confirm.

ACTION: An Engineering Analysis has been opened.

ENGINEER: *Sonny Murianka* DIV CHF: *Richard Boyd* OFC DIR: *[Signature]*
 DATE: 11/27/02 DATE: 11/29/02 DATE: 12/3/02

SUMMARY: In 1998, Bosch started production of their Zero Offset Pin Slide (ZOPS) disc brake caliper assembly. This new caliper incorporated an "environmentally sealed suspension" system to allow the caliper to slide laterally with less friction. The lubricated pins in the ZOPS assembly are sealed in accordion-shaped boots, providing continuous free floating calipers requiring less maintenance and longer pad life. Sliding freely is critical since the actuating pistons within this caliper are not mounted on both sides of the caliper to clamp the rotor disc, but protrude from only one side. The clamping force on the other side of the caliper (for the out board brake pad) is created from the reactionary force through the housing of the caliper. This new system, used by Bosch for years on lighter vehicles, replaced the standard medium-truck rail-slide disc brake design. The exposed "rails" consist of a v-shape plate sliding in grease along a v-notched groove. Field reports indicate that the brake caliper does not always release when brake pedal pressure is removed.

12/03/02

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The ZOPS began to have brake complaints almost immediately upon introduction into the field. Bosch continuously monitored the trend and formed Action Teams to inspect vehicles in the field and investigate why an advanced system, proven on smaller lighter vehicles and in pre-production testing, was accumulating so many "failure to release" complaints from the field. Units were removed from complaint vehicles and taken in for in-depth analysis. As more parts were recovered from the field, the Bosch team identified and remedied over one dozen shortcomings in the ZOPS system and presented them packaged as the new successor, the ZOH-T, introduced in 2002. Complaints on the ZOH-T equipped vehicles are dramatically lower than the previous model.

In June 2002, the PE was opened on Bosch based on a complaint received from the owner of a 40 foot motor home. The owner alleged that repeated attempts had been made by the final stage manufacturer (Monaco), to correct problems that resulted in what he believed were increased stopping distances from severely overheating disc brake calipers. He also reported smoke, heat damage to the ABS sensor and multiple attempts by Monaco to correct the problem. During the PE, Monaco and Western RV both submitted safety defect reports, (02V-278 and 02V-243), to address these concerns. Initially, the PE focused only on recreational vehicles. However, information obtained by ODI from various final stage and axle manufacturers revealed that complaints and warranty claims had been received on essentially all vehicle models using the ZOPS brake system. This would include certain medium duty trucks, as well as certain school bus chassis manufacturers. Information reviewed by ODI indicates the ZOPS systems are generating extremely high temperatures. This overheating can occur during normal and foreseeable usage and may result in dramatic decreases in disc pad life, brake caliper seizure, thermal destruction to the ABS sensors, smoke, wheel end fires, and brake fade increased stopping distances.

International:

During the PE, International was contacted and they furnished ODI with 11,077 brake related warranty claims. NHTSA's Vehicle Research and Test Center (VRTC) reviewed the claims database and, identified 6,611 relevant warranty claims. Using certain words in the "Complaint Comments" column (bind, drag, froz, hang, hung, lock, seiz, smoke, fire) of the International warranty database claims, VRTC (to date) has identified 69 fire events, of which 15 were on school bus chassis. These chassis are used by several final stage manufacturers. These vehicles were identified based on text reports in International's warranty data where the driver and/or technician identified a fire and that fire was reported and accepted by International for warranty. ODI is now collecting fire department incident reports on these fires. ODI is very concerned about wheel end fires and will be contacting every identified final stage manufacturer involved for additional information on these incidents.

The investigation is being upgraded to allow additional, comprehensive data review, to conduct testing, perform a full evaluation of failure allegations from the field and to determine whether field action in the form of a safety recall is indicated for any vehicles utilizing the ZOPS assembly.