Tire Failure = Loss of Control

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Partial v. Full Tread Detachment

ARNDT – “Partial separation produced the most significant vehicle disturbances. The range of vehicle responses is a continuum from minor responses… to critically destabilizing responses resulting from partial separations.” SAE 2001-06-0145.

Front v. Rear Tread/Belt Separation
The Vehicle will pull to the side of the failed tire, regardless of whether its on the front or back.

However, the effect on the vehicle dynamics will change.
Front v. Rear Separation

Understeer

Front tires lose grip
Vehicle starts to plow
Front v. Rear Separation

Oversteer

Rear tires lose grip
Vehicle starts to slide out
Front v. Rear Separation

MICKY GILBERT’S TESTING

- 4 Good Tires (JTR01 – End View)
- Lt Front Sep (JTR03 – End View)
- LT Rear Sep (JTR06 – End View)
Where did the loss of control occur

Rear Tire:

LOC at Tread Sep Side

Arndt - SAE 2001-06-0145
Where did the loss of control occur

Rear Tire:

LOC at Opposite Tread Sep Side

Arndt - SAE 1999-01-0450
Where did the loss of control occur

Rear Tire:

LOC at Opposite Tread Sep Side

Arndt - SAE 2000-01-0697

The test results objectively demonstrate substantial differences in cornering properties. Grouping all tires together, the measured cornering stiffness of a modified tire was reduced on average to 36.1 percent of the normal tire measured properties.
Where did the loss of control occur

Front Tire:

- LOC at Tread Sep Side

Arndt - SAE 2004-01-1075

1) Demonstrates both lateral and longitudinal forces in tread sep. event;
2) Peak resultant forces range from 361 to 1151 lbs;
Where did the loss of control occur

Front Tire:

LOC Opposite Tread Sep Side

1) Look for other contributing factors or if the vehicle is prone to oversteer – such a 15 passenger van or bus.
Only study looking at real world reactions to unforeseen tread separations

1) **Expected** driver reaction is to counter-steer;
2) Experienced driver who are expecting a tread separation can easily control the vehicle;
3) A previously appropriate steer input can result in loss of control;
4) Knowledge of the imminent tread separation reduced the overall probability of control loss from 55% to 20%;
5) Findings from test track studies in which test drivers were aware of an imminent tread separation may underestimate the extent to which tread separation occurring in the real world leads to instability and loss of vehicle control;
6) The increased difficulty in vehicle handling and the associated increased likelihood of loss of vehicle control with decreasing vehicle understeer generalize to real-world driving.
THE FRAUD

Anatomy of Accidents Following Tire Disablements

it was therefore concluded that because the number of tire disablements followed by accidents were so small (not more than 0.06%), a tire disablement by itself could not be considered sufficient cause for an accident. Otherwise, there would be many more accidents resulting from these events.

Klein & Black
1999 paper
1) Article is from 1968 – prior to steel belted radial tires;
2) Bias Ply tires rarely suffered tread separations;
3) Article discusses tire disablements, meaning flat tires and blow outs.
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2) Bias Ply tires rarely suffered tread separations;
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48% described event as “slow leak”

52% described even as a “blow out”

2 out of 5 reported as “repairable”