

Accidents and the Human Element in Skidding

Final Report of Subcommittee B to the First International Skid Prevention Conference
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ACCIDENTS

●SKIDDING was reported as involved in four out of ten (41 percent) rural accidents in Virginia in 1957, according to reports reviewed in a study just completed, covering 34,139 accident reports.

In Great Britain in 1957, records indicate that one out of four (27 percent) personal injury accidents on wet road surfaces involved skidding—while on icy surfaces the proportion was four out of five (82 percent).

On the Pennsylvania Turnpike in 1952-1953, nearly one out of four accidents (22 percent) involved failure of the driver to cope with road conditions. Most of these accidents involved skidding.

These three analyses show what this subcommittee believes will be found wherever there is extensive motor vehicle traffic and adequate accident records:

Skidding is an important factor in highway accidents—indeed, far more serious a factor than is generally realized. And here we're not talking about icy conditions. Furthermore, many skids occur in which, because of circumstances, there is no accident.

Not only is the general public uninformed, but there is evidence that all too many highway administrators and engineers, other officials, and even traffic and safety specialists are inadequately informed.

One reason for this situation in the United States is that reliable skid accident data are unavailable in most states. Indeed, in major part because large-scale reliable skid accident data have not been produced by states, the National Safety Council has not included a summary on this subject in its annual Accident Facts booklet since the 1943 edition.

Furthermore, it is shocking but true that a standard form recommended by a national committee for police accident reporting doesn't even include a place for checking whether or not skidding took place. Consequently such information does not appear in the Standard Motor-Vehicle Traffic Accident Summaries for states or cities. Yet it is generally agreed that skidding is a factor in a large percentage of serious accidents—especially of course when road surfaces are wet or icy.

Moreover, the wet skid factor becomes more serious as speeds increase and the traction coefficient decreases—often sharply.

Increasing development of freeways and other high-type highways inevitably means higher speeds on such superior facilities. Furthermore, traffic volumes are increasing rapidly in many countries—and at the same speed it is clearly more dangerous to skid when there are more vehicles on the road.

Adequate and reliable accident data can be of great value in coping with skidding problems. Skid spot maps can identify bad skid zones. Such information can be used in public information; for enforcement as in apprehending persons driving at excessive speeds; in traffic engineering as in posting warning signs and installing center, lane and road-edge markings; in highway maintenance as in applying anti-skid surfacing materials. Skid accident information can also be of practical use in highway design as in reaching decisions as to sharpness of curves, intersection design, choice of road surfacing materials, methods, etc. Moreover, clearly the value of adequate accident data will increase as highway transportation develops.

Accident reports, based on investigations by trained police to the maximum extent feasible, should be made for all fatal and other personal injury accidents, and for at least the more serious accidents that involve property damage only.

Where feasible, even more thorough "case studies" of serious accidents on a limited sampling basis, can yield more technical, background information (as of basic reasons

for driver trouble) when such studies are carried out by an engineer, physician and social scientist working together.

THE HUMAN ELEMENT

While improvements affecting skidding will be produced through physical developments in roads and control devices, tires, and vehicles, driver actions will remain a dominant factor in skidding. Hence, it is highly important that interest in such physical development be paralleled by adequate attention to human factors.

From analysis of driver-vehicle-and-highway factors in accidents and from other sources, it appears that many drivers are woefully uninformed about skidding. Matters often misunderstood or unknown include the following:

1. Friction between tires and road is often greatly reduced when the road surface is wet, increasing vehicle stopping distances very greatly. The effect of wetness on slipperiness varies greatly with different road surfaces, however.
2. Such friction for an emergency stop on most wet road surfaces is much lower in high speed stops. In a quite high-speed stop on a wet road, such friction is almost as low as that on ice.
3. Some road surfaces which are very non-skiddy when dry, become treacherously slippery when wet.
4. When a road surface is wet, its slipperiness cannot be judged at all by a motorist looking at it.
5. A shower after a dry speel on a heavily traveled highway may cause the highway, due to oil drippings and road film, to suddenly become very slippery until the rain cleans off the surface—even on the best of road surfaces.
6. Even the slightest swerve, brake application, or speed-up can "trigger" a skid on wet or icy road surfaces. The higher the speed, the more true this is.
7. Unevenly or badly worn tires may result in skidding and loss of control on wet roads the conditions of which are otherwise excellent.
8. Skidding is especially likely to occur at curves, near intersections, on steep hills, at traffic circles. One reason is greater pavement wear resulting in lowered friction coefficients. These are also places where drivers decelerate sharply, swerve or otherwise change course rapidly.
9. Many drivers have not developed patterns for action in skids—and understanding of what not to do. These are things which cannot be learned by reading alone—they must be experienced.

RECOMMENDATIONS

This subcommittee presents for Conference adoption the following recommendations:

Recommendation 1—Accident Reports. Each state in the United States, each country having substantial motor vehicle traffic, and each other agency which obtains accident reports is urged to give new and adequate attention to (1) having accident report forms which will produce specific information as to skidding (including information as to accidents in which skidding was a major or contributing factor, information as to the time of beginning of the skid in the accident action sequence, and distance skidded or length of skid marks); (2) assuring satisfactory accident reporting; (3) obtaining thorough skid accident analyses suited to needs of police, engineers, educators, etc., and (4) getting effective use of accident data in dealing with skidding. Skid information should be included in accident reports, whether or not skidding is considered the primary, main or direct cause of the accident.

Recommendation 2—Status of Skid Knowledge. Studies should be made to find out the extent of lack of knowledge and of misunderstanding about skidding among drivers and learners.

Recommendation 3—Skid Instruction in Driver Education Courses, etc. Specific instruction as to skid factors, forces and hazards should be included in high school driver and traffic education courses. Science teachers should be effective in educating and impressing students as to the various principles, factors and relationships involved

in skidding. Appropriate emphasis should also be given in such courses on how to drive under slippery conditions.

Similar knowledge should be imparted to the great majority of drivers who are past high school age. Research should be conducted as to how to accomplish this objective effectively.

Recommendation 4—Training in Sensing Impending Skids. Methods should be developed for training drivers in "sensing" and evaluating possible or impending skid situations in advance.

Recommendation 5—Training Through Induced Skids. Safe but effective techniques should be developed for training drivers, in advanced instruction or courses, in what to do in skids when they occur. Included should be actual experience in skidding to provide the "feel" of skidding, to overcome the natural tendency to panic, and to provide practice in recovery.

Recommendation 6—Driver Clues. To the maximum reasonable extent, drivers should be given helpful clues as to what is ahead, to help them avoid skids. Included should be: (a) realistic speed guide signs for sharp curves; (b) warning signs effective day and night for sharp curves, steep hills, dangerous intersections, traffic circles—these being likely skid locations; (c) reflectorized center, lane, and pavement edge lines, and reflectorized curve delineators; (d) signs warning of pavement which is especially slippery when wet, but only until prompt corrective measures are taken.

Recommendation 7—"Skid Zone" Programs. Each state highway department in the U. S. A. and each country having considerable motor vehicle traffic should carry on a continuing program of locating "skid zones" with unsatisfactorily low wet skid coefficients. In developing such programs, study should be given to the well-developed and effective program in England (through the Road Research Laboratory), to other European programs, and to developing programs and procedures in California, Kentucky, Michigan, Tennessee, and Virginia.

Such programs should be correlated with skid accident information, just as rapidly as reliable accident facts can be secured and analyzed.

However, such program can and should be put into operation even before accident data become available, based on wet skid coefficient surveys conducted on a priority basis, first on main highways at intersection zones, curves, traffic circles, on steep grades, and at locations ascertained from highway patrol officers, maintenance personnel, and motorists' complaints.

Such "skid zone" programs should include carrying out corrective measures, re-determining wet friction coefficients and keeping an appropriate map and tabulation as a "scoreboard" and "progress indicator" so that all highway department units and the general public may be kept informed. Repeat skid tests should be made at least annually.

Recommendation 9—Skid Resistance Standards. Highway authorities in all countries having considerable motor vehicle traffic should take steps as expeditiously as feasible to develop reasonable minimum standards of skidding resistance suitable for different highway speeds, times, locations, conditions, testing methods and devices to be used—but fundamentally providing adequate, reasonable anti-skid protection to motor vehicle drivers. Such minimum standards should apply both to existing and to new highways and should be developed expeditiously, especially since their advantages should apply to freeways and major highway systems (such as in the U. S. A. the National System of Interstate and Defense Highways) in the early stages of their development.

In the United States, it is suggested that development of such minimum skid resistance standards might well be a research project of the American Association of State Highway Officials, perhaps administered by the Highway Research Board.

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SUPPLEMENT—ADVANCE RESEARCH ON SKIDDING

Our subcommittee has been greatly impressed and encouraged by the many evidences of valuable research on skidding carried on by governmental and private agencies in a number of countries. Tire groups, motor vehicle manufacturers, road materials groups, governmental agencies—highway and other, universities and all other agencies which have done significant research relating to skidding are commended. Furthermore, the interchange of ideas which the Conference has made possible has produced many benefits.

During this Conference, our subcommittee has been greatly impressed by skid research progress in various European countries—notably, because of their participation through papers, in Holland, Germany and England. The dynamic quality of interest and activity in Europe challenges us. There are, no doubt, a number of reasons for such dynamic activity. Roads, weather, numbers of motor cycles and other factors presumably explain this in part.

However, in the case of England, another major reason seems clearly to be the existence of the Road Research Laboratory of the Department of Scientific and Industrial Research with permanent, suitably qualified staff and so organized, financed, and positioned that it is free to study any road or highway matter including safety—and apparently to devote reasonably adequate time and consideration to selected researches. Moreover, and most impressive, this English organization is clearly effective in cooperating with private-industry research and development, and in getting highway authorities and others to apply research findings, with outstanding results in the skid-research field. One reason for such laboratory effectiveness is that it is non-executive in function—it is solely a fact-finding, study and investigating agency.

Recommendation—Commendation of England's Road Research Laboratory, etc. It is recommended that this Conference commend this organization and operation in England for accomplishments in skid research—as well as all research units which have likewise presented valuable research reports at this Conference.

It is further recommended that this Conference group urge all countries having extensive highway systems and considerable motor vehicle traffic to give serious consideration to setting up some centralized research organization, with financing, staffing and operational policies which will be of similar service.