Dr. Mike Mamlouk is a Professor of the Civil, Environmental and Sustainable Engineering program at Arizona State University. Dr. Mamlouk graduated from Purdue University and has many years of research and teaching experience in the field of pavement design, maintenance and rehabilitation, pavement evaluation, and material characterization. He has directed numerous research projects on sustainable pavement, pavement evaluation, material testing, pavement preservation, and nondestructive testing. Dr. Mamlouk has published over many journal papers and reports and is the main author of the "Materials for Civil and Construction Engineers" textbook, published by Pearson Education Inc., which has been used at more than 150 schools worldwide. He has been a consultant and expert witness for many industrial agencies. He is a professional engineer in the state of Arizona. He is a fellow of ASCE and an active member of other professional societies such as TRB, AAPT and ASTM.

Dr. Mamlouk recently completed a major research project titled "Validating Endurance Limit for HMA Pavements: Laboratory Experiment and Algorithm Development," funded by the National Cooperative Highway Research Program (NCHRP), Washington, D.C. The project focused on reducing or limiting fatigue cracking, which is one of the main distress types in asphalt pavement. Current design methods of asphalt pavement assume that cumulative damage occurs where each load cycle uses up a portion of the finite fatigue life of the asphalt layer. The concept of endurance limit of hot-mix asphalt (HMA) assumes that there are strain values below which fatigue damage can be "healed" between load applications. The fact that traffic loads are separated by "rest periods" may allow for partial or full healing of the accumulated damage, which in turn increases the number of load repetitions before failure. If the pavement thicknesses and material properties are controlled so that the strain at the bottom of asphalt bound layer(s) does not exceed the endurance limit for the expected load spacing of the design truck, the fatigue life of the pavement can be considerably extended. This concept has significant design and economic implications. The project developed a mathematical model to predict the endurance limit for HMA based on healing using laboratory beam fatigue tests. The project concluded that HMA exhibits endurance limit that varies depending on mixture stiffness, rest period between load applications that may allow for crack healing, and number of load applications.

Dr. Mike Mamlouk is currently working with Drs. Shane Underwood and Kamil Kaloush at ASU on a research project titled "Effect of Pavement Condition on Accident Rate." Pavement distresses directly affect ride quality, and indirectly contribute to driver distraction, vehicle operation, and accidents. A pavement with a bad record of roughness, rutting or potholes can cause a vehicle to lose control when braking or turning, especially under adverse environmental conditions. When pavement roughness increases, the contact area between vehicle tire and pavement decreases, resulting in lower brake friction. Roughness can contribute to greater vehicle instability since different friction forces exist on the two sides of the vehicle. Also, rutting is hazardous in wet weather when water accumulates in the rut path and leads to hydroplaning and loss of control. The problem can be further exaggerated when human factors, such as distraction, alcohol, stress and age, are combined with pavement distresses. Transportation agencies try to improve roadway safety through proper pavement engineering and maintenance. This is a major transportation policy the agency needs to adopt in order to improve its economic competitiveness. Transportation agencies have been looking for the appropriate roughness and rut depth thresholds before which the ride quality should be improved for safety. Decision makers need to know the cost-effectiveness of maintenance in reducing the rate of accidents, especially in accident prone areas. The main objective of this study is to develop models that relate the accident rates to pavement condition. Accidents will be broken down to different severity levels in order to investigate which accident type is largely affected by pavement condition.

Dr. Mike Mamlouk is also working on a research project funded by the National Transportation Center at Maryland, one of the five National Centers that report to the U.S. Department of Transportation. Although roundabouts have been used at many locations around the world, the safety of roundabouts under different conditions has not been fully understood in Arizona. In this study, 17 roundabouts in 5 cities in Arizona were evaluated, which were previously controlled by either stop signs or traffic signals before roundabout conversion. The average rates of accidents, damages, injuries and fatalities per year

and per million vehicles were evaluated. It was found that single-lane roundabouts reduced the accident rate, whereas double-lane roundabouts increased the accident rate. The results also showed that both single- and double-lane roundabout conversions reduced the severity levels of accidents. Considering both accident rate and severity level, warrants need to be developed for roundabout conversion and number of roundabout lanes under different traffic volumes.