The role of nondestructive materials characterization, evaluation and tests (NDT) is changing and will continue to change dramatically. It has become increasingly evident that it is both practical and cost effective to expand the role of NDT and quality control especially today, when lightweight vehicle design is of particular importance, because in addition to novel NDT technologies required for new materials evaluation. As such, the entire NDT procedure and the whole concept of quality evaluation are recently being deeply re-evaluated due to technical and economic reasons.

The goal of this review is to introduce recent breakthroughs in high-resolution acoustic imaging for materials evaluation and NDT. New principles for rapid 2D and 3D image quantitative characterization of bulk and sub-surface acoustical properties and microstructure based on an advanced concept of a portable electronic system, in addition to the new generation of matrix and phase arrays, will be reviewed. Based on the most successful experimental results, examples of different applications will be provided including the evaluation of advanced material structure, quality control of various joints, adhesive bonding, metals and composite layer structures, etc.

This new generation of NDT technology allow us to provide reliable, rapid and cost effective methods to visualize high contrast small scale failures and defects at different depths within inspected parts and can be adapted to high volume manufacture to monitor and control as many stages of the vehicle production process as possible
At the end of the presentation, examples of the future direction in automobile body design will be provided, with the various and sometimes exotic and unique new materials which designers are dreaming of applying to car body solutions. This may already happen in the near future.