

Charles R. Herd Wins Fernley H. Banbury Award

Charles R. Herd, Director, Rubber Carbon Black Technology, Birla Carbon, is the 2019 winner of the Fernley H. Banbury Award. Sponsored by Endurica, the award recognizes the contributions of scientists and engineers in developing production equipment, control systems and instrumentation widely used in the manufacture of rubber or rubber-like articles of importance.

Herd has enjoyed an extensive career in the rubber industry, specifically in the area of developing carbon black for the reinforcement of rubber. Herd worked at Columbian Chemicals to develop and refine quantitative transmission electron microscopy (TEM) methodologies

for the characterization of carbon black aggregates. This work greatly improved the understanding of the relationships between key carbon black properties, such as structure and particle size, their distributional nature and their effect on rubber properties such as hysteresis and failure. This work was subsequently developed into an ASTM test method used within the carbon black industry.

Herd pioneered the characterization of carbon black aggregates by fractal geometry and shape classification using TEM. Based off of this fundamental work, an entirely new range of carbon blacks was developed



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which were tailored through furnace reactor control to significantly expand the traditional constraints and tradeoffs between dispersion, hysteresis and failure in rubber compounds. These patented grades are now widely produced by Birla Carbon on a global basis and have been adopted by major tire manufacturers and non-tire rubber goods manufacturers.

Herd also worked on reconstruction of carbon black filler networks embedded in rubber using 3D TEM tomography. This approach was later adopted by major tire companies and used to perform nanoscale simulations of filled rubbers to provide insight into the design of next generation low rolling resistance tires.

Herd developed a methodology and equipment for the characterization of carbon black dispersion quality in rubber compounds using interferometric light microscopy. Dispersion of carbon black in rubber is critical for realizing the reinforcement benefits of the filler, and therefore there has always been a need for a reliable, rapid and discerning technique to ensure the quality of rubber products and aid in compound development. Again, this methodology became part of the ASTM standard for analysis of dispersion quality of carbon blacks in rubber, and has been widely adopted in the rubber industry.

Herd has also held roles managing the European Central Laboratory of CCC in Bristol, U.K., and later managing the central laboratories for CCC/Birla Carbon in Atlanta, GA. Over the course of his career, Herd has published 20 journal articles and holds three patents. Herd co-authored the chapter on microstructure, morphology and general physical properties in the book, *Carbon Black: Science and Technology*, edited by J.B. Donnet, R.C. Bansal and M.J. Wang. 