Specific Modulus (Young’s Modulus/density) of a material is one of the major considerations in the selection of materials for design of components in the field of automobiles, aviation and aerospace. Composites are finding increasing applications as they can be tailor made for appropriate high specific stiffness (specific modulus). This talk will cover the principles and the technique of squeeze infiltration, a metal matrix composite (MMC) manufacturing process which is amenable to selective reinforcement.

Squeeze infiltration technique can be used to selectively reinforce ring carrier grooves, and crown of the pistons, valve seats, reinforcement of cylinder liners (cylinder sleeves), connecting rods, which are subjected to high temperature and wear. For Squeeze infiltration, both squeeze casting and the process of manufacture of pre-assembled discontinuous fibers (called preform) need to be mastered. Selective reinforcement overcomes difficulties associated with machining of MMCs.

Squeeze casting process will be discussed in which pressure up to 200 MPa has been applied during solidification of British Standards 1490 LM6 (10-13 % Si) melt to produce shrinkage cavity, blow-hole, micro-porosity free and fine grained castings. Cost comparison has been made with the conventional method (gate and riser) of casting of the same component (called Half Clamp). Methodology of manufacture of fiber ‘preforms’ from melt-blown discontinuous alumino-silicate fibers and SiC whiskers will also be presented. During squeeze infiltration, wrought 2014 Aluminum alloy (Aluminum Cu alloys) had been used.

Participants not familiar with composites but involved in selection and use of materials may find it extremely interesting and useful and those already in the composite field may enjoy the presentation as a refresher.