# Processing of various CM247LC powder chemistries in 500W L-PBF system

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In this study, the influence of various chemistries on the melting characteristics of CM247LC powder was investigated, with the intention to minimise / eliminate cracks in L-PBF samples. Since multiple powder chemistries / suppliers were involved, the part fabrication was carried out in a 500W L-PBF system coupled with reduced build volume (RBV). The powder size distribution was in the range of 15 – 53 µm. To understand the effect of powder chemistry, L-PBF samples were analysed for optical density, microhardness and crack length density, in the as built and heat-treated state.

Variation in the crack density was observed across multiple builds and in the range of ~ 0.14 $mm/mm^2$ to ~ 0.88 $mm/mm^2$ for the chemistries chosen. The change in the crack density over many builds is very likely due to the change in powder chemistry over multiple re-uses. The chemistry modification might have accelerated because of heat affected particles and spatters generated in the process were not removed through sieving. It was also observed that the different heating rates between intermediate dwell temperatures (of 400, 500 and 600 °C) and a final dwell temperature during the heat treatment influenced the crack density.