

## HEAT TRANSFER IN PLASMA SPRAYING

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In the processes of plasma technology heat transfer will take place wherever an interaction will happen between the plasma and other kinds of matter. The high pressure plasma is characterized by a high specific enthalpy, which causes a high heat flow density on the surfaces being in contact with the plasma. Therefore, this plasma can heat, melt and evaporate all known materials.

Especially, in plasma spray processing a sufficient particle melting is important for the formation of dense and well adhering coatings. The energy transfer to powder particles depends on the composition and temperature of the plasma and on the particle trajectory and velocity in a rather complex way.

Ideally, the particles should arrive at the substrate in a completely molten state with high velocities. The trend in the DC plasma spraying to higher and higher velocities of the powder particles leads to smaller particles in order to guarantee the complete melting in spite of shorter dwell times within the plasma jet.

However, possibly large particles should be used in order to prevent the quick solidification of particles and the oxygen contamination of the coating.

In contrast to the DC plasma spraying, RF plasma spraying leads to high melting degree of large particles even of refractory metals due to the axial powder injection into the plasma and the long residence times of the powder particles within the plasma.

By using simple approximations for heating up of powder particles and for formation of coatings it is possible to compare the both DC plasma spraying and RF plasma spraying. Using the obtained results it will be discussed the influence of different values of particle size and velocity on the built-up process of the coating.