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Vacuum infusion processing has enjoyed a resurgence of interest in recent years as a primary mode of fabrication over traditional open mold processing. This renewed interest is driven by economic, environmental and engineering concerns as closed mold processing is recognized as being a cleaner, more efficient process than open molding. To facilitate vacuum infusion implementation process simulation models are often used to gain an understanding of, and to optimize the main processing parameters for a given part. Simulation models to date derive resin flow characteristics, i.e. velocity, via the pressure gradient at the resin flow front. Although accurate for closed systems, in systems where the vacuum source is continuously applied during the process pumping speed (the volume flow per unit of time) of the source employed must be taken into account. This paper will explore theoretical process modeling incorporating pumping speed and apply the model in a practical application. Additionally, the implications of pumping speed to vacuum source selection will be discussed in the context of the model.