



$$P = 3 \left(\frac{U_{sv} E_F}{\omega_s L_d} \sin \delta + U_{sv}^2 \frac{L_d - L_q}{2 \omega_s L_d L_q} \sin 2\delta \right)$$

-First you set your terminal voltage (U) and back-emf (E), and rated power (P) for this equation. And angular speed (omega) too. So you must know your back-emf too. If you have surface magnets then $L_d = L_q$, and the latter term goes to zero. Now you have load angle (delta) available.

-Since you also know stator flux-linkage (ψ_s) and magnet flux-linkage (ψ_{pm}) you can calculate LI vector (I have divided it into components above). Flux-linkage vectors have same p.u. values as voltage vectors, only leading 90° . Since you know the reactances, you can calculate the current d and q components and then you know the amplitude and direction of the current vector. Power factor angle is the angle between voltage and current vectors. All the angles can be calculated by using simple trigonometry,

This calculation neglects the effect of stator resistance, but it is rather small.