July 20, 2006

Are the Sag Power Index (SPI®) and the JK parameters for SAG hardness related?

Well, they should in some way be related. After all, they both measure the hardness of ores used for the same grinding mill. The SPI® is a hardness defined in a small 12" diameter by 4" long grinding mill. The feed is crushed to a P80 12.7 mm and the mill is operated at 70% critical speed until the material has reached a terminal P80 of 1.7 mm. The SAG specific energy (SE_{SAG}) is then defined as:

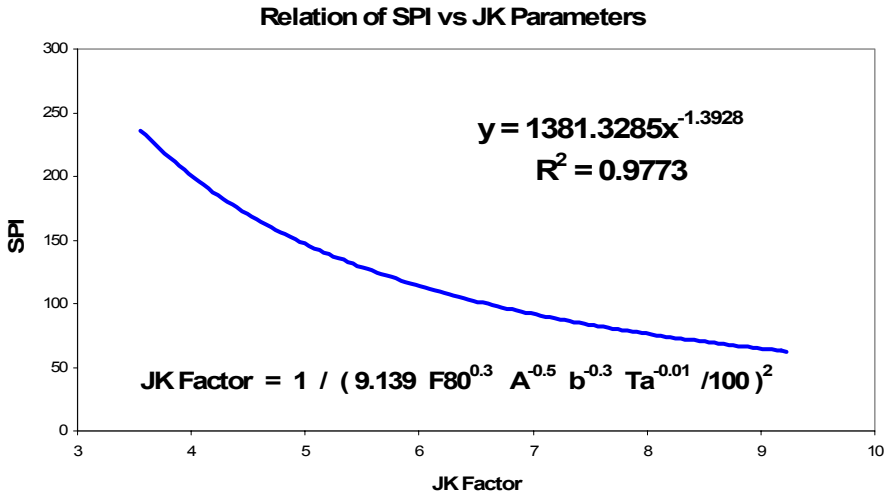
$$SE_{SAG} \text{ in kWh/MT} = (T_{80}^{-0.33})\,(2.2 + 0.1 * SPI)$$

where SPI® is the time, in minutes, it takes to grind the sample and the product of the SAG mill, $\mathbf{T_{80}}$, is the transfer size that feeds the ball mill circuit.

The user would be prudent to subtract any power imparted say by an in-line pebble crusher, or by finer feed (i.e. due to secondary crushing), etc. For starters assume the T80 to be 3.5 mm +/- 1 mm. Even better, the user might collect some "benchmark" samples for SPI as described in various papers published by vendors of the SPI® over the years.

The JK hardness parameters, derived from an impact breakage test are defined by the **A**, **b** and $\mathbf{T_a}$ values. These are commonly used with their proprietary software to size mills. Many have no means to access JK software, however SPI® test is amply described by Minnovex in SAG 1996, Vol 3, p 345 on how to run a test and how to apply it. Or Access John Starkey's (the inventor of SPI®) website at www.sagdesign.com where he has some papers on the subject.

With the following figure of more than 30 points, you can convert from JK to SPI®, to get an idea of your mill size.



Point to ponder: too bad SPI® test doesn't measure the exponential decay in which the P80 decreases with time of grinding…it sure would relate to the **b** of JK.

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