CONFIDENTIAL COMMUNICATION TO ATTORNEY

MEGADIAMOND TRADE SECRETS.

Kinetics versus Thermodynamics in Diamond Sintering.

Just as H. Tracy Hall discovered that pure diamond powder alone can be sintered in a Pressure-Temperature region where diamond is thermodynamically unstable (US Patent 3,815,085, June 11, 1974) if the sintering time is short, so too, can diamond powder mixed with catalyst metals do the same.

Hall subjected diamond powder and graphite to a range of temperatures above the thermodynamically stable region for diamond to exist at a fixed pressure. Graphite, diamond powder, and nickel (Ni) were simultaneously in contact with each other at this higher temperature. The graphite did not convert to diamond (as it would readily do if the temperature were lowered sufficiently), but the diamond powder recrystallized and sintered into a PCD product! However, the time at temperature must be short or the PCD will revert to graphite. The higher the sintering temperature, the shorter the time. In these experiments the sintering time was less than 30 seconds.

H. Tracy Hall came to this realization on December 3, 1970 (Notebook page 191). A copy of this page is attached. As is sometimes the case in chemistry, a kinetic barrier will prevent a reaction or phase change from occurring if the time is sufficiently short. Thus kinetics thwarts thermodynamics.

Mega takes advantage of this trade secret in its processes for making PCD's and thereby reduces press time. Clearly, Megadiamond does not infringe GE's patents.