

VI - GRINDING OPERATIONS

Power grinders are perhaps the most universally used of the small power-driven tools. The usual power grinder, commonly known as the emery wheel, consists of a cast metal stand and two abrasive wheels mounted on a through shaft which is either belt or motor driven. There are also several grinding wheels, such as are found on machine tool equipment where grinding takes the place of lathe and planer work. All grinding operations produce dust to a greater or lesser degree, depending on the composition and construction of the wheel, the material being ground and the ventilation or exhaust hoods provided.

What is the Composition of Grinding Wheels? Grinding wheels are made of either bauxite which is mined, or silicon carbide which is made by heating a mixture of quartz sand, coke and common salt in an electric furnace. The bauxite or silicon carbide are crushed to the desired grain size, mixed with an adhesive substance called a bond, and formed into wheels, discs, cones or cylinders. There are many wheels in which the binder is shellac, rubber, bakelite and other organic compounds. Bauxite wheels are known in the shop as "Alundum" and "Aloxite", while silicon carbide wheels are known as "Crystolon" and "Carborundum". Alundum wheels should be used on material of low tensile strengths such as cast iron, brass, aluminum, copper and marble.

Is Abrasive Dust Harmful? According to Dr. W. Irving Clark in a paper read at a meeting of Government Officials in Industry (Boston - May 21, 1931) the artificial abrasives, aluminum oxide and silicon carbide do not contain free silica and their dust cannot produce silicosis. The dust, like any other inorganic dust, can, however, if breathed for a long period of time in large quantities, produce an X-ray picture similar to that of early silicosis. This picture changes very slightly as years of exposure increase, and at no time are the nodules, characteristic of silicosis, evident. Unlike silicosis, there is no progress in the process after exposure ceases and there appears to be no marked physical disability. Although there is no silicosis, the X-rays do show signs of pneumoconiosis.

Carborundum dust, chemically, is silicon carbide. According to Miller and Sayers (U.S. Pub. Health Rep. Vol. 49 #3 of Jan. 19, 1934) carborundum dust when injected into the peritoneal cavity of guinea pigs produced no reaction and was termed "inert". Dusts such as quartz and flint - silicosis producing dusts - produced a proliferative reaction.

Leroy U. Gardner (U.S. Pub. Health Rep. Vol. 50 #21 of May 24, 1935) reports that carborundum produces practically no reaction when inhaled by guinea pigs in high concentrations over a period of time. Quoting from Dr. Gardner's article, the part pertaining to carborundum dust:

"The dust which does reach the tracheobronchial lymph nodes apparently lacks the proper physiochemical properties to stimulate any but a very slight proliferation of connective tissue. In the lungs, there is practically no fibrosis."

The Journal of the American Medical Association (Notes and Queries 103, 1472, 1934) makes this statement regarding the health hazard of breathing dust from artificial abrasives:

"Only silica (SiO_2) is capable of inducing silicosis, but any other mineral dust under conditions of prolonged and gross exposure may cause some increase in pulmonary fibrosis. If the relative potential harm of silica is rated as 100, these other non-toxic mineral dusts may be rated