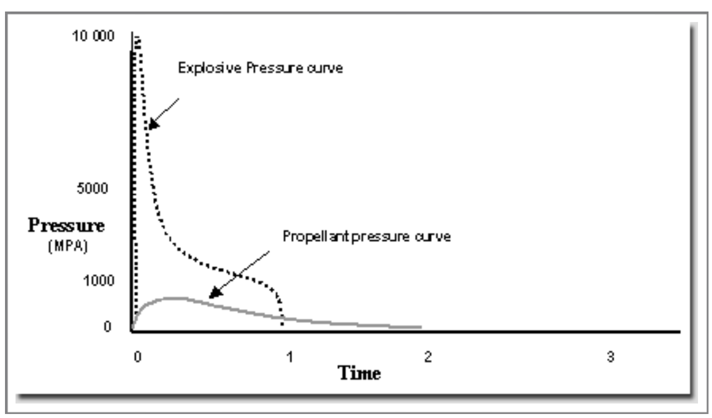
NEWS THIS MONTH

YOUR SOURCE FOR ALL THINGS ROCK-BREAKING

DETONATION VS. DEFLAGRATION

The rock breaking mechanism employed by Nxburst™ differs to that of explosives due to the rock being fractured in tension rather than compression. The gas generated by the ignition of the propellant enters into the micro-fractures created from the percussive drilling process and into the natural fractures and planes of weakness of the rock or concrete, initiating cracks and expanding fractures causing the rock or concrete to break.

The tensile breakage mechanism of Nxburst™ uses a much lower amount of energy than explosives for the same application. The Nxburst™ cartridge contains proprietary technology, which enhances the transfer of energy into the rock to increase the rock or concrete breaking ability, which can be optimally adapted to suit the rock or concrete conditions and rock or concrete breaking requirements for any particular operation / application. The reason why a Nxburst™ cartridge does not explode, is that the velocity of deflagration or burning of the propellant is almost directly proportional to the degree of confinement of the chemical reaction. Thus, in an unconfined environment such as the product's original packaging, the propellant if ignited will only burn at a very low velocity, which is incapable of causing an explosion. In contrast, an explosive, if detonated or initiated in its original packaging, will produce a major explosion the result of which historically has had fatal consequences. The end result is that propellant based cartridges are much safer to transport, store and use than explosives and for that reason the regulations relating to the transport and storage of Nxburst™ are considerably less stringent than for explosives such as Ammonium Nitrate/ Fuel Oil (ANFO).



What exactly is Deflagration and Detonation?

Deflagration:

By definition deflagrations are thermally initiated reactions propagating at subsonic speeds that proceed radially outwards in all directions through the energetic material, away from the ignition source. The maximum pressure developed by deflagration is dependent on the energetic materials involved; their geometry; and the strength (failure pressure) of the vessel or structure confining the materials.

Detonation:

The supersonic reaction speed of detonation develops a shock wave in the explosive, which triggers the propagating reaction. The propagation of the shock wave is accompanied by a chemical reaction that furnishes energy to sustain the shock wave advance in a stable manner, followed by the formation of the final gaseous products and their associated pressures at some time later.

The rate of gas emission from either the detonation of explosives or the ignition of propellant. If confined in a drill hole, is proportional to the rate of burning, it follows that the build- up of pressure in the hole will also be directly related to the burning or detonation rate. At the point in time at which the rock surrounding the drill hole starts to dislodge, the gas contained in the drill hole is released. In the case of explosives, the pressures in the drill hole are so high, due to the rate of detonation of the explosive, that the release of the gases is a violent event that results in a high level of fly rock, shock waves and a high overpressure which produces a destructive concussion effect especially in confined spaces such as are found in underground mines.

Figure 2

In contrast, a tailored Nxburst™ charge produces an optimal pressurization of the hole, which results in optimal gas release at a relatively low pressure, thus obviating the destructive side effects such as fly rock and concussion effects caused by explosives.

In practical terms, deflagration can drastically reduce the hazards of rock-breaking while maintaining the speed and efficiency of using conventional high explosives. Looking at the figure 2 shows you just how contained an event can be while still breaking a significant amount of rock.