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SUCCESSFUL DESIGN SELECTION FOR UNDERGROUND BORING EQUIPMENT

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ABSTRACT: Equipment selection is a critical factor for Design Engineers in determining the success of underground utility projects. A variable as small as cutter spacing on a machine's cutting head can often make the difference between a successful, on-time project and a delayed, costly one. This paper examines how manufacturers determine their selections for two major variables in utility installation technology: cutting tools and cutterhead geometry. The analysis results in a basic roadmap for equipment selection in specific geological conditions.

Whether the method is Tunnel Boring, Auger Boring, Pipe Jacking, or Microtunneling, all Design Engineers have to consider how to design for the most efficient excavation of material from the tunnel heading. Each method has a distinct range of geological conditions in which that efficiency is maximized.

Beyond machine selection is the cutterhead geometry of specific machines. Factors including cutting tool spacing, muck openings, and spoils removal are all important and their effective design requires a full understanding of the project conditions. A cutting head mounted with disc cutters in 36,000 psi rock, for example, would vary greatly from one for a similar crossing in rock at 14,000 psi UCS.

Cutting tool selection is also primary to any design. A multitude of tools including bullet bits, ripper teeth, backhoe teeth, tungsten carbide insert roller cutters, and disc cutters are standard for the utility industry. All of these tools have different ranges of maximal efficiency. The appropriate selection or combination of these tools thus determines advance rates, cost, and timely project completion.