Calculating Speed

Question

I have several screw conveyors in my plant all running at different speeds. I need to increase the speed of a screw conveyor due to increased capacity. All my drive units are Dodge TA II shaft-mounted gear reducers utilizing belts and sheaves between the motor and gear reducer. How do I calculate the current output speed of a screw conveyor? Also, how do I increase the speed of a screw conveyor by 15-percent?

Answer

You need to know several inputs to determine the speed of a screw conveyor utilizing a shaft-mounted screw conveyor drive. The four basic inputs required are – motor speed (MS), gear reducer ratio (GRR), drive sheave diameter (D1) and driven sheave diameter (D2). Most motors are designed for 1750-rpm output speed. The most common shaft-mounted gear reducer is 25-to-1. We will use a gear reducer ratio of 25-to-1 for our example.

To determine the current speed, you can simply measure the outside diameter of each sheave. For demonstration purposes, we will use a drive sheave diameter of 3.5-inches, and a driven sheave diameter of 7.0-inches. Now we can easily calculate the screw conveyor output speed (SCOS) using the following formula –

SCOS = (Motor Speed (MS) / Gear Reducer Ratio (GRR)) X (Drive Sheave Diameter (D1) X Driven Sheave Diameter (D2))

SCOS = (1750 / 25) X (3.5 / 7.0)

SCOS = 35-rpm

If you would like to increase the speed of the screw conveyor by approximately 15-percent to a new screw conveyor output speed (NSCOS) of 42-rpm, then you can simply reduce the diameter of the driven sheave. The desired driven sheave size can be determined by the following formula –

D2 = (Motor Speed (MS) / Gear Reducer Ratio (GRR)) X (Drive Sheave Diameter (D1) X New Screw Conveyor Output Speed (NSCOS))

D2 = (1750 / 25) X (3.5 / 42)

D2 = 5.83-inches

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KWS Manufacturing
3041 Conveyor Drive
Burleson, Texas 76028

Toll Free: (800) 543-6558
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Fax: (817) 447-8528

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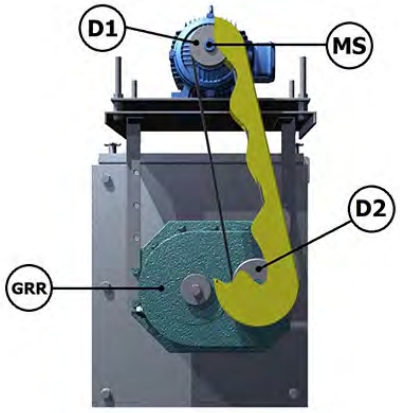
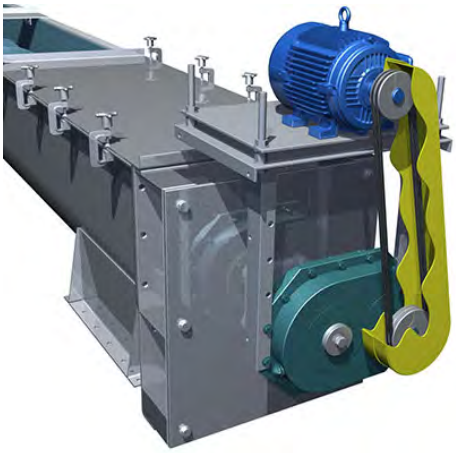


Inputs Needed to Determine
Screw Conveyor Speed



Typical Screw Conveyor Drive
Mounted on Screw Conveyor

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3041 Conveyor Drive
Burleson, Texas 76028

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Fax: (817) 447-8528

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