Screw Conveyors
KWS PROFILE

Founded in 1972, KWS Manufacturing Company, Ltd, is the leader in the design and manufacture of conveying equipment for the bulk material handling industry. Our primary Customers are power transmission distributors, end users, engineering firms, system suppliers and original equipment manufacturers (OEMs).

As an ISO 9001 certified manufacturer, KWS provides the highest quality equipment and service to our Customers. The KWS name stands for Knowledge, Workmanship and Solutions. Our large number of repeat Customers shows our commitment to Customer satisfaction. Our quality system ensures that your equipment is designed and manufactured to rigid specifications and validated by exceeding performance expectations.

We also offer complete system design and engineered solutions for our Customers. KWS is one of the largest conveyor manufacturers in North America and continues to grow every year.

KWS SCREW CONVEYOR ENGINEERING GUIDE

Screw conveyors are a cost effective and reliable method of conveying bulk materials. Thousands of bulk materials are conveyed and processed daily utilizing screw conveyors. The KWS Screw Conveyor Engineering Guide is an excellent resource for understanding and designing screw conveyors. The engineering guide is easy to use, with descriptions of many bulk materials and their characteristics. Examples are provided to assist the screw conveyor designer on how to properly select a screw conveyor, determine horsepower and speed as well as choose the proper components for a specific application.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCREW CONVEYOR BASICS</td>
<td>1</td>
</tr>
<tr>
<td>TYPES OF SCREW CONVEYORS</td>
<td>2</td>
</tr>
<tr>
<td>Horizontal Screw Conveyors</td>
<td>2</td>
</tr>
<tr>
<td>Inclined Screw Conveyors</td>
<td>3</td>
</tr>
<tr>
<td>Pitch Efficiency</td>
<td>4</td>
</tr>
<tr>
<td>Horsepower Requirements</td>
<td>4</td>
</tr>
<tr>
<td>Upset Conditions</td>
<td>4</td>
</tr>
<tr>
<td>Shaftless Screw Conveyors</td>
<td>5</td>
</tr>
<tr>
<td>Advantages of Shaftless Screw Conveyors</td>
<td>5</td>
</tr>
<tr>
<td>Vertical Screw Conveyors</td>
<td>6</td>
</tr>
<tr>
<td>Advantages of Vertical Screw Conveyors</td>
<td>6</td>
</tr>
<tr>
<td>TYPES OF SCREW FEEDERS</td>
<td>7</td>
</tr>
<tr>
<td>Screw Feeders</td>
<td>7</td>
</tr>
<tr>
<td>Variable or Stepped Pitch</td>
<td>7</td>
</tr>
<tr>
<td>Tapered Outside Diameter</td>
<td>8</td>
</tr>
<tr>
<td>Mass Flow</td>
<td>8</td>
</tr>
<tr>
<td>Basic Screw Feeder Design</td>
<td>9</td>
</tr>
<tr>
<td>Feeder Shroud</td>
<td>10</td>
</tr>
<tr>
<td>Screw Feeder Capacity and Speed</td>
<td>10</td>
</tr>
<tr>
<td>Screw Feeder Horsepower Requirements</td>
<td>10</td>
</tr>
<tr>
<td>Other Types of Screw Feeders</td>
<td>11</td>
</tr>
<tr>
<td>Multiple Diameter Screw Feeder/Conveyor</td>
<td>11</td>
</tr>
<tr>
<td>Live Bottom Screw Feeder</td>
<td>11</td>
</tr>
<tr>
<td>Inclined Screw Feeders</td>
<td>12</td>
</tr>
<tr>
<td>Basic Inclined Screw Feeder Design</td>
<td>12</td>
</tr>
<tr>
<td>Inclined Screw Feeder Capacity and Speed</td>
<td>13</td>
</tr>
<tr>
<td>Inclined Screw Feeder Horsepower Requirements</td>
<td>13</td>
</tr>
<tr>
<td>Inlet Length</td>
<td>13</td>
</tr>
<tr>
<td>Flight Pitch Changes</td>
<td>13</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS

BULK MATERIAL CHARACTERISTICS. ..................................................... 14
  Maximum Particle Size and Bulk Material Lump Size .......................... 14
  Bulk Density ................................................................. 14
  % Trough Loading ........................................................ 14
  Material Factor (MF) .......................................................... 14
  Component/Bearing Series ...................................................... 14
  Abrasiveness, Corrosiveness, Flowability and Special Characteristics ...... 14
  Bulk Material Lump Size ...................................................... 15
  Bulk Material Lump Classification ......................................... 15
  Class 1 ................................................................. 15
  Class 2 ................................................................. 15
  Class 3 ................................................................. 15
  Lump Size Ratio ............................................................. 16
  Trough Loading ............................................................. 17
  15% Trough Loading ......................................................... 17
  30%A Trough Loading ....................................................... 17
  30%B Trough Loading ....................................................... 17
  45% Trough Loading ......................................................... 17

COMPONENT / BEARING SERIES. ...................................................... 18
  Component Series .......................................................... 18
  Series A ................................................................. 18
  Series B ................................................................. 18
  Series C ................................................................. 18
  Series D ................................................................. 18
  Component Series Tables ................................................... 19
  Series 1 ................................................................. 20
  Series 2 ................................................................. 20
  Series 3 ................................................................. 20
  Series 4 ................................................................. 20
# TABLE OF CONTENTS

FACTORS INFLUENCING SCREW CONVEYOR DESIGN ........................................... 21
  Abrasiveness, Corrosiveness and Flowability ............................................... 21
  Special Characteristics Notes ................................................................. 21
  Abrasive Bulk Materials ............................................................................. 22
  Highly Corrosive ......................................................................................... 22
  Mildly Corrosive ......................................................................................... 22
  Builds Up and Hardens (A) ......................................................................... 22
  Generates Static Electricity (B) ..................................................................... 23
  Decomposes – Deteriorates in Storage (C) ..................................................... 23
  Flammability (D) .......................................................................................... 23
  Becomes Plastic or Tends to Soften (E) ......................................................... 23
  Very Dusty (F) ............................................................................................. 24
  Aerates and Becomes Fluid (G) .................................................................... 24
  Explosiveness (H) ......................................................................................... 24
  Stickiness - Adhesion (I) .............................................................................. 24
  Contaminable, Affecting Use (J) ................................................................. 25
  Degradable, Affecting Use (K) ................................................................. 25
  Gives Off Harmful or Toxic Gas or Fumes (L) ............................................. 25
  Hygroscopic (M) ......................................................................................... 25
  Interlocks, Mats or Agglomerates (N) ......................................................... 25
  Oils Present (O) ......................................................................................... 26
  Packs Under Pressure (P) ................................................................. 26
  Very Light and Fluffy (Q) .......................................................................... 26
  Elevated Temperature (R) .......................................................................... 26
  May Be Conveyed in a Vertical Screw Conveyor (V) .................................... 26

BULK MATERIAL TABLE .............................................................................. 27
# TABLE OF CONTENTS

SCREW CONVEYOR CAPACITY .................................................. 42
  Calculation Of Conveyor Speed ........................................... 42
  Capacity Factors for Special Pitches ...................................... 43
  Capacity Factors for Modified Flight ...................................... 43
  Example ............................................................................... 44
  Capacity Table ...................................................................... 46

SCREW CONVEYOR HORSEPOWER ........................................... 47
  Friction HP Calculation ........................................................ 47
  Material HP Calculation ....................................................... 47
  Total Shaft HP Calculation .................................................... 47
  Equation Nomenclature ......................................................... 47
  Corrected Material Horsepower ............................................. 49
  Corrected Material HP Chart .................................................. 49
  Conveyors With Special Flights .............................................. 50
    Total Shaft Horsepower ....................................................... 50
    Special Flight Factors ........................................................ 50
    Example ............................................................................ 50

SCREW CONVEYOR TORQUE .................................................. 51
  Torque Table – Carbon Steel .................................................. 52
  Torque Table – Stainless Steel ............................................... 53

SCREW CONVEYOR EXAMPLE ................................................ 54
  Step 1: Establish Characteristics Of Bulk Material .................. 54
  Step 2: Determine Conveyor Size and Speed Based On Capacity  55
  Step 3: Calculate Horsepower Requirements .......................... 56
  Step 4: Calculate Torque Requirements ..................................... 59
  Step 5: Component Series Selection ......................................... 61

DIMENSIONAL LAYOUT OF CONVEYOR ................................. 63