Financial Justification

<table>
<thead>
<tr>
<th>Category</th>
<th>Typical Part Costs - 12 Stations</th>
<th>Typical Part Costs - 24 Stations</th>
<th>Typical Labor Costs - 12 Stations</th>
<th>Typical Labor Costs - 24 Stations</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Pins &amp; Bushings</td>
<td>$8,078</td>
<td>$16,709</td>
<td>$23,650</td>
<td>$41,387</td>
<td>Labor Rates Include On-site Expenses</td>
</tr>
<tr>
<td>2 - Linkage Rebuild</td>
<td>$55,252</td>
<td>$127,118</td>
<td>$41,387</td>
<td>$70,280</td>
<td></td>
</tr>
<tr>
<td>3 - Complete Station Rebuild</td>
<td>$134,775</td>
<td>$412,436</td>
<td>$70,950</td>
<td>$130,075</td>
<td></td>
</tr>
<tr>
<td>4 - Complete Spool Rebuild</td>
<td>$307,007</td>
<td>$881,451</td>
<td>$47,300</td>
<td>$82,775</td>
<td>Labor Performed at Graham Engineering</td>
</tr>
<tr>
<td>5 - New Spool &amp; Cam</td>
<td>$695,000</td>
<td>$985,000</td>
<td>$47,300</td>
<td>$82,775</td>
<td>Includes labor to build spool; On-site installation extra.</td>
</tr>
</tbody>
</table>

- Rebuild costs for Category 1-3 include typical travel & expenses. Rates vary by geographic region.
- Graham Engineering reserves the right to quote rebuild hours based upon condition & location of machines. Estimates will vary.
- Labor costs based on standard 2017 Graham Engineering assembly & Service rates. Rebuild labor costs do not include removing & re-integration of spool into frame.
- Prices for parts & labor are estimates only & will vary based on size (model) of wheel, number of stations, condition of the machine, & other factors. We will be glad to provide a detailed quotation based upon a thorough inspection by a Graham Engineering technician.

Other Considerations

We are often asked how to justify the cost of doing rebuilds. While the factors vary for each customer, the following should be considered when deciding to do a rebuild:

- "Pay Now or Pay Later" – delaying a rebuild will ultimately raise overall maintenance costs as wear will accelerate, requiring even more extensive parts replacements in the future.
- Lost production due to poor bottle quality.
- Lost production due to frequent machine stoppages to deal with issues such as popping molds, mold damage, or breaking of components.
- Down time for machine repairs will be minimized by following proper rebuilding and maintenance procedures.

"As a rule of thumb, when the speed of the wheel (in RPMs) times the number of years of operation reaches the range of 60-70, you should evaluate the need for a Category 4 rebuild."

Maximizing Operational Efficiencies Through Proper Rotary Wheel Rebuilds

Graham Engineering® rotary wheel spools before (foreground) & after (background) a major rebuild. Minor rebuilds are used to maintain your machine in peak running condition, while major rebuilds are used to obtain "like new" performance.
Your Graham Engineering Rotary Wheel

Graham Engineering wheels are designed to operate for decades. We estimate that well over 90% of all GEC wheel machines produced since we began manufacturing wheels in 1968 are still in production today. In fact, the first GEC wheel, serial number 00001, is still in production in Mexico.

Like any mechanical machine, rotary wheel machines from Graham Engineering require routine maintenance, as well as periodic rebuilds. To ensure the prolonged life of your machine, it is important to establish a schedule for both routine maintenance & the replacement of worn parts.

In this guide, we will help you fully understand the rebuilding options available to you & show you how to optimize your production & extend the life of your Graham Engineering rotary wheel blow molding machines.

Understanding Symptoms

The following symptoms may indicate the need for a rebuild:

- Breakage of guide rod or tie bar bolts. (This is often evidence of major wear or even cracked parts due to failure to timely replace the pins & bushings)
- Excessive wear in the cam – such as a rolled out “lip” noticeable to the touch, or “dishing out” of the cam track
- Evidence of fretting or metal particles around the bearings
- Noticeable “play” in the linkages
- Damage to molds – pinches & leader pins
- Frequent issues causing stopping & restarting of the process
- Molds blowing open or loss of clamp pressure
- General tightening up of the processing window
- Issues from mold pinches becoming worn, such as bad trimming. (This may be due to mold misalignment of the pin & guide blocks)
- Bottle drop inconsistencies, or bottles staying in the molds
- Parting line mismatch
- Bottle quality deterioration

The following charts give an indication of the typical durations and costs to perform Category 1, 2, 3 & 4 rebuilds on machines produced since we began manufacturing wheels in 1968 are still in production today. In fact, the first GEC wheel, serial number 00001, is still in production in Mexico.

Understanding Timing

Like any mechanical machine, rotary wheel machines from Graham Engineering require routine maintenance, as well

<table>
<thead>
<tr>
<th>Category</th>
<th>Items Replaced</th>
<th>Typical Frequency</th>
</tr>
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<tbody>
<tr>
<td>Category 1 - Pin &amp; Bushing Replacement</td>
<td>Everything listed under categories 1 &amp; 2</td>
<td>~ 4 Years</td>
</tr>
<tr>
<td>Category 2 - Linkage Replacement</td>
<td>Everything listed under categories 1 &amp; 2</td>
<td>~ 8-12 Years</td>
</tr>
<tr>
<td>Category 3 - Complete Station Rebuild</td>
<td>Everything listed under categories 1, 2 &amp; 3</td>
<td>~ 6-12 Years</td>
</tr>
<tr>
<td>Category 4 - Complete Spool Rebuild</td>
<td>Everything listed under categories 1, 2 &amp; 3</td>
<td>~ 6-12 Years</td>
</tr>
<tr>
<td>Category 5 - Spool &amp; Cam Replacement</td>
<td>Everything listed under categories 1, 2 &amp; 3</td>
<td>~ 6-12 Years</td>
</tr>
</tbody>
</table>

Understanding Symptoms

The following symptoms may indicate the need for a rebuild:

- Bottle quality deterioration
- Parting line mismatch
- Bottle drop inconsistencies, or bottles staying in the molds
- Issues from mold pinches becoming worn, such as bad trimming. (This may be due to mold misalignment of the pin & guide blocks)
- General tightening up of the processing window
- Issues from mold pinches becoming worn, such as bad trimming. (This may be due to mold misalignment of the pin & guide blocks)
- Bottle drop inconsistencies, or bottles staying in the molds
- Parting line mismatch
- Bottle quality deterioration

Category 1 - Pin & Bushing Replacement

Generally, the first “rebuild” required on a rotary wheel machine is the simple replacement of the pin & bushings.

Category 2 - Linkage Replacement

A Category 2 “rebuild” contains the following parts:

- Pins & bushings (Category 1)
- Linkages (as needed)
- Spring stacks

Linkages require replacement when they have become worn from grinding against other linkages, or when they become very tight so that the bearing holes may "wallow out" due to loose fitting of the pins & bushings over time.

When the linkages require replacement, it is our experience that the spring stacks are also due for replacement. Most customers opt to replace all of these units at one time when undergoing a category 2 rebuild.

Category 3 - Complete Station Rebuild

A Category 3 rebuild contains the following parts:

- Everything listed under categories 1, 2 & 3
- Guide rods & guide rod bearings
- Pivot blocks
- Actuating rods & actuating rod bearings
- Bases & gibs (sliders) on the cam follower slide blocks
- Cam followers

Category 4 - Complete Spool Rebuild

This replaces the following parts:

- Everything listed under categories 1, 2 & 3
- Guide rods & guide rod bearings
- Pivot blocks
- Actuating rods & actuating rod bearings
- Bases & gibs (sliders) on the cam follower slide blocks
- Cam followers

Category 5 - Spool & Cam Replacement

For equipment that has worked for many years & shows symptoms of wear at the rotary shaft union, bull gear, shaft bearings & keyways, & cams, we offer complete spool replacement. All rotating parts are replaced. This will also reduce the time needed for repair.

Category 5 is the best option when the line has to be back in production with minimum downtime. Typical change over time is 6-10 days.

Understanding Symptoms

The following symptoms may indicate the need for a rebuild:

- Bottle quality deterioration
- Parting line mismatch
- Bottle drop inconsistencies, or bottles staying in the molds
- Issues from mold pinches becoming worn, such as bad trimming. (This may be due to mold misalignment of the pin & guide blocks)
- General tightening up of the processing window
- Issues from mold pinches becoming worn, such as bad trimming. (This may be due to mold misalignment of the pin & guide blocks)
- Bottle drop inconsistencies, or bottles staying in the molds
- Parting line mismatch
- Bottle quality deterioration

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