Session 3H

Life After the OEM

A Case Study of What Can Happen When You Lose OEM Support, and What You Can Do About It

Presented by:
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Introduction

“Throughout most of the 20th century, governor upgrades were low on most owners’ priority list. The original equipment governors worked well and were extremely reliable; maintenance crews understood how they worked and knew how to service them; spare parts were either on-hand or readily available; and the major Original Equipment Manufacturers (OEMs) continued to provide good support. There was no reason to upgrade.

All that changed by the end of the 20th century. All of the governor-only OEMs had either gone out of business or been acquired by other firms. Parts were increasingly expensive and lead times were long. Powerplant crews found creative ways to get parts: they bought them locally, borrowed from other plants, or simply made the parts themselves. With little to be gained in terms of unit efficiency, and concerns about computer technology, digital upgrades remained a low priority.

Yet, governor technology had long since evolved into digital control, and governor OEMs made a business decision to cut off support for their legacy governors. When customers requested parts, they heard that their governors were obsolete and, although some parts were still available, support would eventually end. They were encouraged to begin planning for digital upgrades. This sent a shock wave through the hydro industry.”
Hydro Governor OEMs: Then

<table>
<thead>
<tr>
<th>Allis-Chalmers</th>
<th>Neypic</th>
<th>Pelton</th>
<th>Voith</th>
<th>Woodward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asea</td>
<td>Leffel</td>
<td>S M Smith</td>
<td>Sulzer</td>
<td>Vevey</td>
</tr>
<tr>
<td>IP Morris</td>
<td>Lombard</td>
<td>LMZ</td>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

[Images of hydro governor components]
Hydro Governor OEMs: Now

<table>
<thead>
<tr>
<th>Andritz</th>
<th>General Electric</th>
<th>Voith</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Third-Party Governor Design-Build Mfrs)</td>
<td>(Large SCADA / Plant Automation OEMs)</td>
<td></td>
</tr>
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</table>
ESB Story: “Our OEM Says We Must Upgrade”

<table>
<thead>
<tr>
<th>Name</th>
<th>River</th>
<th>Units</th>
<th>Year</th>
<th>Governor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poulaphuca</td>
<td>Liffey</td>
<td>2 x 15MW</td>
<td>1937-49</td>
<td>English Electric Mechanical</td>
</tr>
<tr>
<td>Golden Falls</td>
<td>Liffey</td>
<td>2 x 4MW</td>
<td>1937-49</td>
<td>English Electric Mechanical</td>
</tr>
<tr>
<td>Leixlip</td>
<td>Liffey</td>
<td>2 x 4MW</td>
<td>1937-49</td>
<td>ASEA Analog Electric</td>
</tr>
<tr>
<td>Cliff</td>
<td>Erne</td>
<td>2 x 10MW</td>
<td>1955</td>
<td>WGC 517 Digital</td>
</tr>
<tr>
<td>Cathleen’s Falls</td>
<td>Erne</td>
<td>2 x 22.5MW</td>
<td>1952</td>
<td>ASEA Analog Electric</td>
</tr>
<tr>
<td>Carrigadroid</td>
<td>Lee</td>
<td>1 x 8MW</td>
<td>1952-57</td>
<td>Voith Mechanical</td>
</tr>
<tr>
<td>Inniscarra</td>
<td>Lee</td>
<td>1 x 15, 1 x 4MW</td>
<td>1952-57</td>
<td>Voith Mechanical</td>
</tr>
<tr>
<td>Clady</td>
<td>Clady</td>
<td>1 x 4.2MW</td>
<td>1950</td>
<td>Riva Mechanical</td>
</tr>
<tr>
<td>Ardnacrusha</td>
<td>Shannon</td>
<td>4 units; 86MW</td>
<td>1929-34</td>
<td>Alstom Digital</td>
</tr>
<tr>
<td>Turlough Hill</td>
<td>(Pump/Gen)</td>
<td>4 x 73MW</td>
<td>1974</td>
<td>Voith Digital (2009)</td>
</tr>
</tbody>
</table>
ESB Explores a Different Route: Condition Assessment of Existing Fleet

Voith (Mechanical)  
English Electric (Mechanical)  
Asea (Analog)
What Happened to... Asea?
What Happened to....Woodward?

Woodward (Hydros) 1870

Woodward (Hydros) (Engines) (Propellers) 1936

Woodward (Hydros) (Electric) (Gas Turbines) (Steam Turbines) 1964

GE

"Aftermarket Services" including all Hydro designs & patents

Woodward
OEM Engines
OEM Aircraft Controls
OEM Gas Turbines
OEM Steam Turbines
More than 170 years of experience and knowledge in the field of hydropower generation.
What To Do? **Assess** Each of Your OEMs

ASK THEM about their **short-term** and **long-term** plans for:

- Spare Parts
- Factory Repairs
- Field Service
- Training
- Tech Support
- Maintenance Contracts
- Support of newly acquired equipment lines
What To Do? Develop a Fleet Management Plan

If OEM is willing and able, use them to develop a short/long term plan for managing your equipment

If OEM is unavailable or unable, find a Subject Matter Expert inside or outside your company who has expertise

- Can help you prioritize your work. Good units vs bad unit
- Lifecycle analysis
- Short/Mid/Long-term plans

Goals
- increase availability
- reduce # of forced outages
- MTBF / MTTR
- preventative & predictive maint.
- reduce costs

ASK THEM about the long-term (or short-term) availability of:

- Spare Parts
- Factory Repairs
- Field Service
- Training
- Tech Support
- Maintenance Contracts
- Fleet management / Support of other's equipment
What Are Others Saying?

“If you own a mechanical governor, KEEP IT!”
• Direct quote from a Maintenance Foreman at a large SE utility

“We get more callouts on this digital governor than we ever had before”
• Direct quote from a Plant Support Specialist in Canada

“Our new digital governor system has run flawlessly for 12 years, and there’s hardly any maintenance!”
• A satisfied Digital Governor Customer in California

If you go Digital, buy as many electronic spare parts as you can afford, then seal them and put them in long-term storage.”
• General AGC recommendation
Hybrid Solution = Best of Both Worlds

• Legacy governor support for as long as customers want it:
  • Parts and Service
  • Training and Overhauls

• Digital governor solutions when customers make the jump:
  • Customer-preferred platform
  • Governors and Unit Controls
  • HPUs and Pressure Tanks
  • Turnkey Commissioning