

# Bent Stems: Causes and Prevention

Quabbin is often asked to replace bent gate stems. The first step is to determine *why* it bent, so the underlying issue can be corrected.

Gates are typically designed to be easily operated with 40 lbs of effort, and to not fail with up to 100 lbs of effort applied to the handwheel or crank. If a stem is bending, the gate is being operated with far more torque than the structure can withstand.

## Common causes:

- Disc is bound in frame
- Portable operator used without a torque limiter
- Electric operator used with limit or torque switches set incorrectly or broken
- Application of excessive force to crank or handwheel
- Incorrect tracking of gate in frame guides
- Inability of gate to close due to object in waterway
- Undersized stem ( $L/r > 200$ )
- Missing or incorrectly located stop collar

## Prevention:

- Operate gate quarterly (at a minimum)
- Ensure stems are straight and plumb
- Check that stem guides are securely fastened, properly spaced and sized for the stem diameter
- Do not apply excessive force
- Have a torque limiter on portable operators set to 70 foot-lbs
- Include a stop collar positioned 1/16" above the operator nut (when gate is fully closed)
- Observe gate closely during operation for uneven movement, excessive noise or binding, any of which can indicate that adjustment is needed or that an object is lodged in the waterway



Failed limit switches and missing stop nut caused stem to bend.



Excessive force applied to bound gates caused stems to bend.



Not just parts, solutions.

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## Qualifications

Quabbin is an **ISO 9001-**, **AS9100-** and **ISO 13485-**certified gate component manufacturing company located in a 40,000-square foot facility in Wilton, NH. Quality parts, short lead times and broad capabilities have made the company a single-source parts supplier for the water, wastewater, hydroelectric and power industries for more than 25 years.

- Manufactured components for Rodney Hunt-Fontaine from 1996 to 2016 (when they closed).
- Make replacement parts for Armco, Chapman, Coffin, Coldwell-Wilcox, Craft gates and others.
- Supply stems and components to gate manufacturers in the US and Canada.

### Recently-completed jobs:

- **Bureau of Reclamation Lower Colorado Dams:** Year 1 of Intake tower cylinder gate stem assemblies for upstream Nevada tower; supplied 1,000' of 6.5" Dia stems, 600' of 10" Dia stems, *Hoover Dam, Clark County, NV*
- **TVA:** Extension stems for six 24" gate valves, over 360' of stem, couplings, stem guides, operators and pedestals, *Raccoon Mountain Pumped Storage Plant, Marion County, TN*
- **Black River WWTP:** Two Rodney Hunt 6020 manual gear boxes, *Baltimore, MD*
- **City of Detroit:** Four top wedges on a 100-year-old 72" x 120" sluice gate manufactured by Michigan Valve, *Springwells Filtration Plant, Detroit, MI*
- **Abingdon WTP:** Stem for 42" x 42" sluice gate, *Hartford County, MD*
- **TVA:** Four 8" gate valve extension stems, couplings, stem guides and operators, *Wilson Dam, Muscle Shoals, AL*
- **Louisville Metropolitan Sewer District:** Stem, coupling and stop nut for flood gate, *Louisville, KY*
- **DC Water:** Three stems for 60" x 66" sluice gate in the grit removal chamber; also stem, coupling, operator nut and pedestal on a 36" x 36" sluice gate, *Blue Plains Advanced WWTP, Washington, DC*
- **City of New York:** Hinge posts for four 78" x 96" tide gates, *Hunt's Point Wastewater Treatment Plant, Bronx, NY*
- **Northern Indiana Public Service Co.:** Four 7" Dia x 38' L stems with 34' of thread, operator nut and stop nut for two flood gates, *Oakdale Dam, Carroll County, IN*
- **Whitewater WWTP:** Stems stop collar, operator nut, thrust nut, stem guides, *Whitewater, WI*
- **Paducah Levee System:** Stems, stem guides, operators, pedestals, stem covers, stop nuts on three 60" x 60 and three 48" x 48" sluice gates, *Paducah, KY*
- **Milwaukee Metropolitan Sewerage District:** Stems, thrust nuts, stem guides, couplings on two 108" Dia and one 84" x 144" sluice gate, *Milwaukee, WI*
- **Saukville WWTP:** Stems and seals for three 42" x 42" slide gates, *Village of Saukville, WI*
- **Tonawanda Water and Sewer Dept.:** Stems, pedestals, stem guides, stop collars, stem covers, wedges, invert seals, thrust nuts, couplings and electric operators, *Amherst, NY*
- **Allied Technical Services:** 28 split stem guides, *Apple Valley, OH*
- **Syracuse Levee:** Stem, stop collar, thrust nuts, stem guides, stem cover, pedestal and Limatorque operator, *New York State Dept. of Environmental Conservation, Kirkwood, NY*
- **Mari Corps, USA:** 72 jack stands designed to raise and lower the dock at Dangling Rope Marina on Lake Powell, *Kane County, UT*
- **Bureau of Reclamation:** Extension stems, couplings, operator stems, operator nuts, stem nuts, stop collars, thrust nuts, stem bellows nuts, *Derby Dam, Sparks, NV*
- **Green Mountain Power Corp.:** Stems (4.5" x 250" L, 220" thread), operator, operator nuts, pedestals, bellows, interconnecting shafts, stop collars for two 229.5" x 76" dual stem slide gates, *Marshfield Service Spillway, Marshfield, VT*