Ductile iron promotes itself as a strong material compared to PVC. However, strength in the laboratory does not always translate to strength in a municipal water system. A design example illustrates the point.

DESIGN EXAMPLE FROM AWWA C900
The AWWA C900 standard for PVC pipe contains a design example in Appendix B. The example is repeated here (minus the cyclic surge portion, which is generally not appropriate for municipal water systems).

Design example conditions:
- Pipe diameter: 8 in.
- Working pressure (WP) = 160 psi
- Occasional surge: instantaneous change in flow velocity = 7.0 fps

PVC pipe: DR18 Pressure Class 235 psi
- Occasional surge pressure (POS) from a 1 fps instantaneous flow change = 17.4 psi
- Anticipated surge pressure = 17.4 psi/fps x 7 fps = 122 psi

Apply the same parameters to ductile iron pipe.

DI pipe: Pressure Class 350 psi
- Occasional surge pressure from a 1 fps instantaneous flow change = 52.3 psi
- Anticipated surge pressure = 52.3 psi/fps x 7 fps = 366 psi

Analysis:
- Design Check #1: Long-term pressure
  - PVC pipe: Total Pressure = WP + POS = 160 psi + 122 psi = 282 psi
  - DI pipe: Total Pressure = WP + POS = 160 psi + 366 psi = 526 psi

Key Points:
- Ductile iron's high modulus of elasticity causes large surge pressures to be developed.
- Take-aways for a utility:
  - The DI pipe would be overstressed by about 16%.
  - The PVC pipe would not be overstressed, but would still have 33% additional capacity.
  - The DI system would be subjected to a pressure spike of 526 psi (perhaps enough to cause damage to water-system components).
  - The PVC pipe system for the same conditions would experience only 282 psi (about 45% lower than for the DI system).