

THE CASE FOR U.S.-MANUFACTURED BELLEVILLE WASHERS: ENSURING QUALITY, RELIABILITY, AND SUPPLY CHAIN SECURITY

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In today's complex global market, the selection of high-quality components is crucial for ensuring operational efficiency and reliability. Opting for U.S.-manufactured Belleville washers offers numerous advantages, encompassing supply chain stability, adherence to stringent quality standards, and alignment with national economic policies.

A Legacy of Quality and Reliability

Established in 1949, Solon Manufacturing Company, located in Chardon, Ohio, is the [longest-standing Belleville washer manufacturer in the United States](#). With a legacy of delivering high-quality solutions for industrial applications worldwide, our washers are utilized on every continent, in industrial applications from the depths of the ocean to outer space, ensuring reliability in even the most extreme environments. Purchasing domestically produced Belleville washers supports the U.S. manufacturing sector, sustains local industries, and contributes to job creation and economic growth.

Solon exemplifies high standards of domestic manufacturing with [ISO 9001:2015 certification](#), demonstrating a commitment to quality management and continuous improvement. The application of Belleville washers requires precise engineering to optimize performance and cost-effectiveness. Unlike foreign manufacturers operating in different time zones, U.S. manufacturers like Solon offer immediate assistance, ensuring that technical inquiries are addressed promptly for seamless integration into various applications.

Supply Chain Stability and Compliance

Relying on foreign suppliers can introduce uncertainties related to shipping delays, customs complications, and other logistical challenges. Global events have demonstrated how disruptions in supply chains can lead to increased costs and operational challenges. By choosing U.S.-manufactured Belleville washers, companies can mitigate these risks, ensuring consistent availability and reducing lead times.

Unmatched Workmanship and Support

Belleville washers are critical components subjected to high stress in various applications. The use of substandard materials or manufacturing processes can lead to catastrophic failures, compromising the integrity of entire systems. The [Fastener Quality Act](#) was enacted to address such concerns, emphasizing the importance of strict adherence to quality standards. While Belleville washers are not explicitly covered under this act, the principles underscore the necessity for reliable manufacturing practices. Reports have noted that adherence to standards can be inconsistent, particularly with overseas suppliers. Therefore, sourcing from U.S. manufacturers ensures compliance with rigorous quality standards, utilizing primarily domestic raw materials.

Figure 1 shows stresses in a Belleville and bolt relative to their respective yield strengths. It is clear to see that the stresses in the Belleville are much higher and prone to material and manufacturing quality problems. The stresses show in blue are high compressive stress. Predictably, risk of failure is highest in areas of where tensile stresses approach the ultimate strength of the material. The FEA analysis reveals that is far more likely for the Belleville as compared to the

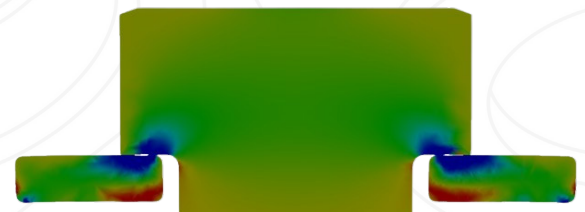
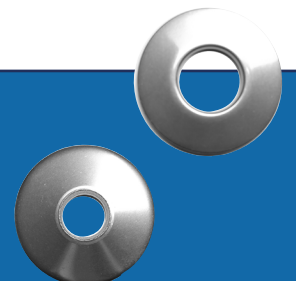


Figure 1. Stress distribution in a Belleville washer



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Alignment with National Policies

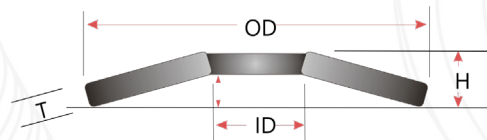
The [Build America Buy America Act](#) emphasizes the importance of using domestically produced materials in infrastructure projects. By procuring U.S.-manufactured Belleville washers, companies align with these national policies, potentially enhancing eligibility for federal funding and demonstrating a commitment to national economic interests.

Selecting U.S.-manufactured Belleville washers offers substantial benefits, including supply chain stability, superior quality assurance, regulatory compliance, and support for the domestic economy. These factors collectively contribute to the long-term success and reliability of operations across various industries.

At Solon Manufacturing Co., an industrial bolting solutions provider, we make bolting better[®] through engineering and manufacturing Belleville springs and washer products that have solved bolting application challenges for OEMs and distributors in over sixty countries.

Our knowledgeable engineering team is available to provide application support and product recommendations. We offer a variety of application-specific Belleville spring washer selection tools that can assist designers in selecting the proper Belleville spring for their requirements, including:

- [Electrical connections](#)
- [Flange connections](#)
- [Infinite Bolt Fatigue Life](#)
- [LNG / Cryogenic](#)
- [Valve packing](#)
- [PV racking systems](#)



Typical Belleville Diagram

For additional resources and information, visit www.solonmfg.com.

ABOUT THE AUTHOR



George P. Davet, BSME, MBA is President, Chief Engineer and Owner at Solon Manufacturing Company and has written and published numerous articles on the use and application of Belleville spring washers. To learn more about Bellevilles and Solon Manufacturing, visit www.solonmfg.com, for technical resources such as case studies, white papers, product selection tools and videos.



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