



## La Belle Lute

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*La Belle Lute*, which translates to “The Beautiful Struggle”, was a collaboration between two colleagues who used both new technologies (3D printing) and traditional textile creation (hand-knitting) to create a wearable garment. The design of this cape was influenced by Gothic architecture and armor, the stories of Joan of Arc, and the battles that today’s women continue to fight.

Gothic architecture first originated in northern France during the twelfth century, and began to decline in the 16<sup>th</sup> century. Towers and spires are some of the characteristics seen in Gothic architecture, which were the design inspiration for the spikes that ornament the 3D printed shoulder pieces. While Gothic architecture began with the design of churches, castles and fortifications built in this architectural style were “planned for defense and administration, but also for their psychological impact on the local population” (Victoria and Albert Museum, n.d.).

During the Gothic period, there was a great deal of political and social upheaval, with more freedom from feudalism. One of the most well-known women who lived during this time period was Joan of Arc, who travelled with King Charles II’s army during the Hundred Years War. This French-English conflict began as a dispute over the French throne. Armor was donated to her, and as the head of the army, Joan of Arc turned the dispute into a religious war (Biography, n.d.). Her leadership and heroism ultimately resulted in an English retreat. Although Joan of Arc was eventually captured and executed, her legacy survived on through her heroine and Catholic canonization (Biography, n.d.).

Today’s women continue to battle different challenges with strength and resilience centuries after Joan of Arc led an army of men into a deciding battle. Examples of the ongoing political activism and involvement by women include, but are not limited to these following changing roles and needs of women: voting (Neuman, 1996), access to comprehensive women’s health care (Clarke & Olesen, 2013), working for equal pay (Rosenfeld, 2017), and access to education (Kelley, 2012). This sense of empowerment was seen recently in the Women’s March that took place on January 21, 2017 in Washington DC. As stated by one of the participants in the Women’s March, “It made us realize that the promise of full equality for all and eradicating hatred and fear in our political rhetoric was far from becoming our reality. The Women’s March reminded me that not only is there hope, but the resistance to misogyny, racism, sexism, xenophobia, hatred and bigotry is alive, well, and more awake and ready to fight than ever” (Donaldson, 2017).

To create the neck and shoulder-pieces for *La Belle Lute*, the garment's model was scanned using a Human Solutions 3D Body Scanner. Following this, the design of the neck and shoulder-pieces were created in Rhinoceros 3D modeling software using the body scan as base geometry, as well as spikes of various sizes, which were 3D printed using a Makerbot Fifth Generation 3D printer. These pieces were 3D printed in a black polylactic acid (PLA), a biodegradable material. The 3D printed pieces were subsequently brushed with silver acrylic paint to emulate the appearance of worn armor. The neck and shoulder-pieces were attached to faux leather fabric and cords. The neck and shoulder pieces were attached to a knitted cape. This cape was hand-knit using stockinette stitch using green wool yarn that was acquired from the Ohio Knitting Mills when it closed in 2004. Ohio Knitting Mills was one of the largest knitwear manufacturers in the United States who made garments for brands such as Spiegel, Sears, JCPenney (Tatar & Grollmus, 2010), Saks, and Van Heusen (Ohio Knitting Mills, n.d).

Using a compilation of our sources for inspiration, we were able to create a silhouette that encompasses power, strength and artification. The mix of textures represents the balance between feminism and fortitude, while the asymmetric shape adds an engaging line of sight for viewers. The results of this collaboration shows how technologically aided design can be used to create a wearable garment that is aesthetically pleasing. *La Belle Lute* is a work that not only highlights the combination of newer technology with traditional textile creation, but also reflects upon history and contemporary events.

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