THE HONG KONG POLYTECHNIC UNIVERSITY
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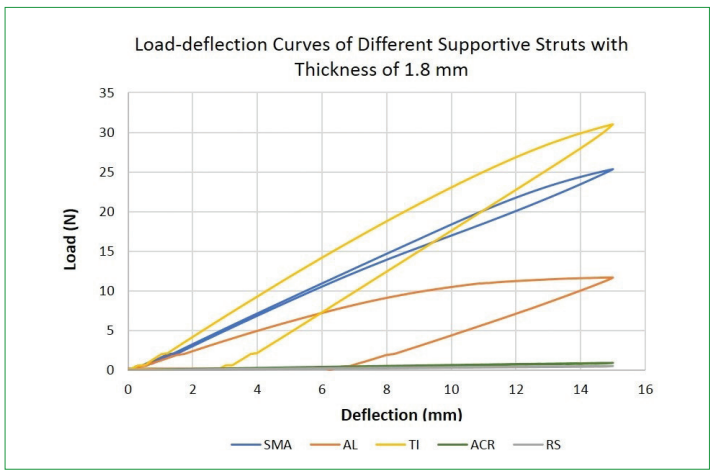
配備形狀記憶合金鉸鏈的可動式矯形腰背架
Flexible Scoliotic Brace with Shape Memory Alloy Struts

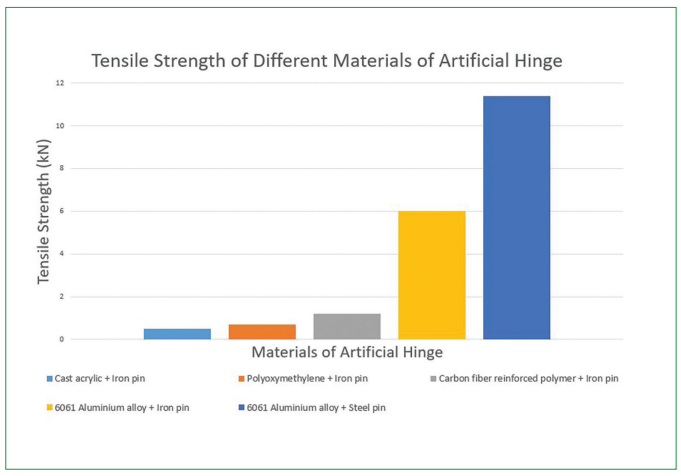
為脊柱側彎患者而設計的舒適功能性服裝
A comfortable functional garment for patients with scoliosis

創新的可動式腰背架是專為患有脊柱側彎的青少年而設計的功能性服裝。它採用了形狀記憶合金和人工鉸鏈，有策略地施加能夠修正脊柱的力，為穿著者提供足夠的支撐。可動式腰背架結合臨床實踐、材料科學及紡織技術，能更有效地控制脊柱側彎的情況，而舒適的設計亦可提高患者對治療的依從性，令患者更有恆心地接受治療，從而降低對傳統支架或手術的需求。

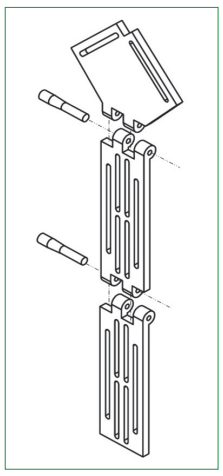
可動式矯形腰背架
The Flexible Scoliotic Brace



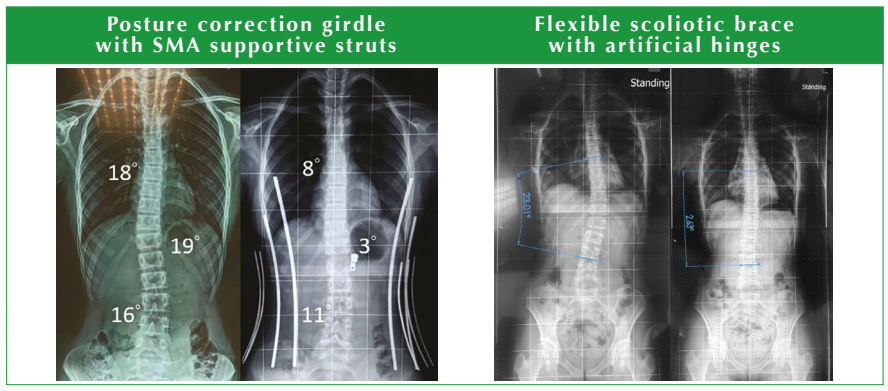
五種物料的荷重撓度曲線比較，包括形狀記憶合金(SMA)、鋁 (AL)、鈦(TI)、丙烯酸樹脂(ACR)和樹脂(RS)
形狀記憶合金具有高剛度及優異的變形恢復能力
Load-deflection curves of 5 different supportive struts: Shape Memory Alloy (SMA), Aluminum (AL), Titanium (TI), Acrylic (ACR) and Resin (RS)
SMA has a high stiffness and excellent shape recovery property



五種物料的拉伸測試比較，包括聚甲基丙烯酸甲酯+鐵針、聚氧亞甲基+鐵針、碳纖維增強聚合物+鐵針、6061鋁合金+鐵針和6061鋁合金+鋼針
6061鋁合金+鋼針具有出色的拉伸性能
Tensile strength of 5 different artificial hinges: Cast acrylic + Iron pin, Polyoxymethylene + Iron pin, Carbon fiber reinforced polymer + Iron pin, 6061 Aluminium alloy + Iron pin and 6061 Aluminium alloy + Steel pin
6061 Aluminium alloy + Steel pin has outstanding tensile property



人工鉸鏈設計
Artificial hinge design



脊柱側彎患者在穿著形狀記憶合金姿勢矯正束身衣及可動式矯形腰背架前(左)及後(右)的X射線圖像
X-ray image of scoliosis subject before (left) and after (right) wearing posture correction girdle with SMA supportive struts and flexible scoliotic brace with artificial hinges

The innovative scoliotic brace is a functional garment specially designed for adolescents with scoliosis. The shape memory alloy (SMA) and the artificial hinges used in this design apply strategic corrective forces to the spine, providing adequate support to the wearers. Combining clinical practice, materials science and textile technology, the scoliotic brace of high wearing comfort can control the progression of spinal deformities more effectively and improve patient compliance, thus reducing the possible need for orthotic interventions or surgery.

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專利申請編號：201821207195.7 (中國)

特色與優點

- 薈萃臨床實踐、材料科學及紡織和服裝技術等方面的專家的跨學科合作項目
- 具卓越彈性的形狀記憶合金在提供足夠支撐力的同時，讓穿著者能夠進行一定程度的身體活動
- 以柔軟材料製成，能提高患者對治療的依從性
- 重量輕巧，較少熱量和汗液積聚
- 可當成舒適的內衣穿著

應　用

- 為患初期脊椎側彎青少年提供姿勢訓練和控制脊柱側彎情況
- 為一般人提供改善運動協調和日常姿勢的訓練

獎　項

美國矽谷國際發明展 - 金獎 (2019年6月)
波蘭發明家及實業協會優異獎 (2019年6月)

Patent Application No.: 201821207195.7 (China)

Special Features and Advantages

- A multi-disciplinary collaborative project that involves experts in clinical practice, materials science, as well as textile and garment technology
- The superelastic SMA provides adequate support while allowing the wearer to retain certain mobility
- Made of soft materials for enhanced patient compliance
- Light weight with less heat and moisture build-up
- Can be worn as a comfortable undergarment

Applications

- Posture training and controlling spinal deformity for patients with mild scoliosis
- Posture training to general public to improve their movement coordination and daily posture

Awards

- Gold Medal - Silicon Valley International Invention Festival (Jun 2019)
- Special Merit Award - Association of Polish Inventors and Rationalizers (Jun 2019)

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