Key Laboratory of Clothing Design and Technology

Donghua University, Ministry of Education, P.R. China

The key laboratory of clothing design and technology (Donghua University), Ministry of Education (Hereinafter referred to as "the Key Laboratory") was established in 2010. It is the only key laboratory granted by the Ministry of Education in the field of clothing education and research in China. The Key Laboratory is committed to establish a comprehensive research institution of clothing science and technology. It is focus on the high performance apparel research and functional design, art creative design and costume culture research, and clothing agile manufacturing and information services. The goal of the Key Laboratory is to provide comprehensive technical support for apparel industry and creative industry to promote industrial development and cultivate innovative talents for the industry.

To support the scientific research activities, the Key Laboratory owns more than 6000 m^2 area and 40 sets of instruments and equipment (Figure 1). There are more than 50 long-term and 10 short-term researchers who conduct research work. Over the past three years, the Key Laboratory has supported more than 30 research projects, and the scholars published more than 150 papers in the international academic journals cited by the Science Citation Index (SCI) database or the Engineering Index (EI) database. Partial of the representative research achievements are as follows.

Figure 1 Experimental instruments and equipment in the Key Laboratory

1. Heat and Thermal Protection Research. With the facilities of Thermal Protective Performance tester (TPP), the Radiant Protective Performance tester (RPP), and the Flame Testing Manikin, the Key Laboratory is able to evaluate of the thermal protective property of both fabric and clothing. Great progress has also been made in the 3D numerical simulation of heat transfer through protective clothing when exposed to fire exposure by Computational Fluid Dynamics (CFD). Relevant papers have been published in the academic journals such as *Scientific Reports*, *International Journal of Heat and Mass Transfer*, *Applied Thermal Engineering*, *Fire and Materials*, *Fire Safety Journal*, and so on.

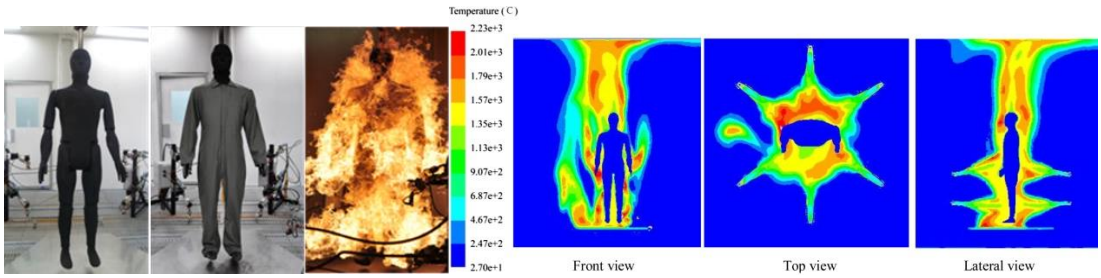

Figure 2 the flame manikin test and CFD simulation

2. Research on 3D human body scanning and modeling. The research "A mixed human body modeling method based on 3D body scanning for clothing industry" provided a fast and feasible construction scheme for 3D virtual human body model used in garment industry. It won the gold medal of invention at the 2016 Romanian National Science and Technology Innovation Exposition.

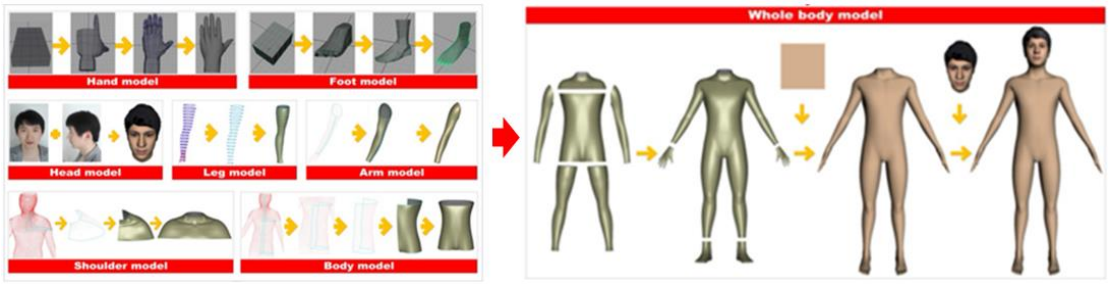

Figure 3 the mixed human body modeling process

3. Fashion creative design and costume culture research. The students' fashion design works were awarded prizes in the international fashion design competitions, such as the American Art Fashion Foundation Competition, the World of Wearable Art Competition, the London Graduates Fashion Week, and so on.

Figure 4 the awarded design works in the international fashion design competitions

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Functional Protective Clothing Research Center

The Functional Protective Clothing Research Center (FPCRC) is located at the College of Fashion and Design, Donghua University, Shanghai. It is dedicated to study the thermal and moisture comfort, sports comfort and protective performance of clothing for the human body. This could provide protection against flame, thermal radiation and extreme temperature for workers in harsh environments, and meets people's requirements on health, comfort and longevity.

The Functional Protective Clothing Research Center undertook the research work in the direction of functional clothing and ergonomics, as well as various national, provincial and ministerial research projects. The research program includes the development of textile products in the fields of occupational safety, sports, military, and medical, the performance of evaluation of various types of clothing (including physical and mechanical properties, heat and moisture transfer performance, hand value, durable washing performance, thermal protection performance, etc.). In addition, it is possible to simulate various environments in climatic chamber (such as high-intensify heat, severe cold, etc.), and evaluate the overall wear comfort of the human body and the overall performance of the clothing in the artificial climate chamber (including objective evaluation of quantitative instruments and subjective psychological sensation in terms of thermal comfort, sports comfort, contact comfort, pressure comfort, ergonomic, etc.). The clothing type for the research and development involves fire-fighting protective clothing, flame-retardant clothing, medical isolation clothing, and chemical protective clothing, cold protective clothing, radiation protective suit, anti-static clothing and other protective clothing.