

DESIGN OF FUNCTIONAL JACKET FOR INDIAN MOTORCYCLE RIDERS

KANIKA JOLLY



DEPARTMENT OF DESIGN
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DESIGN OF FUNCTIONAL JACKET FOR INDIAN MOTORCYCLE RIDERS

Submitted by

KANIKA JOLLY

DEPARTMENT OF DESIGN

In fulfilment of the requirement for the degree of Doctor of Philosophy

To the



INDIAN INSTITUTE OF TECHNOLOGY DELHI

HAUZ KHAS, NEW DELHI - 110016

May 2025

Dedicated to
My Parents ‘Anil Jolly & Urmil Jolly’
& our Pug – ***Oggy***

CERTIFICATE

This is to certify that the thesis entitled Design of Functional Jacket for Indian Motorcycle Riders, being submitted by Ms. Kanika Jolly for the award of the degree of Doctor of Philosophy to the Department of Design, Indian Institute of Technology Delhi, is a record of bonafide work by her under my supervision and guidance. The matter embodied in this thesis has not been submitted to any other University or Institute for the award of any degree or diploma.



P.V. Madhusudan Rao

Professor
Department of Design,
Indian Institute of Technology Delhi,
Hauz Khas, New Delhi - 110016,
INDIA.



Deepti Gupta

Professor
Department of Textile and Fibre Engineering,
Indian Institute of Technology Delhi,
Hauz Khas, New Delhi - 110016,
INDIA.




Sybille Kryzwinski

Professor
Institut Für Textilmaschinen und
Textile Hochleistungswerkstofftechnik
Technical University (TU) Dresden
Dresden, - 01069
GERMANY.

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ABSTRACT

India, the global leader in the two-wheeler market, has had a remarkable expansion in its two-wheeler sector, with output increasing from 5.47 million units in 2000-01 to 42.22 million units in 2023-24. Motorcycles, accounting for more than 60% of overall sales, are not just means of transportation but essential assets for Indian households, enabling mobility and earning revenue through services such as delivery. Although the sector is experiencing significant growth, there has been a troubling increase in motorcycle-related accidents, resulting in motorcyclists facing a fatality risk that is 30 times greater than that of passengers in cars. The literature cites protective clothing as effective in decreasing soft tissue injuries and facilitating quicker recovery by limiting the risk of infections. Regrettably, there is a significant lack of research and design addressing the specific needs and requirements of Indian motorcycle riders.

This thesis presents a methodical approach to developing motorcycle riding clothing (MRC) specifically designed for Indian riders. It presents an integrated design model for MRC that integrates protection, comfort, and aesthetics—developing MRC by employing an ergonomic design approach by analysing the posture of the motorcycle riders, taking into account thermal, moisture, and tactile comfort, and using advanced digital technologies such as 3D body scanners, and CAD software to generate garment patterns which were carried out and reported in individual chapters. Material selection was focused on the selection of materials, as per the body mapping technique, that are well-suited for India's climate. Finally, a physical sample of motorcycle rider jackets was realized, and the sample was assessed and evaluated by user testing.

In summary, a model of multi-functional design has been developed scientifically and systematically, with which an ergonomic motorcycle clothing with superior functional performance was achieved. The outcome of this research helps establish a systematic procedure for producing functional clothing for motorcycle riders in India.

सार

दोपहिया वाहन बाजार में वैश्विक अग्रणी भारत ने अपने दोपहिया वाहन क्षेत्र में उल्लेखनीय विस्तार किया है, जिसका उत्पादन 2000-01 में 5.47 मिलियन यूनिट से बढ़कर 2023-24 में 42.22 मिलियन यूनिट हो गया है। मोटरसाइकिल, जो कुल बिक्री का 60% से अधिक हिस्सा है, न केवल परिवहन का साधन है, बल्कि भारतीय परिवारों के लिए आवश्यक संपत्ति है, जो गतिशीलता को सक्षम बनाती है और डिलीवरी जैसी सेवाओं के माध्यम से राजस्व अर्जित करती है। हालाँकि इस क्षेत्र में उल्लेखनीय वृद्धि हो रही है, लेकिन मोटरसाइकिल से संबंधित दुर्घटनाओं में चिंताजनक वृद्धि हुई है, जिसके परिणामस्वरूप मोटरसाइकिल चालकों को कार में सवार यात्रियों की तुलना में 30 गुना अधिक घातक जोखिम का सामना करना पड़ रहा है। साहित्य में सुरक्षात्मक कपड़ों को नरम ऊतक की चोटों को कम करने और संक्रमण के जोखिम को सीमित करके तेजी से ठीक होने में प्रभावी बताया गया है। अफसोस की बात है कि भारतीय मोटरसाइकिल सवारों की विशिष्ट जरूरतों और आवश्यकताओं को संबोधित करने वाले अनुसंधान और डिज़ाइन की महत्वपूर्ण कमी है।

यह शोध प्रबंध भारतीय सवारों के लिए विशेष रूप से डिज़ाइन किए गए मोटरसाइकिल राइडिंग क्लोथिंग (MRC) को विकसित करने के लिए एक व्यवस्थित दृष्टिकोण प्रस्तुत करता है। यह MRC के लिए एक एकीकृत डिज़ाइन मॉडल प्रस्तुत करता है जो सुरक्षा, आराम और सौंदर्यशास्त्र को एकीकृत करता है - मोटरसाइकिल सवारों की मुद्रा का विश्लेषण करके, थर्मल, नमी और स्पर्श संबंधी आराम को ध्यान में रखते हुए, और 3D बॉडी स्कैनर और CAD सॉफ्टवेयर जैसी उन्नत डिजिटल तकनीकों का उपयोग करके एक एर्गोनोमिक डिज़ाइन दृष्टिकोण को नियोजित करके MRC विकसित करना, परिधान पैटर्न उत्पन्न करना जो अलग-अलग अध्यायों में किए गए और रिपोर्ट किए गए। सामग्री का चयन, बॉडी मैपिंग तकनीक के अनुसार, उन सामग्रियों के चयन पर केंद्रित था जो भारत की जलवायु के लिए उपयुक्त हैं। अंत में, मोटरसाइकिल सवार जैकेट का एक भौतिक नमूना तैयार किया गया, और उपयोगकर्ता परीक्षण द्वारा नमूने का मूल्यांकन और मूल्यांकन किया गया।

संक्षेप में, बहु-कार्यात्मक डिज़ाइन का एक मॉडल वैज्ञानिक और व्यवस्थित रूप से विकसित किया गया है, जिसके साथ बेहतर कार्यात्मक प्रदर्शन वाला एक एर्गोनोमिक मोटरसाइकिल वस्त्र प्राप्त किया गया। इस शोध के परिणाम भारत में मोटरसाइकिल सवारों के लिए कार्यात्मक वस्त्र बनाने के लिए एक व्यवस्थित प्रक्रिया स्थापित करने में मदद करते हैं

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