



PROJECT COMPLETION REPORT

1. Project Number : P 7445
2. Title of the Project : RIGID KNEE BRACE FOR OSTEOARTHRITIS
3. Funding Agency Name : Industry funded project by M/s. Tynor Orthotics Pvt Ltd
4. Project Reference Number provided by the Funding Agency:
P 7445
5. Principal Investigator (Name & Address):

Sl. No	Name	Role	Address
1	Subhash N. N.	Principal Investigator	Engineer C Division of Artificial Internal Organs, DMDE, BMT Wing, SCTIMST
2	Muraleedharan C. V.	Co-Principal Investigator	Scientist G (Sr. Grade) Division of Artificial Internal Organs, DMDE, BMT Wing, SCTIMST

6. Co-Investigators (Name & Address):

Industry experts involved in the joint development are

- Inderjeet Singh, DM-Product D&D, Tynor Orthotics Pvt Ltd
- Harsh Chauhan, Manager, Tynor Orthotics Pvt Ltd
- Ravina Taragi, Product manager, Tynor Orthotics Pvt Ltd

Clinical experts involved from SCTIMST

- Dr. Nitha J, Physical Medicine and Rehabilitation (PMR), SCTIMST
- Dr. Subin Sukesan, SCTIMST

7. Implementing Institution : Jointly by SCTIMST and TYNOR Orthotics Pvt Ltd
8. Collaborating Institutions : Nil
9. Date of Commencement : 21/10/2020
10. Duration : 2 years
11. Date of Completion : 20/10/2022
12. Objectives as approved:

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala (SCTIMST), an Institute of National Importance under the Department of Science and Technology, Government of India, has signed an MoU with Tynor Orthotics Private Limited (Tynor), Mohali, to set up an Orthotics and Rehabilitation R&D vertical at SCTIMST to promote indigenous device development in this sector towards the goal of 'Aatmanirbhar Bharat', a high priority target of the Govt of India.

Tynor, a manufacturer and exporter of high quality and affordable orthopedic appliances and fracture aids in India, will collaborate with SCTIMST for the co-development of Orthotic devices and to promote joint research programs in Orthotics and Rehab. Tynor has funded SCTIMST for Research and Development of two off-loading devices in patients with diabetic foot ulcers and osteoarthritis.

The main objective of this Institute-Industry collaboration is to develop a cluster of orthoses for catering to clinical conditions such as osteoarthritis and diabetic foot ulcer. Asia Pacific is anticipated to witness a lucrative growth in global diabetic foot ulcer therapeutics market owing to the increasing geriatric population, which is more prone to diabetes. Global Diabetic Foot ulcers and Pressure ulcer Market is expected to reach 5265 Million Dollars by 2025 with a compound annual growth rate(CAGR) of 6.6% from 2019-2025, which is quite alarming. Similarly, the global knee braces market is growing due to the rising prevalence of osteoarthritis, increasing number of orthopedic knee surgeries, and growing number of sports injuries in athletics. The global knee braces market size was estimated at USD 1.5 billion in 2018 and is expected to witness a CAGR of 4.3%. The growing burden of osteoarthritis, the increase in target population, and the technology of cost-effective and easy to wear braces are the major growth propellers for the market.

For more details, please refer the website below:

- <https://pib.gov.in/PressReleasePage.aspx?PRID=1655190> , Last accessed on 3 Dec 2023.
- <https://www.tynorstore.com/blog/sctimst-inks-mou-with-tynor-orthotic-to-boost-orthotic-devices/> , Last accessed on 3 Dec 2023.
- <https://www.sctimst.ac.in/resources/SCTIMST-%20TYNOR%20INK%20PACT%20FOR%20JOINT%20R&D%20IN%20ORTHOTICS%20AND%20REHABILITATION%20DEVICES%2017.09.2020.pdf> , Last accessed on 3 Dec 2023.

13. **Deviation made from original objectives if any, while implementing the project and reasons thereof :**
Nil

14. **Field/Experimental work giving full details of summary of methods adopted, data collected supported by necessary tables, charts, diagrams and photographs:**

The project is funded by Industry partner, and detailed reports and figures are not made available in public domain.

15. **Detailed analysis of results:**

The project is funded by Industry partner, and detailed reports and figures are not made available in public domain.

Following were the details of R&D documentations issued.

Sl. No	Document Number	Details
--------	-----------------	---------

1	KB TC DD 001	Gathering Voice of Customer (VOC)
2	KB TC 1 DD 002	Gathering Voice of Customer (VOC)
3	KB TC1 DD003	Specification Development
4	KB TC1 DD005	Preliminary Design Review (PDR)
5	KB TC1 DD 006	Design & Fabrication of Dynamic Leg Model
6	KB TC1 DD 007	PATENT LANDSCAPING REPORT
7	KB TC1 DD 008	Determination of maximum load for deformation of offset hinges of predicate OA Knee Braces
8	KB TC1 DD 004 V2.0	Tear down Analysis of Predicate devices- Rigid OA Knee Brace
9	KB TC1 DD 009	Background data for preparation of study plan for conducting clinical trials of orthotic knee braces
10	7445-TR AIO 002	Infrared Qualitative Analysis of 30 critical samples (using NICOLET iS50 FT-IR)
11	7445- TR AIO 003	Metallic Material Identification test for Benchmark OA Knee Brace
12	7445/TR AIO 001	Micro Raman Spectroscopy of 30 Samples (Using Confocal Raman Microscopy)

**16. Summary sheet of not more than 2 pages under following heads:
(Title, Introduction, Rationale, Objectives, Methodology, Results, Translational Potential)**

The project is funded by Industry partner, and detailed reports and figures are not made available in public domain.

For more details, please refer the website below:

- <https://pib.gov.in/PressReleasePage.aspx?PRID=1655190> , Last accessed on 3 Dec 2023.
- <https://www.tynorstore.com/blog/sctimst-inks-mou-with-tynor-orthotic-to-boost-orthotic-devices/> , Last accessed on 3 Dec 2023.
- https://www.sctimst.ac.in/resources/SCTIMST-%20TYNOR%20INK%20PACT%20FOR%20JOINT%20R&D%20IN%20ORTHOTICS%20AND%20REHABILITATION%20DEVICES_17.09.2020.pdf , Last accessed on 3 Dec 2023.

17. Contributions made towards increasing the state of knowledge in the subject :

The project is funded by Industry partner, and detailed reports and figures are not made available in public domain.

For more details, please refer the website below:

- <https://pib.gov.in/PressReleasePage.aspx?PRID=1655190> , Last accessed on 3 Dec 2023.
- <https://www.tynorstore.com/blog/sctimst-inks-mou-with-tynor-orthotic-to-boost-orthotic-devices/> , Last accessed on 3 Dec 2023.
- https://www.sctimst.ac.in/resources/SCTIMST-%20TYNOR%20INK%20PACT%20FOR%20JOINT%20R&D%20IN%20ORTHOTICS%20AND%20REHABILITATION%20DEVICES_17.09.2020.pdf , Last accessed on 3 Dec 2023.

18. Conclusions summarising the achievements and indication of scope for future work :

The project is funded by Industry partner, and detailed reports and figures are not made available in public domain.

For more details, please refer the website below:

- <https://pib.gov.in/PressReleasePage.aspx?PRID=1655190> , Last accessed on 3 Dec 2023.
- <https://www.tynorstore.com/blog/sctimst-inks-mou-with-tynor-orthotic-to-boost-orthotic-devices/> , Last accessed on 3 Dec 2023.
- https://www.sctimst.ac.in/resources/SCTIMST-%20TYNOR%20INK%20PACT%20FOR%20JOINT%20R&D%20IN%20ORTHOTICS%20AND%20REHABILITATION%20DEVICES_17.09.2020.pdf , Last accessed on 3 Dec 2023.

19. Science and Technology benefits accrued :

a. List of research publications with complete details :

- Nil

b. Manpower trained on the project :

- Research Scientists or Research Fellows** : Nil
- No. of PhD's produced** : Nil
- Other Technical Personnel trained** : Aravind A U, Senior Project Engineer

c. Patents taken, if any : Nil

d. Products developed, if any : Rigid knee braces- Minimum viable prototypes (MVP).

20. Abstract: (In 300 words for possible publication in Bulletin)

The project is funded by Industry partner, and detailed reports and figures are not made available in public domain.

For more details, please refer the website below:

- <https://pib.gov.in/PressReleasePage.aspx?PRID=1655190> , Last accessed on 3 Dec 2023.
- <https://www.tynorstore.com/blog/sctimst-inks-mou-with-tynor-orthotic-to-boost-orthotic-devices/> , Last accessed on 3 Dec 2023.
- https://www.sctimst.ac.in/resources/SCTIMST-%20TYNOR%20INK%20PACT%20FOR%20JOINT%20R&D%20IN%20ORTHOTICS%20AND%20REHABILITATION%20DEVICES_17.09.2020.pdf , Last accessed on 3 Dec 2023.

21. Procurement/Usage of Equipment:

a. Details of Equipment: Nil

Sl. No.	Name of Equipment	Make/ Model	Cost (Rs.)	Date of Installation	Utilisation	Remarks regarding maintenance breakdown

b. **Suggestions for disposal of equipment(s):**

Not applicable



Subhash N. N.
3 Dec 2023

(Name and Signature of PIs with date)

Routing: Signed copy of "Project completion Report" by PI → root@sctimst.ac.in, rpc@sctimst.ac.in