

**REHAB** *T e c h*

Monash Rehabilitation Technology Research Unit

**A Piezoelectric  
Tranducer System  
For Measurments  
of Loads in  
Prosthetics**

**Nebojsa Tomasevic  
Masters Project**



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**REHAB Tech-** Monash Rehabilitation Technology Research Unit

C/- C.G.M.C.

260 - 294 Kooyong Road

**CAULFIELD VIC 3162**

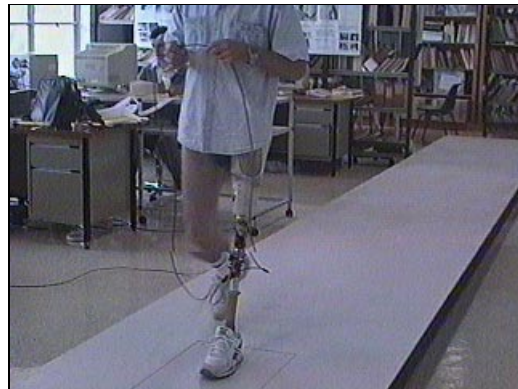
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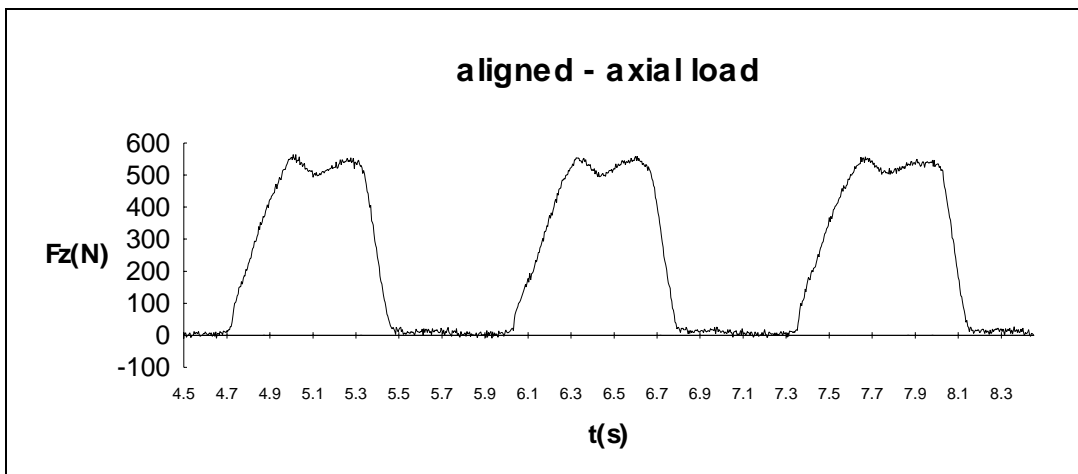
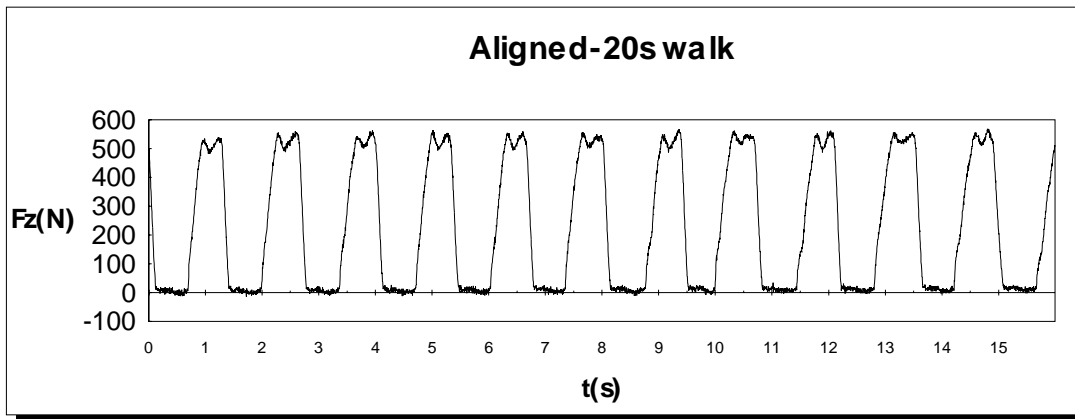
**Email** [rehab.tech@eng.monash.edu.au](mailto:rehab.tech@eng.monash.edu.au)

## A Piezoelectric Transducer System for Measurement of Loads in Lower Limb Prosthetics

The current project was undertaken in order to provide a robust and reliable measurement of in situ prosthetic loads including axial force, bending moments, and torsion. The developed system uses piezoelectric transducers to provide accurate and reliable measurements from a very robust system. The piezoelectric transducers used have built-in charge amplifiers which greatly reduce problems with interferences and low signal levels. To transfer loads acting on prosthetic pylon to transducers a supporting mechanical system was developed. The main feature of this mechanical system was loading plates, whose task was to create the necessary preload on transducers and distribute loads from the pylon to the transducers. An assembled system was equipped with standard prosthetic pyramidal adaptors allowing very convenient installation to pylon of any length. A special signal conditioner was designed to power and process signals for all four transducers. It included a power supply, current source, bias voltage elimination stage, and specific interfaces to an A/D board. A software used for data acquisition and analysis is a specialised package for force plate.

This system had a number of advantages over the other approaches currently being used. In the comparison with the force plate, the system developed here can measure the loading during continuous walking, where as the force plate can only measure one step. In the comparison with strain gauged systems, it has a much better resolution and signal to noise ratio. It is easy to fit and does not require regular recalibration





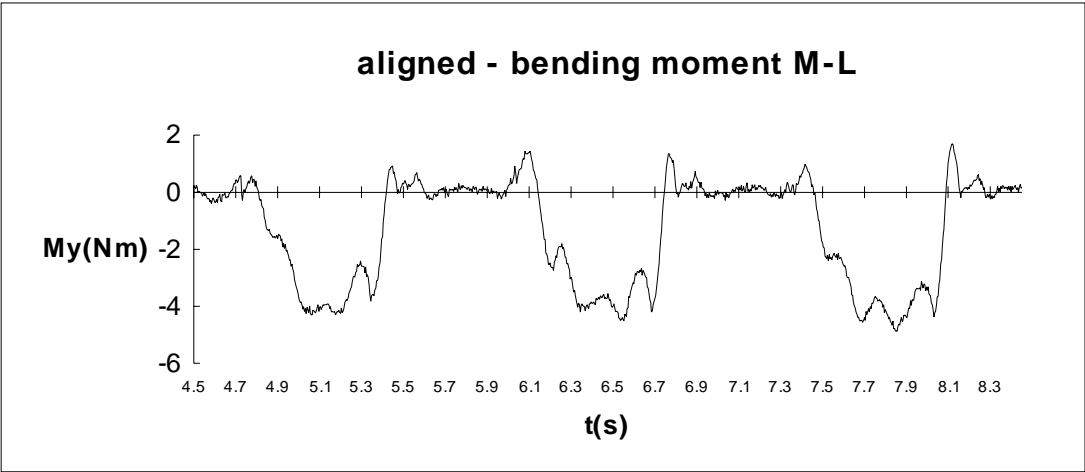
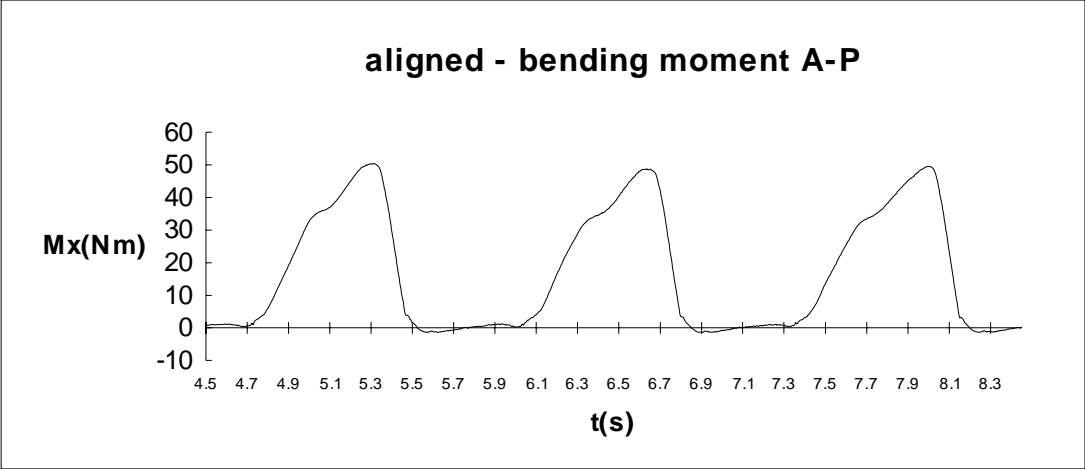


Fig: steps with aligned prosthesis