



## A Review Paper on Knee Brace Supporter

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### 1. Introduction

A subsidiary design which is urgently required for all those individuals like sports person, elders, and working middle age all men and women, who are having troubles related to knee, Knee problems are spreading at high speed in India, main reason of it is arthritis. Treatment consists of knee replacement or coverage. Knee replacement is not mandatory for most elderly people who have to deal with deterioration in their lives. It is a system designed to support. The knee joint develops a mechanism capable of taking the weight off the knee and transferring it to the shoe, thereby relieving pain and minimizing knee loads due to body weight. The movement of the knee joint should therefore not be impeded.



Figure 1.1: Non aligned Knee (3)

#### *External solutions to arthritis*

Osteoarthritis is a complex disease that affects the entire joint. It is best known as an inflammation of the joints that typically affects the knees in older people. This condition usually affects one side of the knee more than the other. This inconsistent injury can cause your knees to misalign (misalignment), which can make you look bow-legged or bow-legged.

Many medicines are available for relieving the pain in knee due to misalignment but they have some side effects, either if arthritis is not treated properly on time it may result to the condition of operation of knee replacement.

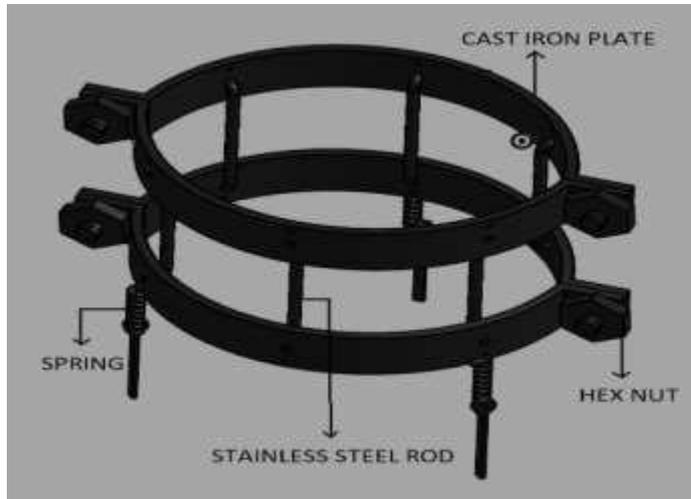
All above conditions either of before or after operation patient has to bear a consistent pain, to overcome this pain there is no such solution available in medical equipment market.

#### *Feasibility of knee brace supporter*

Currently, there is no such solution in the medical device market. Knee replacement surgery is generally not the first option for treating knee pain. A variety of wait-and-see medications can help provide relief. A knee brace is a means of coping with the discomfort of osteoarthritis of the knee. Brace relieves pain by shifting weight away from the most damaged part of the knee, but be aware that knee braces can feel heavy, bulky and hot from the start. Poor fit can lead to slippage, and in limited numbers of people with osteoarthritis, results have been mixed. Some see no benefit. Others report less pain and increased labor.

However, although the current version of the knee brace assembly solves the above problems, it is not suitable for weight transfer at the same time. It is also not prescribed to other patients due to the above issues.

## 2. Construction details



**Figure 1.2:** Knee Brace Supporter Outer Frame

In this illustration both the plate and the spring hold the major components. This is because they are involved in weight transfer, and springs are generally in an expanded state that meets the aforementioned requirements. Here the hook is attached to the knee brace.

In this view the rods and springs are made of hardened steel for high strength and sturdiness and the plates are made of nodular iron for high flexibility, versatile modulus and mechanical strength.

In this figure, the dimensions of the rod, cast iron plate and spring are made according to the patient's dimensions.

### Material Specification

In view of patient's requirement of all age groups, we have decided for keeping the material to be light in weight. In this regard we have selected 'Structural Steel' as our main constructing element (1). Since it is readily available at considerable cost as well as easy to weld and provide good strength.

Contents of Engineering Data		Source	Description
Structural Steel		General_Materials.xml	Fatigue Data at zero mean stress comes from 1998 ASME BPI Code, Section
Click here to add a new material.			
Outline Row 3: Structural Steel			
A		B	
Property		Value	
Material Field Variables		Table	
Density		7850	kg/m <sup>3</sup>
Isotropic Secant Coefficient of Thermal Expansion			
Coefficient of Thermal Expansion		1.2E-05	1/ <sup>o</sup> C
Isotropic Elasticity			
Derive from		Young's Modulus and Poisson's Ratio	
Young's Modulus		2E+11	Pa
Poisson's Ratio		0.3	
Bulk Modulus		1.666E+11	Pa
Shear Modulus		7.692E+10	Pa
Stress-Life Parameters			
S-N Curve		Tabular	
Interpolation		log-log	
Scale		1	
Offset		0	Pa
Tensile Yield Strength		2.3E+08	Pa
Compressive Yield Strength		2.3E+08	Pa
Tensile Ultimate Strength		4.6E+08	Pa
Compressive Ultimate Strength		0	Pa
Isotropic Thermal Conductivity		60.5	W/m <sup>2</sup> ·C <sup>-1</sup>
Specific Heat, C <sub>p</sub>		494	J/kg <sup>o</sup> C <sup>-1</sup>
Isotropic Relative Humidity		10000	
Isotropic Porosity		1.7E-07	dimless

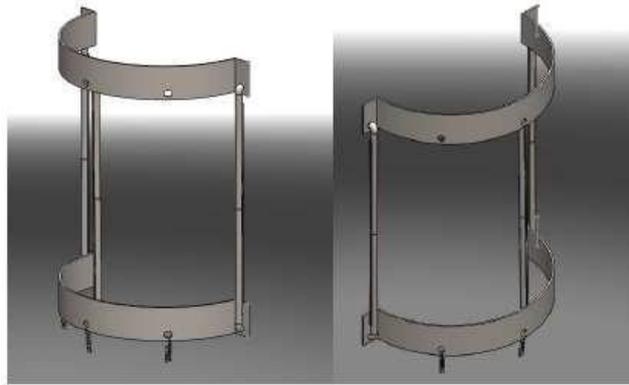
**Figure 1.3:** Structural Steel Properties from Ansys Library (2)

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### 3. Detail Description of Concept

In this solution we propose to link the spring braces with the standard accessible knee braces, these spring braces transfer the load of the knees to the shoes, the subsequent forward knees will be more successful.

The stand is made of lightweight material and the ends are supported by springs. They are designed in such a way that they can be attached to shoes and knee pads. Spring support helps absorb shock while running and walking. The braces attached to the knee pads actually transfer the shock from the knee pads to the springs. In turn, the springs transmit these shocks to the shoe.



**Figure 1.4:** CAD Model Split in Two Halves

### 4. References:

- 1) Metallurgy of Steel Selection in Components Design: Micro-Constituents and Alloying; September 2013; [Advanced Materials Research](#) 824:354-362
- 2) [Investigation of microstructural, mechanical and tribological properties of Al356/3-9%ZrB<sub>2</sub> composites produced by the stir casting process](#); E.Jafari et.al Metall. Res. Technol. 120, 205 (2023)
- 3) Mayo clinic official website; Website link: “<https://www.mayoclinic.org/tests-procedures/knee-braces/about/pac-20384791>”