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Electrochemical Studies of Anionic and Nonionic Micelles with Dyes and Reductant in Photogalvanic Cell

A.S. Meena, Rishikesh, R.C. Meena

Department of Mechanical Engineering, Govt. College of Engineering Jalgaon (Mah.), India

ABSTRACT: In this paper we analyze the motion of animal leg and tried to make the mechanism which is mimic of the animal leg motion. This paper describes the modified design and motion analysis of a 2n-legged mechanism model based on the work of Theo Jansen. The main purpose of this research paper is to analyse the modified motion of Theo Jansen leg mechanism by changing the different dimensions of the links and respective changes in stride height of leg. Also we drawn and stimulate the model based on modified dimension in Pro-E-Creo-2.

KEYWORDS: Links, Motion, Theo Jansen mechanism, Stride height.

I. INTRODUCTION

It has been established that legged, off-road vehicles exhibit better mobility, obtain higher energy efficiency and provide more comfortable movement than those of conventional tracked or wheeled vehicles while moving on rough terrain. A leg mechanism (walking mechanism) is an assembly of links and joints (a linkage) intended to simulate the walking motion of humans or animals. Mechanical legs can have one or more actuators, and can perform simple planar or complex motion Compared to a wheel; a leg mechanism is potentially better fitted to uneven terrain, as it can step over obstacles.

II. LITRATURE SURVEY

When we consider the mining sector, statistics suggests that about 50% of mining cost is spent on roadway and rail transports in the vicinity of the mines (haul roads & side rails). Haul roads cause a great damage to tyres of transporting vehicle requiring frequent and regular replacement, maintenance cost of haul roads is also high and it needs a separate wing. Weight distribution is uneven in haul roads causing higher stress problems in transport vehicles. On a rough terrain legs have advantage over tyres;

Theo Jansen mechanism gave us the smoothest motion and is able to carry loads without much high forces applied to it.

III. CONSTRUCTION

The basic model of Theo Jansen leg mechanism is consist of eight links, seven binary joints and 3 ternary joint with standard reference dimensions' as shown in fig.1.1. The link a and l is fixed link which is real chassis. Degree of freedom is calculated by using,

$n = 3(L-1)-2J-3h$

$= 3(8-1)-(2*10)-0$

$= 1$ i.e. (one input crank is required)

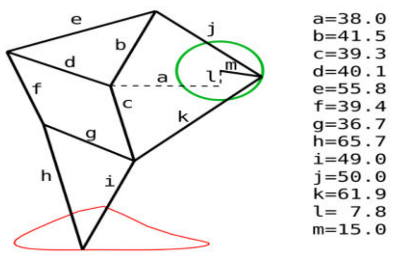

Fig.1.1 Standard dimensions [1]

There are number of ways of arranging Theo Jansen legs. Many current hexapod walkers, including the adaptive suspension vehicle and the Plustech, arrange three legs down the length of each side of the body, as insect legs are arranged. This was also the layout used in the first prototype constructed; the disadvantage of this layout is that it makes the walker long, which will adversely affect manoeuvrability as it does in wheeled vehicles. Three crankshafts are required for a walker with Jansen legs.

Another way to distribute the legs is to place three at the front of the vehicle, and three at the rear. This leg layout is used in MECANT and in the second prototype constructed. This layout allows a shorter vehicle, and if Jansen legs are used, there need only be two crankshafts. So given the need for the simplest layout, this layout is preferred.

IV. WORKING AND ANALYSIS

The desirable and undesirable traits of crank based walking mechanisms for the purpose of energetically efficient and stable locomotion over moderately variable terrain. A linkage is "crank-based" when the circular movement of one point in the linkage translates to movement elsewhere in the linkage; this means the circularly moving part of the linkage can be attached to a crank so that the motion of the mechanism is easily driven.

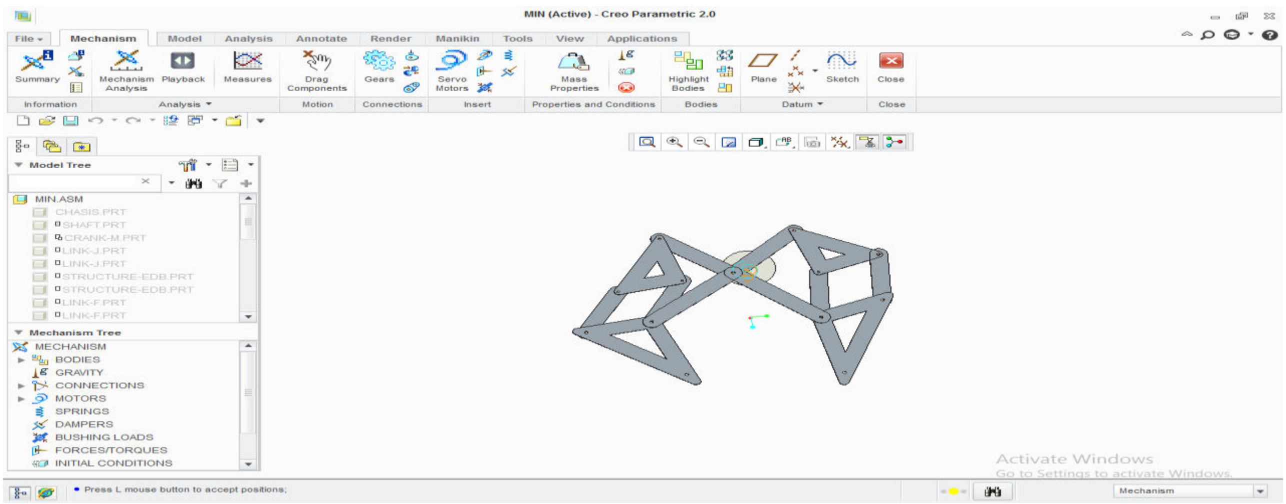

Image 1.1 Theo Jansen leg

Additionally, a fixed point in the linkage relative to the body of the walker is indicated with a black square. The locus can be divided into four parts: the support, lift, return, and lower phases. These phases are illustrated in Figure1.2. Throughout the support phase, the foot is ideally in contact with the ground. During the lift the foot is moving toward its maximum height in the locus. During the return, the foot reaches its maximum height off the ground and moves in the same direction as the body of the walker. Finally, during the lower the foot descends in height until it makes contact with the ground.

In order to perform the analysis of motion of modified Theo Jansen leg, we focused on increasing the stride height without influencing the balancing of the whole. Based on the standard proportionate dimensions we take the reading of the length travelled by leg and also how much it lifts upward. But when model assembled there will be problem of balancing .So we changes the dimensions of various links and note the height and stride length of leg.

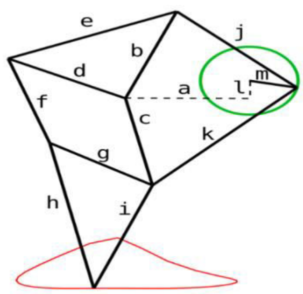

Fig.1.2 Modified dimensions

Modified Dimensions of links:

a = 76	h = 131.4
b = 83	i = 98
c = 78.6	j = 100
d = 80.2	k = 124
e = 111.6	l = 15.6
f = 78.8	m = 30

(All dimensions are in mm)

Various stride patterns traced by the leg are shown below.

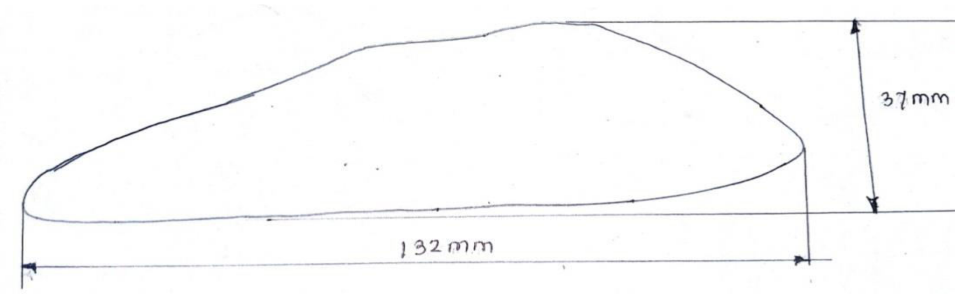

Fig.1.3 Path traced by standard dimensions

Firstly, we changed the dimensions of link J by keeping dimensions of other link as same. So the step height decreases to 27mm which is 10mm less than the height which achieve in case of standard dimensions. Also stride length of leg is increases to 134mm as shown in figure 1.4.

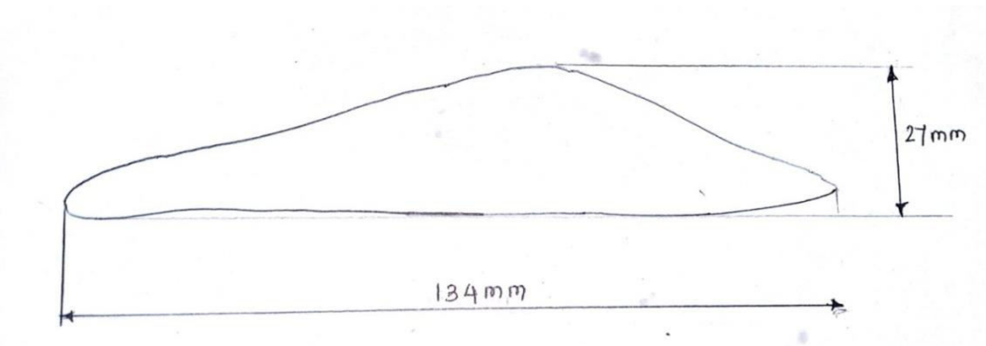

Fig.1.4 Path trace by leg for modification no.1

Secondly, we change the dimensions of link k to 108mm by keeping the dimension of link j as in previous case. So the step height decreases to 18mm which is 9mm less than the step height which achieve in previous case and stride length is 134mm as shown in figure1.5.

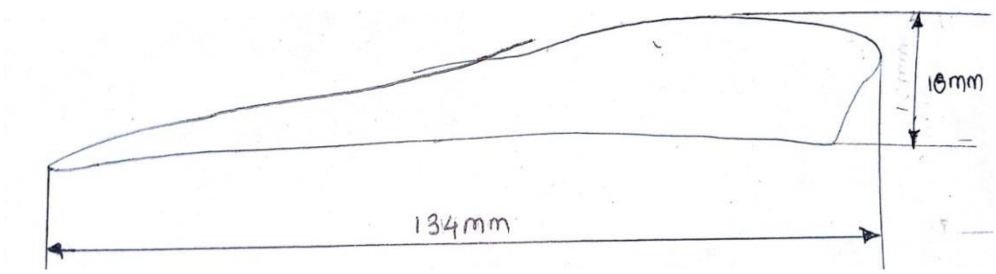

Fig.1.5 Path trace by leg for modification no.2

Thirdly we change the dimension of link j to 92mm by keeping the dimension of link k as standard one. So the step height increases to 44mm which is 7mm more than the step height in case of standard dimension. Also the stride length decreases to 130mm as shown in figure 1.6.

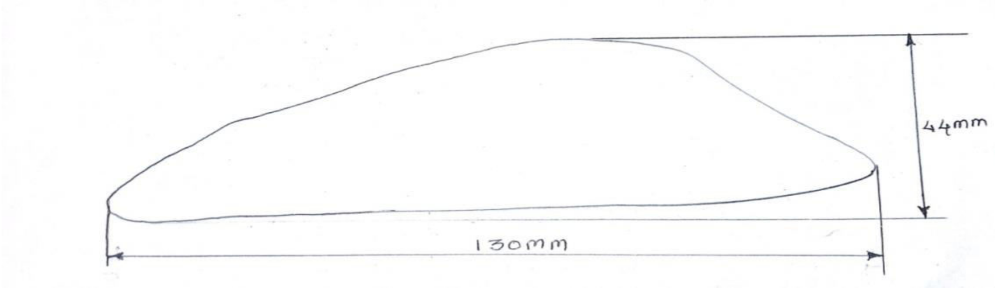

Fig.1.6 Path trace by leg for modification no.3

By changing the dimensions of various links and analysing the changes in the parameters, we select the dimension having lift 44mm and stride length of 130mm.The various link configurations and their respective stride length and step height are tabulated in table as shown below.

Sr. no.	j link (mm)	k link (mm)	m link (mm)	Stride length (mm)	Step height (mm)
1	100	124	30	132	37
2	84	124	20	134	27
3	84	108	20	134	18
4	92	124	20	130	44

Table 1.1 Stride length and Step height for various link lengths

Below figure shows the model of Theo Jansen leg mechanism that developed in Pro-E-Creo-2 software.

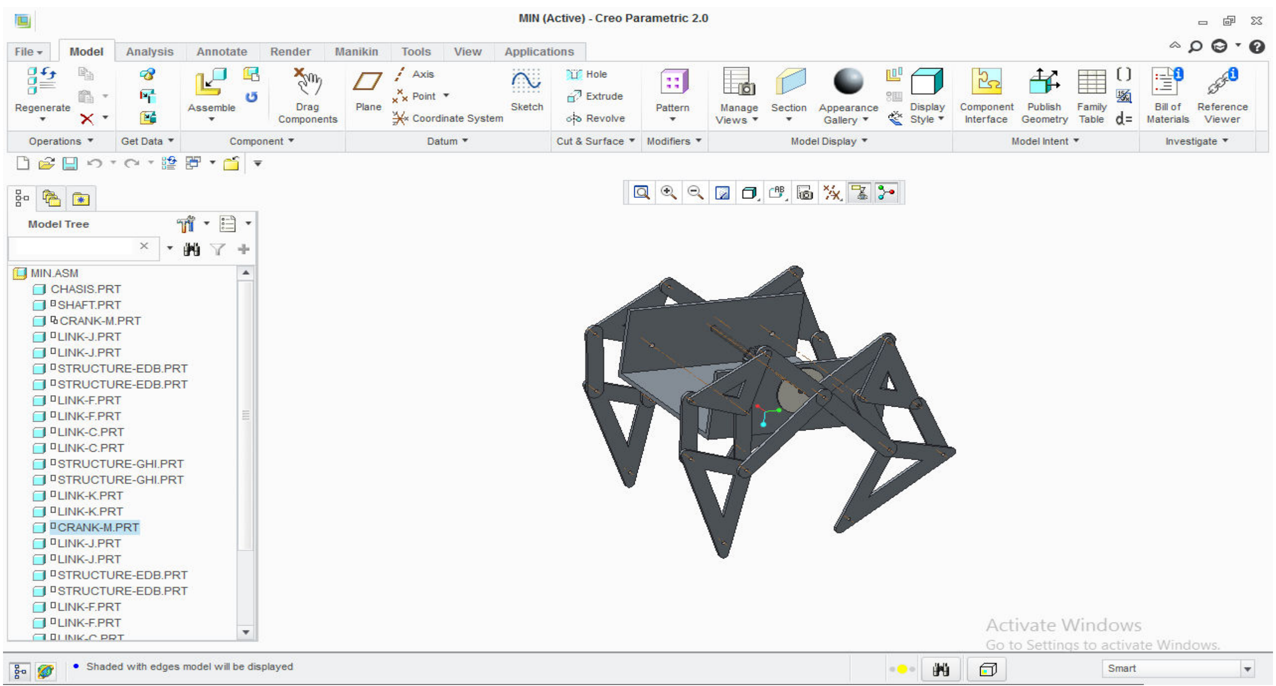

Image 1.2 Theo Jansen leg mechanism (Pro-E model)

The graph with Length of link-j on x-axis and Stride height on y-axis is shown below. This is plotted by using above reading.

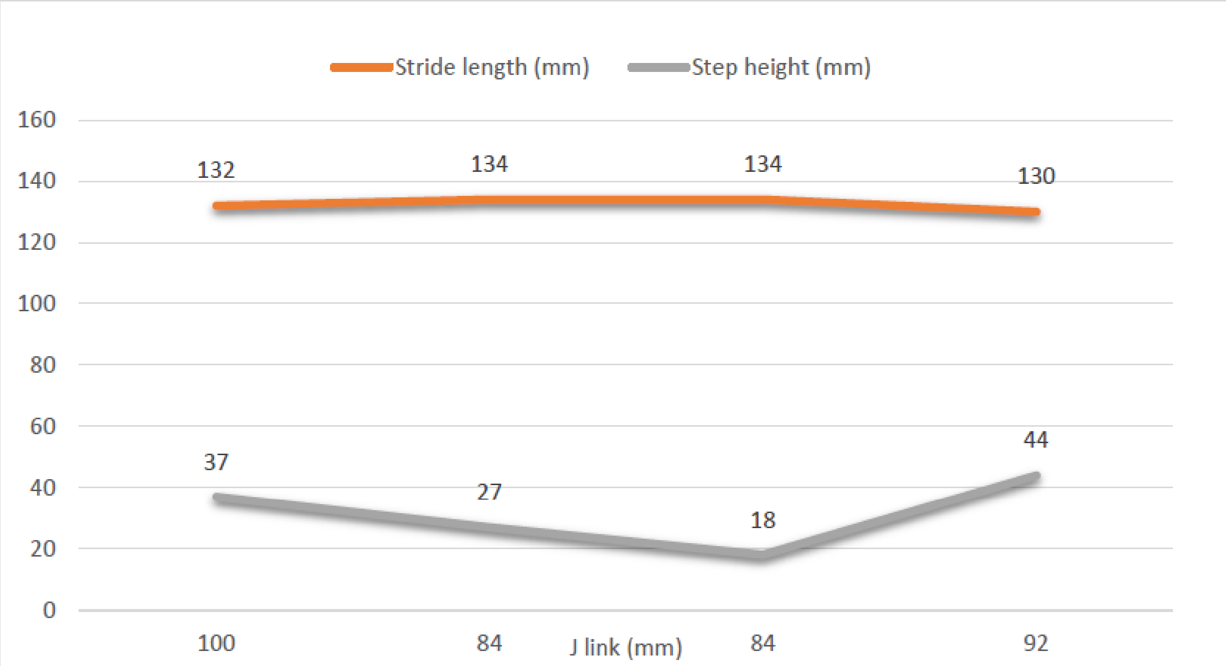

Image 1.3 Graph-link j v/s stride length and step height

V. CONCLUSION

Thus we analyze the Theo Jansen leg mechanism by changing the length of different links and note down the result of change in the step height and stride length. From the above graph we can conclude that the change in the length of link-j most influences the step height of Theo Jansen leg while stride length more or less remains constant.

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