AUTOMATIC BABY SWING

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SUPERVISOR'S DECLARATION

We hereby declare that we have checked this project and in our opinion this project is satisfactory in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering..

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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My beloved father, Mr Hj Mohd Amin Bin Hj Ghazali,

My loving mother Mrs. Hjh Mariah Binti Hj Mahidin,

Brothers and sisters,

All my friends

May Allah bless all of you

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ABSTRACT

Full-size baby swings designed for indoor use from birth to 25 or 30 pounds typically consist of a seat suspended by a pair of arms attached to a frame with wide-standing, tubular-metal legs. Most swings move from front to back, though several models swing from side to side, cradle-style. Portable travel swings are popular with on-the-go parents. These swings sit low to the ground and are designed to be moved from room to room or stowed in the car for a trip to Grandma's. Most swings on the market today are battery-operated and driven by a motor. The automatic baby swing was designed using CAD software. The automatic baby swing was designed using CAD software. Then, the design was analyzed using method FEA (ALGOR) software. These analyses were done to find the best design that can optimize the operation for the stress analysis. There is three design have been sketch. The analysis showed that the difference between them. For the third design designs, the result showed that when force apply, the displacement of improvement design that occur is lowest than current design. In conclusion, this improvement can reduce the cost of repairing because the mechanism improvement made can hopefully reduce the failure occur for that specific automatic baby swing.

ABSTRAK

Berat keseluruhan ayunan bayi yang direka untuk kegunaan dalam bilik daripada lahir hingga 25 atau 30 pound biasanya terdiri daripada sebuah kerusi ditangguhkan oleh sepasang lengan yang melekat pada sebuah frame dengan lebar berdiri, paip-kaki logam. Kebanyakan ayunan bergerak dari depan ke belakang, meskipun beberapa model berayun dari sisi ke sisi, cradle-gaya. Buaian perjalanan mudah alih popular dengan on-the-go orang tua. Buaian ini duduk rendah ke tanah dan direka untuk dipindahkan dari satu bilik ke bilik atau disimpan di dalam kereta selama dalam perjalanan. Kebanyakan ayunan di pasaran saat ini adalah bateri-dikendalikan dan digerakkan oleh sebuah motor. Ayunan bayi automatik ini direka dengan menggunakan perisian CAD. Buaian bayi automatik ini direka dengan menggunakan perisian CAD. Kemudian, rancangan itu dianalisis dengan menggunakan kaedah FEA (ALGOR) perisian. Analisis ini dilakukan untuk menemukan design terbaik yang boleh mengoptimumkan operasi untuk analisis stress. Ada tiga design telah dilukis. Analisis menunjukkan bahawa perbezaan antara mereka. Untuk design ketiga, hasilnya menunjukkan bahawa ketika kekuatan berlaku, pemindahan design perbaikan yang terjadi adalah terendah dari desain saat ini. Sebagai kesimpulan, perbaikan ini dapat mengurangkan kos pembaikan kerana perbaikan mekanisme yang dibuat diharapkan dapat mengurangkan kegagalan terjadi.

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LIST OF SYMBOLS

^0C	Degree Celsius
%	Percent
cm^3	centimetres cube
MPa	Mega Pascal

LIST OF ABBREVIATIONS

3D	Three-dimensional
CAD	Computer aided drawing
CAE	Computer aided engineering
FEA	Finite Element Analysis
FYP	Final year project

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

A baby swing can work wonders, soothing a fussy baby, lulling her to sleep at night or nap time, or occupying her for a few minutes while you get things done nearby or grab a bite to eat. It also comes in handy if your baby needs to sleep in a semi-upright position because she has a cold or stuffy nose. A swing provides a gentle rhythmic motion, which babies are accustomed to from their months in the womb. If you're like countless parents, you may consider a swing a godsend, especially for calming a colicky newborn.

Full-size baby swings designed for indoor use from birth to 25 or 30 pounds (depending on the model) typically consist of a seat suspended by a pair of arms attached to a frame with wide-standing, tubular-metal legs. Most swings move from front to back, though several models swing from side to side, cradle-style. Portable travel swings are popular with on-the-go parents. These swings sit low to the ground and are designed to be moved from room to room or stowed in the car for a trip to Grandma's. Most swings on the market today are battery-operated and driven by a motor that uses four C or D batteries, which may provide up to 200 hours of swinging time. AA batteries may be required, too, if the unit has accessories, such as a CD player. Such models emit a low churning noise with each swing, which can be soothing for some babies but may irritate others.

You'll use the swing the most in your baby's first few months of life. After that, you'll probably use it less, maybe even abandon it altogether (save it for your next baby) unless your baby is addicted to motion. Keep in mind that some babies don't like the rocking of a swing, no matter which type you buy, although they may change their mind after a few tries.

1.2 PROBLEM STATEMENT

Nowadays, the automatic baby swing had been improved and developed with different kind of feature. These features have increased the product cost and this cost does not included with the installation cost. Many people especially with low income couldn't afford to purchase the electronic baby swing. The automatic baby swing needs a very skillful or trained person to attach the automatic baby swing. The problem statement of my project is

- The product available in market is expensive.
- Many people with low income cannot afford to purchase the product.
- The design can be altered to achieve a more simplified mechanism for the same function.

The design can be altered to achieve a more simplified mechanism for the same function. The mechanism should be redesign to find out the alternative mechanism that can reduce the cost and more functional and friendly user. The automatic baby swing should have more than one direction to give more functional to the parents for their child.

1.3 OBJECTIVE

Objectives for this project refer to the Mission, purpose, or standard that can be reasonably achieved within the expected timeframe and with the available resources. Objectives are the most basic planning tools underlying all planning and strategic

activities. They serve as the basis for policy and performance appraisals, and act as glue that binds the entire project together. The purpose of this project is,

- Redesign the automatic baby swing.
- Improvement/Simplify from the available product in market.
- Reduction on the product cost.

Redesign and improvement from the past automatic baby swing that available in the market today. The product of baby swing has to be improvement and Simplify from the available product in market. Reduction on the product cost has to be altered from available product in market.

1.4 PROJECT SCOPE

The project scopes refer to the area or range of one's perceptions, thoughts, or actions covered by a given activity or subject and it should be accomplish in the end of the project. The scope of my project is

- Study several type of automatic baby swing
- Modify the current mechanism of automatic baby swing
- Design using solidwork and working model
- Do the calculation and analysis using Cae (algor) sofware

Study about several types of automatic baby swing and try to understand the working principle in term of movement. Those mechanisms include swing baby type mechanism, direction of swing and how the automatic control the swing. Try to figure out few type of design and sketch from the other design that suitable in market. Roughs sketch several type of automatic baby swing and compare between those designs and choose the best. The design should consider about the portability Compare with the previous design in market. Stress that existing on automatic baby swing need to be study

to avoid failure of the part using Algor software. Order and Purchase the new part based on the design. Build the design based on the finished drawing in full dimension.

1.5 EXPECTED OUTCOME

Designed and fabricated automatic baby swing it should be reliable, easy to maintain, safe to operate and less in cost compared to other types of automatic baby swing. The automatic baby swing also should be able to functional properly when installed on maximum distance between upper and lower limit is 180mm.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will provide the detail description literature review done according to title of design of automatic baby swing. automatic baby swing act as the movement up and down the rocker to make the parents life more easy. The on-board circuit board receives a signal from an access control (like a keypad or a control) and tells the automatic baby swing to swing more speed or more period of time to swing.

2.2 PUTTING ENERGY INTO VIBRATION

When pushing a child on a swing, you cannot just apply a constant force. A constant force will move the swing out to a certain angle, but will not allow the swing to start swinging. Nor can you give short pushes at randomly chosen times. That type of random pushing would increase the child's kinetic energy whenever you happened to be pushing in the same direction as her motion, but it would reduce her energy when your pushing happened to be in the opposite direction compared to her motion. To make her build up her energy, you need to make your pushes rhythmic, pushing at the same point in each cycle. In other words, your force needs to form a repeating pattern with the same

frequency as the normal frequency of vibration of the swing. (Acredolo, L. & Goodwyn, S. 2000)

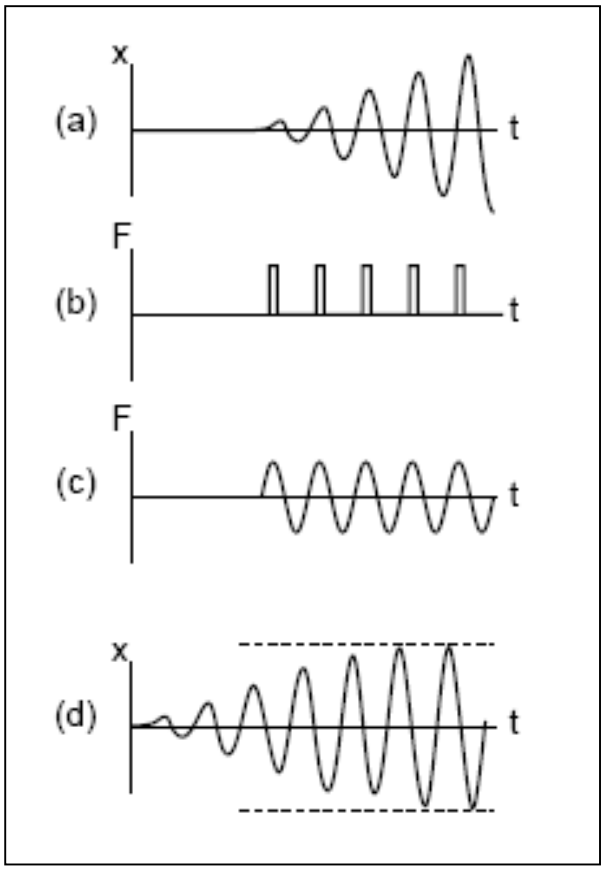

Figure 2.1: Graph Frequency of vibration of the swing

Graph (a) shows what the child's x-t graph would look like as you gradually put more and more energy into her vibrations.

Graph (b). It turns out, however, that it is much simpler mathematically to consider a vibration with energy being pumped into it by a driving force that is itself a sine-wave.

Graph (c). A good example of this is your eardrum being driven by the force of a sound wave.

Now we know realistically that the child on the swing will not keep increasing her energy forever, nor does your eardrum end up exploding because a continuing sound wave keeps pumping more and more energy into it. In any realistic system, there is energy going out as well as in. As the vibrations increase in amplitude, there is an increase in the amount of energy taken away by damping with each cycle. This occurs for two reasons. Work equals force times distance (or, more accurately, the area under the force-distance curve). As the amplitude of the vibrations increases, the damping force is being applied over a longer distance. Furthermore, the damping force usually increases with velocity (we usually assume for simplicity that it is proportional to velocity), and this also serves to increase the rate at which damping forces remove energy as the amplitude increases. Eventually (and small children and our eardrums are thankful for this!), the amplitude approaches a maximum value. (Acredolo, L. & Goodwyn, S. 2000)

Graph (d). Which energy is removed by the damping force just as quickly as it is being put in by the driving force.

This process of approaching maximum amplitude happens extremely quickly in many cases, e.g. the ear or a radio receiver, and we don't even notice that it took a millisecond or a microsecond for the vibrations to "build up steam." We are therefore mainly interested in predicting the behavior of the system once it has had enough time to reach essentially its maximum amplitude. This is known as the steady-state behavior of a vibrating system. (Acredolo, L. & Goodwyn, S. 2000)

2.3 BABY SWING CONSIDERATION BEFORE INSTALLING BABY SWING

Regular nippers and very young babies will enjoy a swinging/vibrating motion to coax them into la la land, whereas active tots will benefit more from hanging toy bars, bright colors and musical sounds. Think about what is likely to preserve baby's interest. This point of design must be considered. (Andrews, L. 2002)

If need to move the swing/bouncer around, need to consider weight, size and collapsibility. Additionally, if living space is restricted avoid one of the bigger framed swings as they'll swamp the room in seconds. panel found that 'size isn't necessarily a good indicator of quality' and indeed their favorite bouncer. The ease of use or portability also have to consider. (Andrews, L. 2002)

The baby swings also have versatility. A swing/bouncer that offers lots of good features is important. Look for removable toys that can replace with own fun creations, different bouncer/swing settings to lull your child to sleep and contrasting textures on the materials. (Andrews, L. 2002)

If baby is to enjoy spending time in his swing/bouncer, comfort is a priority. The model have to provide a good amount of support for your baby's back and neck with the added benefit of soft materials and padded seating. (Andrews, L. 2002)

2.4 AUTOMATIC BABY SWING DESIGN

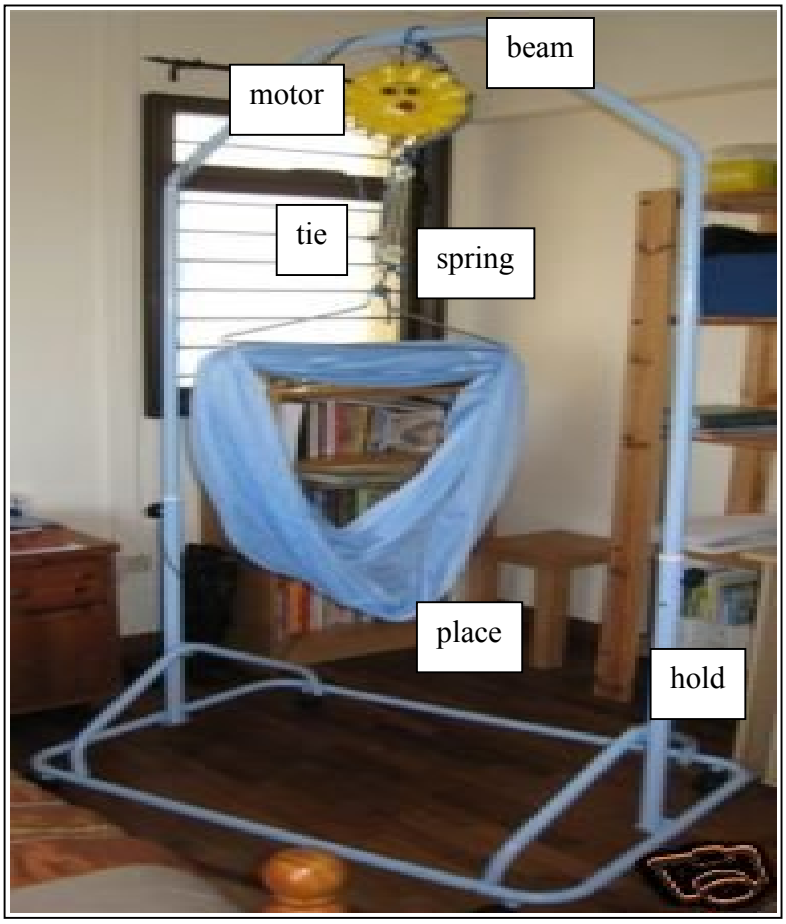

Figure 2.2: Automatic baby swing

In figure 2.1 the function for beam is to support all the force or weight. The beam is the most important part. The steel material of beam can support the weight. The speed and time is control by the electrical motor. The connection of weight of baby with motor is by the tie or rope. The tie will swing or rocker when the motor is move. Tie also will support the spring from fail. The spring cannot give the maximum displacement when tie between the spring. The vibration of spring will swing in same displacement up and down without touch the ground. To bounce or swing. The spring is the most important part. The spring is support from the motor. The spring will bounce according to motor and stop until the energy and force is reduced and become zero. More speed give, the