

# THE BEST PRACTICE FOR FINAL YEAR PROJECT

ROAD MAP TO SUCCESS IN FINAL YEAR PROJECT (DIPLOMA ENGINEERING)

**Bibie Sara Salleh** 



Scan code for e-book:

## Hello.

Ya, you open the right book!

This is a simple illustrative book that will guide you throughout your final diploma year project. Don't worry, this book is not like a thesis or an ordinary book that requires your time to read. We simplify it to 10 SIMPLE STEPS for you to follow one by one.

This book will provide a clear illustrative guide with real examples from the best final year project team from Polytechnic of Sultan Salahuddin Abdul Aziz Shah - BOLER, the one that accomplished tremendous achievement.

Surely, you want to elevate your project to the highest level? Let's start!

#### THE BEST PRACTICE FOR FINAL YEAR PROJECT ROAD MAP TO SUCCESS IN FINAL YEAR PROJECT (DIPLOMA ENGINEERING)

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# Step by step

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THE BEST PRACTICE FOR FINAL YEAR PROJECT

## WHAT DO YOU INTEND TO DO?

Brainstorm your idea with the expert/supervisor to get the basic knowledge of the product

Prioritise & select the best idea

Choose the project title & create a brand with a logo.





# BODER

#### BOLSTER BARRIER



# DEFINE PROBLEM

#### Why? What? When? Where? Who? How?

What is the problem? Focus on the heart of the problem!









A big question mark "?" with regards to the main function of our existing road barrier.



NORTH—SOUTH EXPRESSWAY 22 SEPTEMBER 2015

ner

**KM 195 NORTH HIGHWAY** 

1 JULAI 2016



THIS HAS HAPPENED BECAUSE OF THE SHARP LAPPING OF THE GUARDRAIL POPPED OUT DURING THE IMPACT

1343200

ANTO

O

TWO WAY LANE (CAR FROM THE OPPOSITE SIDE)



#### THE BEST PRACTICE FOR FINAL YEAR PROJECT

# HOW TO WRITE THE OBJECTIVES

The objective must be clear, short, easy, measurable and achievable. Use suitable verbs:

To Design... | To Test... | To Compare... Etc











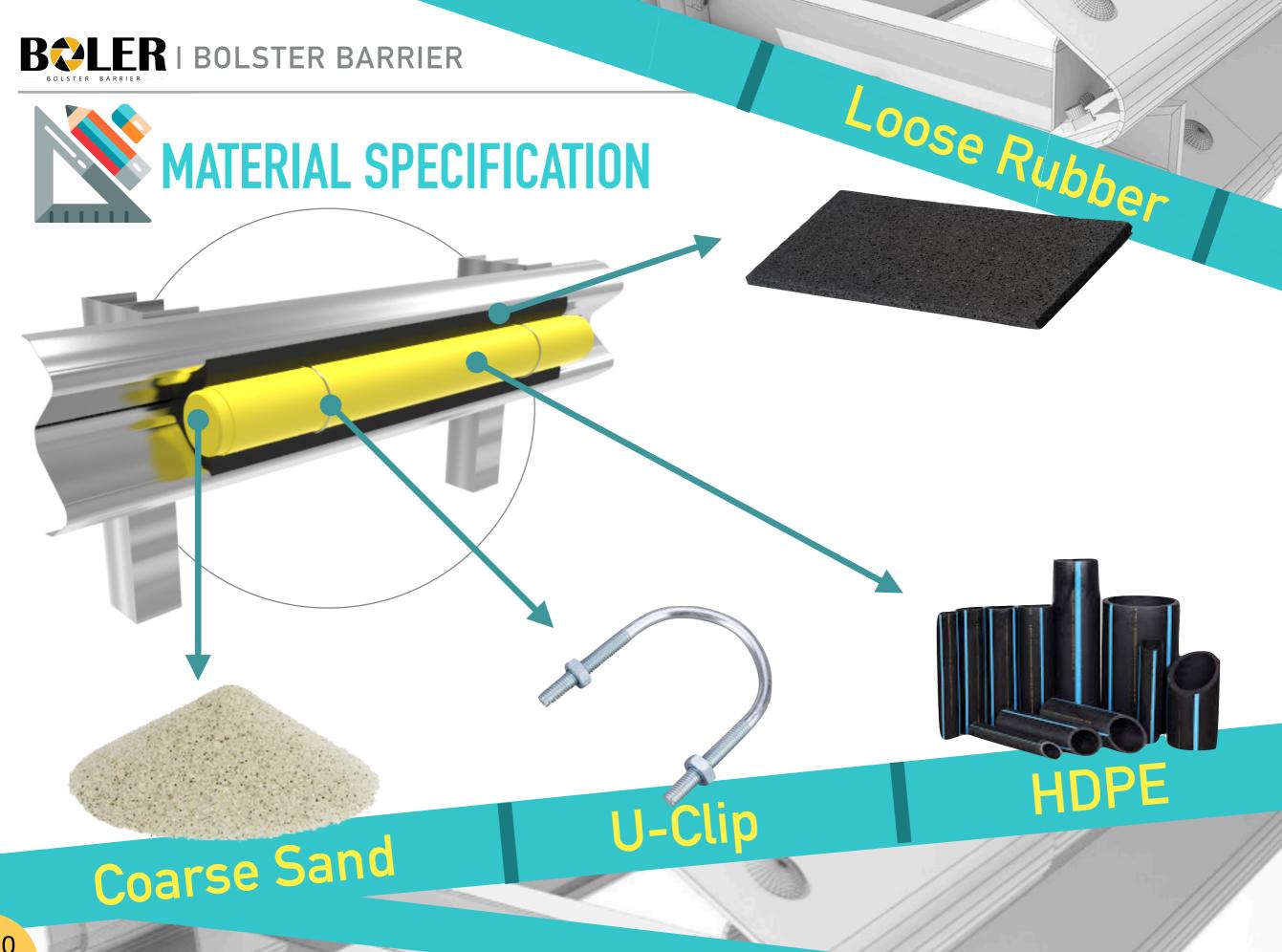
To compare BOLER with the existing equipment installed in Malaysia in-terms of function and price



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# SEARCH YOUR KNOWLEDGE BASE

- Try to focus on the material properties of the product
- List down the material specification
- Highlight the advantage of the materials according to strength, weather-resistant, absorb impaction, etc





#### COARSE SAND

- Loose and dry sand with 95
   Ib/ft3 and 1,520 kg/m3
- Medium density
- To absorb the high impact energy when accidents occur.
- Able to withstand various weather conditions.
- Low cost.
- Inspired by racetrack sandbags (proven impact absorption)

## **U-CLIP**

- Stainless steel U-clip with bolts. SAE grade 440F, UNS S44020.
- The circular shape can reduce the potential for accidental injuries.
- High tensile and durable
  BOLER holder towards the w-beam guardrail.



# LOOSE

- A type of rubber known as Loose rubber
- Pure rubber that is gridded and bound with the binder for crumple zone during impact.
- Act as an impact absorber and to protect the guardrail.

 HDPE, high-density polyethylene with density from 0.93 to 0.97 g/cm3 or 970 kg/m3.

HIGH-DENSITY POLYETHYLENE

- Withstand with high-pressure impact
- Resistance to weather and temperature.
- Good impact absorber



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## HOW TO **ILLUSTRATE** YOUR DESIGN BEFORE FABRICATION OF THE REAL PRODUCT?

Design your product concept using AutoCAD/ Sketch UP/ Other design Software



#### Existing Guard Rail

Liter Without

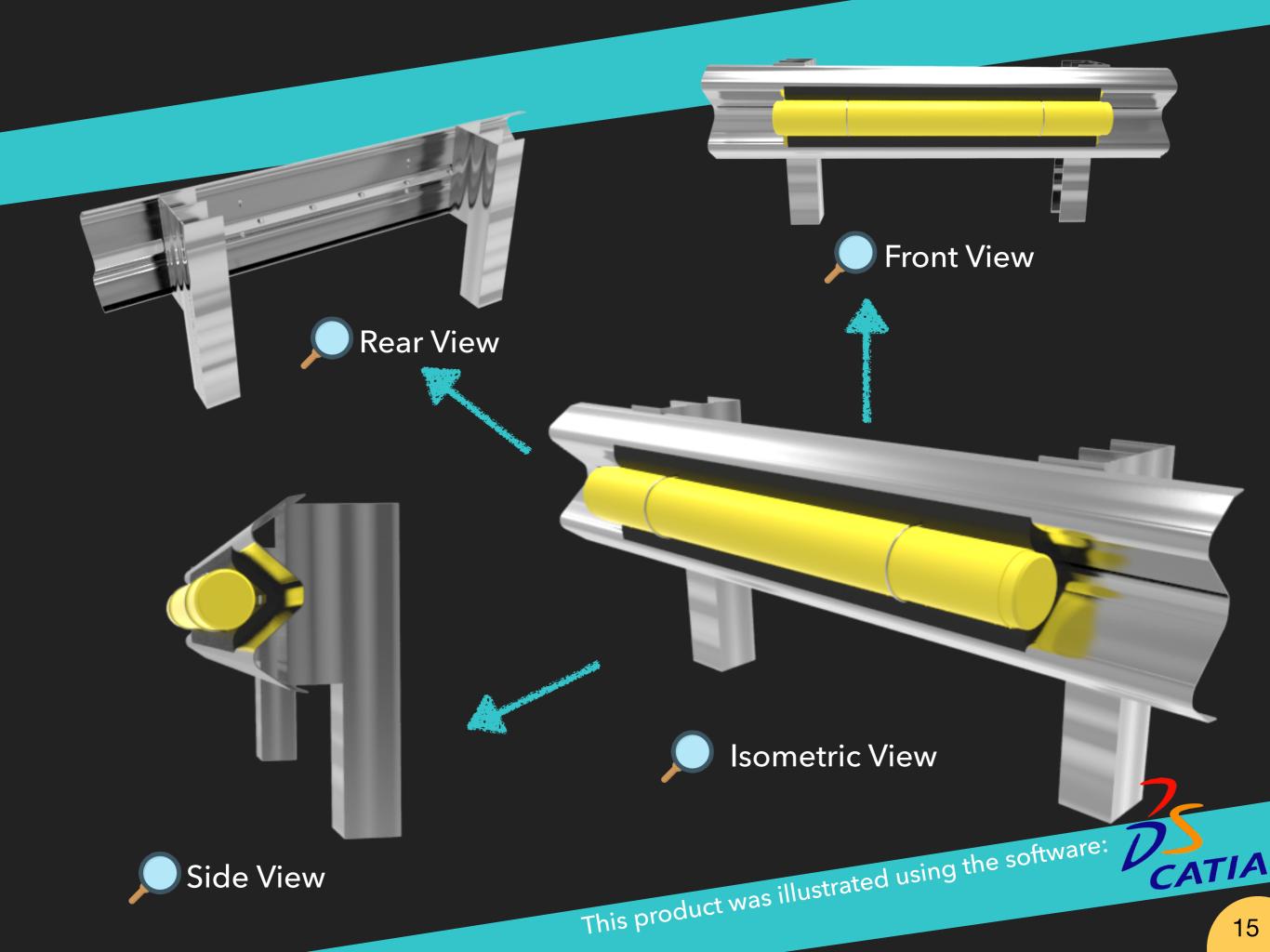
Bolster

C





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#### **APPLICATION AT SHARP CORNER**

#### **ILLUSTRATION OF PRODUCT APPLICATION**

#### **APPLICATION AT SHARP CORNER**

#### APPLICATION AT SHARP CORNER

wild.





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# HOW TO HIGHLIGHT YOUR PRODUCT METHODDOLOGY?

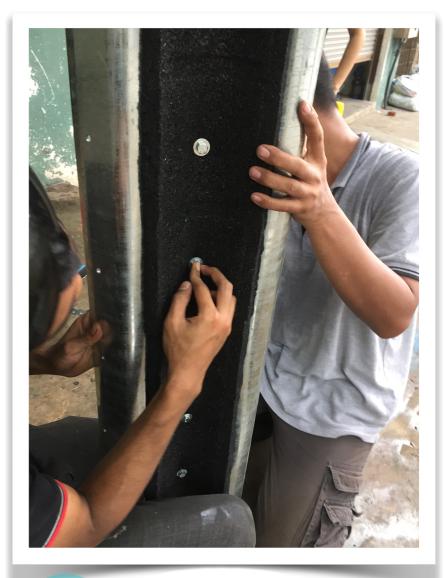
- Show the method of the fabrication process.
- Highlight the test that has been carried out on the product.



## **FABRICATION PROCESS**

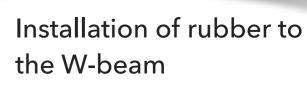


The process of Wbeam selection









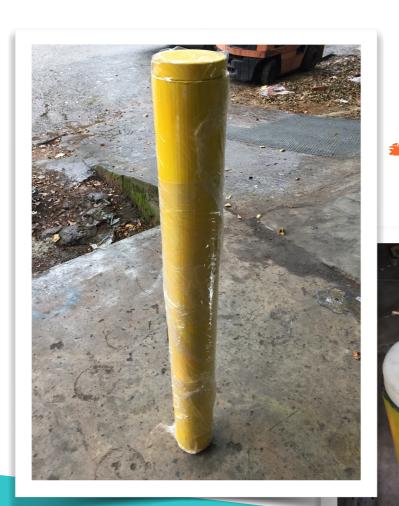


## **FABRICATION PROCESS**



Nylon cap installation and painting process

Assembling the different materials/components for the bolster









Bolster fitted to the w-beam



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# HOW TO EVALUATE THE TEST?

Compare the result with the current/existing product.

Highlight the most significant findings/conclusion/ recommendations from your data.



#### **B**CLER I BOLSTER BARRIER









Fully supported by/in collaboration with the Institute of Road Safety **Research Malaysia.** 

### **DOLLY TEST**

This test used a Dolly to run into **B**CLER (product) to obtain the impact result of energy (kN) and time (ms)

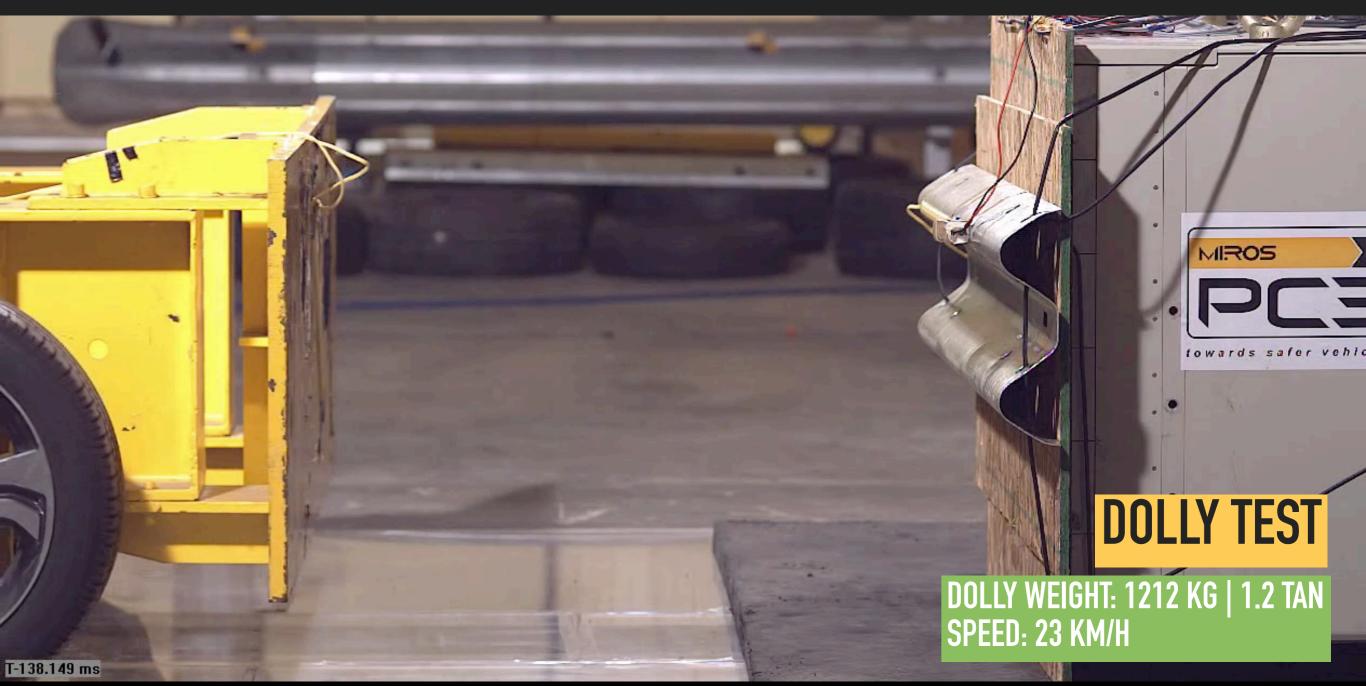




#### PROVISIONAL LABORATORY CRASE CRASH CENTRE (PC3)

~3

## **STANDARD W-SHAPE GUARDRAIL**



T+: -138.149 ms Durat: 0.750 s

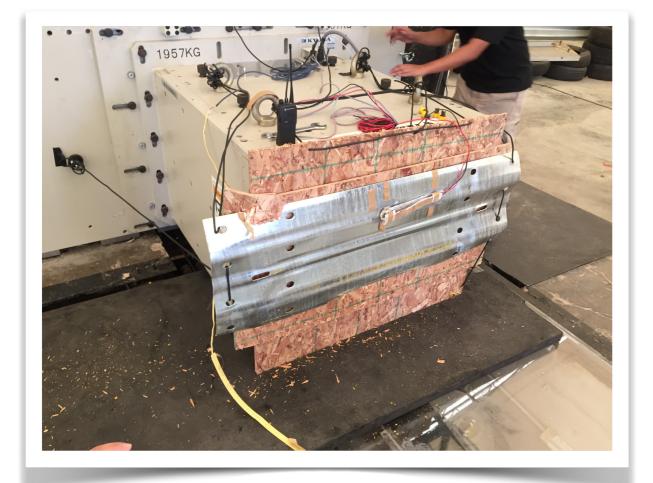




T+: -148.744 ms Durat: 0.830 s





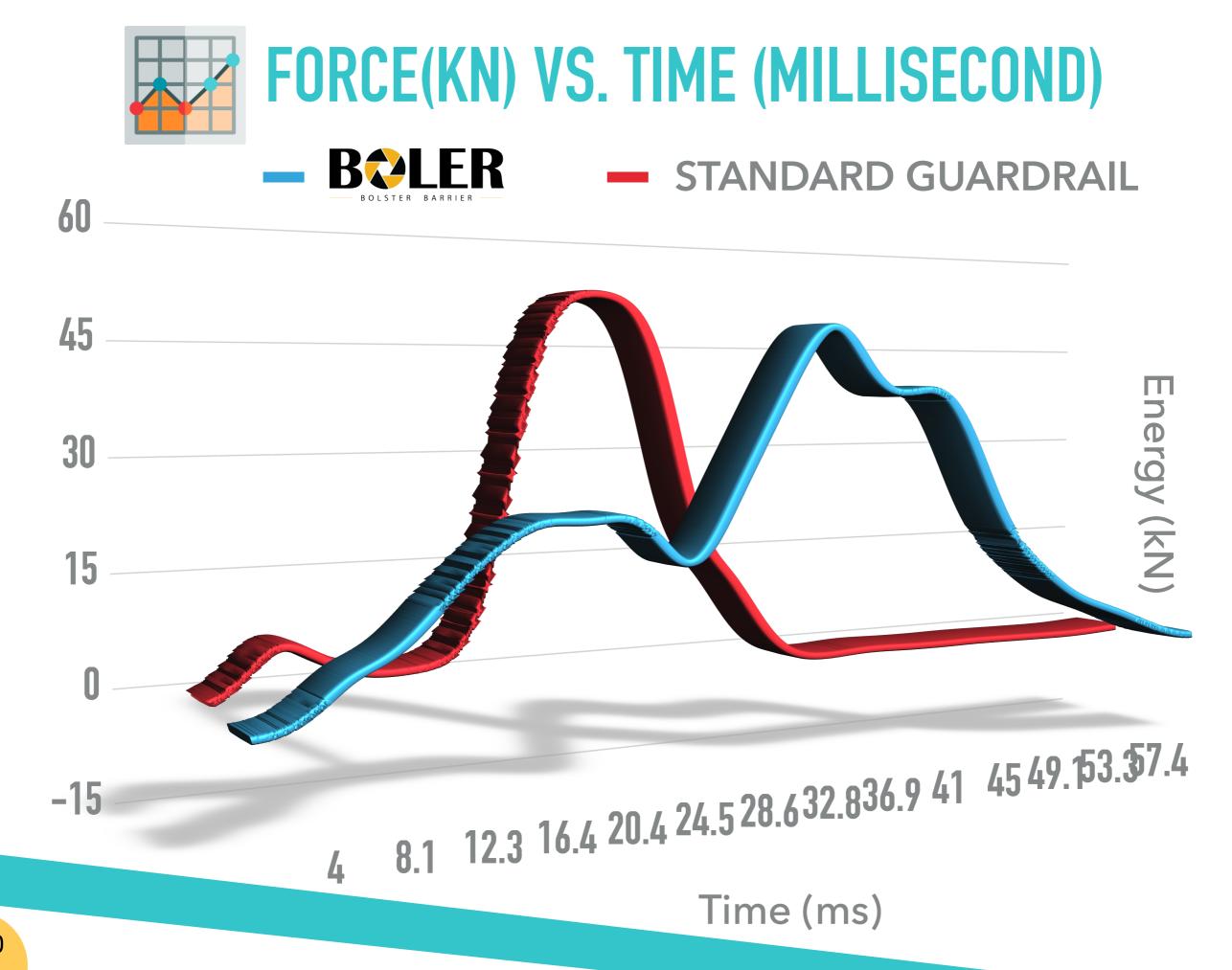




#### W-Shape Guardrail







### **3 INSIGHTS/RESULTS OF PRODUCT** TESTING

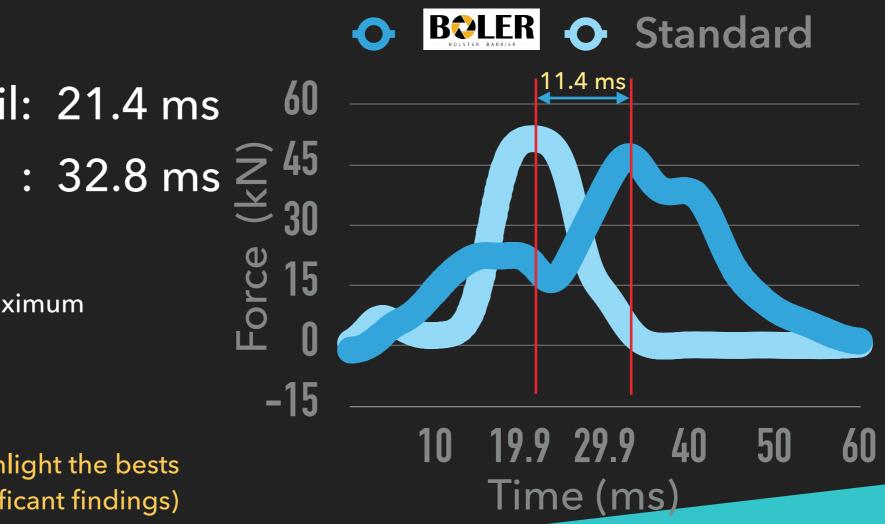
1. The maximum collision impact could be delayed to 11.4 millisecond

W-Shape guardrail: 21.4 ms

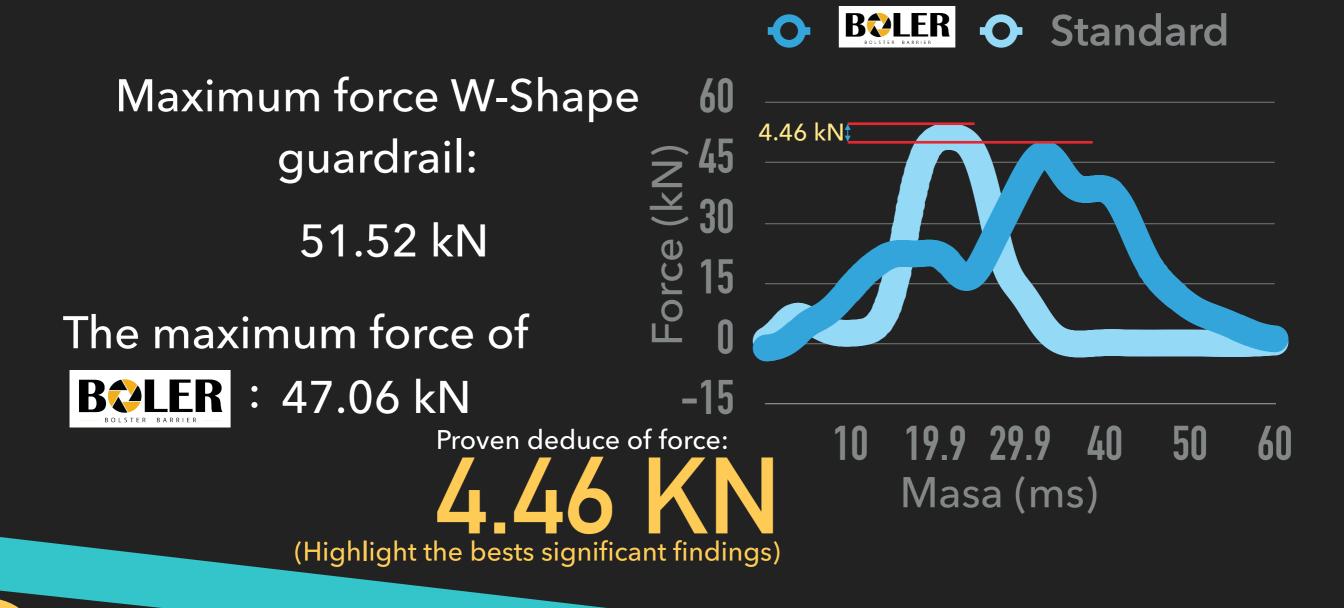
**B¢**LER

We succeed to delay the maximum impact by

> (Highlight the bests significant findings)



2. Maximum peak force can be reduced to 4.46 kN

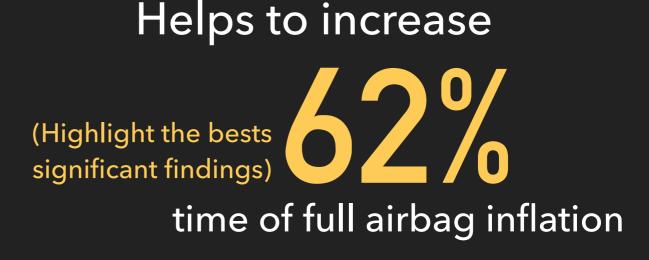




3. Generally, the complete inflation of airbags of a vehicle takes approximately 30 millisecond

-With **BELER** we had successfully delayed 11 milliseconds on the collision impact.













 Tested By Associated Prof Dr Amudin Abu, Head of Intelligent Dynamic & System (IDS), Malaysia Japan International Institute of Technology (MJIIT), UTM Kuala Lumpur.

The structure was analysed using Finite Element Method (FEM). The structure was modelled using Finite Element software MSC PATRAN and MSC NASTRAN as a FEM solver.

#### CAR MODEL

 $\label{eq:approximate mass=1500 kg} \mbox{Weight of car} = 14700 \mbox{N} \mbox{Approximate car stop at distance 0.3 m (1FT) after crash average impact force, $F_{AVG}D = -1/2MV^2$} \label{eq:approximate}$ 



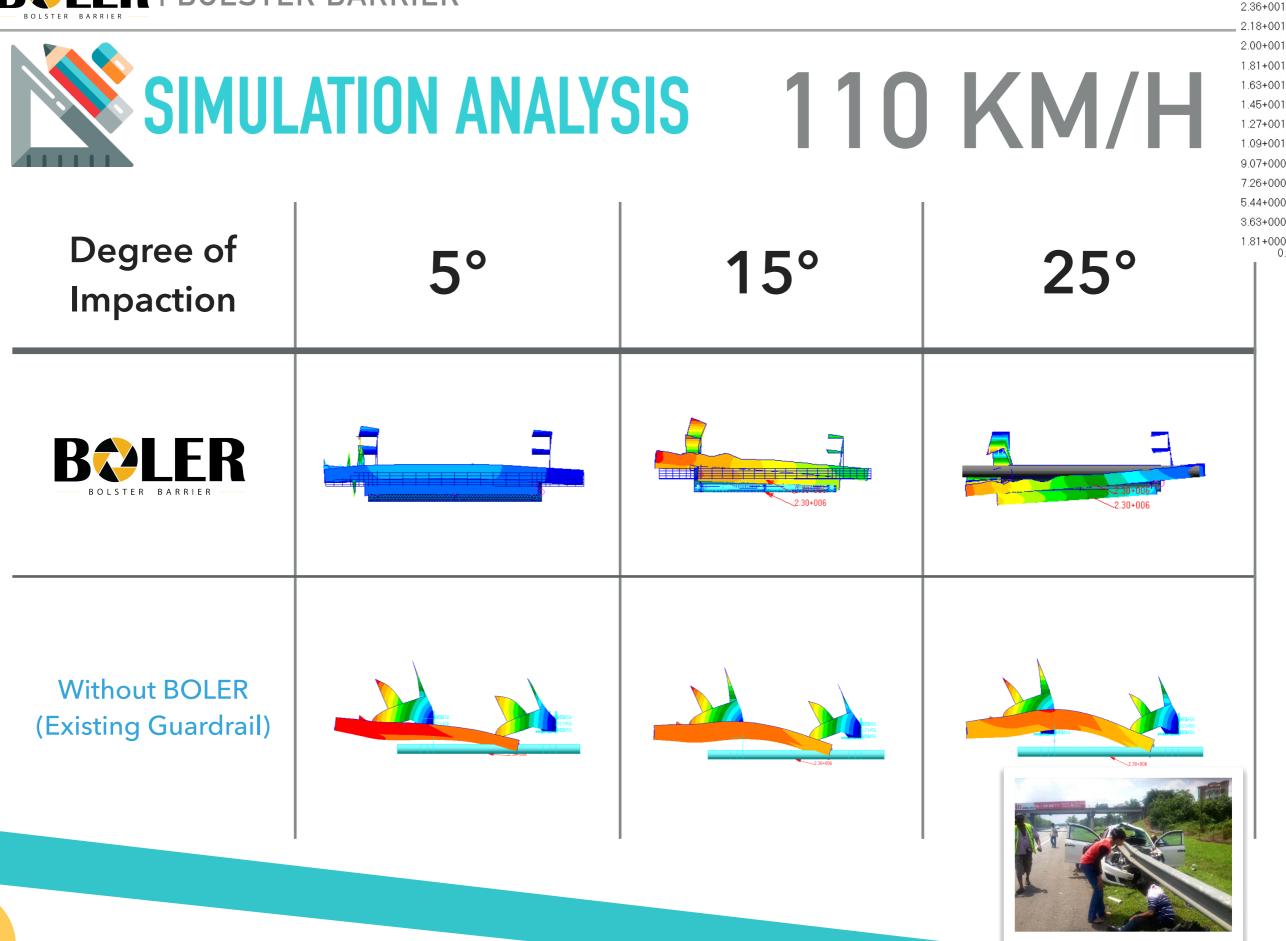
Degree of Impaction	<b>5°</b>	15°	25°
BEER LER BOLSTER BARRIER			2.72+001 2.72+005 2.7
Without BOLER Existing Guardrail)		1 21-066	1 21-006

2.72+00

2.54+001 2.36+001



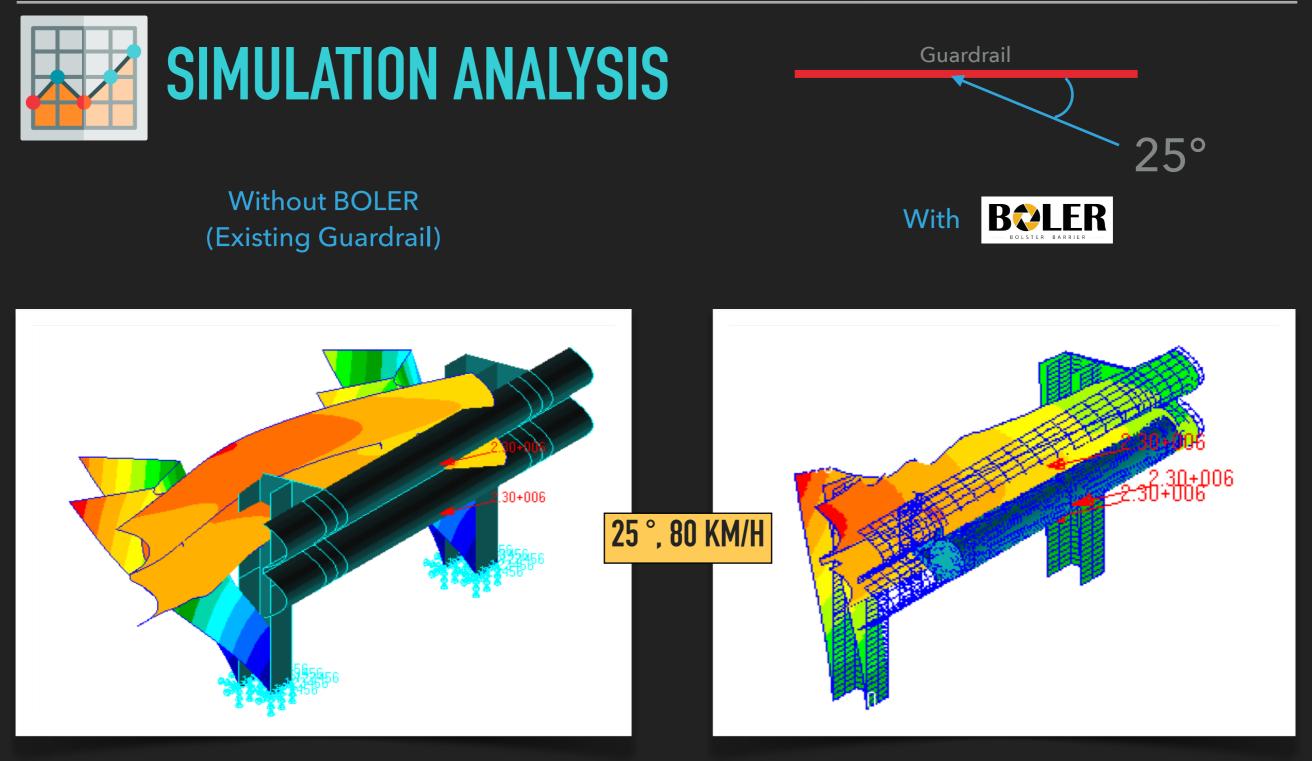
36



2.72+00

2.54+00





\*The BOLER can withstand the impact when being hit at a certain angle. Thus, minimising the probability of the guardrail popping out, while preventing it impaling the car.



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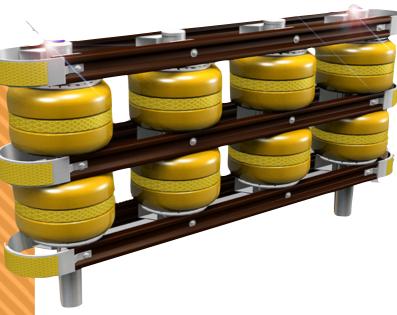
## **SHOW HOW YOUR ANSWER THE** QUESTION







Roller barrier was installed at critical areas with sharp corner/black spot area (i.e. Subang Jaya & Menora Tunnel) for a trial period of 2 years.





### **FUNCTION COMPARISON**

### EXISTING W-BEAM GUARD RAIL

- High casualty during accidents
- Stop the vehicles with less impact absorption
- Need physical
   maintenance, high
   deflection impact after
   an accident

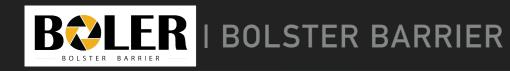
ROLLER BARRIER

- In provision period for
   2 years
- Does not stop the vehicles completely
- Lead to the secondary accidents that are caused by dynamic movement



Stop the vehicles with high absorption impact compared with product **1** 

- Less maintenance cost after the accidents, reduce the deflection of product **1**
- Does not lead to the secondary accident compared with product 2





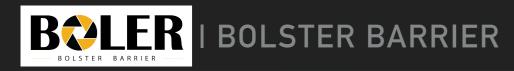
### EXISTING W-BEAM GUARD RAIL

ROLLER BARRIER



**RM 227.71** Per Meter

**RM 683.23** Per Meter RM 117.35 Per Meter RM 345.07 Includes existing guardrail





- Cheap
- Easy to maintain
- Easy to install
- Low potential of a secondary accident





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## HIGHLIGHT YOUR SUBJECT EXPERIS /REFERENCES

- This is to show your research collaboration.
- Get the supporting letter from the company/suitable associations.
- List down your potential client for commercialisation purposes.



### ASSOCIATES EXPERTS



#### Assoc. Prof. Dr Aminudin Bin Hj Abu

Head Of Intelligent Dynamic & System (IDS), Malaysia Japan International Institute of Technology (MJIIT), University Technology Malaysia K. Lumpur.

#### **Azri Bin Asmat**

Roadoro

Inspecting Engineer at RoadPro Rayspeed Holdings Sdn Bhd



# Maizatulharmi binti Mohd Taserip

JKR

Senior Assistant Director of Public Works Department, Negeri Sembilan

#### **IR Mohd Satimin Bin Ismail**

**Director of Synergy Network** 





#### Zulkifli Hj. Haron



Director of Zull Design Autotronic and an expert inventors of technology equipment.





Roadoro

Letter from RoadPro Rayspeed Holdings Sdn Bhd **RAYSPEED HOLDING SDN BHD**(679166-A)

P. O. Box 300, 70730 Seremban, Negeri Sembilan Darul Khusus Tel: 606-677 3429 Fax: 606-677 3519 E-mail: rayspeed\_holding@yahoo.com.my

Tarikh: 17/01/2017

Ruj Kami: RHSB/PSA/170117

Kepada Sesiapa Yang Berkenaan

Tuan/Puan,

#### Per: POTENSI PRODUK BOLER UNTUK DIKOMERSILKAN

Dengan segala hormatnya, merujuk kepada perkara di atas, saya menyokong penuh bahawa produk BOLER ini boleh diketengahkan untuk dikomersilkan memandangkan kelebihan produk ini adalah;

- a. Teknologi pelajar Malaysia berbanding produk Roller Barrier yang sedang dipasang dalam tempoh percubaan di Subang Jaya (Teknologi Korea)
- b. Harga murah 4 kali ganda berbanding produk Roller Barrier
- c. Mampu melewatkan masa hentaman sebanyak 11.0 milisaat (35%) berbanding penghadang jalan sedia ada tanpa pemasangan BOLER, seterusnya meningkatkan masa pengaktifan airbag sebanyak 62%. Ini berpandukan pada keputusan ujian hentaman 'Dolly Test' dilaksana di CP3 MIROS, Melaka

2. Pihak kami menyokong penuh potensi produk ini untuk dikomersilkan dan digunakan oleh pihak berwajib sebagai peranti baru yang dipasang pada penghadang jalan sedia ada agar dapat mengurangkan kadar kemalangan maut di negara kita.

Semoga berjaya.

Sekian, terima kasih.

Yang benar,

(Mohu Azri Asmat) Pengurus



### MARKET STUDIES





Approved by Road Furniture Supplier -RoadPro Rayspeed Holdings Sdn Bhd

### **POTENTIAL CLIENT**





TRACK YOUR ACCOMPLISHMENTS

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# LIST DOWN ALL YOUR ACHIEVED STATES IN EXHIBITION OR COMPETITION





	<b>13 July 2016</b> 1st meeting & project briefing <b>5 August 2016</b> First presentation of idea to the panels of lecturers			• <b>17 November 2016</b> Start-off Prototype		<b>25 November 2016</b> Product fabrication at the factory	
	23 days	78 days		6 days		6 days	
Start	BRAINSTORM	PRESENTATION	GRANT	FABRICATION	TESTING	FABRICATION	
			26 days		2 days	Next Page	
	2 August 2016 Meeting with industrial parties for introduction of product & brainstorm		<b>22 October 2016</b> Selected & received RM 5000.00 grant from Mylnovasi 2016		23 November 2016 Product testing at MIROS		



### **PROJECT TIMELINE**

RM 1000.00.

Second pres to the panels lecture.		<b>24 January 2017</b> Second presentation to the panels of lecture. <b>23 days</b>	1	<b>14 March 2017</b> Final Project Competition & Exhibition (FPCE). (Gold Medal)		<b>28 March - 4 April 2017</b> Geneva Invention (Gold medal & Special Invention award)
	COMPETITION	PRESENTATION		COMPETITION		
				40 days		
	<ul> <li>1-2 December 2016</li> <li>1st competition,</li> <li>Mylnovasi 2016. Placed</li> <li>first runner up and</li> <li>received pattern grant</li> </ul>		<b>16-18 February 2017</b> 2nd competition, Malaysia Technology Expo. (Gold medal)		Bes Stu	March 2017 at Project award at dent's Excellent ard of PSA 2016.



#### SELECTED AS ONE OF THE BEST 15 INNOVATION GROUP IN ZONE COMPETITION OF MALAYSIA INNOVATION 2016



PLACED FIRST RUNNER UP IN MYINOVASI 2016 UNDER KPT (NATIONAL LEVEL)



**RECEIVED PATTERN GRANT FOR THE PRODUCT ON MYINOVASI 2016 AT KPT** 



MALAYSIA TECHNOLOGY EXPO 201 Putra World Trade Centre KL



RECEIVED BEST PROJECT AWARD IN STUDENT'S EXCELLENT AWARD OF POLYTECHNIC SULTAN SALAHUDDIN ABDUL AZIZ SHAH 2016 (GOLD AWARD)

MUDKAH

HUD

GOR

16 MARCH 2017



HONOURED WITH SPECIAL INVENTION AWARDS FROM KING ABDUL AZIZ UNIVERSITY OF SAUDI ARABIA.



AWARDED GOLD MEDAL FOR 45TH INTERNATIONAL EXHIBITION OF INVENTION GENEVA, SWITZERLAND 2017.



10 FEBRUARY 2018

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### Acknowledgements

Ministry of Higher Education Malaysia

Politeknik Sultan Salahuddin Abdul Aziz Shah

Malaysian Institute of Road Safety Research (MIROS)

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Maizatulharmi binti Mohd Taserip Public Works Department, Negeri Sembilan Azri Bin Asmat RoadPro Rayspeed Holdings Sdn Bhd

Zulkifli Hj. Haron Zull Design Autotronic

Special thanks to, BOLER team; Nur Qasrina Binti Amiruddin Nur'Izzah Sahirah Binti Samat Awangku Nazrul Haziq Bin Awangku Abdul Rahim Iskandar Zulkarnain Bin Adamulhasza

### About the author

**Dr Bibie Sara Salleh** is currently a senior lecturer at Civil Engineering Department, Politeknik Sultan Salahuddin Abdul Aziz Shah. Starting her career in 2003, Dr Bibie Sara was promoted to her present position as the Head of Department of Facility Management & Development in May 2018. She graduated from Universiti Teknologi Malaysia with a Bachelor of Science in Civil Engineering in 2001. After graduation, she continues her Master study in Technical & Vocational Education in 2002. Juggling between work, family & schoolwork, Dr Bibie Sara pursued her part-time study in Master of Highway & Transportation Engineering in Universiti Putra Malaysia in 2007. She has been awarded a scholarship under *Hadiah Latihan Persekutuan (HLP), Ministry of Higher Education* for her PhD in Civil & Structural Engineering at Universiti Kebangsaan Malaysia and finished her PhD in 2019.

Throughout 17 years of her career, she had gain experienced in TVET education comprising of curriculum, instructional, assessment and also research development. She also specialises in the resources management which supports the TVET curriculum, contributes to the development and implementation of the polytechnic Strategic Plan. The plan, provides the framework, direction and supervision of facility management and development, supervises budget preparation for the institution under Malaysian Plan, development allocation etc. She is subject matter specialist in the field of transportation planning, non-motorized (cycling & pedestrian) planning and implementation and highway & traffic engineering.

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