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Tamilarasu. B

UG Students of M.
Kumarasamy College of
Engineering, Karur,
Tamilnadu, India

Sudhakaran.N

UG Students of M.
Kumarasamy College of
Engineering, Karur,
Tamilnadu, India

Yuvaraj. S

UG Students of M.
Kumarasamy College of
Engineering, Karur,
Tamilnadu, India

Vijay. P

UG Students of M.
Kumarasamy College of
Engineering, Karur,
Tamilnadu, India

Correspondence:

Tamilarasu. B

UG Students of M.
Kumarasamy College of
Engineering, Karur,
Tamilnadu, India

Design and Fabrication of Rescue Motor Vehicle

Tamilarasu. B, Sudhakaran.N, Yuvaraj. S, Vijay. P

Abstract

Now a day's road accidents in India are increasing day by day, approximately more than 400 peoples are died on accidents and many are injured. As per survey in India, Tamilnadu is the state which has the maximum number of road accidents and injuries. At present, 108 ambulances and private ambulances are doing the medical services to victim. But the ambulances cannot reach the hospitals within the time due to heavy traffic in rural and urban cities. To overcome this situation, the government of India planned to serve the first aid to victim. As a result, in India in 2015 Karnataka government introduced the bike ambulance scheme to serve the first aid to the accident victim until the arrival of ambulance. Recently in 2016 Tamilnadu government also introduced the same scheme. The schemes can serve only first aid to the accident victim but can't help the accident victim to take them to the hospitals on the time. To overcome these problems, we design and fabricate the rescue motor vehicles (RMV) which can be used to carry the accident victim to the hospitals on time. The rescue motor vehicle includes an inclined stretcher support to carry the victim. This additional stretcher has been modelled by using the CREO software and analysed by using ANSYS software. RMV includes an emergency kit, foot rest and siren. Emergency kit consists of portable oxygen cylinder, pulsoxymeter, BP apparatus, glucometer and digital thermometer. Thus the RMV can serve immediate first aid to the accident victim and also to carry the victim to the hospitals even in the heavy traffic conditions too.

Keywords: RMS, Ambulance

1. Introduction

We regularly observe an emergency vehicle struck in activity, endeavoring to move past the gigantic trail of vehicles before it and achieve the clinic on time. Amid that brilliant hour, when each and every second checks, activity squanders a great deal of time, now and again notwithstanding prompting loss of life. The bicycle ambulances which will give essential therapeutic help to the patient in require till the four wheeler rescue vehicle arrives. The administration will be extremely valuable in congested territories with overwhelming movement, where a four-wheeler can't reach on time. The two-wheeled ambulances are outfitted with medical aid units and oxygen barrels, and the rider will be a prepared paramedic with a driving license. The motorbike ambulances would go in limit avenues in the event of crises and would be useful in giving emergency treatment on dire basis. This crisis bicycle rescue vehicle which frame some portion of a crisis medicinal administration, overseeing crisis care to those with intense therapeutic issues.

1.1 Ambulance

A rescue vehicle is a vehicle used to convey wiped out or harmed individuals to the close-by healing facilities. The term emergency vehicle originates from the Latin word 'ambulare'. The entry of emergency vehicle can be discovering by its siren sound and cautioning light. The siren will ring when the casualty is inside the rescue vehicle. At the point when there is no patient inside the emergency vehicle then it won't ring. At whatever point the siren rings every other vehicle on that entry need to give the best approach to ambulance. Ambulances (Ambulancias in Spanish) were first utilized for crisis transport in 1487 by the Spanish powers amid the attack of Malaga by the Catholic Monarchs against the Emirate of Granada.

2. Literature Review

R.A. Dennis (2008) has said a noteworthy worry of country individuals in many creating nations, particularly in sub Saharan Africa, is access to wellbeing administrations in a crisis. This is especially valid for ladies, the same number of crises include convoluted pregnancies or disease of youthful kids. A 2004 meeting of wellbeing associations presumed that enhanced crisis wellbeing administrations were fundamental if thousand years objectives (MDGs) identified with maternal and infant wellbeing in Africa were to be accomplished. This ought to incorporate successful means for auspicious transport of patients to referral administrations. Traditional ambulances are costly and hard to keep up. There is unmistakably potential for suitable lower cost adaptations to benefit as much as possible from restricted assets. Cruiser based ambulances are especially fitting since the innovation is normal and bikes are broadly utilized as a part of wellbeing effort programs.

Jan J.Hofman, et every one of the (2012) have said that To survey whether cruiser ambulances set at provincial wellbeing focuses are a more powerful technique for diminishing referral delay for obstetric crises than an auto rescue vehicle at the area healing facility, and to contrast venture and working expenses and those of a 4 wheel drive auto emergency vehicle at the region clinic.

Ra Dennis, et every one of the (2015) have said that Lack of reasonable transport is a noteworthy limitation on access to crisis human services in rustic regions of Sub Saharan Africa and one of the fundamental obstructions to accomplishing Millennium Development Goals 4 and 5 in these nations. Regular ambulances are costly to procure and work and this paper contends that there is a solid case for presenting lower-cost forms. The paper depicts the effective trials of a cruiser rescue vehicle trailer (MAT) in Zambia and talks about the ramifications of the discoveries as to setting up a crisis transport benefit in light of ease ambulances.

Sunil S.Bhopal, et each of the (2012) has said that birth remains an unsafe undertaking for a considerable lot of the world's ladies. Advance to enhance this has been moderate in sub-Saharan Africa. The second postponement, where transport foundation is entering in enabling a lady to achieve mind, has been a generally dismissed field of study. Six eRanger motorbike ambulances, particularly built for use on poor streets in asset poor circumstance swere gave in 2006 as a major aspect of a crisis referral framework in provincial Sierra Leone.

Jessica Vechakul (2008) has said that in creating nations, individuals are biting the dust from treatable maladies since they can't achieve medicinal care when they require it most. Run of the mill strategies for transport, for example, wheelbarrows or cruisers are too moderate, perilous, or costly. The bike emergency vehicle is a privately delivered and kept up, fuel-less vehicle that gives protected, moderate transport. The outline of this proper innovation fluctuates significantly between nations in light of the changeability in neighborhood conditions, for example, landscape, social marks of shame, and accessibility of materials. This proposal depicts the improvement of a bike rescue vehicle

(Zambulance) intended for Zambia. The Zambulance is a two-wheeled trailer that conveys a sheet metal stretcher, and can be towed by basic bikes. The rescue vehicle is manufactured from standard bike parts and steel stock, for example, 25 mm round tubes that can be effortlessly bowed to limit cuts and welds. A solitary rider can transport one patient at normal paces of 25kph for separations up to 35km on acceptable B-level streets. The trailer is 200cm by 98cm and measures 22 kg, while the stretcher is 200cm by 65cm and measures 20 kg. The Zambulance costs 1,200,000 Zambian Kwacha or around 315USD (in light of conversion scale on December 27, 2007).

3. Methodology

The motor rescue vehicle consists the following parts.

- Stainless steel rod and plate
- Seat belt
- Plywood
- Seat

3.1 Stainless Steel

3.1.1 Austenitic stainless steels

Austenitic stainless steels are 200 arrangements or 300 arrangements. They are non-attractive and have high erosion protection. They can be solidified just by icy working - not by warm treatment. They are exceptionally formable. In any case, they are inclined to stretch erosion breaking. There are three subtypes: straight, L and H. Prominent straight sorts are grades are 201, 202, 301, 302, 303, 304, 305, 308, 309, 310, 314, 316, 317, 321, 347, 348 and 384. L sorts have higher erosion protection than the straight sorts. Cases incorporate 304L and 316L. H sorts are appropriate for use in high temperature situations. Austenitic stainless steels are utilized as a part of shafts, valves, screws, bushings, nuts, airplane fittings, substance gear, and nourishment handling hardware, fermenting hardware, cryogenic vessels and so forth.

3.1.2 Ferritic stainless steels

Ferritic stainless steels are 400 arrangements. They are attractive. They have brought down pliability and lower erosion protection than the austenitic evaluations. In any case, they offer high protection from push consumption breaking. They are solidified by icy working and are not warm treatable. A portion of the well-known evaluations are 405, 409, 430, 434, 442, 436 and 446. Run of the mill applications are warm exchangers, car clasp, heater parts, and warmer parts.

3.1.3 Martensitic stainless steels

Martensitic stainless steels are 400 arrangements and 500 arrangements. They are attractive. They have higher quality, higher wear protection and higher exhaustion protection than the austenitic and Ferritic grades. They can likewise be warm treated. Be that as it may, erosion protection is direct and lower than the austenitic and Ferritic grades. They are profoundly machinable. A portion of the well-known evaluations are 410, 414, 416, 420, 440 and 431. Real applications are machine parts, pump shafts, fasteners, bushings, coal chutes, cutlery, equipment, stream motor parts, mining hardware, rifle barrels, screws, valves, airplane fittings, shoot douser embeds, and bolts.

3.1.4 Precipitation Hardening Grade Stainless Steels

Precipitation Hardening Grade Stainless Steels are likewise called PH sorts. Their consumption protection is proportional to that of austenitic evaluations and quality is by and large higher than that of Martensitic grades. They likewise hold high quality at hoisted temperatures. They are warming treatable. They are primarily utilized as a part of aeronautic trade for aviation basic segments. Prevalent evaluations incorporate 17-4PH and 15-5PH.

3.1.5 Duplex stainless steels

Duplex stainless steels are blend of austenitic and Ferritic. They give higher consumption protection than the austenitic stainless steels. They are additionally more impervious to push erosion breaking than the austenitic stainless steels. They have higher quality than the austenitic evaluations. Famous UNS duplex evaluations incorporate S32101, S32304, S32003, S31803, S32205, S32760, S32750, S32550, S32707 and S33207. Ordinary applications are water treatment plants and warmth exchanger segments.

3.2 Physical Properties of stainless steel

The explanation behind choosing stainless steel is typically because of favorable circumstances given by physical properties, for example, erosion protection. Not with standing consumption protection the favorable physical properties of stainless steel incorporates

- o High and low temperature protection.
- o Ease of manufacture.
- o High quality.
- o Hygiene and simplicity of cleaning
- o Recyclable
- o Long life cycle
- o Low attractive porousness

3.3 Plywood

The plywood is utilized as a part of our venture to settle the seat. Without plywood the seat can't be stationary amid the driving. The plywood is settled with the stainless steel pole. Two cross stainless steels are settled in the stainless steel pole to convey the plywood.



Fig 3.1: Ply wood

3.4 Seat

The seat was settled on the plywood. The seat is utilized to convey the casualty. It will be settled around 120 degree. So the casualty can sit easily.



Fig.3.2: Seat

3.5 Seat Belt

The street condition might be great or awful. The casualty can slip from the bicycle when it is turning or going in an unsmooth street conditions. So the safety belt is utilized to keep the patient unbending with the bicycle. It can be a defend to the casualty amid the unsmooth street conditions.



Fig 3.3: Seat belt

4. Experimental Design

4.1 Iterations

4.1.1 Iteration 1

To start with we chose to settle the bar just before the motor. In legend magnificence bicycle there is a space amongst motor and curved guard of the front hagggle there is a guard. So we chose to settle the pole in that space to adjust the heap. Yet, the accompanying issues will emerge in the event that we did that. We select the saint Honda wonder bicycle. Since it is utilized by the many individuals and furthermore contrasted with alternate bicycles it is accessible requiring little to no effort in the market. On the off chance that we settle the pole before the motor it will be hard to repairman while repairing the vehicle.

The driver can't begin the vehicle utilizing kicker or it might wind up noticeably awkward to driver. This game

plan will make aggravation to the driver to keep his leg on stool and furthermore to change the riggings and apply the brake. In bike motor the warmth will be delivered at abnormal state. The bar can without much of a stretch warmed by the warmth of the motor. Since it will be nearer to the motor. This warmth can be exchange all through the pipe. Either the driver or patient will be enduring by the warmth when they touch that. So we have changed our arrangement.

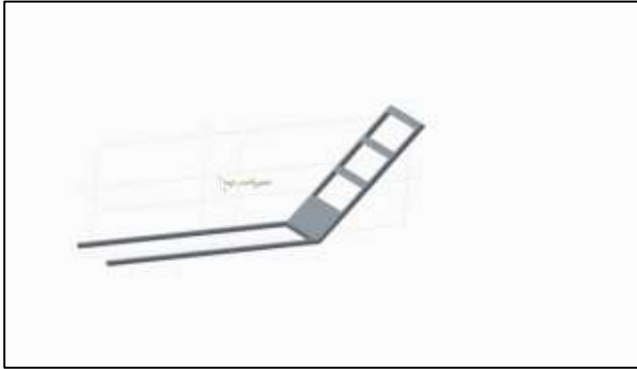


Fig 4.1: Iteration 1

4.1.2 Iteration 2

Next we have chosen to settle the bar close by the footstool of the driver. At first we chose to settle the bar as a solitary piece to adjust the heap. Be that as it may, in this plan likewise the driver will be enduring to begin the vehicle or to change the apparatus or to apply the brake.

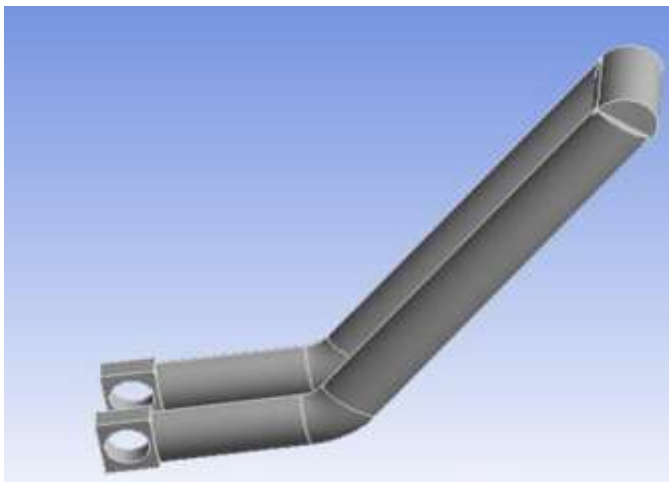


Fig 4.2: Iteration 1

4.2 Fabrication

The stainless steel was twisted. It can't be twisted without the correct machines. We bowed the stainless steel pole utilizing two rollers. Two stainless steel plates have purchased. In the event that we settle the seat without the best possible help it might be adaptable amid the drive. So these plates have settled over the stainless steel pole. These plates settled with the stainless steel pole to convey the plywood. The stainless steel plate is settled with the stainless steel bar by utilizing the welding procedure. We realize that for the welding procedure the every material ought to be made of a similar material. So we have chosen the stainless steel as the material of the plate. The plywood was joined over the stainless steel plate and pole. Without the best possible help the plywood can't be

settled. That is the reason we welded the stainless steel plate over the stainless steel rod. The Seat has settled over that plywood to give more agreeable to the patient. At first we have wanted to purchase the stretcher fabric which is in green shading that is utilized as a part of healing centers and ambulances to convey the patient. If we utilized that green material as a seat, the plate which was settled over the bar might be awkward to the victim. So we chose to settle the seat rather than that green material to give more agreeableness to the victim. The situation resembles a normal seat that settled in autos. Presently the casualty feels better. The plate has purchased to settle the pole with the bicycle. The penetrating was done on the stainless steel pole and on that plate.

The nuts have purchased to settle the setup with the bicycle utilizing the gaps that have bored. The penetrating has done at the two places on the stainless steel pole and the extra plate to change the position of the seat. On the off chance that the patient is a short individual, at that point the bar is settled utilizing the primary opening by stray pieces. In the event that the casualty is excessively tallness, at that point the setup is settled on the second gap utilizing the stray pieces. The street condition might be smooth or unpleasant. So the patient can be slip from the bicycle amid the voyaging. So the safety belt has joined to our setup. The safety belt has joined with the assistance of another plate.



Fig 4.3: Experimental Setup

The plates have settled at the bowing spot of the stainless steel bar. Two plates have settled on the two sides. These plates are utilized to settle the safety belts. The Two safety belts will be in a X shape to unbending the casualty with the bicycle. These safety belts will spare the patient from the slippage.

5. Result and Discussion

At long last we chose to settle the pole close by the safeguard. In the event that we settle the pole close by the safeguard the heap will transmit to the focal point of the bicycle. So the front wheel of the bicycle won't be lift when we apply the overwhelming burden on the posterior of the bicycle. There is no unsettling influence to the driver when we settle the bar close by the safeguard. The casualty

likewise feels great by this outline. The cost of the material

is likewise low when we apply this outline.

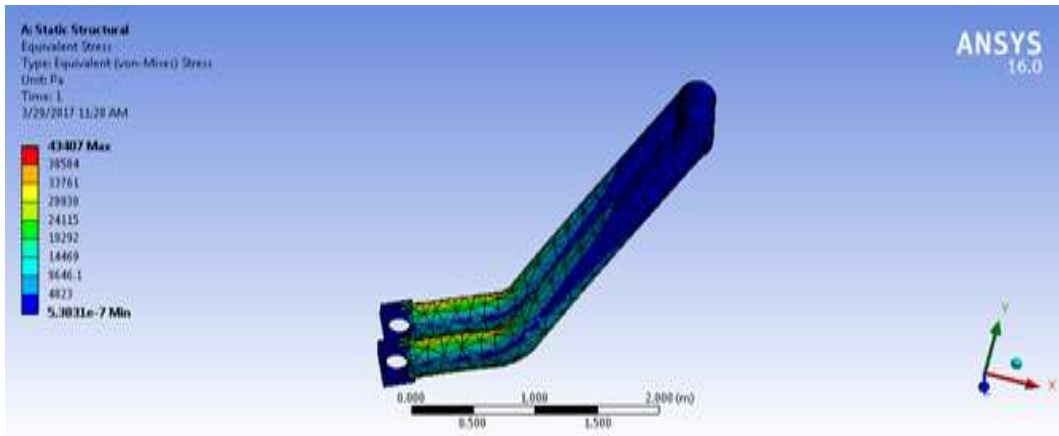


Fig 5.1: Elastic Stress

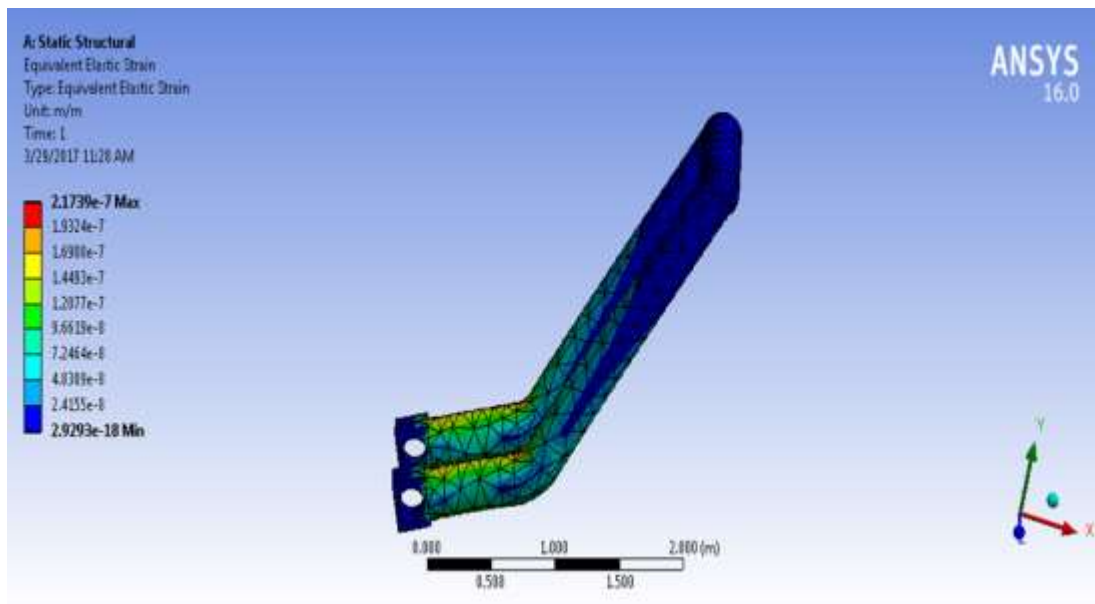


Fig 5.2: Elastic Strain

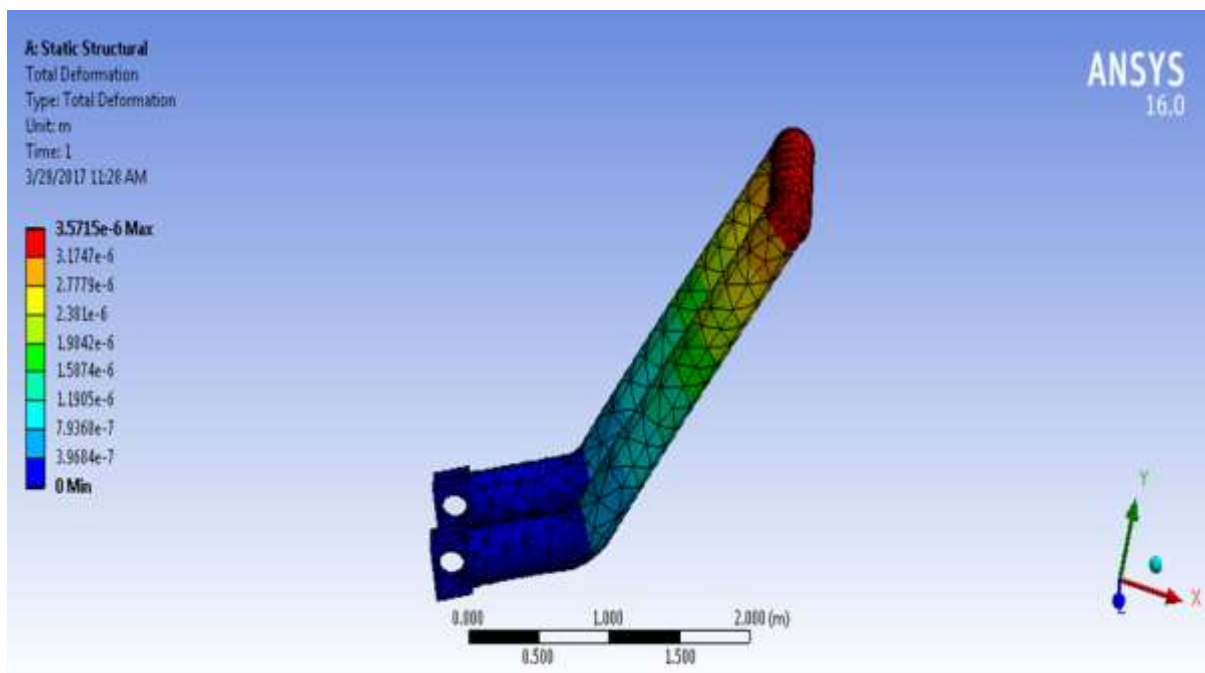


Fig 5.3: Total Deformation

Conclusion

The Rescue engine vehicle can convey the mishap casualty to the healing facilities inside the brief timeframe. The RMV can be used in limit avenues and substantial movement conditions. It can pass the activity effortlessly since the need of less space.. It can with stand the heap around 150 kg. The greatest anxiety esteems are acting in the protected area. The aggregate disfigurement is likewise inside the point of confinement. So the Rescue engine vehicle is protected to convey the casualty and furthermore it will spare the life of the casualty.

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