Project created on 08.09.2016 13:53.

Report for project Senior Design Electronic book

Task created on 30.11.2016 09:21.

Meeting 11/21/16

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:23.

Step 1: Meeting Notes taken by Shirshak

No description

[Meeting_Notes_11-21.doc] File uploaded on 30.11.2016 09:23.

Comments for step Meeting Notes taken by Shirshak

No comments

Activity of task Meeting 11/21/16

30.11.2016 09:21 *Nischal Khanal* created task **Meeting 11/21/16**.
30.11.2016 09:23 *Nischal Khanal* created Step 1 **Meeting Notes taken by Shirshak**.
30.11.2016 09:23 *Nischal Khanal* completed Step 1 **Meeting Notes taken by Shirshak** (1/1 completed).

Samples of task Meeting 11/21/16

No samples

Task created on 23.11.2016 21:58.

Progress Report Update

No due date

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 24.11.2016 06:04.

Step 3: Project Scope

The main objective of this project is to solve the problem presented above by creating and manufacturing a medical device, which provides rehabilitation for hand burn patients who have already received an initial help from medical professionals (but cannot afford or do not have access to proper rehabilitation). More precisely, such device will help to reestablish hand motion for second-degree hand burn victims who are struggling to perform simple daily chores. As proper rehabilitation was not provided, regular hand motion is lost due to formation of contracture and mismanagement of scar tissue(5). The device will be simple, non-invasive and easy to use. Since the targeted stakeholders are people living in underprivileged rural part of Nepal and are mostly illiterate or have only basic educational background, the affordability and user friendliness will also be an important consideration for this device. Hence, the upper limit for device cost will be $20, however between $10-15 will be preferred. The project will be a failure if targeted population are not compliant or cannot afford the device. Since the device will have to be used throughout the day on daily basis, another important consideration is that it should not prevent the patient from performing other regular chores. Another major criteria is that devices needs to created within next 3 months to meet the criteria of Senior Design Class. Finally, the project will be considered a success if the created device is easily accessible to rural population of Nepal, and about 80% of users have their basic hand movement reestablished by 6-12 month of their device use.

Comments for step Project Scope

No comments

Completed by Shirshak Aryal on 24.11.2016 06:04.

Step 2: Need Statement

According to the official data from Health Ministry of Nepal published in 2010, about 69% of the cases reported with domestic burns were from age group 16-35 from rural areas of Nepal (2). Data after 2010 has not been published been published by the Nepali government, hence it will be taken as most recent official data. About 95% percent of the domestic burns in those regions were due to use of traditional cooking techniques such as use of firewood, stoves and cooking lamp (3). Hand burns are the one most common category of burn as hand they are most likely used body to perform different household chores. Hand burns due to domestic activities such as cooking, use of heating lamps, stoves, firewood etc. is a very prevalent in rural villages of Nepal (1) . Woman and children are 50% more likely to get hand burns, as they are usually restricted to household work compared to male adults in Nepal(4). Although most of these patients suffering from hand burns do receive surgery or other interventions from medical center, they cannot afford or do not have access to proper rehabilitation system. Due to lack of rehabilitation post hand burns, further healing of scar tissue and skin contracture treatment is halted, which reduces or completely prevents hand/ palm movement of such burn victims. Hence, even with simplest form of hand burns, patients from rural regions are being forcefully crippled for their lifetime due

their poor socioeconomic condition. This problem associated with hand burn rehabilitation is still prevalent in rural communities of Nepal, but no significant effort has been made to address this problem of rehabilitation.

Comments for step Need Statement

No comments

Completed by Shirshak Aryal on 24.11.2016 06:03.

Step 1: Need statement and Project Scope

Need statement and Project Scope were modified. Write up has been included in the progress report.

Comments for step Need statement and Project Scope

No comments

Activity of task Progress Report Update

23.11.2016 21:58 *Shirshak Aryal* created task **Progress Report Update**.
23.11.2016 22:01 *Shirshak Aryal* created Step 1 **Need statement and Project Scope**.
24.11.2016 06:03 *Shirshak Aryal* completed Step 1 **Need statement and Project Scope** (1/1 completed).
24.11.2016 06:04 *Shirshak Aryal* created Step 2 **Need Statement**.
24.11.2016 06:04 *Shirshak Aryal* completed Step 2 **Need Statement** (2/2 completed).
24.11.2016 06:04 *Shirshak Aryal* created Step 3 **Project Scope**.
24.11.2016 06:04 *Shirshak Aryal* completed Step 3 **Project Scope** (3/3 completed).

Samples of task Progress Report Update

No samples

Task created on 30.11.2016 09:27.

Design Alternatives

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:45.

Step 1: Design Alternatives

Our group used permutations of three distinct design constituents to devise the best solution. These constituents are: contact media, hand enclosure device and material choice. For each constituent, our group performed extensive research

and analysis to develop several alternatives. The best alternative for each constituent was determined through separate Pugh chart analysis. These alternatives were then used to devise the best overall solution.

Comments for step Design Alternatives

No comments

Activity of task Design Alternatives

30.11.2016 09:27 *Nischal Khanal* created task **Design Alternatives** .
30.11.2016 09:45 *Nischal Khanal* created Step 1 **Design Alternatives**.
30.11.2016 09:45 *Nischal Khanal* completed Step 1 **Design Alternatives** (1/1 completed).

Samples of task Design Alternatives

No samples

Task created on 30.11.2016 09:33.

No due date

Hand enclosure devices

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:57.

Step 1: Pugh Chart - Hand enclosure devices

No description

[Pugh_Chart_-_Hand_Enclosure_Device.docx]
File uploaded on 30.11.2016 09:57.

Comments for step Pugh Chart - Hand enclosure devices

No comments

Activity of task Hand enclosure devices

30.11.2016 09:33 *Nischal Khanal* created task **Hand enclosure devices**.
30.11.2016 09:57 *Nischal Khanal* created Step 1 **Pugh Chart - Hand enclosure devices**.
30.11.2016 09:57 *Nischal Khanal* completed Step 1 **Pugh Chart - Hand enclosure devices** (1/1 completed).

Samples of task Hand enclosure devices

No samples

Task created on 28.11.2016 21:06.

No due date

Exoskeleton splints (3 solutions)

No description

Task tags: *No tags*

Completed by Nischal Khanal on 02.12.2016 06:26.

Step 3: Exoskeletal Splint

This device is based on the Exohand and the Exotendon Hand Device, both of which are mechanical exoskeleton that are worn like a glove and help with rehabilitation of arm, hand and finger joints. The devices function by supplementing and enhancing hand movement; any motion made by the patients is amplified in strength by the exoskeleton, allowing them to manipulate object beyond their baseline physical capabilities. The exoskeleton has the same degree of freedom as the human hand, thus allowing for a full range of motion. Using the device, patients can practice normal movement of wrist, hand and finger motion, thus allowing them to regain proper physical control. These specific devices are electromechanical and far beyond the capabilities of our project scope. However, we can apply the mechanical aspects of the exoskeleton to help rehabilitate our target population. For our project, we would create a exoskeleton which encompasses the wrist, hand and fingers like a glove and would have hinges corresponding to joints on these appendages (i.e. a hinge at the wrist, at the base of each finger, etc.). These hinges have some sort of knob that would allow for pressure adjustment. The exoskeleton would hold the hand and wrist in a static position but the device would be static progressive, thus allowing for pressure adjustments throughout the recovery process (like how braces work by slowly adjusting the pressure on the teeth to properly align them). The pressure on the skeleton would be adjusted in increments, slowly moving the hand from a contracted position to a normal, relaxed position. The patient would periodically remove the skeleton to perform hand exercises to build up and maintain their range of motion. The advantages of this device lie in its ability to precisely apply pressure to necessary joints to promote rehabilitation and combat the loss of hand motion. This device is the closest alternative to physical therapy, which is the ideal treatment for post-burn surgery rehabilitation. The static progressive nature of the device allows the patient to use only one device for their entire recovery period. Disadvantages of this device lie in its high mechanical complexity; patients would not be able to fix the device if it ran into some mechanical issue and would have to get a completely new device. Following up on this, the device would also have a lower durability (when compared to something like an elastic glove or elastic wraps). The costs associated with the device could also be high depending on the material choice as the ideal materials for such a skeleton tend to be more expensive.

Comments for step Exoskeletal Splint

No comments

Completed by Shirshak Aryal on 28.11.2016 21:08.

Step 1: Exoskeletal Splint Summary

Attached file contains relevant information from 3 currently used exoskeletal device, all of the them are integrated with some sort of robotics and human computer interface.

[3_Exoskeletal_Solutions.docx] File uploaded on 28.11.2016 21:08.

Comments for step Exoskeletal Splint Summary

No comments

Completed by Shirshak Aryal on 28.11.2016 21:11.

Step 2: Literature Review Papers for Exoskeletal Solution

More relevant information were obtained from papers 3 and 6. Others were primarily for background information

[Exoskeleton1.pdf] File uploaded on 28.11.2016 21:10.

[Exoskeleton2_Robotics.pdf] File uploaded on 28.11.2016 21:10.

[Exoskeleton3.pdf] File uploaded on 28.11.2016 21:10.

[Exoskeleton5.pdf] File uploaded on 28.11.2016 21:10.

[Exoskeleton6.pdf] File uploaded on 28.11.2016 21:10.

Comments for step Literature Review Papers for Exoskeletal Solution

No comments

Activity of task Exoskeleton splints (3 solutions)

28.11.2016 21:06 *Shirshak Aryal* created task **Exoskeleton splints (3 solutions)**.
28.11.2016 21:08 *Shirshak Aryal* created Step 1 **Exoskeletal Devices Summary**.
28.11.2016 21:08 *Shirshak Aryal* edited Step 1 **Exoskeletal Devices Summary**.
28.11.2016 21:08 *Shirshak Aryal* completed Step 1 **Exoskeletal Devices Summary** (1/1 completed).
28.11.2016 21:10 *Shirshak Aryal* created Step 2 **Literature Review Papers for Exoskeletal Solution**.

28.11.2016 21:11 *Shirshak Aryal* edited Step 2 **Literature Review Papers for Exoskeletal Solution**.

28.11.2016 21:11 *Shirshak Aryal* completed Step 2 **Literature Review Papers for Exoskeletal Solution** (2/2 completed).

28.11.2016 21:12 *Shirshak Aryal* edited Step 1 **Exoskeletal Splint Summary**.

30.11.2016 09:53 *Nischal Khanal* created Step 3 **Exoskeletal Splint**.

30.11.2016 09:53 *Nischal Khanal* completed Step 3 **Exoskeletal Splint** (3/3 completed).

30.11.2016 09:53 *Nischal Khanal* uncompleted Step 3 **Exoskeletal Splint** (2/3 completed).

02.12.2016 06:26 *Shirshak Aryal* completed Step 3 **Exoskeletal Splint** (3/3 completed).

Samples of task Exoskeleton splints (3 solutions)

No samples

Task created on 27.11.2016 19:39.

No due date

Compression Splint

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:52.

Step 2: Compression Splint

The compression splint is based off the Plaster of Paris which uses Neoprene, a synthetic rubber produced by the polymerization of chloroprene, to make the splint. For this enclosure device, a thermoplastic polymer sheet would be used to mold a splint specific to each patient. The mold would be applied directly to the scar area and allowed to solidify; it would be secured using elastic wrapping bandages. Because the cast would not be static-progressive, it would need to be paired with a physiotherapy routine to completely restore hand function. This might not be feasible for our target population since using this solution would require us to include a manual on physiotherapy techniques and would require that each patient have some other person in the household capable of walking them through the therapeutic motions. Furthermore, the splint would have to be completely replaced each time pressure adjustments became necessary, thus increasing the overall cost of the treatment. The one major advantage of this splint would be that by locking the hand and wrist into specific positions and compromising their function in the short term, the splint is able to better preserve long term function of the hand throughout the recovery period.

Comments for step Compression Splint

No comments

Completed by Shirshak Aryal on 27.11.2016 19:41.

Step 1: Plaster of paris splint with neoprene

No description

[Compression_Splint.docx] File uploaded on 27.11.2016 19:41.

Comments for step Plaster of paris splint with neoprene

No comments

Activity of task Compression Splint

27.11.2016 19:39 *Shirshak Aryal* created task **Compression Splint**.
27.11.2016 19:41 *Shirshak Aryal* created Step 1 **Plaster of paris splint with neoprene**.
27.11.2016 19:41 *Shirshak Aryal* completed Step 1 **Plaster of paris splint with neoprene** (1/1 completed).
30.11.2016 09:52 *Nischal Khanal* created Step 2 **Compression Splint**.
30.11.2016 09:52 *Nischal Khanal* completed Step 2 **Compression Splint** (2/2 completed).

Samples of task Compression Splint

No samples

Task created on 25.11.2016 22:32.

Jobst Compression Pumps

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:52.

Step 2: Compression Pump

This device is based on the Jobst Intermittent Pump System 7000. This device is currently used for individuals with upper and lower extremity edema or disabilities. It functions by inflating a sleeve which wraps around the appendage and uses air pressure to compress the affected area. The sleeve is connected to an air pump via plastic tubing; the air pump itself uses a 110-volt power source. For our device, air tubes could be inserted into the hand enclosure and retained via an exoskeleton. The pressure can be adjusted via a dial found on the air pump. Studies have the ideal pressure to be 40 mmHg with 15 second inflation time and 10 second deflation time. However, these values are for upper arm and thighs; to apply the pump for wrist and hand use, the pressure must be lowered to 20-30 mmHg. The advantages of this device would be easy and precise pressure management. The hand enclosure device also could be worn for a few hours a day rather than the entire day. In addition, this therapy has been shown to greatly reduce edema caused by injuries (in this case burns). However, the major

drawback of this device is the requirement of an external pump and power supply. Most of our target population will not have access to reliable electricity to run such a device. The pump would have to be adjusted to use a battery source which would increase cost. In addition, every enclosure device would need a complementary pump, greatly increasing the cost of treatment. The price range of these air pumps is $69 to $549, well out of our budget range. A compromise could be made by using a hand pump. However, such a modification would largely eliminate the preciseness associated with the pump and require a physically capable person to aid the patient daily.

Comments for step Compression Pump

No comments

Completed by Shirshak Aryal on 25.11.2016 22:38.

Step 1: Jobst Intermittent Compression Pump

It falls under category of hand enclosure devices. See the second document for full article.

[Jobst_Intermittent_Compression_Pump.docx]
File uploaded on 25.11.2016 22:38.

[Jobst_Compression_Pump_Article.pdf] File uploaded on 26.11.2016 21:36.

Comments for step Jobst Intermittent Compression Pump

Shirshak Aryal on 26.11.2016 at 21:36: Full article is now uploaded here.

Activity of task Jobst Compression Pumps

25.11.2016 22:32 *Shirshak Aryal* created task **Jobst Compression Pumps**.
25.11.2016 22:37 *Shirshak Aryal* created Step 1 **Jobst Intermittent Compression Pump**.
25.11.2016 22:38 *Shirshak Aryal* edited Step 1 **Jobst Intermittent Compression Pump**.
25.11.2016 22:38 *Shirshak Aryal* completed Step 1 **Jobst Intermittent Compression Pump** (1/1 completed).
26.11.2016 21:36 *Shirshak Aryal* edited Step 1 **Jobst Intermittent Compression Pump**.
26.11.2016 21:36 *Shirshak Aryal* commented on Step 1 **Jobst Intermittent Compression Pump**.
26.11.2016 21:37 *Shirshak Aryal* edited Step 1 **Jobst Intermittent Compression Pump**.
30.11.2016 09:52 *Nischal Khanal* created Step 2 **Compression Pump**.
30.11.2016 09:52 *Nischal Khanal* completed Step 2 **Compression Pump** (2/2

completed).

Samples of task Jobst Compression Pumps

No samples

Task created on 25.11.2016 21:03.

No due date

Coban Wraps

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:52.

Step 2: Elastic Wrap

The Elastic Wrap is based on Coban Wraps which are thin and self-adhering elastic support wraps. These wraps are long and narrow, like a bandage and are applied via circumferential wrapping. For our device, we would choose an elastic and breathable material for the wrap and securely adhere the wrap over the affected area on the patient's hand and wrist (see figure). Pressure is applied via the elastic properties of the material and is adjusted based on the tightness of the circumferential wrapping. Due to the technique of application, the only factor that needs to be adjusted when accounting for different hand and wrist sizes is the length of then wrap itself; this can be easily achieved by creating rolls of different sizes. It is also very easy to apply a contact media to these wraps as the chosen media can be applied to one face of the wrap during the manufacturing process. The advantages of this solution are low associated cost and the ease of production. In addition, only the length of the wrap needs to be adjusted to account for varying hand and wrist dimensions. The mechanical complexity of this device is very low and, thus, the durability is very high. Adjustments can be easily made for breathability and water resistance by simply changing the material choice for the wrap. The major drawbacks of these wraps, however, lies in the imprecise pressure applied (there is no real way to measure the pressure other than by "feeling" and is entirely dependent on the person applying the wrap). Following on this, patients would have to be trained to properly put on the wrap due to the risks associated with over-compression. Furthermore, the entire wrap would have to be changed on a weekly or biweekly basis depending on the daily activates of the patient and the environmental conditions.

Comments for step Elastic Wrap

No comments

Completed by Shirshak Aryal on 25.11.2016 21:09.

Step 1: Coban wraps

Fall under hand enclosure device category of solution for our project. It uses compression technique to reduce edema and restores hand movement faster. More details in the attached document

[Coban_Wraps.docx] File uploaded on 25.11.2016 21:09.

Comments for step Coban wraps

No comments

Activity of task Coban Wraps

25.11.2016 21:03 *Shirshak Aryal* created task **Coban Wraps** .
25.11.2016 21:08 *Shirshak Aryal* created Step 1 **Coban wraps**.
25.11.2016 21:08 *Shirshak Aryal* edited Step 1 **Coban wraps**.
25.11.2016 21:09 *Shirshak Aryal* edited Step 1 **Coban wraps**.
25.11.2016 21:09 *Shirshak Aryal* completed Step 1 **Coban wraps** (1/1 completed).
30.11.2016 09:52 *Nischal Khanal* created Step 2 **Elastic Wrap**.
30.11.2016 09:52 *Nischal Khanal* completed Step 2 **Elastic Wrap** (2/2 completed).

Samples of task Coban Wraps

No samples

Task created on 21.11.2016 01:39.

Elastic Glove

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:51.

Step 2: Elastic Glove

This design is derived from pressure garments which are made from an elastic fabric which stretches over the desired surface and applies mechanical pressure to the hand and wrist. Pressure variance of the device is a result of the fabric tension per unit length (would depend mostly on size of the garment versus the size of the patient’s hand)(2) .The desired pressure range is 20-30mmHg; pressures above 40 mmHg would constrict blood flow to the point of adversely affecting patient health. The garment functions by reducing (but not halting) blood flow to the hand, thus reducing hypertrophy. Our glove design would come with elastic adjustments through the use of straps. This would allow the glove to fit a multitude of patients as each could adjust the dimensions to their hand and wrist. The specific pressure applied each adjustment would be tested during development and noted on the device using a scale on the straps. The advantage is that one device can be adjusted to fit a multitude of hand and wrist sizes, thus lowering the overall production costs. In addition, the device is simple enough to require minimal post-supervision. The main disadvantage is that it would have to

be worn 23 hours a day for maximum effectiveness. This would lead to overheating of the hand, especially when the patient is in hot or humid environment. The discomfort associated with the device would lead to low patient compliance.

Comments for step Elastic Glove

No comments

Completed by Nischal Khanal on 21.11.2016 01:41.

Step 1: Elastic glove - Hand enclosure device

No description

[Elastic_Glove.docx] File uploaded on 21.11.2016 01:40.

Comments for step Elastic glove - Hand enclosure device

No comments

Activity of task Elastic Glove

21.11.2016 01:39 *Nischal Khanal* created task **Elastic Glove**.
21.11.2016 01:40 *Nischal Khanal* created Step 1 **Elastic glove - Hand enclosure device**.
21.11.2016 01:41 *Nischal Khanal* completed Step 1 **Elastic glove - Hand enclosure device** (1/1 completed).
30.11.2016 09:51 *Nischal Khanal* created Step 2 **Elastic Glove**.
30.11.2016 09:51 *Nischal Khanal* completed Step 2 **Elastic Glove** (2/2 completed).

Samples of task Elastic Glove

No samples

Task created on 30.11.2016 09:33.

No due date

Materials

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:58.

Step 1: Pugh Chart - Materials

No description

[Pugh_Chart_-_Materials.docx] File uploaded on 30.11.2016 09:58.

Comments for step Pugh Chart - Materials

No comments

Activity of task Materials

30.11.2016 09:33 *Nischal Khanal* created task **Materials**.
30.11.2016 09:58 *Nischal Khanal* created Step 1 **Pugh Chart - Materials**.
30.11.2016 09:58 *Nischal Khanal* completed Step 1 **Pugh Chart - Materials** (1/1 completed).

Samples of task Materials

No samples

Task created on 30.11.2016 09:41.

Spandex

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:54.

Step 1: Spandex

Spandex is a synthetic fiber made primarily of polyurethane polymer with exceptional elasticity, strength, and durability. It is one the most common “athletic” fibers as its flexibility, comfort and strength allow athletes to retain their full range of motion when performing their activities. The fabric is also lightweight with a density range of 1.15 to 1.32 g/cm3. It can stretch from 400% to 700% of its original length; it can also be stretched repeatedly without being deformed. It retains its material properties up to 150 degrees Celsius. It is also waterproof and resistant to perspiration; the fabric is also breathable so usage for extended periods of time is not an issue. The material cost is also low at $6/m2. This fabric would be ideal for a glove orientated solution. The main disadvantage of this material is that once it has been shaped, changing the pressure applied is very difficult. This could perhaps be achieved by placing straps at various points on the glove that could be tightened to adjust pressure but this would be an imprecise solution.

Comments for step Spandex

No comments

Activity of task Spandex

30.11.2016 09:41 *Nischal Khanal* created task **Spandex**.
30.11.2016 09:54 *Nischal Khanal* created Step 1 **Spandex**.

30.11.2016 09:54 *Nischal Khanal* completed Step 1 **Spandex** (1/1 completed).

Samples of task Spandex

No samples

Task created on 30.11.2016 09:41.

Metals

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:55.

Step 1: Metal

Metals are the most common materials used for exoskeletons. They are the most durable of the materials and produce the most rigid structures. They have high melting points and tensile strength, making them ideal for producing a durable hand enclosure device. For example, titanium has a tensile strength 880 MPa, an elastic modulus of 113.8 GPa, a compressive yield strength of 970 MPa and a melting point of 1604 degrees C). Even with their high strength, metals tend to be light (titanium has a density of 4.43 grams/cm3); thus, an enclosure device made of such a metal would be easy to wear for extended periods of time. Furthermore, metals such as titanium and steel also are resistant to rust and corrosion, increasing their lifespan. The costs of metals are also low compared to other materials with titanium costing $3.65/kg and stainless steel costing $2.35/kg. These metals also have high biocompatibility (i.e. no side effects). The disadvantage of using a metal is the difficulty of production and the waste associated with the production. We would not be able to melt down and shape the metal so it would need to be purchased in the required shapes (i.e. rods or sheets). Any unused length or portion of metal would go to waste. In addition, we would need to use a machine shop to manipulate the metal, thus, increasing the overall cost of the project.

Comments for step Metal

No comments

Activity of task Metals

30.11.2016 09:41 *Nischal Khanal* created task **Metals**.
30.11.2016 09:55 *Nischal Khanal* created Step 1 **Metal**.
30.11.2016 09:55 *Nischal Khanal* completed Step 1 **Metal** (1/1 completed).

Samples of task Metals

No samples

Task created on 29.11.2016 23:31.

No due date

Titanium: Potential material

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 29.11.2016 23:36.

Step 1: Titanium Properties

In conclusion, they are biocompatible, not hazardous, and less dense compared to other metal, and cost effective in relative terms. See my summary paper for more details.

[Titanium_metal.docx] File uploaded on 29.11.2016 23:36.

Comments for step Titanium Properties

No comments

Activity of task Titanium: Potential material

29.11.2016 23:31 *Shirshak Aryal* created task **Titanium: Potential material** .
29.11.2016 23:35 *Shirshak Aryal* created Step 1 **Titanium Properties**.
29.11.2016 23:36 *Shirshak Aryal* edited Step 1 **Titanium Properties**.
29.11.2016 23:36 *Shirshak Aryal* completed Step 1 **Titanium Properties** (1/1 completed).

Samples of task Titanium: Potential material

No samples

Task created on 28.11.2016 17:07.

No due date

Gloving Material Choice

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:54.

Step 3: AQUAFIT NS

Aquafit NS is a thermoelastic polymer sheet that is activated when placed in hot water (65 degrees C) and can be molded to fit the desired shape. The material hardens after molding and can be formed in to a cast. Once activated, the material is incredibly versatile and flexible and can be molded into any shape. In addition, it can be reactivated by placing back in water and can be reused and reshaped easily. However, this can also be a disadvantage as the material could deform due to sweat and heat buildup during a hot/humid day. The healing process is dependent on the rigidity of the hand enclosure device and any deformation can

cause incomplete recovery. Other advantages include its low density of 1.14 g/cm3, various degrees of perforation to allow for breathing and low cost.

Comments for step AQUAFIT NS

No comments

Completed by Nischal Khanal on 30.11.2016 09:53.

Step 2: Thermoplastic Polymer Tape

A thermoplastic polymer is one which becomes a malleable plastic when heated and hardens when cooled. For this project, the most applicable polymer would be a thermoplastic tape. The tape has a flexural modulus of 90 MPa but is limited in elasticity. The material is porous and thus will allow the skin to breathe, increasing patient compliance. With regards to function, the tape is self-adhesive and is activated in water at 65 degrees C. After activation, it can be wrapped around the desired area and left to harden. The circumferential wrapping technique allows a roll of tape to cover any shape and size of hand. However, this method would result in irregularities of effectiveness from patient to patient since the efficacy of the tape would be dependent on the ability of the person making the cast. A better use of the material, for this project, would be to create a polymer sheet from the tape and use a blueprint to excise a standardized cast. This is possible because the material bonds to itself when activated and wet, and remains bonded after drying; the activation and hardening process can be repeated multiple times. Despite the many positives of this material, it major drawback is its cost: $270/m2.

Comments for step Thermoplastic Polymer Tape

No comments

Completed by Utsav Malla on 28.11.2016 17:17.

Step 1: Glove Material

Check file attachment for details.

[Material_Glove.docx] File uploaded on 28.11.2016 17:17.

Comments for step Glove Material

No comments

Activity of task Gloving Material Choice

28.11.2016 17:07 *Utsav Malla* created task **Gloving Material Choice**.
28.11.2016 17:16 *Utsav Malla* created Step 1 **Glove Material**.
28.11.2016 17:17 *Utsav Malla* edited Step 1 **Glove Material**.
28.11.2016 17:17 *Utsav Malla* completed Step 1 **Glove Material** (1/1 completed).
30.11.2016 09:53 *Nischal Khanal* created Step 2 **Thermoplastic Polymer Tape**.

30.11.2016 09:53 *Nischal Khanal* completed Step 2 **Thermoplastic Polymer Tape** (2/2 completed).
30.11.2016 09:54 *Nischal Khanal* created Step 3 **AQUAFIT NS** .
30.11.2016 09:54 *Nischal Khanal* completed Step 3 **AQUAFIT NS** (3/3 completed).

Samples of task Gloving Material Choice

No samples

Task created on 27.11.2016 22:26.

Thermoplastic Splints (see this at last)

No due date

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 27.11.2016 23:01.

Step 1: Thermoplastic Splints & Splint management

Look at this after completing other solution write up.

[Analysis_of_Materials_for_Splinting.pdf] File uploaded on 27.11.2016 23:01.

[Splint_Management.pdf] File uploaded on 27.11.2016 23:01.

[Splinting_Strategies.pdf] File uploaded on 27.11.2016 23:01.

[Burn_Rehabilitation.pdf] File uploaded on 27.11.2016 23:01.

Comments for step Thermoplastic Splints & Splint management

No comments

Activity of task Thermoplastic Splints (see this at last)

27.11.2016 22:26 *Shirshak Aryal* created task **Thermoplastic Splints (see this at last)**.
27.11.2016 23:01 *Shirshak Aryal* created Step 1 **Thermoplastic Splints & Splint management**.
27.11.2016 23:01 *Shirshak Aryal* completed Step 1 **Thermoplastic Splints & Splint management** (1/1 completed).

Samples of task Thermoplastic Splints (see this at last)

No samples

Task created on 26.11.2016 21:25.

No due date

Material 1: ABS

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:54.

Step 2: ABS

ABS is an opaque thermoplastic that is widely used in 3D printers. It is characterized by its resistance to chemicals, heat, and physical impact; it has a compressive strength of 65 MPa, a compressive modulus of 3.5 GPa, and heat resistant to 250 degrees C). ABS is also very malleable and can be molded into any shape. Its use with 3D printers is a huge advantage because it lowers the cost of production and the manual labor required. Furthermore, ABS is recyclable (i.e. if the prototype is not desirable, it can be melted down and reused), thus minimizing waste of material. Unfortunately, ABS is on the expensive side at $18.96/kg. However, this cost is made up partly by the ease of production and the recyclability of the product.

Comments for step ABS

No comments

Completed by Shirshak Aryal on 26.11.2016 21:26.

Step 1: Properties of ABS

No description

[Acrylonitrile.docx] File uploaded on 26.11.2016 21:26.

Comments for step Properties of ABS

No comments

Activity of task Material 1: ABS

26.11.2016 21:25	*Shirshak Aryal* created task **Material 1: ABS**.
26.11.2016 21:26	*Shirshak Aryal* created Step 1 **Properties of ABS** .
26.11.2016 21:26	*Shirshak Aryal* completed Step 1 **Properties of ABS** (1/1 completed).
30.11.2016 09:54	*Nischal Khanal* created Step 2 **ABS**.
30.11.2016 09:54	*Nischal Khanal* completed Step 2 **ABS** (2/2 completed).

Samples of task Material 1: ABS

No samples

Task created on 28.11.2016 17:07.

No due date

Contact Media Solutions

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:57.

Step 2: Pugh Chart – Contact Media

No description

[Pugh_Chart_-_Contact_Media.docx] File uploaded on 30.11.2016 09:57.

Comments for step Pugh Chart – Contact Media

No comments

Completed by Utsav Malla on 28.11.2016 17:09.

Step 1: Contact Media

Hypafix, Elastofix, Silicone Gel, Mederma, Petrolatum Gel

[Hypafix_and_Elastofix.docx] File uploaded on 28.11.2016 17:09.

[Mederma.docx] File uploaded on 28.11.2016 17:10.

Comments for step Contact Media

No comments

Activity of task Contact Media Solutions

28.11.2016 17:07 *Utsav Malla* created task **Contact Media Solutions**.
28.11.2016 17:08 *Utsav Malla* created Step 1 **Contact Media** .
28.11.2016 17:09 *Utsav Malla* completed Step 1 **Contact Media** (1/1 completed).
28.11.2016 17:09 *Utsav Malla* edited Step 1 **Contact Media** .
28.11.2016 17:09 *Utsav Malla* edited Step 1 **Contact Media** .
28.11.2016 17:10 *Utsav Malla* edited Step 1 **Contact Media** .
30.11.2016 09:57 *Nischal Khanal* created Step 2 **Pugh Chart – Contact Media** .
30.11.2016 09:57 *Nischal Khanal* completed Step 2 **Pugh Chart – Contact Media** (2/2 completed).

Samples of task Contact Media Solutions

No samples

Task created on 30.11.2016 09:44.

No due date

Cotton

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:51.

Step 1: Cotton

Cotton is the most common lining material for casts and splints. It also forms the basis for most gauze pad and wound dressings. It is easily accessible and very cheap, costing as low as $0.004 per cm2. Most dressing pads come with a perforated, non-adherent film, thus allowing the material to make direct contact with wounds. Because the material is so malleable, we could use it to line the inner surface of our hand enclosure device to increase the comfort. In order to improve breathability, we could also perforate the cotton. Furthermore, a non-adherent cotton layer can be used with and without a gel, thus providing flexibility when considering design costs (i.e. if the enclosure device is too costly to allow for a gel, just a cotton layer could be used). In addition, solely using cotton eliminates the need for the patient to maintain a constant supply of gel or ointment and eliminates the need to periodically reapply contact media. However, to account for sweat buildup in humid environments, we could implement a replaceable inner lining that could be easily swapped out if the patient so desired. The major drawback of just using cotton would be the loss of any soothing, moisturizing or scar managing abilities.

Comments for step Cotton

No comments

Activity of task Cotton

30.11.2016 09:44	*Nischal Khanal* created task **Cotton**.
30.11.2016 09:51	*Nischal Khanal* created Step 1 **Cotton** .
30.11.2016 09:51	*Nischal Khanal* completed Step 1 **Cotton** (1/1 completed).

Samples of task Cotton

No samples

Task created on 30.11.2016 09:44.

No due date

Petrolatum

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:51.

Step 1: Petrolatum/Petroleum Jelly

Petrolatum and Petroleum based gels are widely used for the treatment and management of burns. These gels and ointments have been shown to reduce erythema and skin irritations associated with postsurgical scars and shown to act as moisturizing agents for the skin. This media is widely available from a variety of manufacturers and are very cheap in comparison to other gels (costing little as $4.58 for 370 grams). While patients would still need to regularly take off the hand enclosure device in order reapply the contact median, due to its low cost, it would be possible to supply our target population with enough gel to last the duration of their treatment.

Comments for step Petrolatum/Petroleum Jelly

No comments

Activity of task Petrolatum

30.11.2016 09:44 *Nischal Khanal* created task **Petrolatum**.
30.11.2016 09:51 *Nischal Khanal* created Step 1 **Petrolatum/Petroleum Jelly**.
30.11.2016 09:51 *Nischal Khanal* completed Step 1 **Petrolatum/Petroleum Jelly** (1/1 completed).

Samples of task Petrolatum

No samples

Task created on 30.11.2016 09:44.

No due date

Aloe Gel

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:50.

Step 1: Aloe Gel

Aloe Gel is another herbal ointment used to soothe the pain associated with burns. The gel is effective in reducing pain and inflammation while promoting skin growth and repair. Studies have shown that patients treated with aloe gel tended to heal faster than those without. The gel also serves as a moisturizer, thus increasing patient comfort and compliance when wearing the enclosure device for extended periods of time. Aloe Gel has the advantage of being cheaper at only $8.95 for 114 grams. However, it does not contain any scar reduction properties and still requires the patient to maintain a constant supply of the media for reapplication. Nevertheless, it can be used as an easily accessible and cheap pain reducing agent for our device.

Comments for step Aloe Gel

No comments

Activity of task Aloe Gel

30.11.2016 09:44 *Nischal Khanal* created task **Aloe Gel**.
30.11.2016 09:50 *Nischal Khanal* created Step 1 **Aloe Gel**.
30.11.2016 09:50 *Nischal Khanal* completed Step 1 **Aloe Gel** (1/1 completed).

Samples of task Aloe Gel

No samples

Task created on 30.11.2016 09:44.

Mederma

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:50.

Step 1: Mederma

Mederma is an ointment used to improve scar appearance. It is an aqueous hydrogel with Allium cepa(onion) as its active ingredient. This could be used to line the inner layer of our hand enclosure device to improve comfort and, thus, patient compliance and improve the color and texture of burn scars. Various studies have shown that this gel is effective reversing the inflammatory and proliferative responses of hypertrophic scars. Disadvantages of this media arise from the need for the patient to maintain a constant supply throughout the recovery period and the need to periodically remove hand enclosure device in order to reapply the contact media. Furthermore, the media is relatively expensive for our target population at $16.50 for 50 grams.

Comments for step Mederma

No comments

Activity of task Mederma

30.11.2016 09:44 *Nischal Khanal* created task **Mederma**.
30.11.2016 09:50 *Nischal Khanal* created Step 1 **Mederma**.
30.11.2016 09:50 *Nischal Khanal* completed Step 1 **Mederma** (1/1 completed).

Samples of task Mederma

No samples

Task created on 30.11.2016 09:44.

Elastofix

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:50.

Step 1: Elastofix

Elastofix is a combination of Hypafix and a Silastic Elastomer (silicone elastomer). In this case, Hypafix is first applied to the affected area, followed by a layer of elastomer, forming a two-component adhesive contact media. If applied to our device as the inner layer, Elastofix will eliminate the need for a retention system on the hand enclosure device due to its adhesive nature. In addition, Elastofix is versatile and can be applied to fit any size of hand and wrist. The adhesive substance is also water proof and, thus, will survive the rigors of daily life in rural Nepal. However, the biggest disadvantage of this solution is that it requires cleaning and reapplication every week, requiring the patient to remove and reapply the hand enclosure device weekly. Furthermore, similar to Hypafix, the material has low breathability, thus making it not ideal for the hot and humid climate of Nepal.

Comments for step Elastofix

No comments

Activity of task Elastofix

30.11.2016 09:44	*Nischal Khanal* created task **Elastofix**.
30.11.2016 09:50	*Nischal Khanal* created Step 1 **Elastofix**.
30.11.2016 09:50	*Nischal Khanal* completed Step 1 **Elastofix** (1/1 completed).

Samples of task Elastofix

No samples

Task created on 30.11.2016 09:44.

Silicone Gel

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:49.

Step 1: Silicone Gel

Silicone is a polymer composed of silicon, oxygen, carbon, and hydrogen atoms. The gel has high biocompatibility and can be applied directly to the skin without side effects. It minimizes hypertrophy and softens established scars, facilitating their resolution; the gel can be formed into scar treatment sheets which prevent scar formation and improve scar appearance. For our project, the silicone gel can

be used to line one of the pressure garments and facilitate the reduction of hypertrophic scars. The gel also has protective properties in that it prevents bacterial invasion into the scar tissue. It also allows for high patient compliance due to its high breathability and its ability to reduce itching and discomfort traditionally associated with scars and cast-like devices. One of the major drawbacks of the gel is its cost: $13 for 6 ml.

Comments for step Silicone Gel

No comments

Activity of task Silicone Gel

30.11.2016 09:44 *Nischal Khanal* created task **Silicone Gel**.
30.11.2016 09:49 *Nischal Khanal* created Step 1 **Silicone Gel**.
30.11.2016 09:49 *Nischal Khanal* completed Step 1 **Silicone Gel** (1/1 completed).

Samples of task Silicone Gel

No samples

Task created on 30.11.2016 09:44.

Hypafix

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:49.

Step 1: Hypafix

Hypafix is a non-woven, unilateral elastic, and semi-porous polyester material with a hypoallergenic polyacrylate adhesive. It is traditionally used as a surgical retention dressing. The material itself is water-resistant and the adhesive is non-irritating; the inherent elasticity provides protection without constraining movement. Lining our enclosure device with Hypafix would help ensure secure adhesion between the device and the patients hand and wrist, thus improving the effectiveness of the device. Hypafix also limits the progression of hypertrophy by reducing the capillary activity. Hypafix is also very affordable at $0.002 /cm2. The one major drawback of the material is its limited airflow which would result in patient discomfort when applied for extended periods of time, thus leading to low patient compliance.

Comments for step Hypafix

No comments

Activity of task Hypafix

30.11.2016 09:44 *Nischal Khanal* created task **Hypafix**.

30.11.2016 09:49 *Nischal Khanal* created Step 1 **Hypafix**.
30.11.2016 09:49 *Nischal Khanal* completed Step 1 **Hypafix** (1/1 completed).

Samples of task Hypafix

No samples

Task created on 20.11.2016 23:45.

No due date

Massage Therapy

No description

Task tags: *No tags*

Activity of task Massage Therapy

20.11.2016 23:45 *Nischal Khanal* created task **Massage Therapy** .

Samples of task Massage Therapy

No samples

Task created on 16.11.2016 01:26.

No due date

Solution Ideas

No description

Task tags: *No tags*

Completed by Nischal Khanal on 25.11.2016 22:41.

Step 3: Massage Therapy for Burn Victims

This non-splint based solution seems to be promising. I am looking into it in more detail but here are the articles that I am exploring currently:
https://www.ncbi.nlm.nih.gov/pubmed/19083657?ordinalpos=14&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_
https://www.ncbi.nlm.nih.gov/pubmed/16112449?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_D
https://www.ncbi.nlm.nih.gov/pubmed/10850898?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_D
https://www.ncbi.nlm.nih.gov/pubmed/9622469
https://www.ncbi.nlm.nih.gov/pubmed/24630820

Comments for step Massage Therapy for Burn Victims

No comments

Completed by Shirshak Aryal on 16.11.2016 02:50.

Step 2: Other solutions

Found other existing solutions for burn rehabilitation. List includes: 1) Use of Coban wraps, 2) Jobst Intermittent Compression pumps, 3) Standard pressure garment gloves, 4) Joshi External Stabilizing system. Further indepth research on these solutions will be done.

Comments for step Other solutions

No comments

Completed by Utsav Malla on 16.11.2016 01:30.

Step 1: Non Splint Solution

Researched on various solutions for burn scar contracture management. Came up with multiple solutions that does not include physical rehabilitation using a splint. The most prominent one was use of "contact media" namely hypafix, elastofix, and silicon gel. Presssure/Retention Garments, Massage Therapy, and Moisturizing cream were a few others that I came across. Next agenda research more in depth on all of these techniques.

Comments for step Non Splint Solution

No comments

Activity of task Solution Ideas

16.11.2016 01:26 *Utsav Malla* created task **Non-Splint Related Solution**.
16.11.2016 01:30 *Utsav Malla* created Step 1 **Non Splint Solution**.
16.11.2016 01:30 *Utsav Malla* completed Step 1 **Non Splint Solution** (1/1 completed).
16.11.2016 02:49 *Shirshak Aryal* created Step 2 **Other solutions**.
16.11.2016 02:50 *Shirshak Aryal* edited Step 2 **Other solutions**.
16.11.2016 02:50 *Shirshak Aryal* completed Step 2 **Other solutions** (2/2 completed).
20.11.2016 23:36 *Nischal Khanal* created Step 3 **Massage Therapy for Burn Victims**.
25.11.2016 22:41 *Shirshak Aryal* completed Step 3 **Massage Therapy for Burn Victims** (3/3 completed).

Samples of task Solution Ideas

No samples

Task created on 30.11.2016 09:27.

Alterations to Team Responsibilities

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:49.

Step 1: Alterations to Team Responsibilities

Shirshak will now be responsible for the progress report presentation and Nischal will be responsible for the proof of concept presentation.

Comments for step Alterations to Team Responsibilities

No comments

Activity of task Alterations to Team Responsibilities

30.11.2016 09:27 *Nischal Khanal* created task **Alterations to Team Responsibilities** .
30.11.2016 09:49 *Nischal Khanal* created Step 1 **Alterations to Team Responsibilities** .
30.11.2016 09:49 *Nischal Khanal* completed Step 1 **Alterations to Team Responsibilities** (1/1 completed).

Samples of task Alterations to Team Responsibilities

No samples

Task created on 30.11.2016 09:27.

No due date

Revised Project Scope

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:46.

Step 1: Revised Project Scope

The main objective of this project is to solve the problem presented above by developing and manufacturing a device that provides rehabilitation for hand burn patients after they receive initial treatment from medical professionals. The device will help restore the pre-burn range of hand motion for second and third-degree hand burn victims. The device must accommodate for the various wrist and hand dimensions present in the patient population and must not hinder day-to-day activity. Considering the medical knowledge and capabilities of the population, it must be easily applied and removed and must not require more the assistant of one additional person to administer; the instructions must be clear and easy enough for even children to understand and follow. The device must have a lifespan of the longest expected recovery time; during this period, it must be able to endure environmental factors such as temperature, weather, water damage, and physical impact. It must also administer the specific pressures required for recovery and allows for adjustments in pressure as the recovery progresses. Given the socioeconomic state and tolerance of the target population, the device must be affordable and comfortable to wear for extended periods of time. The project will be considered a success if device is easily accessible to rural

population of Nepal, there is a patient compliance of at least 90% and at least 90% of users have their normal hand movement reestablished at the end of their recovery period.

Comments for step Revised Project Scope

No comments

Activity of task Revised Project Scope

30.11.2016 09:27 *Nischal Khanal* created task **Revised Project Scope**.
30.11.2016 09:46 *Nischal Khanal* created Step 1 **Revised Project Scope**.
30.11.2016 09:46 *Nischal Khanal* completed Step 1 **Revised Project Scope** (1/1 completed).

Samples of task Revised Project Scope

No samples

Task created on 30.11.2016 09:27.

Revised Need Statement

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 30.11.2016 09:47.

Step 1: Revised Need Statement

Per the official data from Health Ministry of Nepal published in 2010, about 69% reported domestic burn cases were from the age group 16-35, within rural areas of Nepal (2). After 2010, data has not been published by the Nepali government; thus, the 2010 statistics will be taken as most recent official data. About 95% percent of these domestic burns arose from traditional cooking techniques such as the use of firewood, open stoves, and cooking lamps (3). Hand burns are the one most common as they are most likely used body part when performing different household chores. These burn incidents are very prevalent in rural villages of Nepal (1). Compared to men, women and children are 50% more likely to get hand burns as they perform most of the household chores (4). Although most of these patients suffering from hand burns receive surgery or other interventions from a medical center, they cannot afford, or do not have access to, a proper rehabilitation system. This lack of post-burn rehabilitation hinders the healing of scar tissue and skin thus reducing or completely preventing hand/ palm movement of burn victims. Due to this poor socioeconomic condition, even the simplest form of hand burns cripple patients in rural regions for life. Because no significant effort has been made to address the problem of rehabilitation within Nepal, our group aims to develop a device solution which can perform the task of rehabilitation and allow complete recovery for these burn victims.

Comments for step Revised Need Statement

No comments

Activity of task Revised Need Statement

30.11.2016 09:27 *Nischal Khanal* created task **Revised Need Statement**.
30.11.2016 09:47 *Nischal Khanal* created Step 1 **Revised Need Statement**.
30.11.2016 09:47 *Nischal Khanal* completed Step 1 **Revised Need Statement** (1/1 completed).

Samples of task Revised Need Statement

No samples

Task created on 21.11.2016 00:41.

Final Design Specification

No due date

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 21.11.2016 00:44.

Step 1: Design Specification Table

No description

[Design_Specification_.pdf] File uploaded on 21.11.2016 00:44.

Comments for step Design Specification Table

No comments

Activity of task Final Design Specification

21.11.2016 00:41 *Shirshak Aryal* created task **Final Design Specification**.
21.11.2016 00:44 *Shirshak Aryal* created Step 1 **Design Specification Table**.
21.11.2016 00:44 *Shirshak Aryal* completed Step 1 **Design Specification Table** (1/1 completed).

Samples of task Final Design Specification

No samples

Task created on 30.11.2016 09:27.

Revised Design Specifications

No due date

No description

Task tags: *No tags*

Completed by Nischal Khanal on 02.12.2016 06:23.

Step 1: Revised Design Specifications - Pre Final Solution

No description

[Revised_Design_Specifications.docx] File uploaded on 30.11.2016 09:48.

Comments for step Revised Design Specifications - Pre Final Solution

No comments

Activity of task Revised Design Specifications

30.11.2016 09:27 *Nischal Khanal* created task **Revised Design Specifications**.
30.11.2016 09:48 *Nischal Khanal* created Step 1 **Revised Design Specifications - Pre Final Solution**.
02.12.2016 06:23 *Shirshak Aryal* completed Step 1 **Revised Design Specifications - Pre Final Solution** (1/1 completed).

Samples of task Revised Design Specifications

No samples