

## INTERNAL MECHANICS OF AN IRON MAN SUIT

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### ABSTRACT

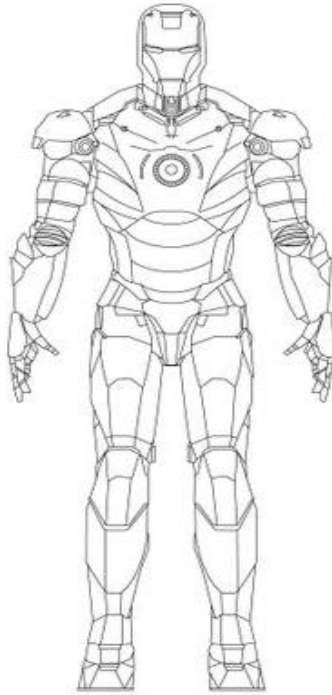
*As the name indicates “Iron Man Suit” but that’s not even close of being true that it is completely made of Iron. It is the blend of various metals such as titanium-nickel alloys with a vibranium added. Iron Man Suit is used to reduce the impact damage from projectiles and also used for mechanical work such to pushing or lifting heavy objects as it has inbuilt hydraulic mechanism. This paper discloses internal mechanics of an Iron Man Suit as much as possible that includes basics to Material Science, Aerodynamics, Ergonomics (Layer 1, Layer 2 and Layer 3) and Power Source using Arc Reactor.*

**Keywords:** Iron Man Suit, Internal Mechanics, Robotics, Advanced Robotics, Cybernetics, Advanced Cybernetics, Arc Reactor

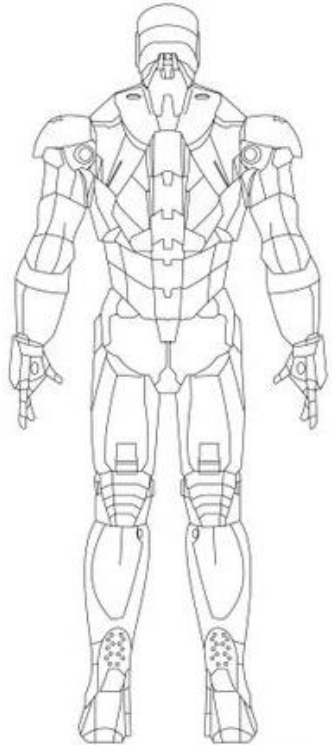
### INTRODUCTION

Iron Man Suit is built from composite material protecting the wearer from various projectiles. Design of Iron Man Suit includes but not limited to Robotics (to design the suit), Electronics (to make the suit work), Aerodynamics (suit could fly), Avionics (to control the suit), Propulsion (to go), Manufacturing (to make the suit), Material Science (to choose and design the correct material for each purpose), Physics (understand the forces involved, electro-magnetism specifically), Mathematics (to calculate everything), Chemistry (deeper understanding of materials, propulsion and rockets), Biology (effects of the human body at altitude in a tiny suit, oxygen control etc.), Computer Science (human-computer interface, most of the suit), Ergonomics (comfort, usability etc.) and Energy Generation (Arc Reactor) (Thejollyginog, 2015). Ignoring any weaponry systems such as Ballistics (firearms in the

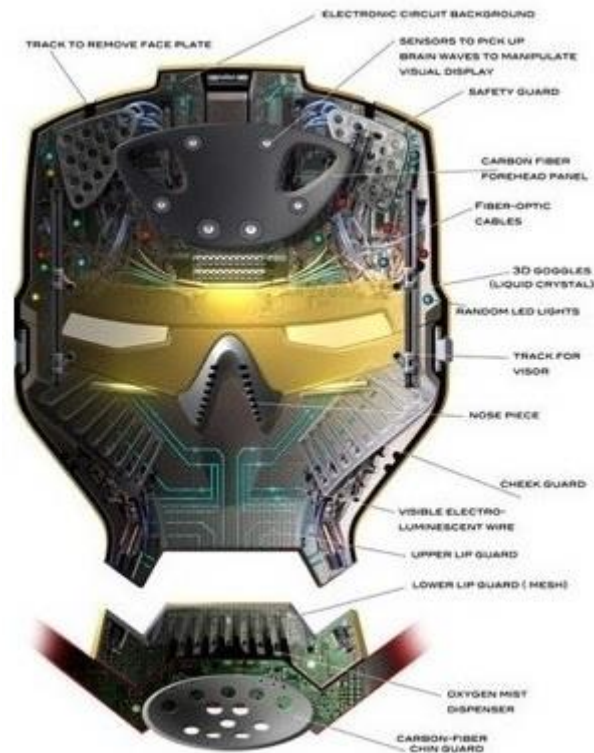
suit), Rockets/Explosives (rocket based weaponry) and in detail as it is not required (Figures 1-2).



**FIGURE 1**  
**ILLUSTRATES FRONT VIEW OF IRON MAN SUIT ALLOYS OF VARIOUS METALS SUCH AS TITANIUM-NICKEL WITH ADDED VIBRANIUM.**



**FIGURE 2**  
**ILLUSTRATES BACK VIEW OF IRON MAN SUIT ALLOYS OF VARIOUS METALS SUCH AS TITANIUM-NICKEL WITH ADDED VIBRANIUM.**



**FIGURE 3**  
**ELECTRONIC CIRCUITRY OF FRONT VIEW (INSIDE) IRON MAN HELMET.**  
**INTERNAL CIRCUITRY**

Figure 3 illustrates Internal Circuitry of Iron Man Suit helmet. Major parts are Tracking device to remove faceplate, Electronic Circuit Background, Sensors to pick up brain waves to manipulate visual display, Safety guard, Carbon Fiber Forehead Panel, Fiber optic cables, 3D Goggles (Liquid crystal), LED Lights, Track for Visor, Nose Piece, Cheek Guard, Visible electro-luminescent wire, Upper lip guard, Lower lip guard (Mesh), Oxygen Mist dispenser, Carbon-fiber chin guard (Erynus D'Alecto Graeme. 2010).

## MATERIAL SCIENCE

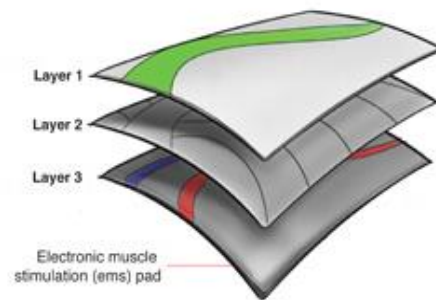
### CHEST AND DORSAL

The chest and dorsal areas is where user in the Iron Man Suit will take the large amount of damage because of its widest surface area, and it would require toughest part of the armor. Most possibly it may consist of using titanium-nickel alloys with vibranium (to radically reduce impact damage). Its flight surfaces (maneuvering) would require being even stronger since they will have to bear great stresses whenever user takes turns at high speeds and will likely be made of crystalline titanium (Stack Exchange. 2013).

### INTERNAL LAYER

Iron Man internal Suit has to be layered; inner layers will likely contain padding, ballistic mesh and other like materials to offer level of cushion for the wearer to reduce impact damage. It is also conceived there must be some sort of force field and anti-gravity technology to reduce damage dealt to the wearer and the suit. Otherwise, wearer in the Iron

Man Suit would suffer far greater contusions from impacts and explosions. Though it is implicitly understood since ancient armors had to pad the user to protect them from concussive force (Stack Exchange. 2013) (Figure 4).



**FIGURE 4**

**ILLUSTRATES THREE INTERNAL LAYERS INSIDE OF IRON MAN SUIT.**

### **HEAT RESISTANCE**

Areas requiring heat resistance will most likely use carbon nanotubes material to channel heat away from the wearer. Carbon nanotubes material can be used for thrust boots and other parts (Stack Exchange. 2013).

### **AERODYNAMICS**

Most likely rest of the suit, arms and legs will use crystallized titanium material that is common to high velocity aircraft engines. These are durable and at the same time expensive, capable of taking variances in temperature and surviving extreme stresses. Making note importance of legs and other body parts are, one would most likely add protection as much as possible without adding too much weight (Stack Exchange. 2013).

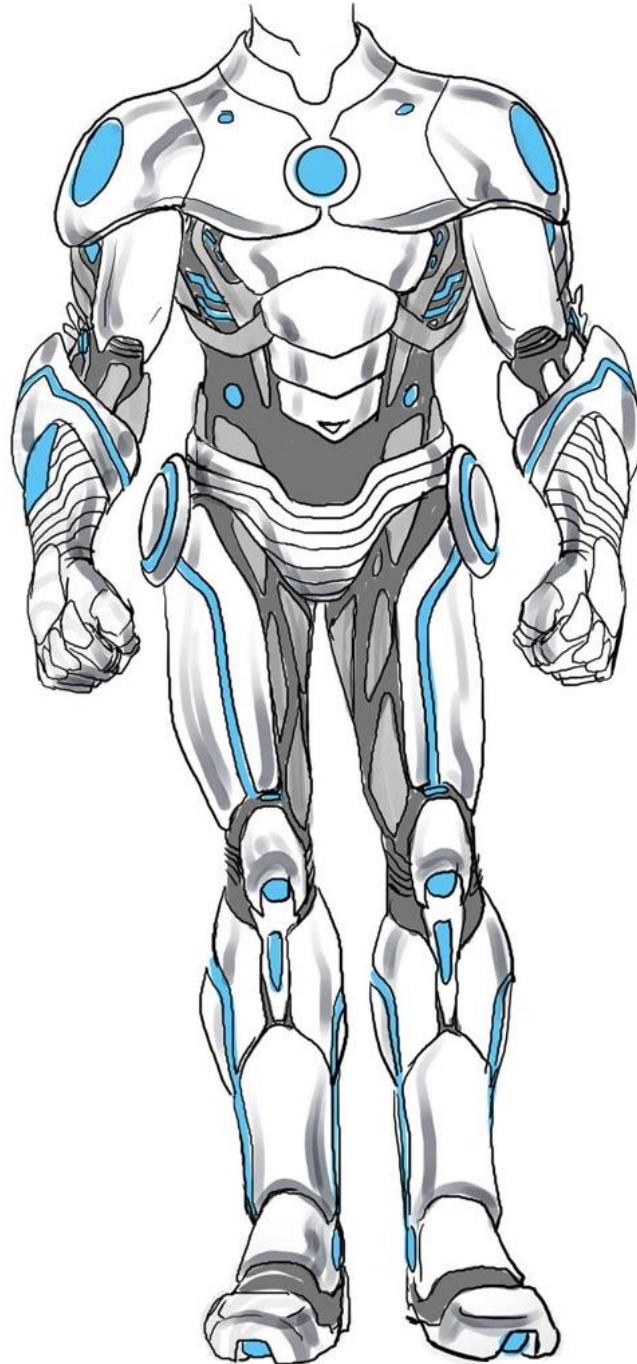
### **ERGONOMICS**

#### **INTERNAL PADDING OF AN IRON MAN SUIT**

Layer 1: Diamagnetism is the characteristic feature of an object which causes it to create a magnetic field in reluctance to an externally applied magnetic field, thus causing a repulsive effect. Respectively, an external magnetic field alters the orbital velocity of electrons around their nuclei, thus changing the magnetic dipole moment. As per Lenz's law, this opposes external field. Diamagnets are materials that have magnetic permeability less than  $\mu_0$  (a relative permeability less than 1). Therefore, diamagnetism is a form of magnetism that is only demonstrated by a substance in the presence of an externally applied magnetic field. It is generally fairly a weak effect in most materials, even though superconductors exhibit a strong effect. Diamagnetic materials create lines of magnetic flux to move away from the material, and superconductors can exclude them completely (except for a very thin layer at the surface) (Reddit. 2015).

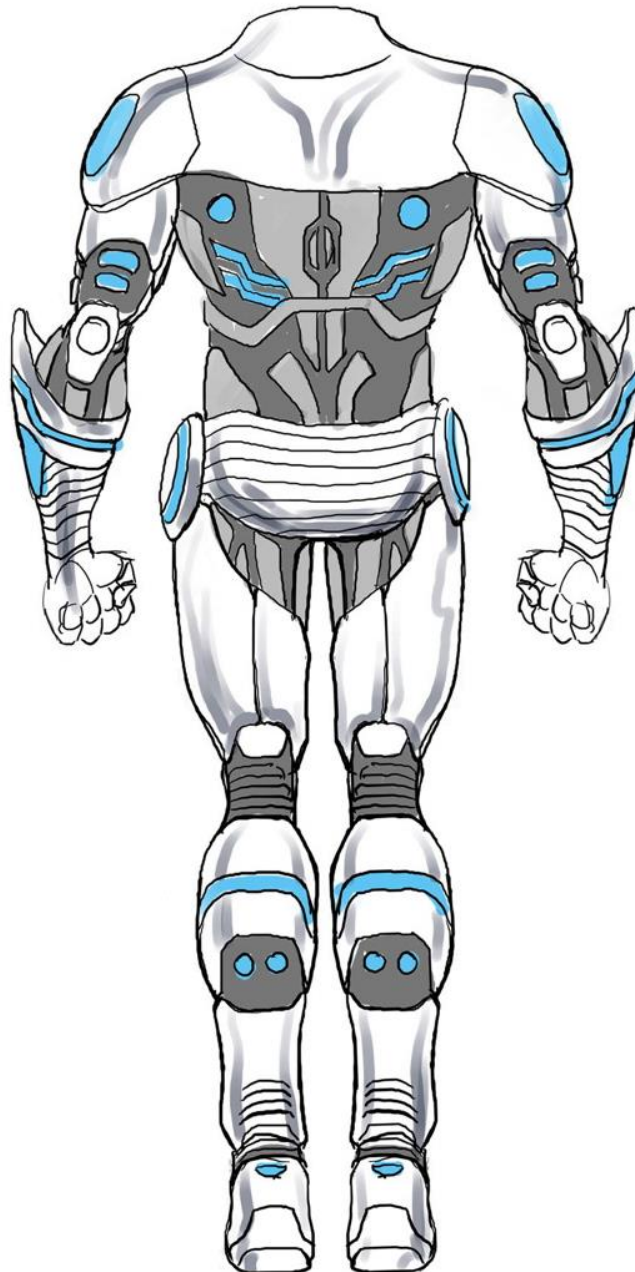
Layer 2: Second layer has presser field generator array. It is tuned to the nano-mesh. The generator and mesh produce a resonant cavity in which the operator's body is essentially suspended. It is on own emergency power circuit. Its main function is to instantly percolate or add momentum to the operator's body with essentially instant and uniform effect. This field is why the operator isn't turned into bony soup when he impacts solid objects at great speeds.

The field, being a field and not an outside force, catches/moves/decelerates the full thickness of the body evenly. The only impact the operator can feel is the nano-scale differences inherent in the system's feedback loops. So you can fall a thousand feet onto concrete or get hulk-punched but only experience enough non-uniform delta-v to get bruised (Reddit. 2015). The field also makes it very hard to stab the occupant as its boundary is almost impenetrable. So if it can damage the suit fairly easily (as such things are measured) but if it penetrates the armor the operator is still well protected (Figures 5-6).



**FIGURE 5  
ILLUSTRATES FROND VIEW INTERNAL PADDING (INCLUDING THREE  
LAYERS) IN AN IRON MAN SUIT**

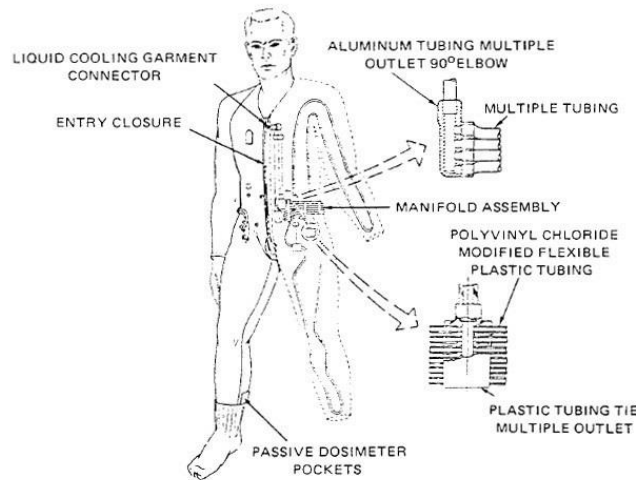
Layer 3: [Nano Mesh] There is a nano-suit that can smooth out fabric wrinkles, which at the forces involved could cause serious damage to flesh or bone, and which otherwise create a uniform surface out of the irregularities of a normal body. This layer is temperature controlled and hence no sweat and other are precipitations are taken away. It's made out of individual nano-machines that can pass through or saturate the fabric of clothes (Reddit, 2015). The nano-mesh is also used for reading biological signs, making the electrical connection with the power source, and measuring user intended body movements for transmission to the suit's drivers (Reddit, 2015). Next is all the automation layers and machinery. They give the suit its utility and weapons value. They translate movements of the nano-mesh into movements of the armor (Reddit, 2015).



**FIGURE 6**  
**ILLUSTRATES BACK VIEW INTERNAL PADDING (INCLUDING THREE LAYERS) IN AN IRON MAN SUIT.**

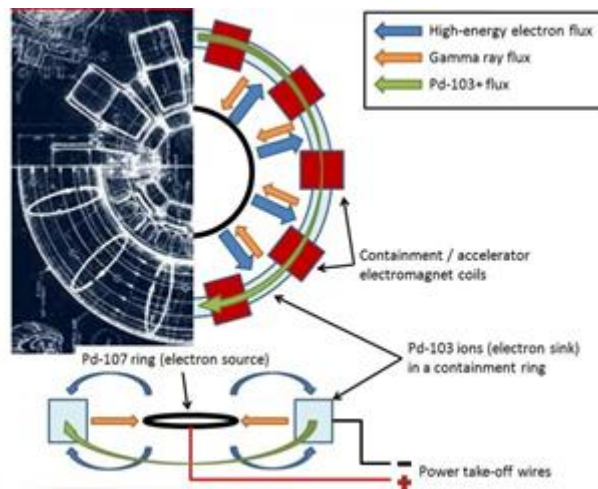
### COOLING AND HEATING MECHANISM OF AN IRON MAN SUIT

Figure 7 illustrates cooling and heating mechanism for an Iron Man Suit. Major parts included but not limited to Liquid cooling garment connector, Entry closure, Aluminum tubing multiple outlet, manifold assembly (Aplanetruth, 2015).



**Figure 7**

**ILLUSTRATES COOLING AND HEATING SYSTEM IN THE IRON MAN SUIT.**



**FIGURE 8**

**ILLUSTRATES POWER SOURCE FOR IRON MAN SUIT.**

### POWER SOURCE

To power Iron Man Suit a reliable cold fusion reactor is required. Arc reactor is compact fusion reactor. It is a multi-isotope radio-decay cell that can be created using Low Energy Nuclear Reactor (LENR) technology which is a low-radiation fusion reactor. Palladium isotope can be used as a core and it generates significant amount of power. It also introduces a new portable method to generate power without generating too much heat and heavy radiation (Mitra, 2018).

## CONCLUSION

Based on the hypothesis and illustrations explains Internal Mechanics of an Iron Man Suit can be visualized. Explained models in Internal Mechanics are Internal Circuitry of internal helmet of an Iron Man Suit, Material Science (only includes Chest and dorsal protection, internal layer and Heat resistance), Aerodynamics (only includes Flight areas), Ergonomics (only Layer 1, Layer 2 and Layer 3 [Nano Mesh]) Cooling and heating mechanism and Power Source. However, in this paper it does not include are Advanced Robotics (to design the suit), Detailed Electronics (to make the suit work), Detailed Aerodynamics, Detailed Avionics, Propulsion, Manufacturing, detailed Material Science (to choose and design the correct material for each purpose), detailed Physics (understand the forces involved, electro-magnetism specifically), Mathematics, Chemistry (deeper understanding of materials, propulsion and rockets), detailed Biology (effects of the human body at altitude in a tiny suit, oxygen control etc.) and Computer Science (human-computer interface, most of the suit).

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