

A PROJECT REPORT
ON
“UNIVERSAL POWERFLEX”

Submitted to
UNIVERSITY OF MUMBAI

In Partial Fulfilment of the Requirement for the Award of

BACHELOR’S DEGREE IN
MECHANICAL ENGINEERING

BY

SHAIKH MOHSIN KHALID 16DME174
SHAIKH SHEHZAD AHMED 16DME177
SAYED MOHSIN HUSSAIN 15ME096

UNDER THE GUIDANCE OF
PROF. MOHD SIRAZUDDIN KHAN



DEPARTMENT OF MECHANICAL ENGINEERING
Anjuman-I-Islam's Kalsekar Technical Campus
SCHOOL OF ENGINEERING & TECHNOLOGY

Plot No. 2 & 3, Sector - 16, Near Thana Naka,
Khandagaon, New Panvel - 410206
2018-2019

AFFILIATED TO
UNIVERSITY OF MUMBAI

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CERTIFICATE

This is certify that the project entitled

“UNIVERSAL POWERFLEX“

submitted by

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is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Mechanical Engineering) at *Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai* under the University of MUMBAI. This work is done during year 2017-2018, under our guidance.

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I am grateful to him/her for his timely feedback which helped me track and schedule the process effectively. His/her time, ideas and encouragement that he gave is help me to complete my project efficiently.

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Project I Approval for Bachelor of Engineering

This project entitled *“Universal Powerflex”* by *Students Name* is approved for the degree of *Bachelor of Engineering in Department of Mechanical Engineering*.

Examiners

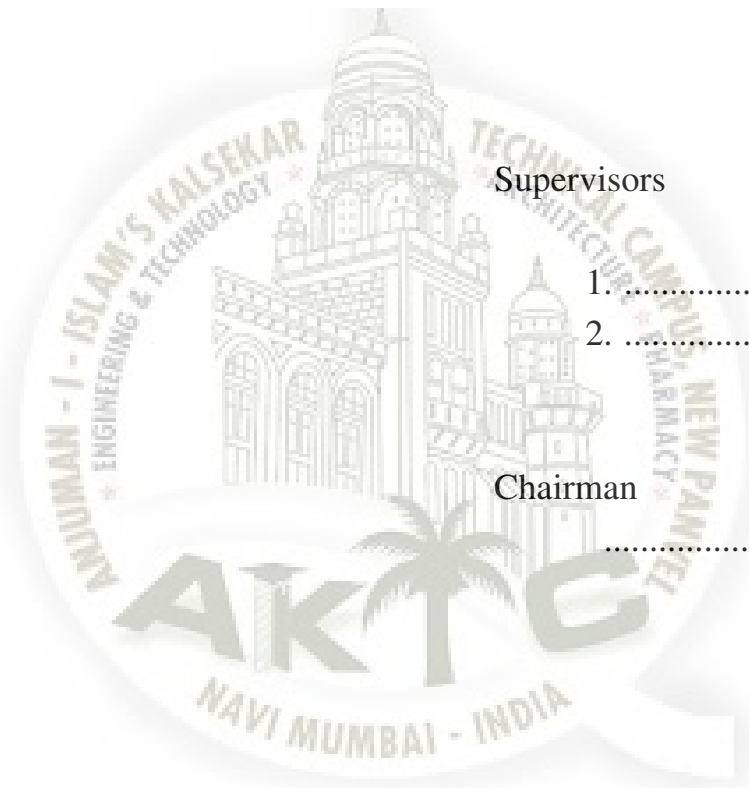
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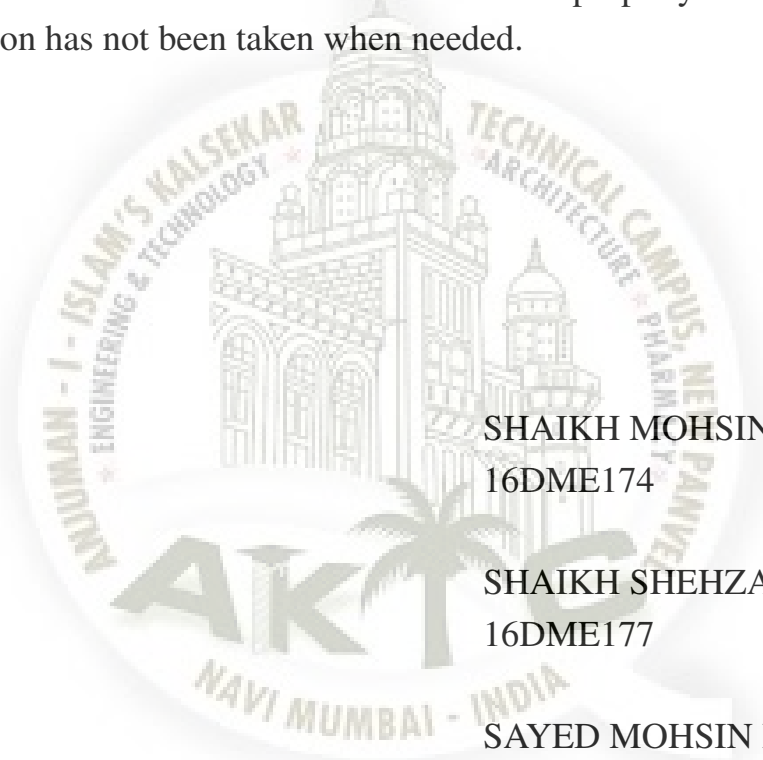
Chairman

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Declaration

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.



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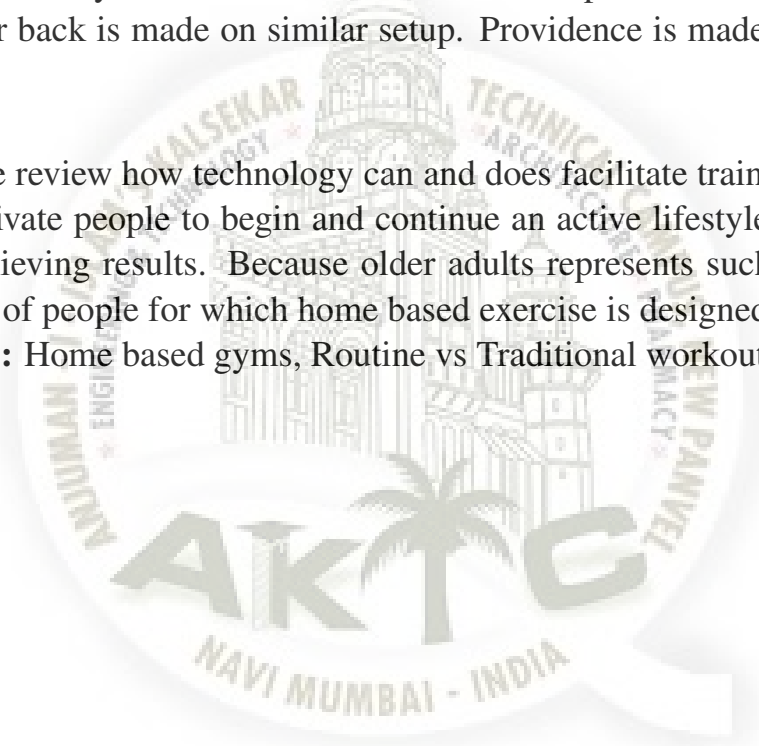
ABSTRACT

Background: Developing alternative exercise programmes that can alleviate certain barriers to exercise such as psychological, environmental or socio- economical barriers, but provide similar physiological benefits e.g. increases in muscle mass and strength, is of grave importance. This pilot study aimed to assess the efficacy of a whole-body home-based exercise training (HBET) programme, incorporated into daily living activities, on skeletal muscle mass, power and strength.

Methodology: In this exercise based setup utmost care is being given to brush up the routine based exercise more effectively. The exercise regarding chest is being carried out by cross fly machine while for shoulder lat pulldown is considered. The arrangement for back is made on similar setup. Providence is made for triceps and biceps also.

Outcome: we review how technology can and does facilitate training from home, how it can motivate people to begin and continue an active lifestyle, how it can be effective in achieving results. Because older adults represents such a specific and important class of people for which home based exercise is designed.

Keywords: Home based gyms, Routine vs Traditional workout



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Chapter 1

Introduction

1.1 Historical approach

In ancient times, there were no motorized treadmills, elliptical machines, or exercise bikes. Nor were there any free weights or weight machines for that matter. But does that mean people were out of shape?

Of course not. Instead, fitness was a way of life - it was survival. Hunting prey, foraging, farming and maintaining a home meant that people were constantly moving throughout the day. Despite the fact that these individuals never had any structured workout routines, they rarely suffered from some of the health problems that we see in today's world. They ate all-natural foods that came from the ground or wild and sustained a high total daily calorie burn. These two combined factors produced a fit and healthy body - one that was agile, strong, and lean.

If you would like to learn how your own DNA relates to your fitness goals, you may want to take a look at our Helix DNA Reviews, TeloYears Review, and 23and Me Reviews pages. These resources can provide you with valuable insights regarding latest advances in DNA tests for health.

Considering "Natural" Fitness Think about the natural fitness that occurs during our childhood years. A healthy, active child typically isn't spending time on treadmills or in the gym lifting free weights. Instead, children are running and playing. They're moving around but in manners that they enjoy. In fact, many young children will seek out physical activity if you let them. In some cases, it's difficult to get them to stop moving around!

Then once they're introduced to the sedentary ways of today's world as they become teenagers with all the computer games and TV shows, they start adopting the habits that too often persist into adulthood. Their former play time is overtaken by time spent sitting on the couch; their only fitness-related activity might be when they attend school gym sessions.

Where We Are Today This brings us to where we are today with our definition of 'fitness'. For many people, going to the gym fully encompasses all the fitness we get in our life. We have desk jobs where we stay sedentary for 8 hours a day and have other demands of our time afterwards that don't include getting out and getting

active. Our evenings may also involve little activity, turning in for bed after sitting down to watch TV for a few hours while consuming high-calorie processed foods.

Is it any wonder that we're experiencing the health problems we are today? The high-sugar foods we're eating send a surge of insulin streaming through our veins, which then sucks all that excess sugar up and deposits it straight into our bodies' fat stores. This will also cause an elevation in blood triglycerides to take place as well, setting us up for heart disease.

Some of us do go so far as to create structured workout programs in the gym, which is good, but this doesn't get us mentally fit like non-gym activities do. Nor does it challenge our bodies in innovative ways. With gym activities, you'll be performing the same repetitive motion time and time again, so there is little thought required to complete the activity. If you were to go out and play a game of soccer, for example, your mind must shift constantly and pay attention to what's going on in the field. This added mental stimulation will not only improve your fitness while enhancing your mind-body coordination, but it will also keep you that much more interested in the workout as well. Think of our ancestors hunting for their meal, no two pursuits quite the same. While a few people do like to go into the gym and 'zone out' as they find it relieves stress, most people need more than that.

1.2 Purpose

The purpose of home based industry is to provide an alternative to conventional bodybuilding practices, to overcome all the drawbacks i.e commuting, long hours not to find motivation, lack of service and hygiene. system are designed with the help of springs to utilize the effect of tension force, the project provides accommodation to much more exercise based work since its an adaptation of crossfly machine.

1.3 Project Scope

The fitness industry in India is controlled at a variation point, with the high market division, amazing market potential and end-to-end overall growth. The fitness sector in India has travelled a long journey from local 'akhadas' to wrestling now being a part of the international Olympics, with India actively taking part in it and winning medals for the country. Bodybuilding and powerlifting championships are other such examples. So a care is taken to provide a solution on home based alternatives to give fine touch instead of rigorous routine. Today fitness industry in India is going towards health, well-being, good looks and confidence. Resistance training, aerobics, Zumba, aerial yoga, Pilates, MMA, kickboxing etc. have become the fitness trends over a few years in India.

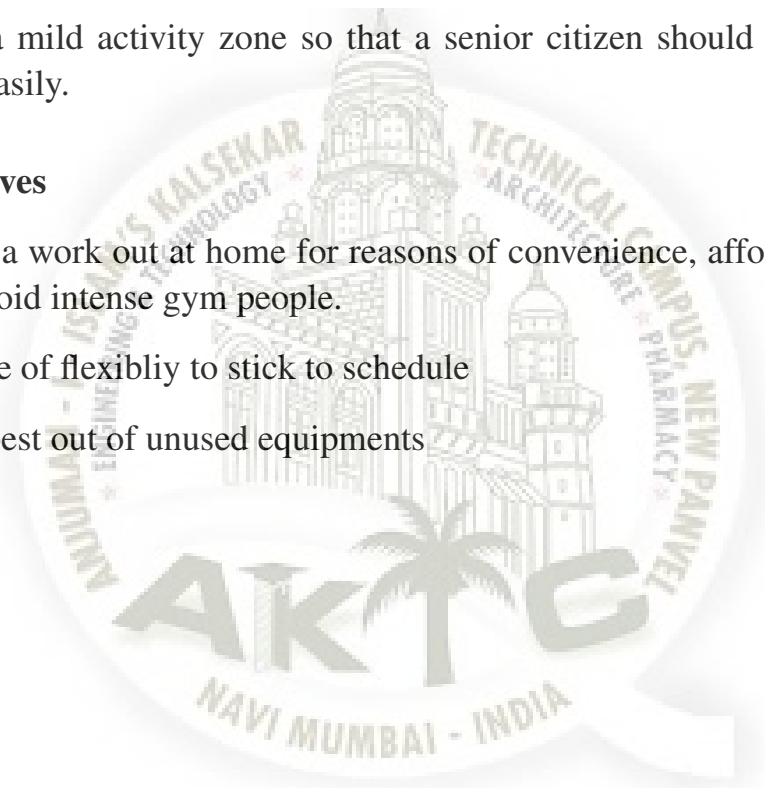
1.4 Project Goals and Objectives

1.4.1 Goals

1. Increasing efficiency and productivity.
2. Increasing emotional resilience.
3. A commute free process since it is one of the biggest hurdle in fitness
4. Creating an arena where u wont require any waiting time, a workout could be done in 20-40 minutes.
5. Routine based workout zone for corporates and office employees, schools.
6. Creating a mild activity zone so that a senior citizen should also able to do workout easily.

1.4.2 Objectives

1. Providing a work out at home for reasons of convenience, affordability or privacy to avoid intense gym people.
2. Providence of flexibliy to stick to schedule
3. Creating best out of unused equipments



Chapter 2

Literature Survey

2.1 OVERVIEW

Drawing on the premise that femininities and masculinities are historically and culturally produced, the impact of fitness performances upon gendered identities has been addressed by various scholars (e.g., Craig & Liberti, 2007; Dworkin 2003; Heyes, 2007; Johansson, 1996; Johnston, 1996; McCreary & Saucier, 2009; Salvatore & Marecek, 2010; Tiggemann & Williamson, 2000). Dworkin (2003) writes that for most of its existence the gym has been associated with masculinity. The body building gym especially promoted and celebrated characteristics associated with male-ness, such as strength, power, competition and aggression, so that one could argue that through cultivating a muscular physical exterior, men were able to re-emphasize their superiority and dominance. Whilst this still may be true for body-building gyms, contemporary fitness gyms seem to work in more complex ways. Women's participation in gyms has widely increased and women entering the weight training area have become more common. Nonetheless empirical studies show that men and women tend to have very different objectives and motives for attending the gym (e.g., Haravon Collins, 2002; Salvatore & Marecek, 2010). Whilst male gym goers seem to be disproportionately concerned with arm, back and chest strength in contrast to lower body strength female participants are primarily interested in weight loss, and thus engaging more in cardio-vascular exercises.

As Featherstone (2010) puts forward, in contemporary Western societies, the body is understood as a reflection of one's inner self so that one may argue that body modification technologies and body enhancement regimes can be understood as attempts to construct not only a beautiful, strong and fit appearance but also a beautiful, strong and fit self. One may then ask if people work out at gyms for more than body-related reasons, that is to say, if gyms also function as places in which people seek to alter and "re-invent" themselves in a more general sense.

2.1.1 Outcome of Paper

As stated above, members undergo re-inventive regimes not only because they regard it as a positive opportunity to boost self-esteem but also partly because they believe they have a moral responsibility to be healthy or to feel better. In the context of the gym one may then ask what participants hope to gain through the correction of their bodies and the advancement of their fitness levels, and relatedly, in which ways they feel incomplete or insufficient if they fail to do so. In this vein, the present study addresses the questions of how and to what extent the gym functions as an active and reiterative attempt to create better versions of the self. In other words, it asks to what extent gym participants seek to re-invent themselves other than on a physical level.

2.1.2 Results

The results of the analysis revealed three key themes related to participants' expectations and motives for exercising at the gym. Participants believed that exercise at the gym grants:

1. More efficiency and productivity.
2. A higher sense of control over their lives and
3. An increase of psychological well-being.
4. In addition, there was also a group of respondents who displayed (self-) critical sentiments towards the gym.

Chapter 3

DESIGN

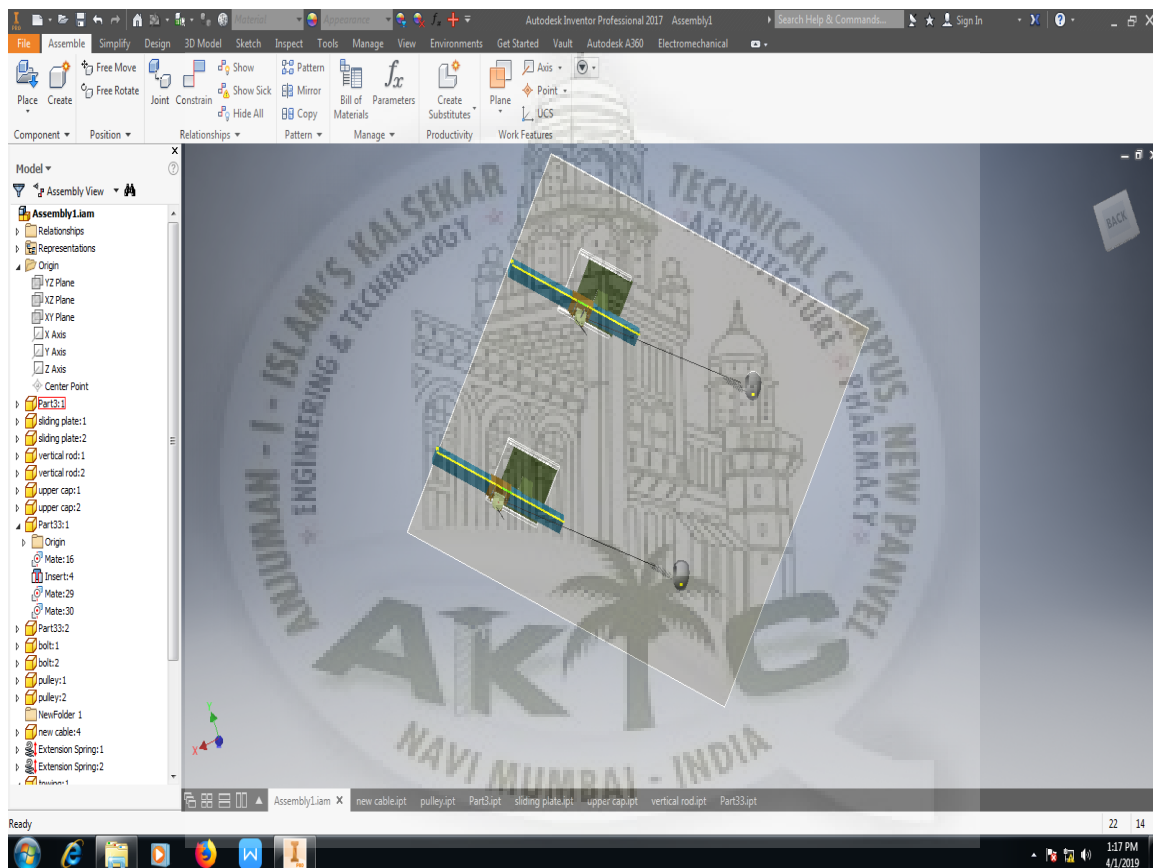


Figure 3.1: INVENTOR MODEL

Chapter 4

Details of Mechanism

4.1 Step 1 : Aligning the plate and painting

In this stage the plate made up of material MS Steel is being purchased from uttarshiv dahisar.the size of the mounting plate is 6ftx4ft. the unevenness of the plate is being overcome by slight hammering. The function of the plates to mount the whole assembly on it and to take the corresponding forces and stresses.the main purpose of the plate is to provide mobility of the setup, if the assembly is mounted directly on the walls it will cost damage and look shabby . different components are aligned on the basis of cable pulley and marking is to be done on the basis of the same.



Figure 4.1: METAL PLATE

4.2 Step 2 : Welding of detachable plate

Since detachable plate is something which can be taken out from main plate any time, but due to design consideration and effect of impact and fluctuating load it can easily be sheared off. To overcome this the plate on which the pulley aligner rod is fixed is welded on both of its ends.

The dimension of the plate is given as 60mm x 60mm. To further accommodate the plates to be welded on the main plate, a slight gap is being maintained for its safety of the system between the parallel plates.



Figure 4.2: DETACHABLE PLATE

4.3 Step 3 : Fixing of the pulley aligner rod

The pulley aligner rod is something which gives height variation to the pulley, since the holes for pulley fixer is made considering the length of the wire, average human size, major consideration in cross fly machine. The entire load is been taken by the detachable plate.

The material of the rod is purposely to be taken of stainless steel. As it is much more smoother in operation reducing wear and tear while reciprocating of pulley assembly. Around 4 holes at equidistance of 5cm each is being punched so that the notch shaft could accommodate easily. The material is being purchased from jarimari kurla west. Since the material is hollow effects of bending is being reduced considerably.

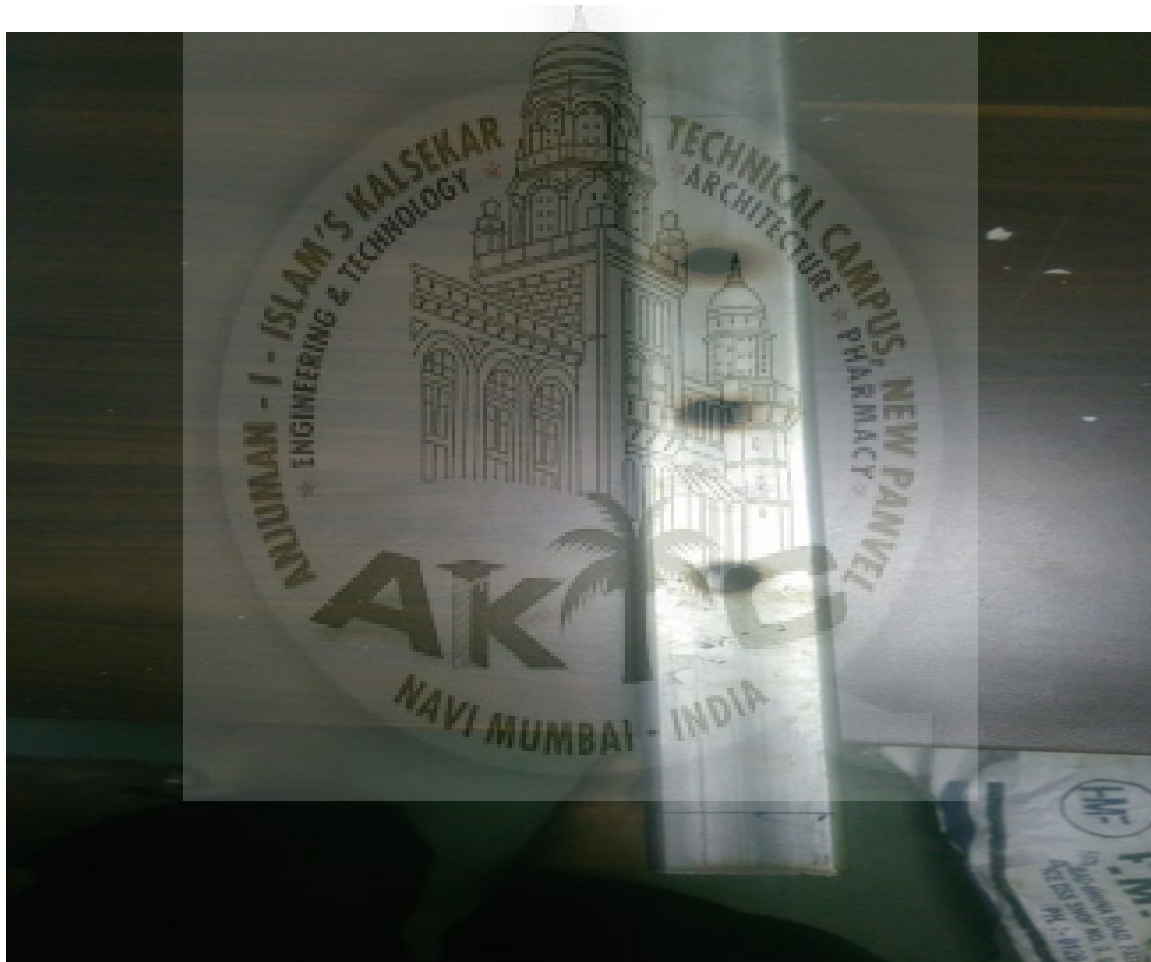


Figure 4.3: PULLEY ASSEMBLY ROD [STAINLESS STEEL ROD]

4.4 Step 4 : Pulley assembly with adjuster

The main function of the pulley is to give mechanical advantage to the whole system against the rigidity of the springs. In our design 2 pulley assembly are used symmetrically to the plate. the shackle plate is provided to have the motion of the pulley in x -x direction only.

The size of pulley is 4inches, the purpose of this size is that it gives better directional stability,cable control across all ranges of operation.Basically in all cross fly arrangement 4-5 inch pulley is used.

For the purpose of halting the pulley in y-y direction, a stopper is used at equidistance holes. The size of the shaft is 50mm. the step is provided to accommodate the springs which acts as a main source of retraction. the material is used for shackle plate is stainless steel sheet therefore for the purpose of welding, gas welding is required.



Figure 4.4: PULLEY ASSEMBLY

4.5 STEP 5 : Mounting of Springs

To get away from traditional dead weight based training the springs is used to quench for the desire of something new. Since dead weight is used as strength based training spring provides with the advantages of resistance based training which is desired.

: the spring designed is based on the strength which would be equivalent to load displaced in lbs in y-y direction.the spring is categorically divided into 3 categories

- a] Beginner Zone
- b] Intermediate Zone
- c] Advanced Zone

Spring designed is based upon the number of coils and the wire diameter to vary its stiffness which would further change the force required to cause displacement. The material of the spring is taken to be grade 2 - steel, it is most widely used to manufacture helical tension springs in local market.the springs basically uses the material MUSIC WIRE ASTM - 228. it is more economical and durable in normal environment of mumbai, if the spring is subjected to corrosive environment or high temperature zone the material should be selected among the stainless steel to counter the layer of corrosion.

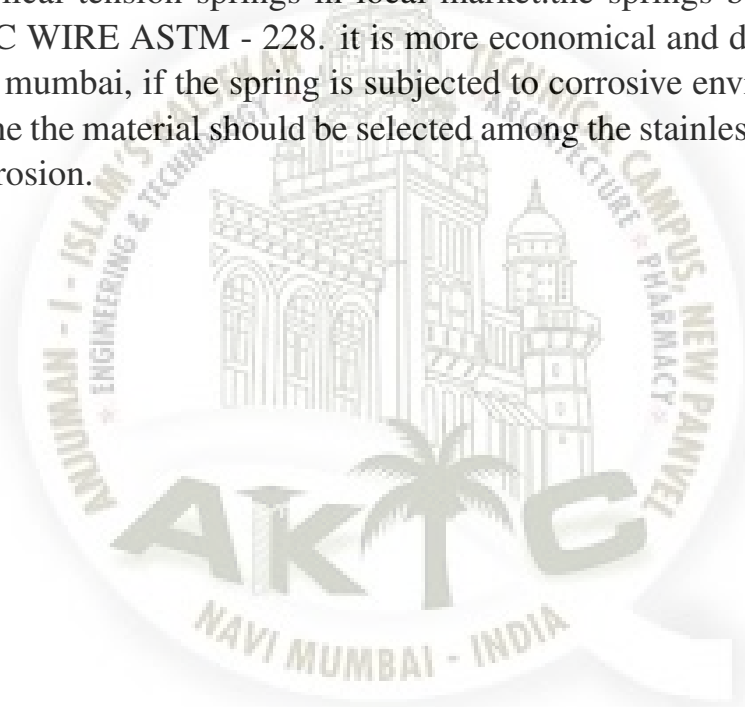




Figure 4.5: SPRINGS

4.6 STEP 6 : Winding of the Cable And Cable Length Determination

The cable would be wound across the pulley on one side attached to the handle for operator and on the other hand directly to the fixed springs. the no of falls in the pulley would be across 3 and bend would be across 2 on either side.

The length is adjusted as soon as the operator reaches the 'X' mark. the length of the cable is 6metres. depending upon the personal physique and arm length the size of cable will accommodate to fulfill the demands of the problem.



Figure 4.6: CABLE LENGTH DETERMINATION

4.7 STEP 7 : Mounting of Towing and fixed spring

For the purpose of exercises like biceps and triceps the system given in the bottom of main plate via towing hook. this towing hook is bolted across the threads and welded across its ends. the arrangement gives much more stiffness to the abdomen based exercise since mechanical advantage across pulley is not there.



Figure 4.7: TOWING

Chapter 5

Exercises that can be Performed

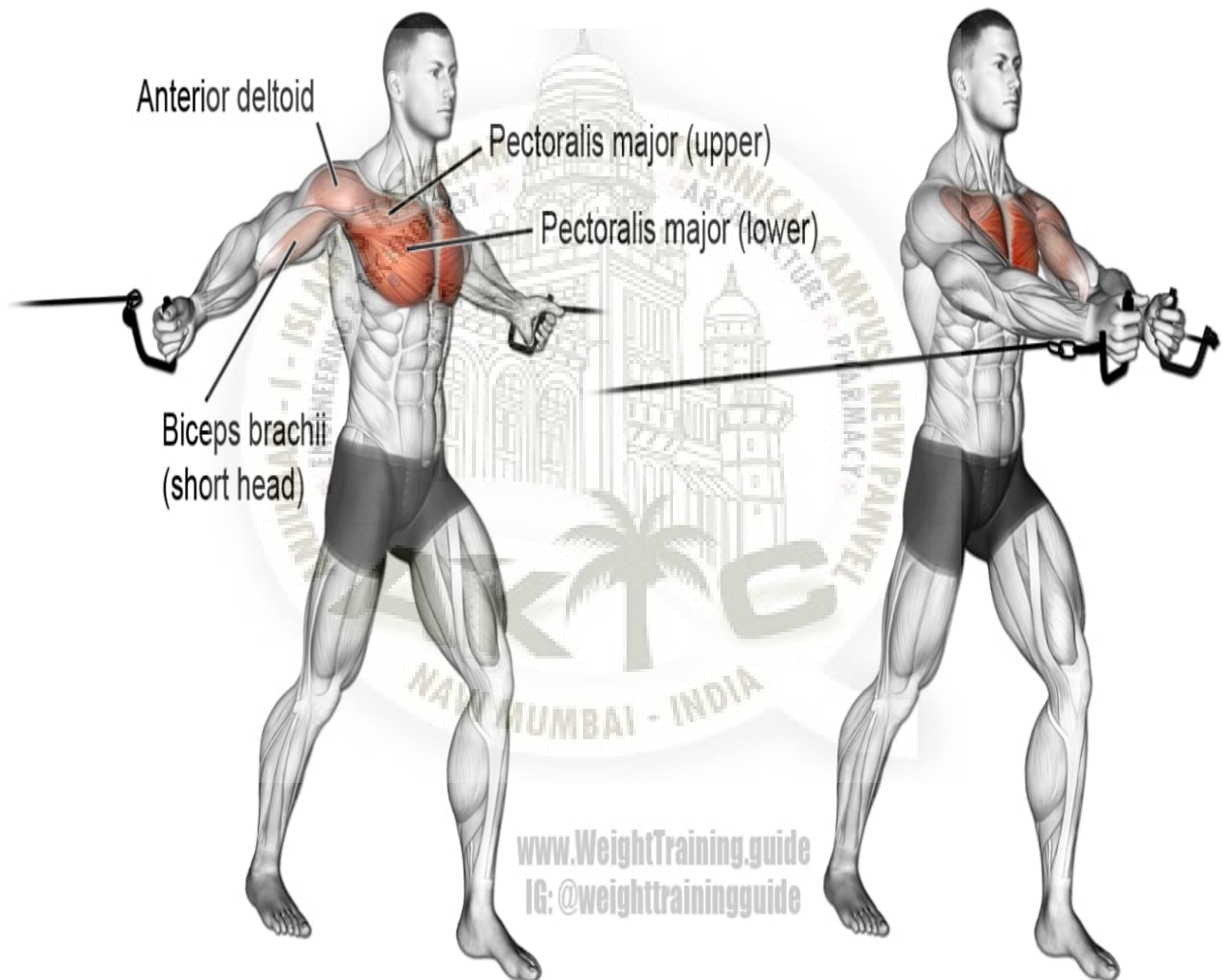


Figure 5.1: CHEST

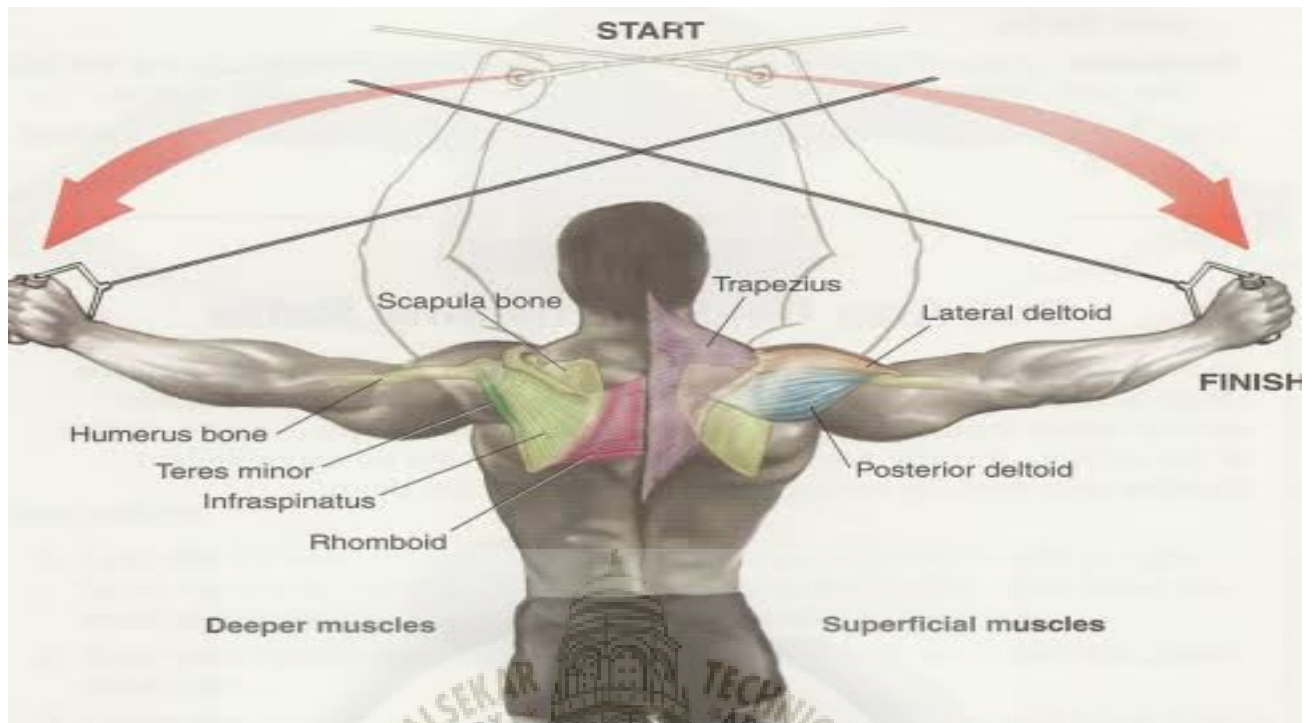


Figure 5.2: BACK



Figure 5.3: SHOULDER

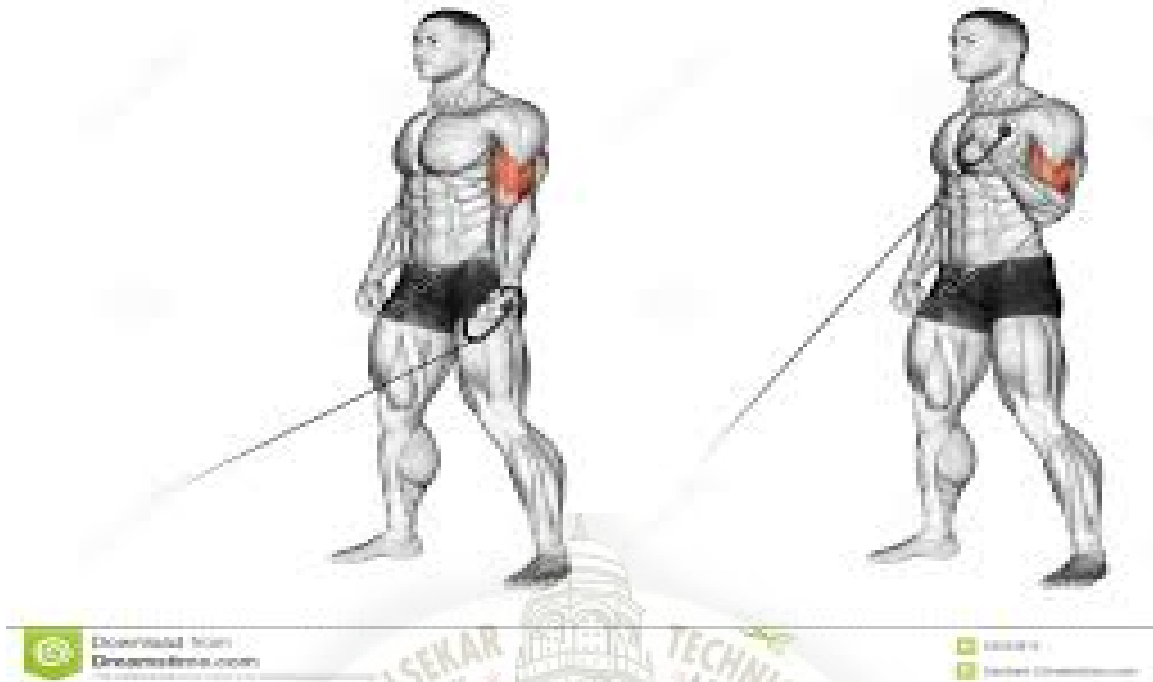


Figure 5.4: BICEPS



Figure 5.5: TRICEPS

Chapter 6

CALCULATION

6.1 SPRING CALCULATION

Table 6.1: Table of Rate And loads

Spring Rate (or spring constant)K	0.0757 N/mm
Maximum load possible (Fmax)	25.8911 N
Maximum load possible considering Hook Stress(FmaxHS)	21.2383 N
Initial Tension (Tension in it)	1.6816 N

Table 6.2: Table of Safe travel

Maximum Safe Travel (Travelmax)	319.7270 mm
Maximum Safe Travel considering Hook Stress(TravelmaxHS)	258.2798 mm

Table 6.3: Table of Weight And Measures

Weight of one spring M	0.0131 Kgs
Weight of one thousand springs, M1	13.0666 Kgs
Length of wire required to make one spring, Lwire	2393.9658 mm

Table 6.4: Table of Stress Factors

Material shear modulus, G	79241,245,136.187 Pa
Maximum shear stress possible, tmax	1040.212 Pa
Wahl correction factor, W	1.114

Physical Dimensions

Diameter of spring wire, d :	0.940 mm
Outer diameter of spring, D_{outer} :	12.700 mm
Inner diameter of spring, D_{inner} :	10.820 mm
Mean diameter of spring, D_{mean} :	11.760 mm
Length Inside Hook (Free length), L_{free} :	76.200 mm
Number of active coils, n_a :	62.798
Body length, L_{body} :	59.970 mm
Hook length 1:	8.115 mm
Hook length 2:	8.115 mm
Total Hook Length:	16.230 mm
Type of Hooks:	machine hooks
Spring index, C :	12.511

Figure 6.1: PHYSICAL DIMENSION

Chapter 7

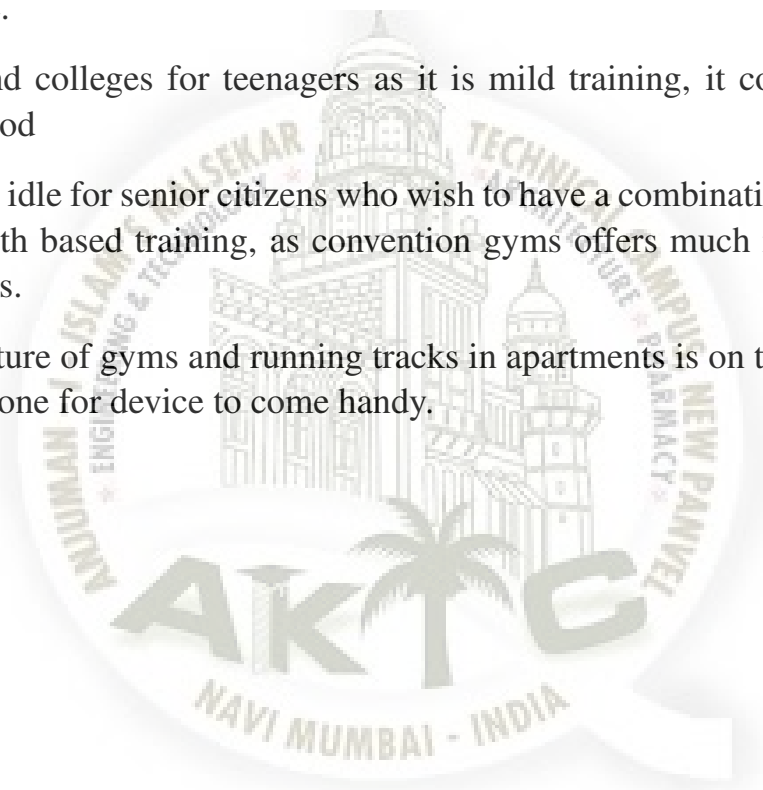
TOTAL COST OF PROJECT

Sr.No	Material		Transportation	Machining	
1	Main plate	2200	500		2700
2	Detachable plate	50*15	750		750
3	Pulley	164*2	340		340
4	Vertical rod	110*15	1950	300-gas welding	2250
5	Cable wire	6*60 metre	360		360
6	Spring	2350			2350
7	Cover plate	250			250
8	Towing	300			300
9	Miscellaneous				3000
10	Total				12300

Chapter 8

TARGETED AUDIENCE

1. Office Employees who wants to warm up after monotonous work to be more productive.
2. schools and colleges for teenagers as it is mild training, it could be used in sports period
3. It could be idle for senior citizens who wish to have a combination of resistance and strength based training, as convention gyms offers much more variety to young ones.
4. As the culture of gyms and running tracks in apartments is on the rise, it could be a great one for device to come handy.



Chapter 9

Overview of the Process Performed Project

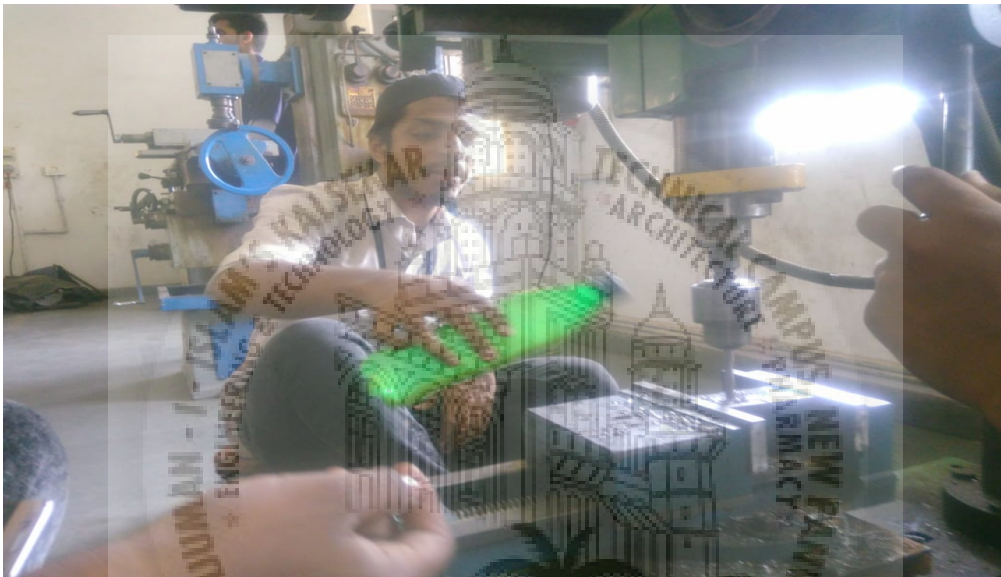


Figure 9.1: PLATE DRILLING



Figure 9.2: MACHINING

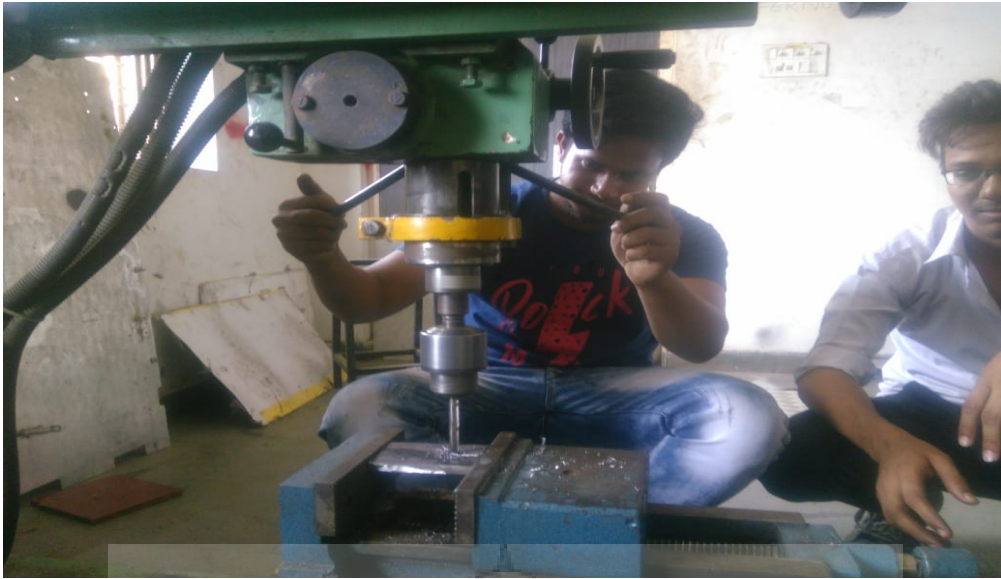


Figure 9.3: DRILLING



Figure 9.4: PLATE GRINDING



Figure 9.5: DRILLING IN ROD



Figure 9.6: CUTTING

Chapter 10

Conclusion and Future Scope

10.1 Conclusion

This study has shown that the reasons for why people join the gym as an ‘institution without walls’ are manifold. To invoke Scott (2011), when people join institutions to alter themselves, it is often that they feel a personal desire and responsibility to create an optimized self. What participants expect to achieve at the gym is a better version of their selves in several ways. Firstly, many of the interviewed gym participants hope, and indeed perceive themselves to be more productive and efficient. Second, they feel they have more control over their lives when they train at the gym regularly. Third, they associate their gym workout with increased psychological resilience. It can therefore be said that these people engage in regular gym training to create a better, fitter and stronger version of themselves, that enables them to “keep on going”, to master their everyday lives, to cope psychologically with their stresses and strains.

Important to note, the sample of this study was limited for it consisted of students and working adults only, that is to say, of people who either sell or prepare to sell their labour force at the market. It would be interesting to explore how people out of employment such as retirees and other non-workers make sense of their gym exercise. Tulle and Dorrer’s (2012) study, for example, reveals that gym participants over 65 years old tend to come to the gym not only for physical training but also to form social bonds that exceed the boundaries of the fitness locale. In general, people who have been referred to the gym as a result of a medical condition might experience the gym differently than participants who come there for leisure, perhaps more as a compulsory “homework”. In an interesting case study, Nash (2012) shows that pregnant women do not only use the gym to get fitter for birth but also, quite paradoxically, to manage anxieties about weight gain. The author shows how pregnant gym users, more than non-pregnant women, compare the size and shape of their bellies to those of other pregnant women in aerobics classes. As she writes, the fact that body related anxieties manifest themselves in the embodied experience of group exercise challenges research suggesting that prenatal exercise has largely pos-

itive effects on mood and body image. For some of her informants, Nash maintains, pregnancy fitness means a third shift of work on top of their continuing commitment at home and in paid employment.

For the recruited participants exercise in a gym was obviously an important enough part of their lives for they volunteered and were interested to talk about fitness in general and their own fitness practices and histories in particular. It would be worthwhile to look at the motives of gym members for whom the gym is not that important or who train only occasionally as this may yield different results. Relatedly, it might be interesting to interview people who have strong feelings towards the gym because of their negative experiences there.

In future studies, it would be fruitful to explore to what extent gym-related practices resonate with broader discourses on health and fitness in a given society. It has been noted that in the last three decades or so, corporate managerial vocabularies have infiltrated governmental understandings and handlings of health with ideals of rationalization and efficiency, customer satisfaction, producer/consumer relations and performance targets (Numerato, Salvatore, & Fattore, 2012; Tonkens, Bröer, Van Sambeek, & Van Hassel, 2013). With the progressive abolishment of the social welfare state in many European countries, health is increasingly treated as a private responsibility and as something that one can purchase it might be worth discussing the gym as a social practice as an element of the commercialization of health services. Gyms can be said to speak directly to such neoliberal agendas, which try to increase the number of active and self-reliant citizens and to decrease the number of those who are dependent on the state and others. When gyms motivate their members to take responsibility for their own physical strength, they frame health as a feature of the self that individuals can and should responsibly manage. Taking on responsibility for one's health has a normative and moral impetus, too, for lack of health 'clashes too uncomfortably with the image of the "good citizen" as someone who actively participates in social and economic life, makes rational choices and is independent, self-reliant and responsible' (Galvin, 2002, p. 107). Comparing and contrasting the results of this study with contemporary discourses and policies on health would help us to widen our understanding of not only participants' motives to do gym exercise but also of the societal functions of gyms.

10.2 Future Scope

1. Online fitness platforms

The internet has been a double-edged sword for personal fitness. An outpouring of information has made it easier than ever for newcomers to research fitness plans and develop custom solutions that work best for them. On the other hand, information overload often leaves people deciding between conflicting opinions. The result has been an increased demand for packaged experiences that meet more than just one aspect of a person's fitness needs.

Todd Musgrove, Chief Strategy Officer at Kenzai, an online fitness platform shares, "The key is providing a fitness program that covers exercise, nutrition, education and support to achieve results." In doing so, programs equip people with all the tools needed for sustaining their fitness success.

2. Alternative health coaching

In the past, consumers' main source for health info was either their trainer or a book about fitness. As the internet makes it easier than ever to expand a network of fitness experts, the number of providers offering qualified advice increases. Most of the time, this advice comes from outside the traditional gym network. Online providers and retailers are beginning to offer coaching services that deepen the connection with their product but also give actionable advice to the consumer. Musgrove shares that online coaches can "educate trainees on how to change their lifestyle to maintain their results after they complete a program versus gyms and personal trainers that profit from a dependency relationship." By providing trainees with more coaching, retailers and online platforms are making health advice less of a commodity and more of a service.

3. Functional fitness is on the rise

Look at any fitness trend list for 2017 and you will find aspects of functional fitness. Whether it is body weight training or High Intensity Interval Training (HIIT), consumers are turning to alternatives that can help them achieve body transformation anywhere.

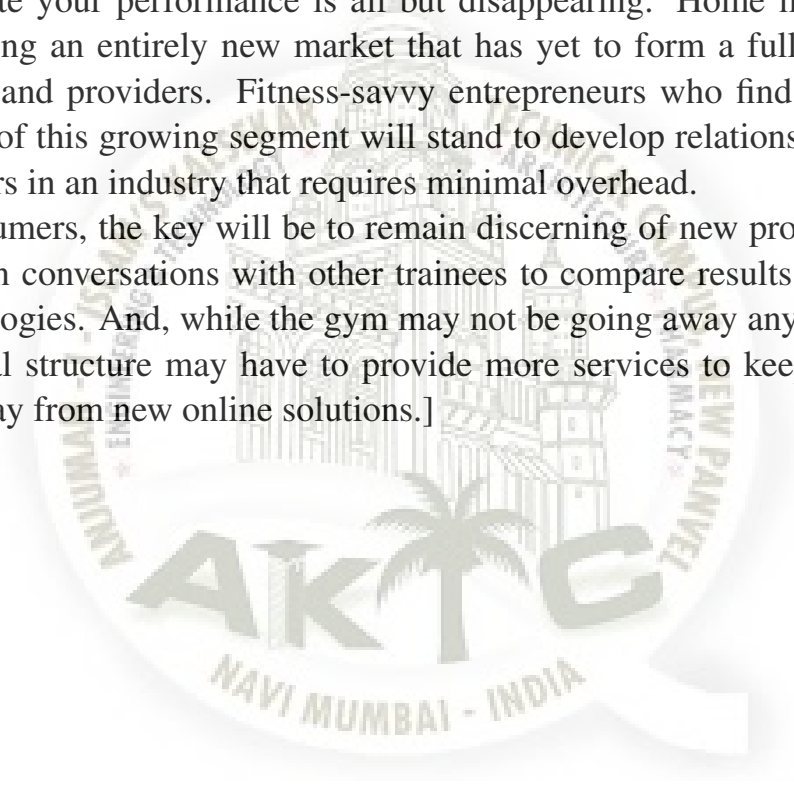
These workouts generally require minimal equipment, meaning there is no need for interruption to fitness routines, even if the trainee is traveling or unable to get to the gym. Digital platforms provide guided experiences in functional

fitness and have the advantage of being available for anyone with an internet connection. Equipment is expensive. By limiting spending on equipment trainees can direct that money toward personalized fitness experiences instead.

4. **Wearables**

According to data from the IDC, sales of various wearable fitness devices are up over 163 percent compared to previous years. That means the number of consumers accessing wearable devices is on the rise as well. As a result, tracking home fitness progress is becoming easier than ever before. In the past, aspiring gymgoers might need a high-tech elliptical at the gym to help them monitor their heart rate, but now, with people wearing multiple devices to track their fitness and movement on a regular basis, the need for a central location to evaluate your performance is all but disappearing. Home fitness warriors are creating an entirely new market that has yet to form a full ecosystem of products and providers. Fitness-savvy entrepreneurs who find ways to meet the need of this growing segment will stand to develop relationships with new consumers in an industry that requires minimal overhead.

For consumers, the key will be to remain discerning of new products and participate in conversations with other trainees to compare results and emerging methodologies. And, while the gym may not be going away anytime soon, the traditional structure may have to provide more services to keep its customer share away from new online solutions.]



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