

## **Memorandum**

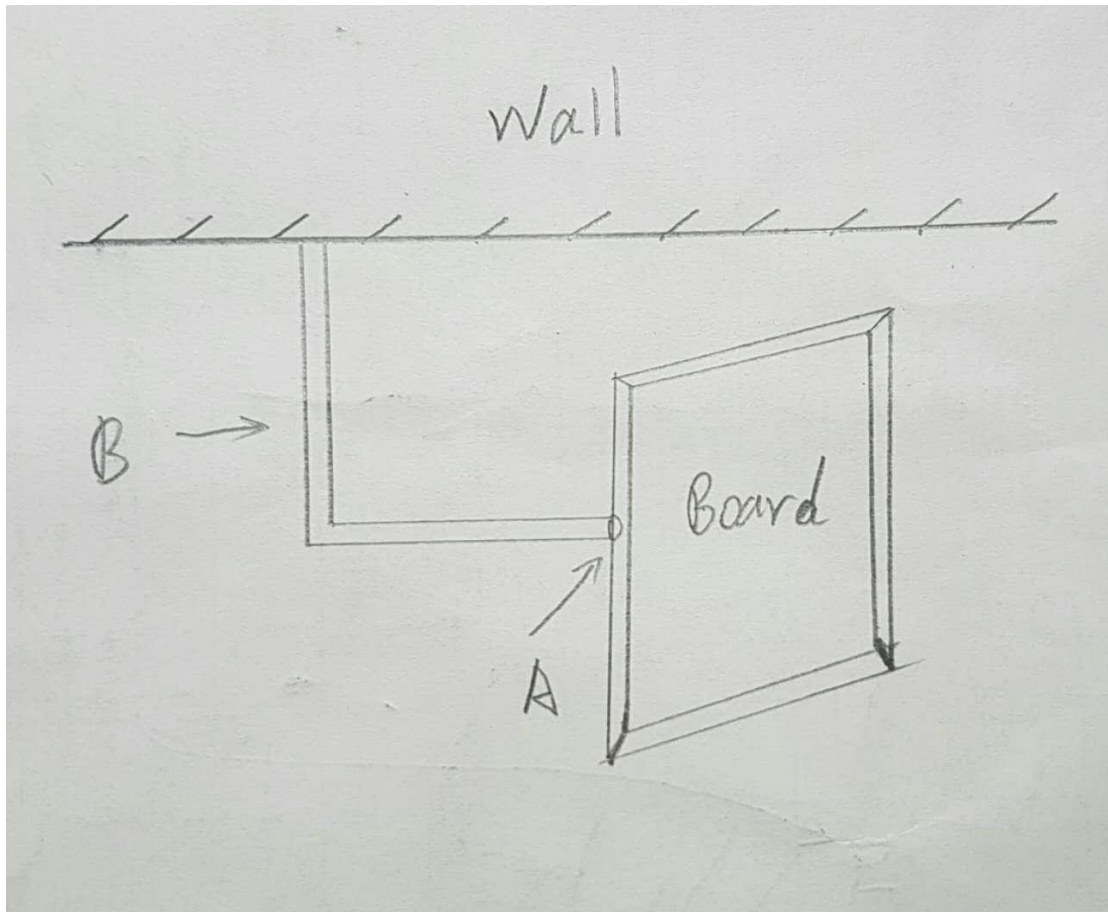
**TO:** David Trevas  
**From:** Yongzhen Li ( Team 27 )  
**Section:** 5  
**SUBJECT:** Analytical Tasks Assignment  
**DATE:** 11/11/2016

### **Introduction**

There are some disabled people in society, their life is not convenient. Thus, people invented a lot of assistive devices in order to help disabled people to do some activities in daily life, these devices could improve their quality of life. Then more and more disabled people are able to live a life of independence and play more important role in society.

My project is Assistive Device for the Art Studio, this is a very important and high level engineering project. My goal is to design a device that could help disabled people to draw. There are some disabled people can not move their hand flexibly, it is difficult for them if they want to draw. These people like art even if the body is disabled, but they also have hobbies and dreams, engineers should help them to realize their dreams. Thus, I will design a art device, it can slide up and down or rotate in order to help disabled people who can not move hand flexibly could touch every place of the board.

## Project Description



This device is hung on the wall, the stick B can shrink and it connect the wall and board, when disabled people finish drawing and do not use the device, the stick B could be shortened in order to keep the board close to the wall. And the small ball A connect the board and stick, the ball A could control the board slide up, down and rotate. This device takes up very little space and it is very convenient to use.

The material is Aluminum [1]. Based on the research, aluminum is a good choice, it is cheap, resistant to corrosion and the weight is light, the use of aluminum is very extensive in the industrial field. Therefore, I will choose aluminum as the material of the device.

### Calculation

Board: length  $L=1\text{m}$ , width  $w=0.75\text{m}$ , thickness  $t=0.01\text{m}$

Horizontal Stick: length  $L=1\text{m}$ , diameter  $=0.02\text{m}$

Density of aluminum:  $2.7 \times 10^3 \text{kg/m}^3$

Calculation: Volume of board:  $1 \times 0.75 \times 0.01 = 0.0075 \text{m}^3$

Mass of board:  $0.0075 \times 2.7 \times 10^3 = 20.25 \text{kg}$

Moment:  $20.25 \times 9.8 \times 1 = 198.45 \text{N}\cdot\text{m}$

The calculated moment is to determine whether the aluminum stick is able to support the weight of device. Based on the research [2], all mechanical properties was known, I can control the volume of board or length and diameter of stick in order to ensure the material will not failure.

### Design Evaluation

Criteria	Point
Adjustable	8
Ease to use	9
Light weight	7
Safety	8
Ease to store	9
Size	8
Ease to clean	6
Comfortable	7
Saving time	7
Cheap	8

From the design evaluation, this design is very good, it may be the final design of our team. Also, all the research and data of this design will give our team a lot of help, such as calculation equation, mechanical properties of materials.

### Reference

1, <https://en.wikipedia.org/wiki/Aluminium>

2, [www.matweb.com/](http://www.matweb.com/)