

Final Report: NUT & SAIMA Corporation Internship

FY 2019

Contains cumulative documentation of work and learnings for every working day at SAIMA Corporation- TSUJIDO, JAPAN.



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Day 1 (Tuesday, 28/05/19)

Tokura San introduced me with the Company employs, after a short cleaning of warehouse (every Tuesday we clean warehouse places).

Then Lan San took me to for a visit to every section of the company with a short information about everything.

I sat with Tokura San and started with basics of Fastener industries with standards followed in the different places around the globe.

ISO- International standard

KS-Korea

GB-China

JIS- Japan

DIN-Germany

With Germany being the first country to start the trend of standardization.

Also, that USA follows Inches in unit whereas rest of the world follows mm.

Then we discussed about Nonsert screws by SAIMA which are basically Tapping screws for soft plastics.

Tapping screws: These are screws which can be screwed inside specific materials without a metal insert (female screw hole).

The main benefit of using Tapping screws is that it simplifies the recycling process where the metal insert is needed to bring out for material recycling and ultimately it also brings down the cost of installment and recycling with ease.

SAIMA NONSERT:

Special types of Tapping screws by SAIMA specifically for Soft Plastic materials.

- ✓ It needs no metal insert.
- ✓ In general screws have a Thread angle of 60 Degrees, but since nonsert screws are specially designed for plastics without any metal

insert the Thread angle is reduced to 30 Degrees so that the Normal Stress component on screw along its light is increased for more reliable and intact fit in soft plastics with able to sustain Repeatable screwing.

- ✓ It requires High TORQUE to reach failure and a low torque for driving it.
- ✓ Hole diameter and driving torque is Calculated scientifically using analyzers to provide best results.
- ✓ Created notion of generation 1, 2, 3, 4 just as a part of marketing strategy.

After this discussion I had a discussion on SAIMA's Business perspective and TRF screws with Kase San:

Tamper Resistant Fasteners:

Tamper Resistant Fasteners are screws, Nuts and Bolts best characterized by their unconventional drive style. Tamper Proof Fasteners are used in areas where an assembly is accessible to the public, as a means to deter or prevent disassembly.

Tamper proof security screws, or Tamper resistant security screws, are distinguished by having an unconventional drive, making tampering with the screw more difficult, if not impossible without the matching driver.

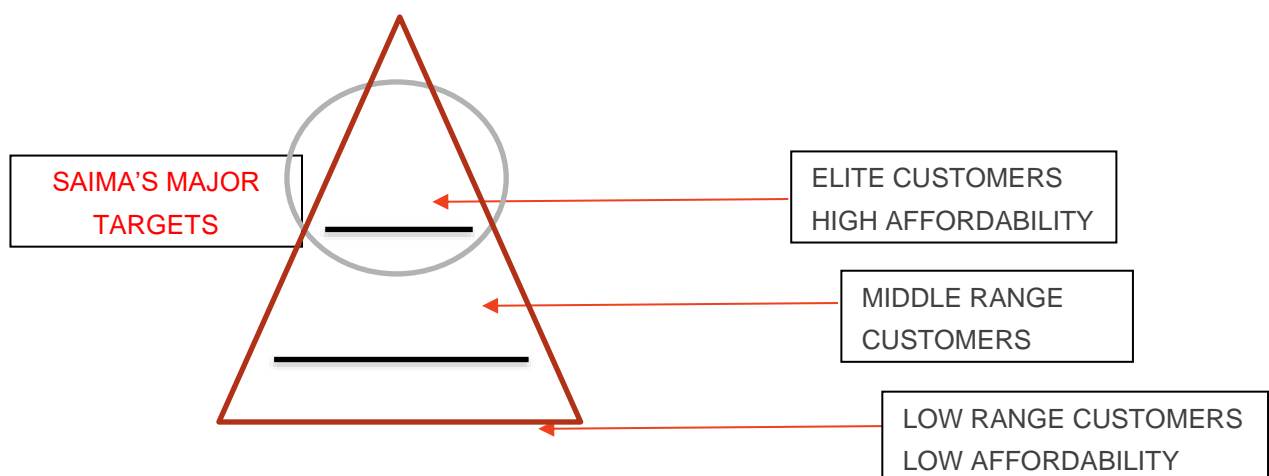


Security Screws are used for securing materials from being tampered with, such as gutters, license plates, grills in jails, schools, boats and cars. They are also used in food prep and processing areas to prevent any unavoidable situation of dropping screws in Food products. We often see security screws used in bathroom stalls, particularly toilet partitions and other public locations.

SAIMA's Business perspective:

SAIMIA is sales company which outsources the manufacturing of its products. There are companies who are manufactures and also does wholesales which are the major competitors of SAIMA at international level as they offer much lesser prices, but SAIMA has a special stand in Japan as it's among the selected company which produces these specific types of which are the great need of the market.

Also because Saima outsources its products the final price of the products goes a bit high but because of the exceptional excellent quality of the Products SAIMA stands tall in the market.



Then I got to know about **310 Express** which is basically another Brand under SAIMA's cover producing relatively cheaper screws targeting the Customers with low Affordability specially for developing countries like India, Thailand and China.

The term "310" originates from the name of Company's CEO "TAK SAIMA"

SA→SAN→ THREE, I→ICHI→ONE, MA→MARU→ ZERO= 310. Hence 310 express.

The lineup of the 310 Express is slightly different which follows almost the same design and technology but manufactured mainly out of Steel instead of Stainless Steel(Type A2) as used in SAIMA's exclusive products.

310 Express is currently selling three categories of products in the market:

- (a.) 310 Micro for mini scaled screws used in electronic devices, Optical Glass frames, Cameras, Watches etc.
- (b.) 310 Slim same as SlimHead screws
- (c.) 310 Tamper same as TRF screws

Day 2 (Wednesday, 29/05/19)

Sat with Lan San and we discussed about Slim Head screws by SAIMA.



Peculiarities:

- The head width is very thin with none side slant profile which makes it even more stable and looks keenly intact with the surface.

M5*20	Head	Weight
SlimHead	1.0mm	2.6g
DIN7984	3.5mm	3.7g
DIN912	5.0mm	4.1g

- Recess of the screw is less deep with smaller size to make it compatible with the proposed design. Hence it is also relatively lighter in weight.

- The Aluminum version(Aluminum Slim Head) is 1/3rd the weight of an steel, stainless screws.

APPLICATIONS:

- Used for Thin plate Fastening on floors, electric appliances, Automobile seats,
- Used in drones, airplanes for weight minimization.
- In Public areas to avoid injuries from screw heads

- For better appearance and increasing aesthetics.

Then I had discussion with Kase San over:

Since Slim Head screws have smaller and less deep recess which might create issues of Cam- Out. So, we came up with QuaStix to encounter this issue:

QuaStix:

- ✓ **No Cam-out, due to interlocking fit between the screw and the fastener.**
- ✓ **Improved Torque Transmission.**
- ✓ **Special recess profile developed in the screw for the fit.**
- ✓ **Qua SlimHead Screw: Slim Head screws with QuaStix properties.**

DAY 3:

Another sitting with Kase San discussing various divisions of the company and knowing what they deal with exactly.

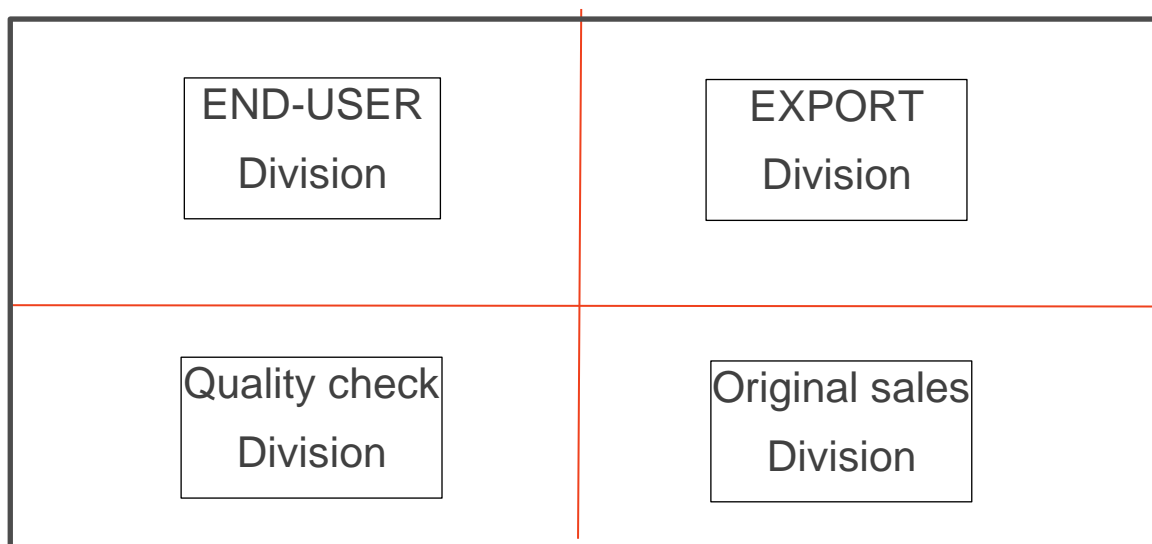
SAIMA was founded in 1952 by Tak Saima as a Garment Factory dropping his career in Sales. By 1996 company has a capital as high as 100,000,000 JPY. In 1998 company started its division in TRF screw series business and now SAIMA is a name for quality in Fastener industry.

SAIMA has many overseas offices, one of them is in China with around 10-15 employs whose work mainly remains to work alongside the manufacturing factories and take care of that quality marks up to SAIMA's level. It is so because SAIMA outsources some of its orders like that of Plastic designs, Diecasting and pressing to China, ordered by customer as the cost of making such things is much cheaper in China than in Japan so SAIMA take it as an opportunity and because they also take care of the quality by help of their staffs their purpose is achieved.

But unlikely to above screws are mostly outsourced in Japan itself because its much feasible.

Roughly SAIMA sales goes around 400,000 USD every month, with only 1/10th of sales in overseas, profiting around 40 percent out of it.

SAIMA sales have the following division:



- a.) Original Division: Deals with customer wholesalers and company for the Original trade mark products of SAIMA which includes- Nonserts, SlimHeads, TRF and Inch types, only inside Japan. Goods are sold at around 50% of the rate, further it depends on the wholesales at what rate they might sell it to End-users.
- b.) End User Division: Same as Original Division in work but only deals with the end users. Generally quoted at 100% of price tag with some flexible negotiation as per the orders and situations.
- c.) Export Division: Deals with every sort of sales and works overseas. Involving products of 310 Express, Original SAIMA products and JIS standard products. Note that 310 is only sold overseas. And there is a special demand of JIS standard outside Japan by newly establishing Japanese companies overseas.
- d.) Quality Check Division: Takes care of the overall management and lineup of every work.

Marketing Tips:

- Never share different Price rates to customers, companies at same location who can possibly know the differences. This can really affect their relation and business with us.

Today CEO of the SAIMA, Mr. Tak Saima arrived after his visit to China. We also had a short meeting where we discussed about SAIMA in his perspective and also about things that makes Japan stand different in the Crowd.

Countries like Japan and Korea are much different than others, Here the whole country speaks the same Language sharing the very same Culture in the whole country. This makes them able to communicate much

proficiently within each other than any other country like India, UK, China. Here in Japan even when strangers meet and talk it seems like they know each other so well, this is because of the unique uniformity in culture and Language throughout the country.

This is not the same in other places, take an example of UK, only a fraction of people speaks English over there and rest of them speaks and shares various other culture.

Mr. Tak emphasized on the importance of Language for expanding business. Like you can do business in Dutch countries without knowing fresh, simply because you can't reach out them without knowing their language. If you are wish to expand market in India you need to know English. Same as a typical Japanese Company would never take an Indian Intern as the typical Japanese company will not entertain any other language than Japanese.

Then he suggested me that my current age is very essential to develop an aptitude for Business and marketing skills as an Engineer stands with an advantage to strive in the market due to this strong technical skills and knowledge.

DAY 4:

Interview on preparation for the Tokyo Expo by various staffs in specialized topics:

****TRF with Hamaguchi San:**

1. What TRF you suggest?

ANS: TRIO, as its unique design by Saima and has two types. Type A is symmetric and Type B is asymmetric (only available after order).

2. What is the minimum order for TRF and SlimHead?

ANS: One piece.

3. Recommend 310 express to foreign stakeholders if they want a cheaper option.

4. What is the price, why is it so costly?

ANS: Depends on order quantity. Its costlier because we manufacture lesser quantity with high precision and special unique Design.

5. Do you manufacture in China?

ANS: No, since we have less quantity to manufacture and we can't risk the confidentiality of our product. We manufacture in Japan itself.

6. Is it possible to buy individuals?

ANS: No, because we can't give away the tools to individuals.

7. Is it RoHS compliance certified?

ANS: Yes.

8. Material Choices?

ANS: Stainless A2, Stainless A2 + Blacken, Stainless A2+ Nyloky (self-locking property).

9. What Length available?

ANS: We have some length variations in steps of different length. We can cut if a specific length is needed.

10. Recommend TRF screw type for outdoor usage?

ANS: One side Pan head machine screws as it does have holes, so there won't be any accumulation of water drops.

11. The NON-RECESS TRF screws can not be sold directly to the customers in EUROPE because we have our agent in Europe, so for any purchase from Europeans customers, it needs to be done through the Agent. Final price is to be decided by the agent, but we sell agent at much lower price.

****SLIM HEADS with Lan:**

1.) What size is available?

ANS: Depends on the material you choose; we have variation in limitations.

2.) Most popular size?

ANS: M3, M4

3.) What is the minimum order for longer screws than in the catalog?

ANS: For screws that come in the range of our catalog we can cut it as per requirement. But for longer ones, we only take orders for a minimum quality of 30,000 pcs.

4.) We at SAIMA maintains the stock of all the products in the catalog with a notion of minimum stock. If the quantity in stock goes below that limit we order to renew the stock. Even for Saima minimum order quantity is 30,000 pcs.

5.) If the quantity required by the customer is not available in stock, how much time it takes?

ANS: Around 2 months.

6.) For QuaStix, it's only available in Steel Material, but if customer wants it in Stainless steel, we need at least 3 months with a minimum order of 30,000 pcs.

7.) Our Japanese manufacturers: WIT for Slim Head and noninsert, Mampay for TRF.

8.) Why special recess for Slim Head, the 6 Lobe one?

ANS: First that it has better transmission of Torque, to minimize the non-threaded region in the screw and ultimately with these recesses we can achieve much thinner Head widths.

9.) Can Slim Heads replace the common screws?

ANS: Only the machine screws, we have done various experiments to make sure its durability. We make sure that Minimum Destruction Torque

(TD) is higher than that of a common machine screw.

10.) We have options for various surface layers. We add Copper beside Nickel to make Nickel intact on the surface.

Kase San on SAIMA expansion:

1. KOAS is the company at China in collaboration of KIMTKA, KIITAGAWs, OSAWA, AZAUMA, SAIMA. It is not a manufacturer but a trading company like SAIMA in Japan.
KOAS deal with the QC and the other works like Exhibition and Seminars. Deals with TRF, SH, NS shells and Part products majorly (as per the drawing provided by the customers) using cutting, pressing and die casting. Major customers in China includes, Railway and automation industry with great demand of JIS products by Japanese industries at CHINA.
2. India office:
 - * Handled by Puneet Jain.
 - *Setting up his own new company.
 - *Net no profit (in loss), but SAIMA is spending in scope for a future market

Day 5:

(After the Daily usual morning acknowledgment)

****Monday Morning Meeting:**

Everyone sat together and discussed the happenings of last week:

1. Individual report by everyone on their Day-wise works and targets achieved last week.
2. Sale activities in the last week. (Only for official staffs including 2 staffs from KOAS- China Office + 1 staff from India Office, not part time staffs)

TORQUE ANALYZER (by Kase San):

Some Points:

- ❖ TF should be more than 3 times the TD to call it a good DATA.
- ❖ TS to TF gap should be higher for ease in use for screwing up by drivers.
- ❖ If Screw is coming out after reaching the bottom may be, we need to reduce the torque (due to higher reaction torque) or Change the driver head (may be its not fitting well).
- ❖ Very useful and ergonomic for product development and prototyping to avoid failure, loss of preparations, time and money. Generally, when we are developing product body it is always better to check the failure possibility for the holes and screws decided for it as the mold cost is very high and the chance of failure becomes very less if we check its durability beforehand in the Torque Analyzer.

Procedure to Use the Torque Analyzer Machine:

1. Select the type of screw, Material and the hole size you want to experiment with.
2. Choose an ideal screwdriver for the particular screw head selected. The screw should not drop down of the driver when inserted (male to female) in it and held vertically up straight position.
3. Tighten up the material base with the screw hole aligned to the vertical axis of the torque analyzer machine and screw at the nozzle of the axis
4. Set up the software environment on the connected PC (COM 6) and configure the setting you want for the experiment (like set the required RPM).
5. Now start the machine by the push-up button and the data will be recorded automatically.
6. Repeat the experiment various times (more than 10) and average it for a result for conclusion.

Plot explanation:

Torque analyzer reproduces the entire fastening process as a graph:

- TD: The Driving torque at which the screw is inserted inside the material till it reaches tightening stage.
- TS: The settling Torque that is required for tightening of the screw (also called as Tightening Torque).
- TF: As the Driving work is done, screw starts to tighten up by increasing Torque which finally fails at The Failure Torque. Which is the maximum allowed Torque for a screw in a specific surface.

PRODUCT CODE Nomenclature at SIAMA:

1a	1b	2a	2c	3a	3b	4a	4b	5a	5c
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With the respective places denoting:

- 1.) Recess Type (Characters)
- 2.) Head Type (Digits)
- 3.) Diameter (Decimals)
- 4.) Length (Integer)
- 5.) Color/Platting [if any] (Characters)

EXAMPLE:

- OW010416: Screws with “One-way” recess, “01” for Head type, “04” for a diameter of 04 mm and “16” length of 16 cm.
- HE010506BK/NY: Screws with “Hex- Socket” recess, “01” for Head type, “05” for a diameter of 5 mm and “06” for a length of 6 cm.

Every Monday learning session (12:45-1:00)::

- ✓ Common session for everyone to learn something together.
- ✓ Generally, if some new changes brought at one or other thing in the company everyone should be aware of it to avoid confusions and work more efficiently.
- ✓ Also, regarding the latest changes one can raise any doubt and confusion at the same time.
- ✓ Some new technical info or concept everyone should know is also discussed as per requirements.

Learning Discussions today:

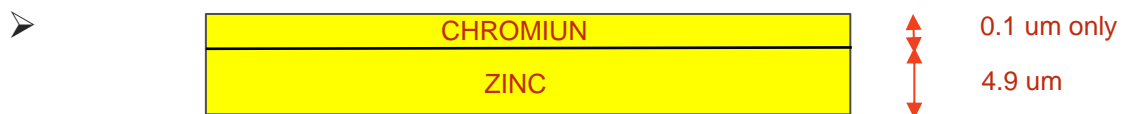
- ❖ About the new excel system developed by _ for producing billing stamps on the shipping items. Extra information will be automatically produced if one puts the product code correctly in the code box.
- ❖ Then there was a Sales department discussion on how to avoid/reduce wrong shipping due manual errors by the employees.

****EXHIBITION Discussion:**

- We will be under the FUJISAWA section area.
- Stall Dimension: 3m X 2m.
- We will be mainly exhibiting and marketing SlimHead brand because this exhibition is all about Automation and IOT and SlimHead is the most applicable in these fields.
- Inside we will also have some TRF types.
- We will change the names of the SlimHead screws to Robotic screws (something like this) for marketing purpose to make it more appealing and understandable to the viewers.
- Making more contacts and collecting name cards is also an aim.
- We will stand outside the counter and distribute the company card with the brief information and say some catching words like "Super light screws". If the customer is interested in such topics he would like to know more and then if he wants, we can show him our products and discuss further.
- Then we discussed about peculiarities of SAIMA SlimHead just as a recap of concept and points to keep in mind. The reduced head with, with special recesses, and minimized non threaded area.
- Then we were discussing about the other standard product with similar utility as SlimHead and the problems in those screws like the Bulgy head or some requires material extrusion at the top of the

hole and most important none of them are as thin as SlimHead (1mm thin).

- New thing got to know: The Six lobe recess used in SlimHead was accepted in JIS 3 years back. So, we can say the Six lobe recess type SlimHead are JIS standard.
- SlimHead as replacement for common screws: For replacement the Durability Torque of SlimHead must exceed the screw from which we want to replace it from (STRENGTH OF SlimHead: 4.8). Henceforth, not all the common screws can be replaced but as per our experiments and data it can replace all the common machine screws.
- Although Aluminum SlimHead are $\frac{1}{3}^{\text{rd}}$ the weight of the steel SlimHead ones, but their strength (TD) is almost Half as that of the steel one. Hence the Aluminum SlimHead can't be used to replace the common machine screws as Steel SlimHead can.
- Zinc + Chromium Plating over the screws to prevent corrosion and longer the durability: Saima guarantees a plating of exactly 5 micrometers.



It can sustain itself without rusting for 72 hours when kept in extreme corrosive conditions.

DAY 6:**Certificate of Origin [Form A]** (discussion with Tak San):

- A CO is an important international trade document that certifies that goods in a particular export shipment are wholly obtained, produced, manufactured or processed in a particular country. They also serve as a declaration by the exporter.
- To allow developing countries grow in business, using this certification, import taxes can be cut down totally or partially.
- In lots of countries its hard to get even the real Form formats, fake ones are all around. Also, getting the certificate issued takes many days in other countries.
- In Japan there is no such issue and moreover the certificate is issued just within a day.
- I went few days back to Fujisawa with Kase San for getting the certificate done for a China export.

Overseas export:

Then from Lan San I got to know much closely how commodities are received re-labeled and exported to our customers/end-users.

- First, we receive the order from our host manufacturers/ trading companies (specific products that we don't produce on our own or some special demand by our customers).
- We remove all their labels and replace it with SAIMA or 310 express stickers (as per the product) with the same lot number, because we don't maintain this transparency here.

But for cases in which the customer has special request for a part/product from a specific company, we don't do so as here we have to maintain the transparency as it's what customer's demand.

- Sticker put ups are done very cleanly and patiently to keep it neat and presentable.
- We pack up the small boxes in a big one and keep it ready to export.

Day 7, 8 & 9: Smart Factory Industrial Exhibition, TOKYO, JAPAN-2019

(5th, 6th and 7th June, 2019)

Location: Aomi Exhibition hall, (at Tokyo Teleport station)



- Day one was the least busy day over all, and S Stall also got very less visitors.
- Day Two and Day Three was very crowded and the SAIMA Stall was also very busy both of the days.
- The Idea for gives card sized information leaflet instead of A4 sized brochures was actually a great Idea. People don't hesitate to take and read it as its small and cute, and a lot of people after reading the small leaflet were coming back to our stall gaining interest to know more after reading the brief catchy sentences on it.

In contrast the stall Infront of us was distributing A4 sized pamphlets, I observed rarely anyone was taking it.

Suggestions for Future:

- May be in next time when SIAMA exhibits TRF screws, we can keep an interactive setup where big sized TRF screws can be displayed on a board with a provision for the visitors to use them various screw drivers and try to loosen or Fasten screw with various Heads. This can really help engage much more people in SAIMA's stall. If possible, it will be better if the screws are over-sized for the purpose of display and to attract people.

My personal Takeaway:

It was great experience to witness and participate in a Japanese Expo. It orders and the discipline in the way its conducted.

Met and talked with numerous stakeholders and businessman in Japan. A lot of companies had product related to natural disasters specially earthquakes.

I also got change to experience how exoskeletons works.



I also met an amazing person named IKEDA Yoshio; the Japan CEO of a European company named VITRINEMEDIA.

He did his Bachelors in Physics at Japan itself and since he realized he want to do business he went for his MBA as Paris.

Currently, he is the only person taking over the whole companies work in Japan, though the company is new in Japanese market, but still doing all work alone for even a single customer is tough and outstanding. He is also looking for other scopes for himself to start a business of his own independently soon and he says all these current endeavors will help himself be a good CEO of his future company if he keeps on working hard the same.

In Japan there is great culture of even sustaining small companies very well and maintained which I really liked and appreciate.

All these lit a spark inside me to do something of my own in future.

DAY-10:**Thermosetting Plastics:**

- **pDCPD** (polydicyclopentadiene)
- Polyurethanes
- Polyureas
- Structural Foams
- Polyester
- Vinyl Ester
- Polyimides
- Epoxies
- Melamine
- Silicone
- Urea Formaldehyde

Today I started the testing work on Hard Plastics. Specifically, I need to start with the Bakelite material.

I finished markings and stickers for different the holes of specific diameter on the test materials.

10 each for the test diameters.

**BAKELITE SLABS (nos-47):**

- Width:25mm
- Hole Diameter: 3.4mm,3.5mm,3.6mm.3.7mm
- Distance between adjacent hole centers:13mm

Properties of Bakelite Plastic:

- ✓ Bakelite is the trade name for **phenol formaldehyde resin**.
- ✓ Its chemical name is polyoxybenzyl methylene glycol anhydride.
- ✓ It is a thermosetting plastic.
- ✓ A thermosetting plastic is a plastic that liquefies and is malleable when heated. Then it becomes permanently hard and rigid when cooled. Thus, it can be used to make a variety of items.
- ✓ It does not conduct electricity.
- ✓ It is resistant to heat, and is nonflammable.
- ✓ It is also resistant to chemical action.

After Lunch there was distribution of the Safety food stock at SAIMA Corporation. To be safe side for any sudden natural calamity where there might be a need to escape urgently to a safe place, hence every company/workplace is supposed to store a stock of food for emergency situations like earthquakes which are common in Japan. If the particular stock is not being used within a year it is distributed among the staffs to avoid wastage of food due to expiry.



Day 11:Bakelite material Market Research:Some Popular types of bakelite:

Bakelite Phenolic is produced in dozens of commercial grades and with various additives to meet diverse mechanical, electrical and thermal requirements. Some common types and their properties are noted below.

- Paper Reinforced Phenolic NEMA XX per MIL-I-24768 PBG: Normal electrical applications, moderate mechanical strength, continuous operating temperature of 250°F.
- Canvas Reinforced Phenolic NEMA C per MIL-I-24768 TYPE FBM NEMA CE per MIL-I-24768 TYPE FBG: Good mechanical and impact strength with continuous operating temperature of 250°F.
- Linen Reinforced Phenolic NEMA L per MIL-I-24768 TYPE FBI NEMA LE per MIL-I-24768 TYPE FEI: Good mechanical and electrical strength. Recommended for intricate high strength parts. Continuous operating temperature 250°F.
- Nylon Reinforced Phenolic NEMA N-1 per MIL-I-24768 TYPE NPG: Superior electrical properties under humid conditions, fungus resistant, continuous operating temperature of 160°F.

Market Study:

- ❖ Global Bakelite market is anticipated to witness considerable growth over the next FIVE years on account of increasing usage in major industrial applications electronics, power generation and aerospace. Bakelite is widely used in semi-conductors, wire insulations, brake pads, and other automotive components manufacturing owing to its heat resistant and electrical non-conductivity property.
- ❖ **Bakelite is proved to be hazardous to the atmosphere during production processes such as compilation, manufacturing, and dumping. These factors are expected to hinder the market growth over the foreseeable future. Furthermore, Bakelite contains**

asbestos, formaldehyde, and other toxins which are proved carcinogens.

- ❖ Huge production of these gaming devices in countries such as India, China, and Hong Kong are anticipated to fuel the demand for Bakelite in this region. Bakelite is also used in making Bakelite jewelry owing to their fine artisanship and is expected to further complement the market growth in near future.
- ❖ Bakelite is used as an adhesive compound, molding compound, and as a protective coating in major industrial applications.
- ❖ Asia Pacific was the key regional market and is expected to witness rapid growth on account of increasing Bakelite consumption in major end-use segments such as semiconductor, inexpensive games, and automotive brake pads.
- ❖ Increasing utilization of billiard balls and dominoes in China and Japan is expected to enhance the market growth in Asia Pacific.
- ❖ Increasing automotive production in China, India, Japan and Korea is expected to further drive the regional Bakelite market. Bakelite is manufactured in various forms such as rod, sheets, and tube for many industrial applications in aerospace and electronics industry.
- ❖ North America and European market are expected to have considerable growth on account of growing aerospace and power generation industries in the region.
- ❖ Major companies operating in the global Bakelite market include Sumitomo Bakelite Co. Ltd. and MingQun Optoelectronics Tech. Co. Ltd., Borden Chemical Inc., Romit Resins Pvt. Ltd., Momentive Specialty Chemicals, and Elkor.

Rest of the Time I was drilling 3.7mm and 3.6mm holes in the Bakelite slabs.

Day 12-13:

Apart from the drilling holes and preparation for the experiments, I was spending more time in digging about the Bakelite we are using.

Research on Bakelite types that are going to be used for the Hard-Plastic Tapping screw testing:

a) Paper based Bakelite:

Paper Based Industrial (Bakelite) Boards are manufactured by using Kraft paper as reinforcement with specially formulated Phenolic resin as bonding media. The high-quality Paper Based Bakelite Sheets are widely appreciated and used in Electrical and Automobile industries because of their extraordinarily high resistance to electricity, heat and chemical action.

Based on the selection of the paper pulp (black or Orange), the Bakelite can be varied either Black or Orange.



Applications: Distribution Board, Fuse Holder Base, Relay Spacer, HV Transformers, Tap Changers, Grid Covers, Selector Bank Insulation, Battery Eliminators, Transformers and Choke Bobbins, Tube Light Ends and Chokes, Control Panels, Condenser Mountings, Transformer Covers, CB Handles and Side Frames

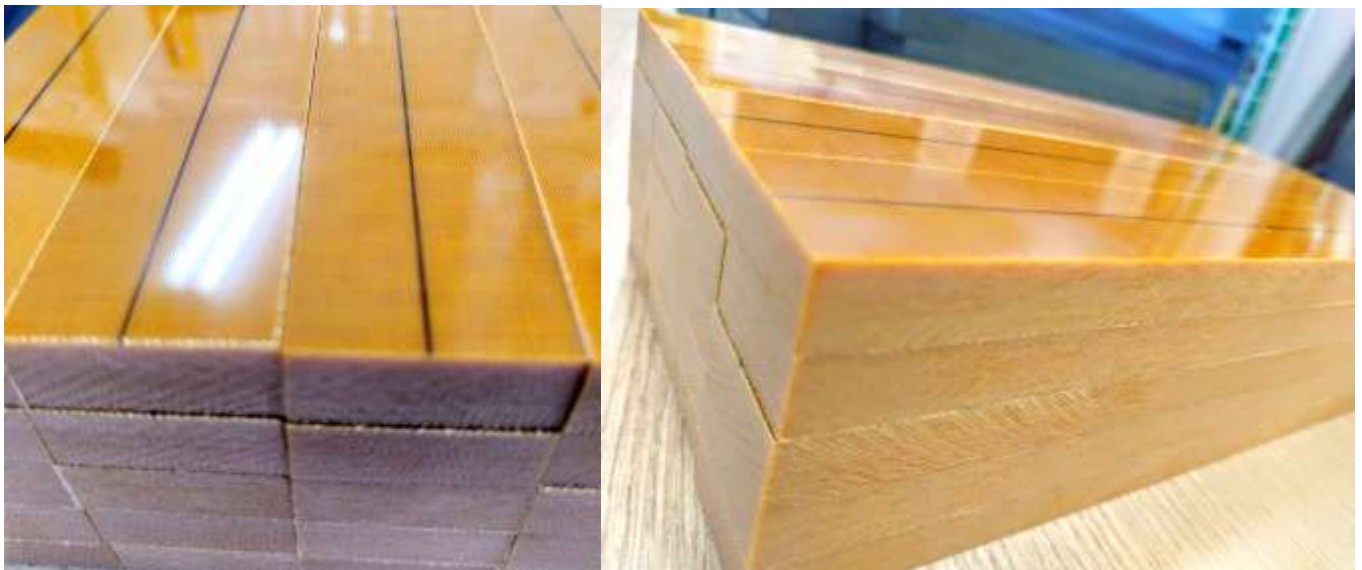
b) Fabric or Cloth Based Bakelite:

Fabric Bakelite is a phenolic rigid laminate reinforced by a woven cloth, for use in mechanical and structural applications.

Fabric Bakelite Sheet is a versatile and economical grade of hard-wearing plastic that is used in a variety of areas. Typical uses include the manufacture of wear plates, electrical insulation pads, bushes, bolt sleeves, saw guides, rollers and conveyor wheels. It machines well and can be accurately cut and drilled.

This particular type of Bakelite is manufactured from thermosetting phenol formaldehyde resin reinforced with layers of fabric. This combination is then heated and pressed to create a tough, dense materials with good heat resistance, electrical insulation properties and the ability to withstand abrasion.

Perhaps due to the fact it's been around in one form or another since about 1907, Fabric Bakelite Sheet is known by many names. These include canvas Bakelite, phenolic Bakelite, SRBF and phenolic resin bonded fabric. Part of the reason for this naming variation is that, over time, numerous grades of Bakelite have developed with some designed for highly specific, specialised applications.



Applications: Conveyer machine, textile machinery, Shuttles, Automobile Couplings, Structural Parts, low Voltage contact Breaker, Friction Plates, Heavy duty gears, Pulleys, Work Bench Top, Rolling Mill bearings.

Summarizing Comparison:

Parameters	Paper based	Fabric based
Density	1.3-1.4 g/cc	1.4- 1.5g/cc
Composition	Cellulose paper + phenolic resin	Woven Cotton Fabric + phenolic resin
Colour	Black/Orange	Brown/ Natural
Price rate	5 USD/ KG	2.5 USD/ KG
Heat Resistance	140 C	125 C
Flexural Strength	130 MPA	110MPA
Water Absorption (D-24/23, thickness 1.6mm)	265 mg	220 mg
Advantages	high dialectical strength, Low Loss Factor	High impact strength, Non-abrasive, Chemically resistant
Major Applications	Electric safety/insulation & resisting Heat Radiation	where mechanical/structural durability and strength is more important than electric insulation-wear resistance, resilience
Potential Customers	Electric Boards, Electronic Industry	Textile Shuttles, pickers, Gears, Pulley, Bearing & wearing Plate.
Manufacturers/dealers	Shreelam Insukation(Mumbai), INSULECT, ZTELEC Group, SUMITOMO BAKELITE, Krishna Hylam	SUMITOMO BAKELITE, INSULECT, Krishna Hylam

Some References:

<https://www.alibaba.com/showroom/phenolic-cotton-fabric-bakelite-sheet.html>

<https://www.alibaba.com/product-detail/paper-and-phenolic-resin-base-laminated-60724491280.html?spm=a2700.7724857.normalList.1.f23b408bdVzefC&s=p>

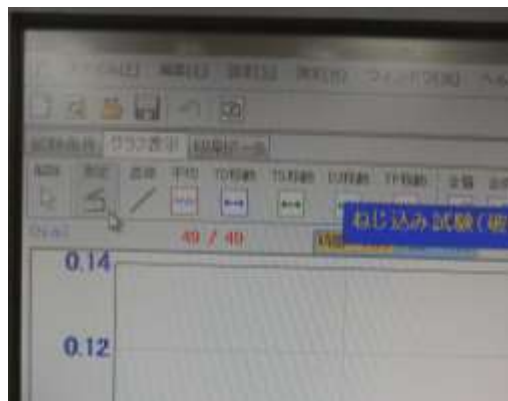
<http://www.insulcut.com.au/bakelite-fabric-based-industrial-laminate/>

Day 14:

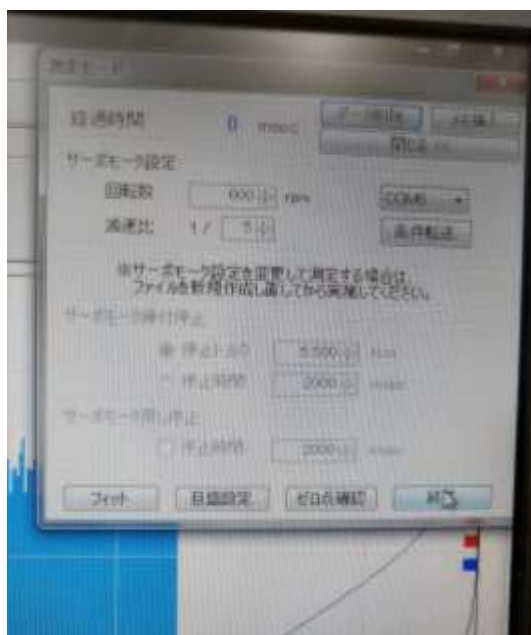
After a brief for usage instructions by Kase San, started with the Torque analyzer experiment today.

Some Tips for System usage:

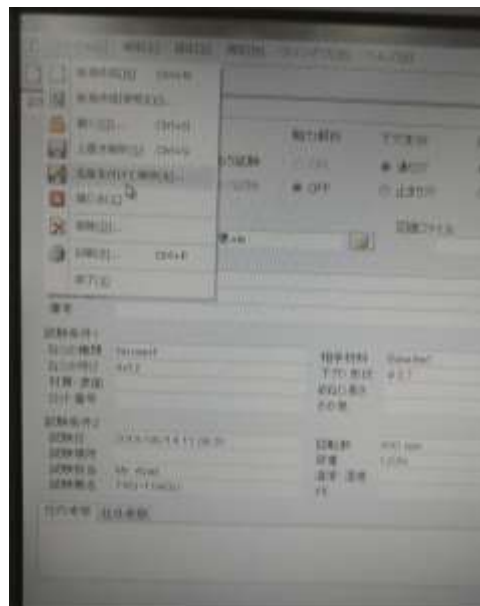
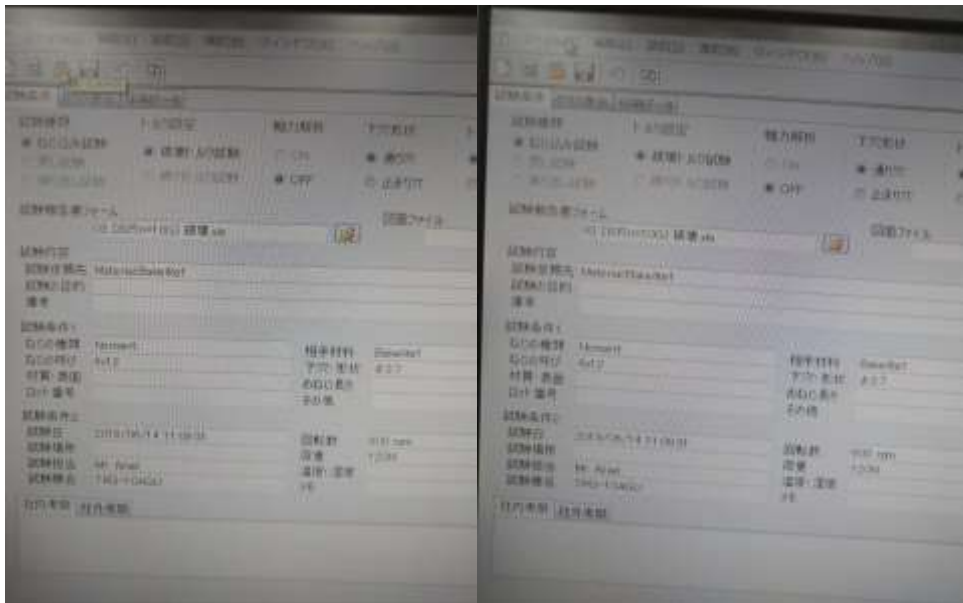
- ✓ To start (before start of the drilling) Click on that Play button:



- ✓ Take all data of with one specification in one Lot (that will be averaged anyway) with out doing anything than just fastening one by one. And then end it while saving it as the dialog box pops up when u click on End.



- ✓ Whenever any particular specification/parameter in the experiments is changed update the data here. And at the same time save a new file with appropriate filename for the new data too.



- ✓ For a weight of 190 N, we will do it for 24 holes (2 slabs) in each of 3.5mm, 3.6mm and 3.7 mm sets.
- ✓ 12 holes (1 full slabs) will be then tested for a gradual decrement of weight with a step of 10 N.

- ✓ We will stop at the weight which starts showing fastening difficulties like Cam-out or being not able to drill in effectively.

Today's Testing:

- 3.5mm, 3.6mm and 3.7mm with 190 N load (24 each)
- 3.5mm, 3.6mm and 3.7mm with 180 N load (12 each)

Inference:

- Noticed unusual cracking sound in 3.5mm samples several times while fastening through the torque Analyzer.
- All the plots obtained shows characteristics of good data as in all the cases TF is more than Three times that of TD.

DAY-15:

Packaging conventions hold an important part for a company that is known for its quality and standards. It becomes more important when company frequently deals with International exports. Saima Packaging conventions and standards:

❖ Small sized Boxes:

- Variation in 3 sizes: S, M and L.
- 1 L box = 2 M boxes= 4 S boxes.

❖ Carton Boxes:

- Variation in 3 sizes: S, M and L.
- Each L Carton can contain 10 L boxes.
- Each M Carton can contain 6 L boxes.
- Each S Carton can contain 3 L boxes.



- ❖ For Shipment of Large quantity there might be need for shipment by Pallet (for more than 7 Cartons) in which early reservation and pickup is needed by shipping courier agent. Currently SAIMA's Pallet shipping are done by TOLL (can take up to 2 Pallets/day) and SAGAWA (can takes up to 2-3 Pallet/day), mostly done TOLL as it is cheaper.

DAY- 16:**SAIMA Philosophies:**

- The Blue Ocean Philosophy: Not involving in the Competition
- The Broken Window Theory: Taking Correcting Steps at early stage
- PDCA rule: Plan-Do-Check-Act
- 5s Rules to improve efficiency

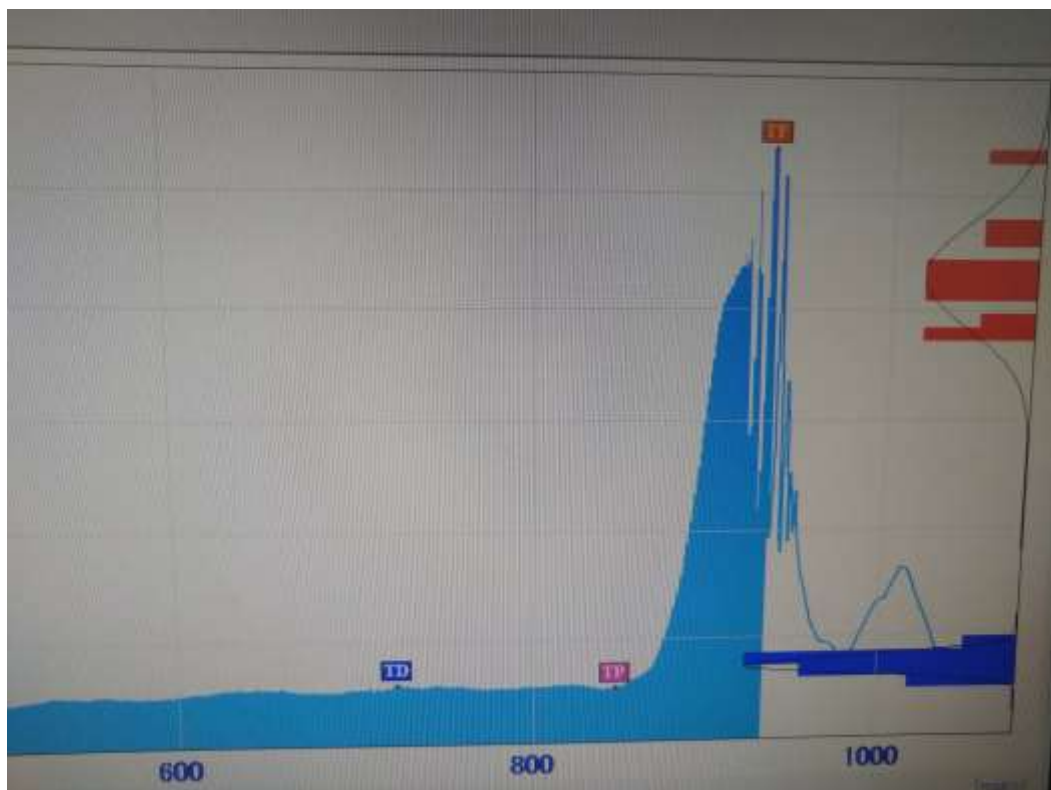
Then Mr. Tak also discussed why they all clean on their own and its significance. The very first thing is that is the part of the culture and it arises a better attitude towards life. Secondly, he said cleanliness from Business point of view is also very crucial as it helps log lasting of equipment's and other resources. And lastly, he because we are earning a doing great, so its also our duty to give back to the society and surroundings in which we live and a good cause starts with cleanliness.

Tackling the Cracking sound while testing

It is obvious that the holes of 3.5mm are not proper that's why the cracking sound was most prominent for 3.5 mm holes.



But then I saw the wooden base on which it was held. I noticed that the center line Gap given is quite less and nails were actual getting in contact with the sides of wood slightly. So, using some gardening tools available I increased the center line Gap, which actually reduced the frequency but couldn't completely nullify which points out that few of the holes are not proper.



The cracking sound is undesirable as it doesn't allow you to conclude to any certain outcome. Essentially it produces random noise due to vibration that you can see at the ending part of the plot where the curves get non smooth. We can't take the TF from such data for our average as it's a noise. So, I deleted such data samples with the unusual trend or noises like this to get better averaged result.

Torque Analyzer testing:

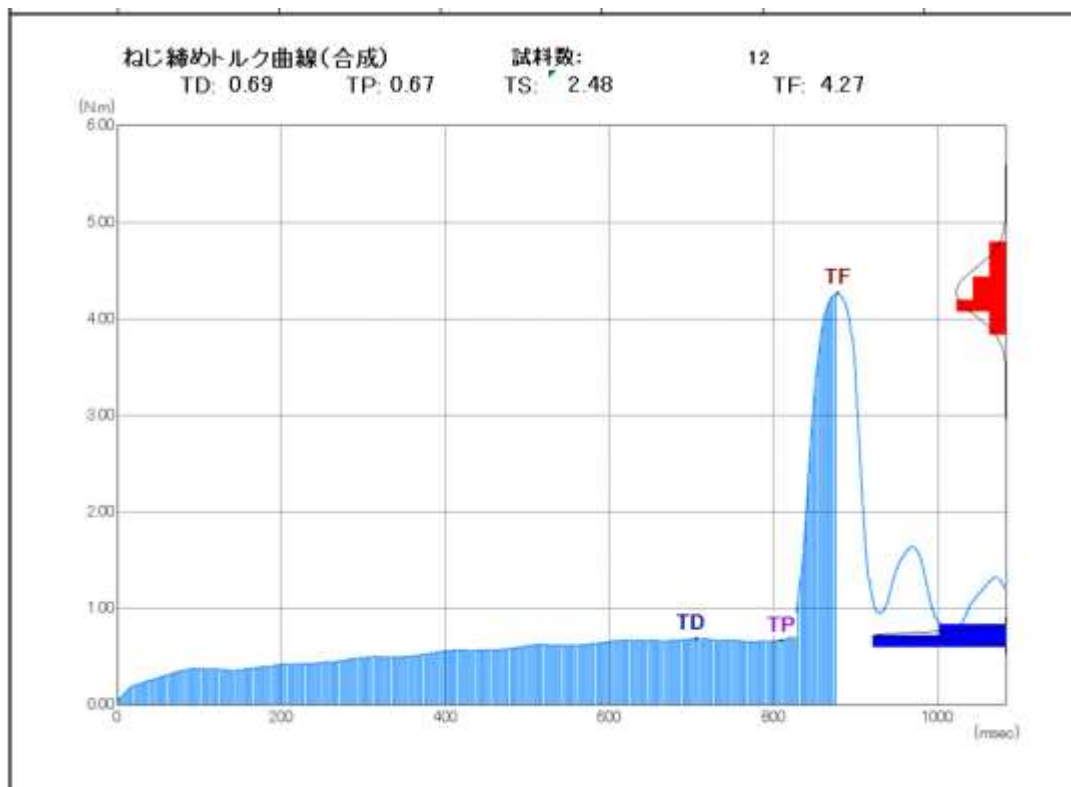
Loads for Testing: 151 N, 131N, 111 N, 91 N, 71 N

Overall Interference:

- Frequency Cracking sound was reduced, but it was still coming even after cutting off extra side wood from the base holder. It was most frequent in 3.5mm slabs.
- Partial Cam occurred in 91 N, but some were going fine.
(check data and report exactly for what hole size.)
- For the least load of 71 N, Cam out was 95% in all the cases.

DAY 17:Plot explanations:

The following plot trend is observed when a successful fastening data is collected using the Torque Analyzer.



1. The Graph shows an initial slight positive slope in case of driving torque and then later reduces after a point. This is due to the fact that the material thickness is lower than the working length of the screw. Once the screw comes out of the other end of the material the, there is no more thread to be cut, hence the driving torque reduces.
2. There is a sinusoidal increased and decrease after the material failure, though the part is of no relevance to us. The sinusoidal behavior is due to the design of the screw, there is a periodic change in friction due to carrying area of contact as can be imagined from looking at an idle screw rotation.
3. The high peak depicts the amount of torque the material can withstand before the material fails. And when this goes beyond a certain level, sometime the screw fails.

Day 16 testing Data summary:

3.7 MM BIT		Material: Bakelite 1			
Features\Load	181 N	151 N	131 N	111 N	91N
TD	0.712	0.588	0.656	0.687	0.588
TS	2.48	2.06	2.28	2.51	2.06
TF	4.27	3.562	3.919	4.353	3.562
F/D	6.011	6.05	5.97	6.336	6.054

3.6 MM BIT		Material: Bakelite 1			
Features\Load	181 N	151 N	131 N	111 N	91N
TD	0.682	0.734	0.721	0.759	0.728
TS	2.67	2.80	2.45	2.77	3.26
TF	4.7	4.894	4.194	4.807	5.804
F/D	6.962	6.67	5.82	6.32	8.205

3.5 MM BIT		Material: Bakelite 1			
Features\Load	181 N	151 N	131 N	111 N	91N
TD	0.710	0.739	0.728	0.731	0.665
TS	2.78	2.4	2.52	2.43	2.34
TF	4.787	4.084	4.331	4.141	4.038
F/D	6.92	5.52	5.95	5.66	6.126

Results:

1. Driving Torque decreases with increase in hole diameter.
2. Failure Torque decreases with increase in hole diameter.
3. Highest F/D ratio found somewhere in the middle.
4. Cam out was observed for loads lesser than 111 N. For 91 N some of the testing were successful but others were failing (CAM-OUT) and for 71 N all the test samples failed.
5. No Head Breaking observed as now.

Result Analysis:

- The Driving Torque increases with increase in hole diameter because there is a decrease in the amount of material to be cut in single rotation in case of higher diameter. Hence, less torque to be applied. A Higher Driving Torque is an Undesirable quality.
- The Failure torque shows the strength of the bond between fastener and the material. More the material between the screw and the base, greater the friction, tougher is the bond to break or fail. A Higher Failure Torque is a desirable quality.
- There is trade-off between Lower Driving Torque and Higher Failure Torque as you move from one-hole diameter to another. Hence the optimum lies somewhere in the middle. In both cases it is at 3.4mm.



- Observation for the CAM-OUT cases: (for the plot above)
Cam Out data were observed to have non-sinusoidal vertical zig zag patterns after the Maxima of the plot where as in cases of a good fastening the latter is sinusoidal. The sloppy zig zag peaks observed is due to the vibrational action by the fastening bit after it loses the hold on the screw and starts vibrating 'to-fro' over the screw head due to the reaction forces.

DAY 18:

Based on the previous data and after discussion with Oba San, we came to the agreement for focusing on 3.6 mm holes testing as the Data trends for 3.6mm are impressive.

- ✓ F/D ratio has been observed to be the highest.
- ✓ Failure Torque is highest too.
- ✓ Driving Torque is not the least but it's totally in the acceptable range so, we chose it with the other significant factors like TF and F/D ratio.

Performed the experiments after drilling of the other two Bakelite.

*3 slabs of Black Paper based Bakelite (Bakelite 2).

*And 3 slabs of Brown Fabric Based Bakelite (Bakelite 3).

Interference for Todays testing:

- Fastening in the new material was much smoother. And I found the new Bakelite much finer than the 1st material.
- I finally understood the reason behind the cracking sound producing vibration noise in the Data.
- The following cracking happens in the following cases:
 - a) When the Hole is not drilled properly.
 - b) When the hole is having extra crude material at the lining of the hole.
 - c) Also, if the screw is set to fasten in at inappropriate angle, the same is observed.

DAY 19:

Data Collection and Analysis of previous Day's Testing:

Load: 131 Newtons | Drill Bit: 3.6 mm | Nos: 36 holes

Material	TD			TS	TF			F/D		
	MIN	AVG	MAX		MIN	AVG	MAX	MIN	AVG	MAX
Brown Paper Bakelite	0.65	0.721	0.81	2.45	3.96	4.12	4.32	5.11	5.836	6.55
Black Paper Bakelite	0.61	0.731	0.89	2.58	4.11	4.45	4.87	5.10	6.128	7.41
Brown Fabric Bakelite	0.81	0.941	1.17	2.88	4.41	4.85	5.3	4.1	5.185	6.02

DAY 20:

Testing on 3.7 mm bit holes for 2 slabs (24 Holes) in each material with a load of 131 N. Also, apart from this time OBA San suggested to keep listing of Maxima, Minima of the parameters, to just help him observe the trend of data in the summary Table.

Load: 131 Newtons | Drill Bit: 3.7 mm | Nos: 24 holes

Material	TD			TS	TF			F/D		
	MIN	AVG	MAX		MIN	AVG	MAX	MIN	AVG	MAX
Brown Paper Bakelite	0.58	0.654	0.72	2.19	3.57	3.705	3.79	5.21	5.7	6.47
Black Paper Bakelite	0.60	0.704	0.77	2.34	3.58	4.00	4.41	4.90	5.708	6.50
Brown Fabric Bakelite	0.73	0.846	0.97	2.23	3.36	3.641	3.92	3.56	4.331	5.05

****Comparison Table:**

Comparing the results of testing in for 3.6 and 3.7 drill bit holes.

Material		TD			TS	TF			F/D		
		MIN	AVG	MAX		MIN	AVG	MAX	MIN	AVG	MAX
Brown Paper Bakelite	3.6	0.65	0.72	0.81	2.45	3.96	4.12	4.32	5.11	5.836	6.55
	3.7	0.58	0.654	0.72	2.19	3.57	3.705	3.79	5.21	5.7	6.47
Black Paper Bakelite	3.6	0.61	0.731	0.89	2.58	4.11	4.45	4.87	5.10	6.128	7.41
	3.7	0.60	0.704	0.77	2.34	3.58	4.00	4.41	4.90	5.708	6.50
Brown Fabric Bakelite	3.6	0.81	0.941	1.17	2.88	4.41	4.85	5.3	4.1	5.185	6.02
	3.7	0.73	0.846	0.97	2.23	3.36	3.641	3.92	3.56	4.331	5.05

Conclusions:

- ✓ For Paper Bakelite (Brown/Black), 3.7 drill bit is providing a better result in our testing. TF and F/D for 3.7 and 3.6 drill bit are not very contrasting, but TD is lower when using 3.7 drill bit hole. Hence overall, 3.7 drill is more optimum for Paper Bakelite.
- ✓ For Fabric Bakelite, the TF for 3.7mm drill bit hole is very low. We can't choose 3.7mm. but 3.6mm is doing really well in comparison. Hence for Fabric Bakelite 3.6 mm bit is optimum.

DAY 21:

After presenting the results of Testing on Bakelite, Oba San was satisfied with the Data and results.

So next we started working on Epoxy Hard plastic.



Load: 131 Newtons | Drill Bit: 3.7/3.6 mm | Nos: 24 holes

Material/ Specs	TD			TS	TF			F/D		
	MIN	AVG	MAX		MIN	AVG	MAX	MIN	AVG	MAX
Epoxy 3.6mm (9/24 Camouts)	0.72	0.906	1.07	3.43	5.26	5.81	6.43	5.04	6.52	8.3
Epoxy 3.7mm (3/24 Camouts)	0.72	0.838	1.1	2.8	4.53	4.9	5.54	4.27	5.9	7.0

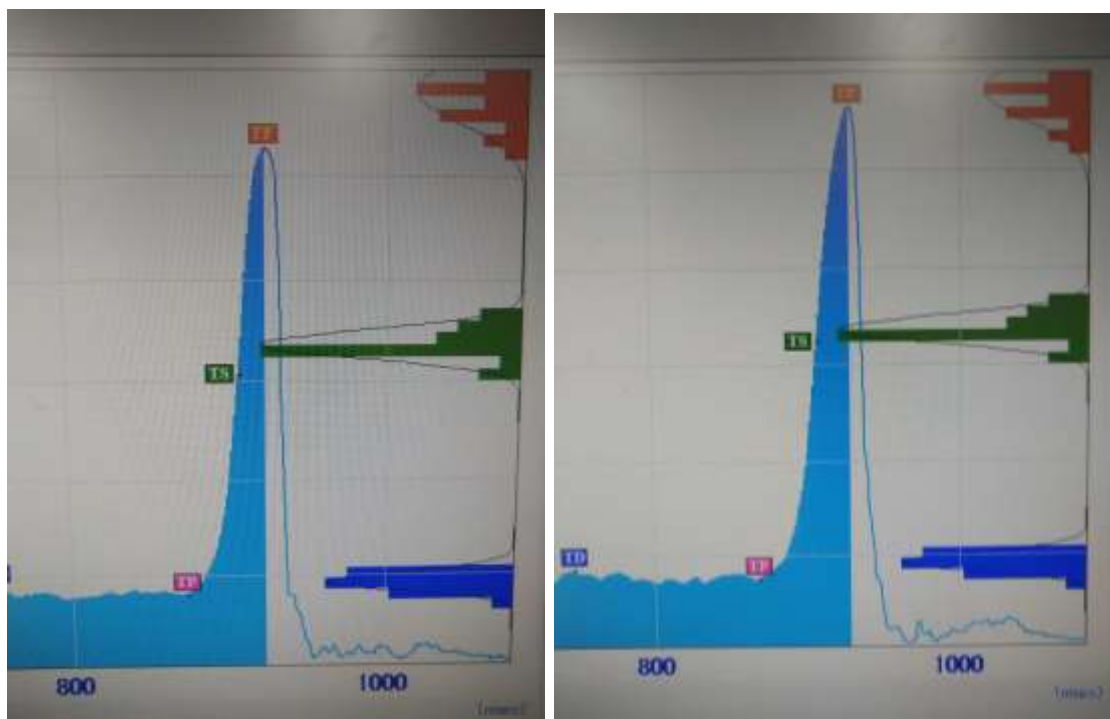
Interference:

- For the 3.6 mm hole fastening, 9/24 cam-out occurred, 4/24 head breaks occurred and overall 13/24 samples failed i.e. more than 50 percent samples were unsuccessful.

- Torque vs Time plots for the head break samples were unique and understandable.
- For 3.7 mm hole fastening, 3/24 cam-out occurred and other were successful with good performance data.
- Overall High Driving Torque (TD) Values are observed.

Head break Plot explanation:

The following trend was observed in all the testing in which Head breaks occurred.



A peak at Failure Torque(TF) and then suddenly dropping down to almost zero, this is because at the failure Torque the Screw fails and the Head breaks, after which the resistive torque almost becomes zero as the contact is lost.

Suggestions:

- 3.6 mm drill holes are not suitable for the given Tapping screws in epoxy material.
- 3.7 mm drill holes can be deployed.
- We can have further testing on 3.7 mm drill holes with higher torque to avoid Cam-out instances.

DAY 22:

Epoxy testing went well as discussed with Oba San. He suggested we can move on and If I think of any more testing for which I am doubtful, I can carry on to it.

I wanted to test on bit higher loads~ 141N or 151N, because according to my analysis Increasing the load might help give better performance for the Epoxy material. (results Added ahead)

Further Oba San asked me to look into the previous reports of Vaishak and Kausik (previous SAIMA interns) and try to come up with a better compilation of conclusion.

SAIMA personal Interviewing/ consultancy session that happens twice an year(during June and December) started today. This is arranged between the CEO and each of the staffs individually for the following reasons:

- To get feedback of the staff's perception about the companies current state.
- To discuss about salary raise.
- To know what the company and that individual staffs have mutual expectations from each other.
- An personal acknowledgement for a good spirit in work place.

DAY 23:

I was looking into the design of the Tapping screw that we are using in the our testings on Hardplastic, I had doubt related to the patent of the screw design. Later the following was discussed with Kase San:

- Discussed about the Saima's patent over its designs. We don't have Patents on particuular designs as such but we have trademarks for the major grouped products which no one can copy. A Manufacturing patent of any particular design is only valid for 5 years and don't lasts long, and generally the price of the product is also incresed after patent so its not veary feasible to patent very design for SAIMA.
- Major competetions like NITTOSEIKO's "P-Tite" screws which are patented by the company, still there are P-type screws in the Market which have exactly the same Design as that if P-tite, so any one can manufacture and sell that design.
- Our Non-sert Design is similar to that of a switzerland based company, EJOT's "Delta PT" screws. Similar "Thread angles" and the tail of the screw is typically similar to their" Self driving Tapping screws".
- Detailed research on competetitive products are added ahead in the report.

HALF YEARLY Interviews done!

The following were the main highlights for the Half yearly interviews:

- Staffs strongly feels there should be more space available around to work. While packing, quality checking, stocking if more space is available staffs can be more productive and quality of work and the mindset will also be affected by it.
- Sales department staffs arenot well connected to the End users so newly joined staffs face little problem while taking orders and qoutations.

The CEO addressed the solutions for the following problems like he will bring more machines and equipments which can ease their works.

DAY 24:

I have been studying failure of materials for the past 3 days to understand the failure with the screws better from engineering point of view.

Today there was assembling of the new digital boards by vitremedia, which will be used for future Expos and Exhibitions. It would be helpful to attract more people towards SAIMA's stall.



Later we were discussing SAIMA's outreach programs. Currently, Saima supports 'DMM.make' and 'TUT Formula team'.

- ❖ DMM.make: Its a commercial innovation community for prototyping and product development. SAIMA helps the community by providing screws for free. Big part of large communities are very important in Bussiness. It helps bring attention to far potential customer for our existance and we can collobrate much easily benifitting each other. We have scheduled our visit at DMM.make on 9 July followed by a business Dinner.
- ❖ TUT Formula team: A group of students from Toyohasi university of Technology who build F1 gasoline cars for competetions. Saima helps them in Funding and providing free screws. This helps SAIMA for getting an eaiser consumer feedback and to let the younger

generation be aware of the Companies excellent product as the students will soon join Industry and can bring us more opportunities.

DAY 25: Mon

Company expects me to look for better Outreach opportunities In India among University students.

After proper reseach I will be attaching adding it in the report for review.

-----Analysis of scopes of Fasterners in CFI competetion teams-----

Monday learning session:

Matsumoto San discussed about various new competetors in the market with brief descriptions and comparison with our similar products and strategies to compete with them.



DAY 26: Tue**Load: 151/141 Newtons | Drill Bit: 3.7 | Nos: 24 holes**

In the previous experiments with epoxy material for the new Tapping screws, we found out that 3.6mm holes were performing really bad. In contrast 3.7mm holes were having workable performance. So, I checked whether the performance improves on providing a higher load or not. keeping in mind we can't provide a huge Load in manual working condition for which these Tapping screws will be mostly used.

Material/ Load	TD			TS	TF			F/D		
	MIN	AVG	MAX		MIN	AVG	MAX	MIN	AVG	MAX
Epoxy 3.7, 131 N (3/24 CAMOUTS)	0.72	0.838	1.1	2.8	4.53	4.9	5.54	4.27	5.9	7.0
Epoxy 3.7, 141 N	0.69	0.82	0.97	2.4	3.74	4.2	4.67	4.02	5.16	6.67
Epoxy 3.7, 151 N	0.63	0.838	0.98	2.55	3.45	3.98	4.55	3.67	4.98	6.46

Interference:

- For a Load of 131 Newtons there were 3 Camouts/ 24 tests. But just by a difference of 10 N load, there was a great improvement in performance and No Camouts were observed.
- Although TF values are lowered on increasing Load but TD values are also decreased. And overall, it's not a problem.
- Best optimum results are shown in 141 N Load which are also affordable load for manual fastening, because for 141 Newtons there is no risk of Camouts which are there in 131 N load.
- On further higher load (151 N) performance turns bad.

Conclusion:

- In epoxy using 3.7mm drill holes with 141 Newton load is most reliable.

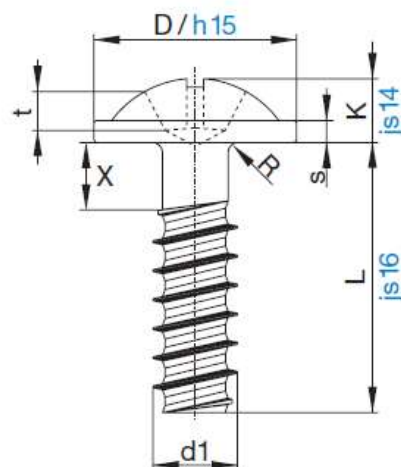
DAY 27 Wed :**Competitive products analysis:****#EJOT's Delta-PT screws**

On the Website they say: "EJOT is a European market leader in fastening technology. In Europe, our numerous sales companies and offices guarantee direct customer contact and fast availability of our products. EJOT services and products are also available on the worldwide stage. We have production sites and sales offices in North America and Asia."

The Company have their own patented Tapping screws for Thermoplastics with the trade name of EJOT DELTA PT Screws.

According to the company, "The flank angle of the DELTA PT® screw enables a visible reduction of the radial expansion compared to conventional thread flanks of screws with 60° flank angle (e.g. sheet metal screws). The 20° or 30° angle respectively only generates a small radial expansion and a very thin-walled design can be achieved. Furthermore, the thread flank enables an optimal material flow even with reinforced thermoplastics. "

They haven't mentioned any specific performance for different varieties of Hard or Thermoset plastics.



EJOT has another type of tapping screws for much crude and tough materials like steel, wood concrete, called “**Self-drilling screws**”, which basically have a drilling capability at the tail tip.

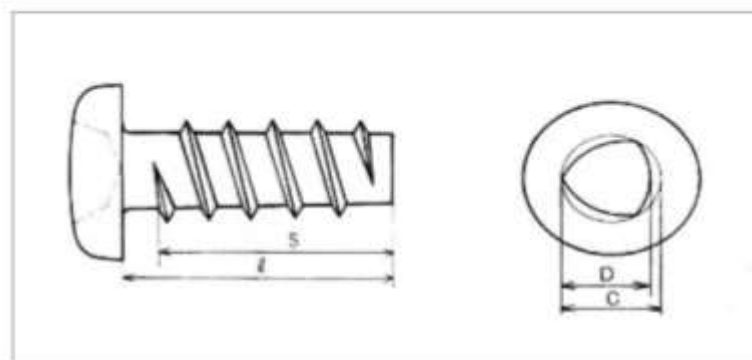


#NITTOSEIKO's “P-Tite” screws

P implies plastics, the screw was exclusively designed to drill threads properly inside soft plastics. This design too was made by the Nitto company.

Thread Angle: 45 Degrees, with TRIANGULAR Thread Profile.

P TITE



Screw diameter	Pitch	No. of philips recess	P Tite			
			C		D	
			Max	Min	Max	Min
M2	32	1	2.12	2.02	2.04	1.94
(M2.3)	28		2.43	2.33	2.35	2.25
M2.5	24		2.63	2.53	2.54	2.44
(M2.6)	24		2.73	2.63	2.64	2.54

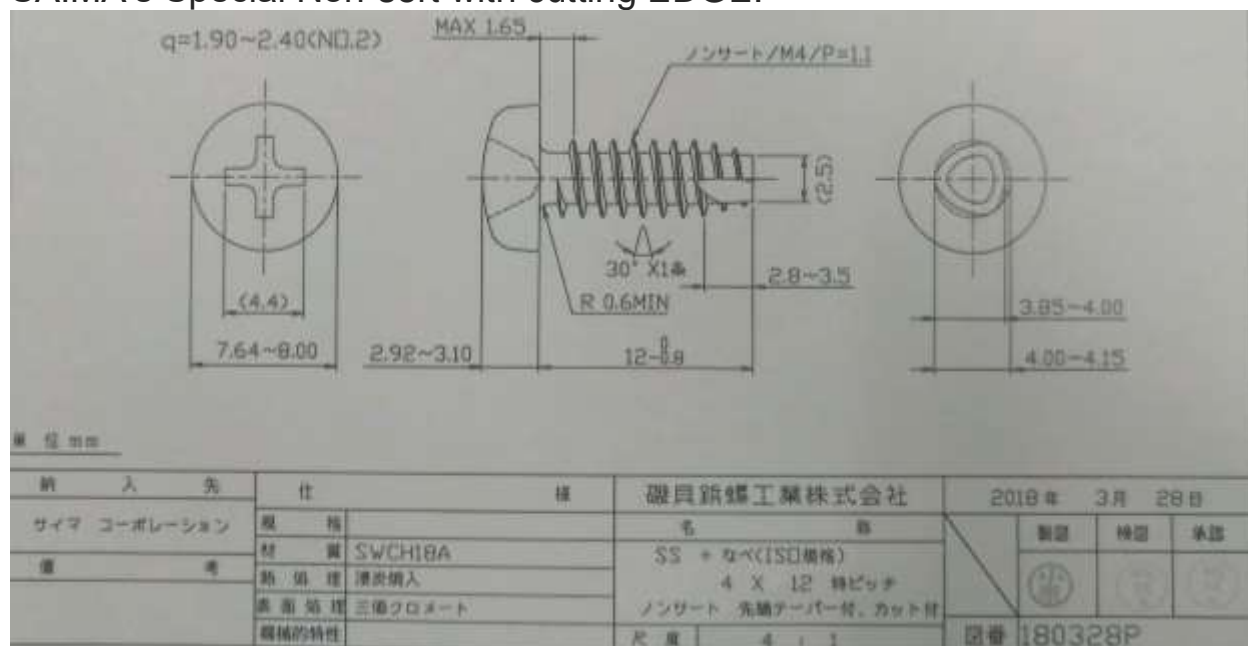
Though “P-Tite” is trade marked by NITTOSEIKO, but its Design is completely same as P-Type screws, which is a standard design and anyone can manufacture and trade.

Overlook at SAIMA's Special NONSERT screws:

- SAIMA's Thermoset plastic Tapping screws have best derived features from “Delta PT” screws, EJOT's “Self-Drilling screws” and “P-Tite screws”
- Special NONSERT has Thread angle of 30 Degrees as “EJOT Delta PT screws”.
- Tapered (Shank Slot), cut edge as essence and inspiration from “EJOT's Self-Drilling screws” and “Delta PT-S”.
- The Thread Profile Shape is Triangular as in typical P-Type screws, same as “NITTOSEIKO's P-Tite screws”.

DAY 28: thrus

SAIMA's Special Non-sert with cutting EDGE:



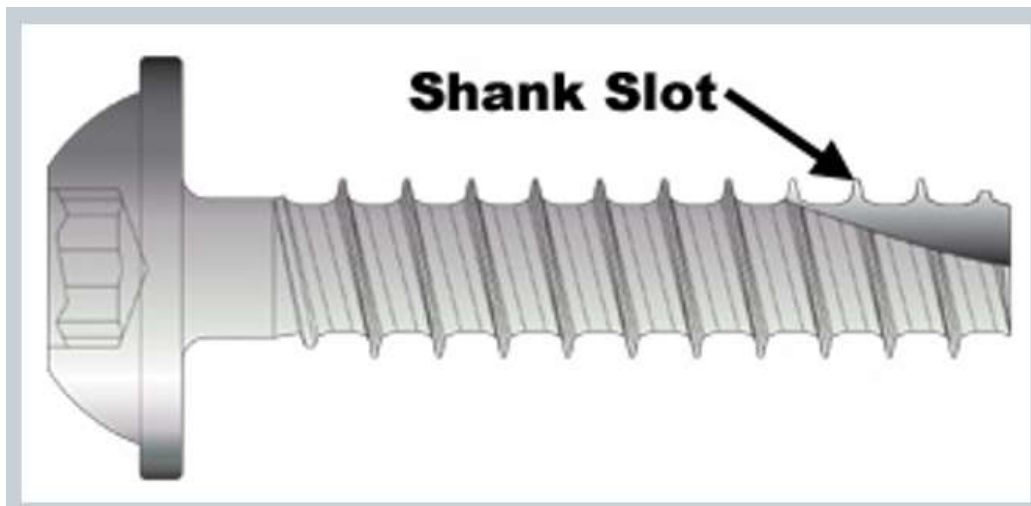
Thread Angle: 30 Degrees

PITCH: 1.1mm

Thread Profile: Triangular

The Design have following features:

- Reduces radial stress due to low flank angle and cutting edge
- Insert elimination possible
- Allows for thinner boss designs
- Offers high retention when used in thermosets
- The special Triangular profile of the thread system in which the material can exert resistance only at the three edges unlike in the circular one, where resistance is at all the points of the thread line



DAY 29: FRI

First Presentation in front of Oba San, Kase San and Tokura San.

The Presentation went for about 2 hours, I was explaining almost everything very Thoroughly.

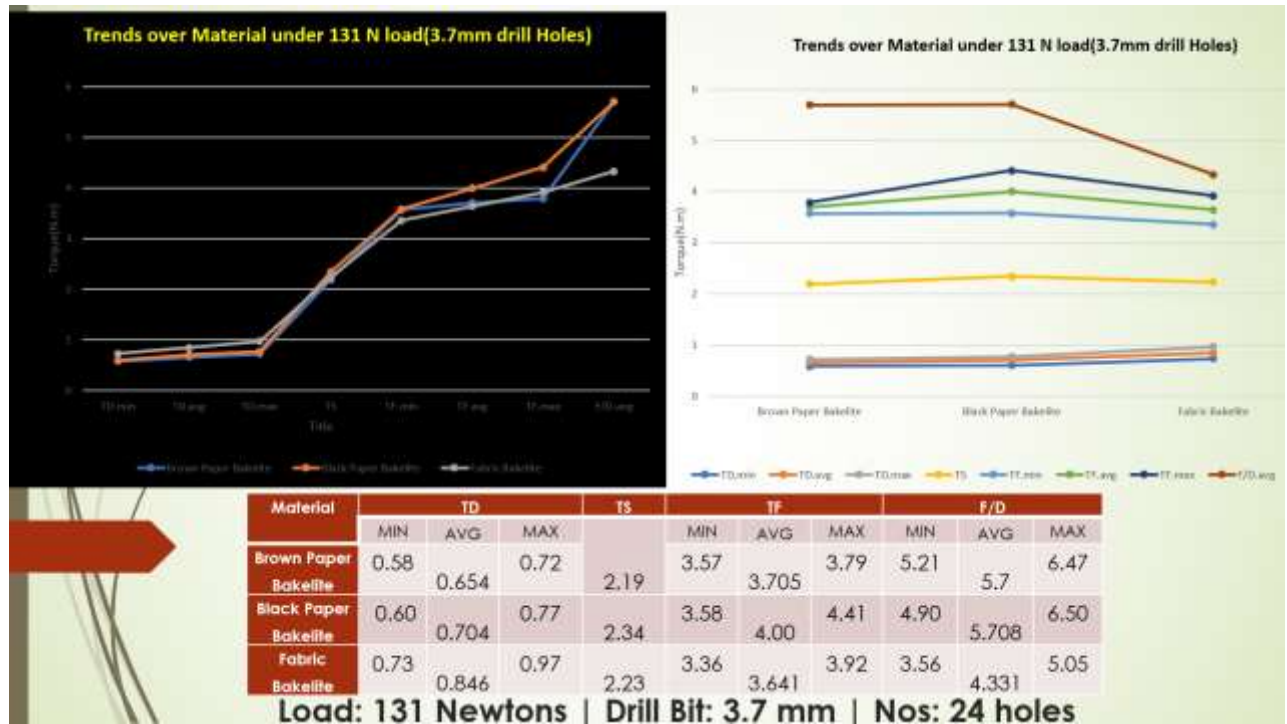
Comments for improving the Presentation:

- ✓ Selective Talk and discussion
- ✓ Less Text and more pictures and Graphics
- ✓ Easier English words so that all can understand
- ✓ Lesser compact slides
- ✓ To remove those slides about which our sales team already know.

DAY 30: Mon

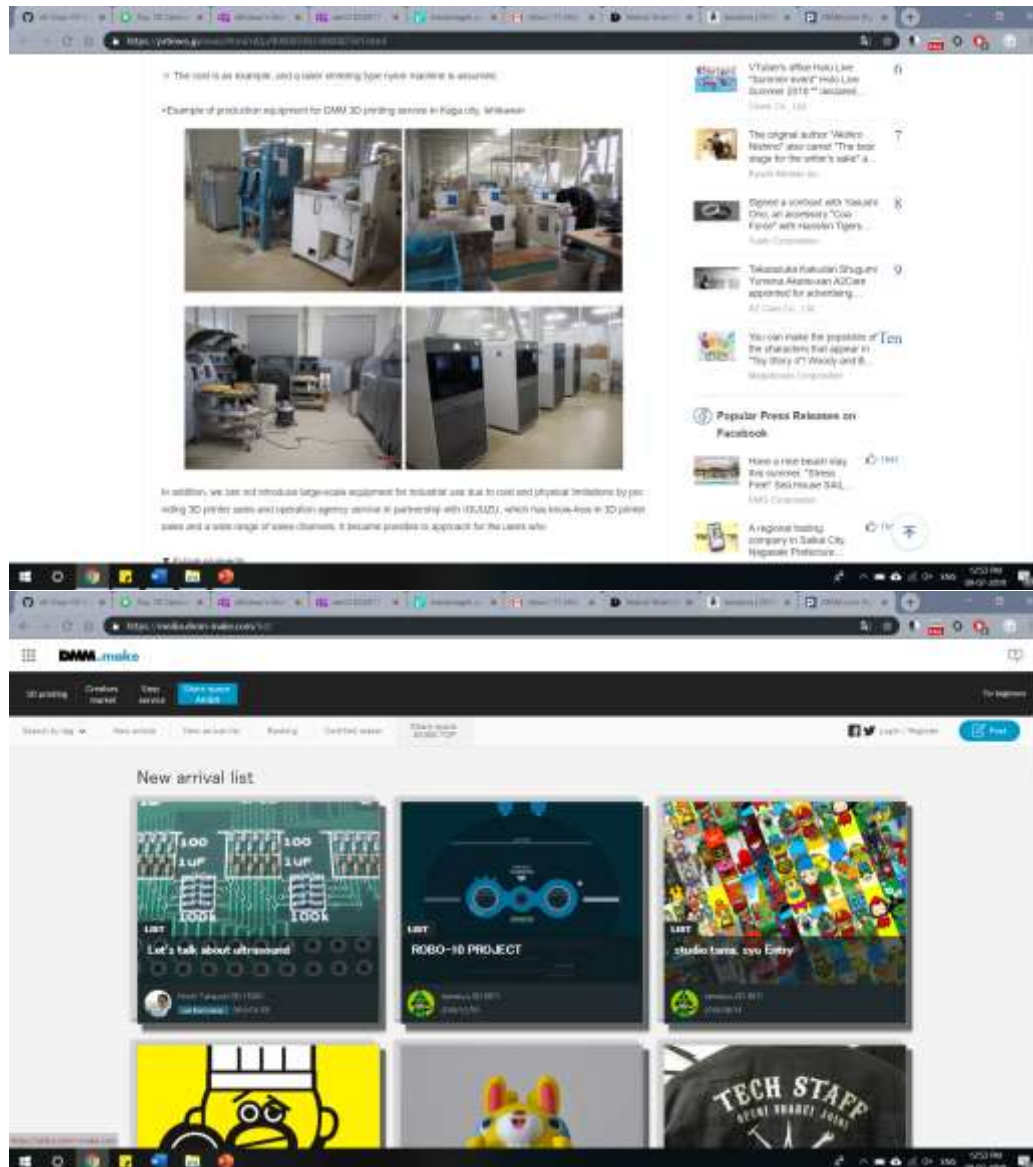
Visualizing Data and extracting conclusions from them.





DAY 31: Tue

Visit to DMM.MAKE in Tokyo



DAY 32: Wed

It was a great time meeting and talking to open minded Japanese Businessmen. “Hiroo Ukumori” was the special guest who was the main reason for this visit. He was explaining us the importance of outreach in Startups and how it can be helpful for us to explore our business by seeding them. He has lots of connections with international companies and Startups.

Further they also invited me to be open for working on my own new ideas and they are always open for me.



Later we visited Akiabara place exploring Robots after a long talk.

20-60-20 Philosophy:

Everywhere people can be divided into 3 major Groups:

- I. Top 20% : People who don't sit back and come up with their own ideas. Never stopping, open to new ideas and always working towards it.
- II. Middle 60% : Non- creative people who just want a job and will work as instructed. They just follow commands.

- III. Bottom 20% : The Lazy people, they even avoid working. They don't even work after being instructed.

We should always fight to be in the Top 20%.

Trust and Business goes Hand to Hand in Japan unlike other countries:

After questioning Mr. Tak for the patent policies and exclusiveness of SAIMA's Designs manufactured by the outside manufacturers, he said we don't wanna make a patent and spend time fighting alligations with others as we do small scale business and the limited time we should focus on developing with our customers.

Also he said speciallin in Japan there is a lot of trust among the peers and traders, they do understand the exclusiveness of our design and there need not be a paper work for the exclusive treatment.

DAY 33: Thrus

Industry and factory trips which are in regular business with SAIMA

1. TOUYO SCREW CO. LTD:

It's a big company marketting only the standard screws. SAIMA has a good relation with the company.



2. A very Old Screw Manufacturing Factory:



Got live demonstration of screw Pressing and thread forming. The production line was very quick.

The company mainly manufactures the security Fasteners for Saima Corporation.

DAY 35:

Visit to Hikarri Lineup manufactureres:



They mainly deal with Pressing related orders. Their major customer include companies like Panasonic.

And one of their major area is making Child care products usually used in Shinkansen and public toilets for Baby care.

DAY 36:

It was a National Holiday in Japan on the occasion of "Marine Day". (15th off July, 2019).

DAY 37:**My experience and acknowledgement for the 2 month stay in Japan and working at SAIMA Corporation:**

OHAYOO GOZAIMASSU/KONNICHIIWA

HAJIMEMASHITE(nice to meet you)

I was fortunate to get this opportunity to work at SAIMA corporation. I had a lot of new experiences, made lots memories and learnings which I may carry for life time.

Working on the SAIMA's nonser screws and the Torque Analyzer was a great learning for me. SAIMA's closed office environment is a unique. Since it's not a small company, everyone knows each other very well and takes care of each other personally. And I was really amazed by the intention of our CEO behind this culture of our company as he believe for himself its not important how big it be, but rather he wants everything to be supervised cared at personal level which gives him the ultimate satisfaction.

It happened for me to do mistakes several times, but I was always consolidated and brought into the light very positively.

Overall my stay was very smooth and pretty for which I thanks our Company and the public administration of Japan which works really efficiently for the train services to the on road traffic.

I did struggled for the taste of food in Japan initially but with I time I started liking a lot of Japanese dishes. My favourite being Ramen and Sushi.

I am taking back a lot of memories and learnings from Japan that I will definitely share among my friends and acquaintances back in India.

DAY 38:

Day of Final Presentaion:



Professor Yamamoto from NUT also arrived to see my presentation.

It was great day. Everyone Liked the presentataion and it was great presenting my handmade caricature to everyone. Everyone was very happy after seeing their caricatures.

DAY 39:**Final Results and conclusion:****Drill Bit: 3.5/3.6/3.7 mm | Load: 181/151/131/111/91 Newtons**

- As Load Increases all the Plots appears o shift UPWARDS, until failure(CAM OUT) is observed.
- Cam out was observed for loads lesser than 111 N. We can also notice an Unusual Bump in the plots.
- For 91 N some of the testing were successful but others were failing (CAM-OUT).
- And, for 71 N all the test samples failed, except 3.7mm samples(1/12 failed), **which also shows that for a larger Hole, Failure and Driving Torque decreases.**
- No Head Breaking observed as now.
- **With cumulative Observation 131N Load working most CONSISTENT and hence, reliable which is used in further testing.**

Load: 131 Newtons | Drill Bit: 3.7 mm VS 3.6 mm

- For Paper Bakelite (Brown/Black), 3.6 drill bit is providing a better result in our testing.
- TD is always slightly lower in 3.7mm Holes.
- But TF and F/D for 3.7 and 3.6 drill bit are showing considerable difference.
- Hence overall, **3.6 drill holes are optimum for both Paper and Fabric Bakelite with a load of 131 N.**
- For Fabric Bakelite, the TD Values are highest which means Fabric Bakelite needs a higher driving Torque than other. Also because it is much tougher and stronger due to various reinforcements.

Load: 131 Newtons | Drill Bit: 3.7/3.6 mm | Nos: 24 holes

- For the **3.6 mm** , 9/24 cam-outs, 4/24 head breaks and overall 13/24 samples failed i.e. more than 50 percent samples were unsuccessful.
- Torque vs Time plots for the head break samples were unique and understandable.
- For **3.7 mm** hole fastening, 3/24 cam-out occurred and other were successful with good performance data.
- High Driving Torque (TD) Values are observed

FINAL CONCLUSIVE HIGHLIGHTS:

- ✓ In Bakelite(Paper and Fabric) using **3.6mm** drill holes with **131 Newton** load is most reliable.
 - ✓ In epoxy using **3.7mm** drill holes with **141 Newton** load is most reliable.
 - ✓ Driving Torque decreases with increase in hole diameter.
 - ✓ CAM OUTS happening for **lesser Loads** and **smaller Diameter holes**.
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- ✓ Failure Torque decreases with increase in hole diameter.
 - ✓ Head Breaks happening at much **Higher Loads** and **smaller Diameter Holes**.

DAY 40: FRI

Trip to ISUZU