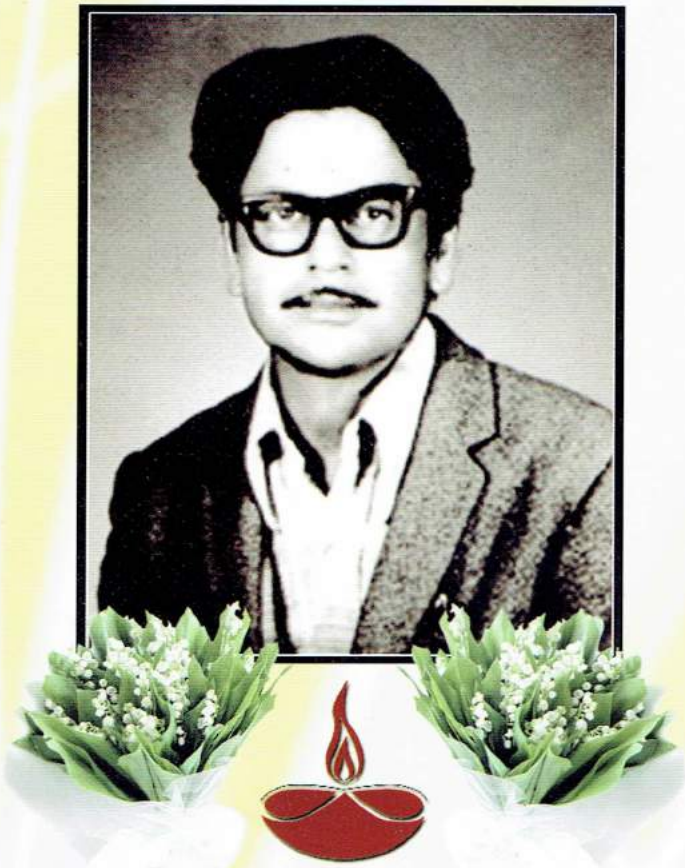
YANTRIK – OYANTRIK

A bulletin published by the Mechanical Engineering Department

ASSAM ENGINEERING COLLEGE

JALUKBARI, GUWAHATI -13

A tribute to Professor A K Padmapati, Former Principal, Academician par excellence and a great humanist.



His ultimate visit to AEC

Baneswar Khound, Ex-Aecian (Mechanical)

A shower in the previous night washed away the dusts and dirt from all around. The day was sunny with clear sky all over. The majestic RCC two storied building with clock tower amidst, gave a pleasant look with the hillocks full of greeneries just behind it.

We, the members of Rengoni Assam, walked down the half oval shaped vast grassy yard lying bare in front of the building of the premier institute to survey to finalize the suitable spots for planting three Bakul saplings. Padmapati sir, accompanied by Sandip Goel, an Ex-Aecian, from the college guest house arrived at the spot.

Seeing sir arrive in frail health, we all greeted him in a passionate manner. We encircled him and handed over the sapling. Eagerly accepting the sapling, sir closed his eyes, murmured in an ecstatic way for a moment & gently placed the sapling in its final place. Suddenly, at the same moment, a Cuckoo started singing Ku-u, Ku-u, Ku-u..... at its highest pitch of voice and fled away beyond our sight. We all got excited & rejoiced saying it—'Urooli', the symbolic rite of an auspicious occasion.

Thus 'Eco –Aesthetic Plantation Project' got inaugurated. We never imagined—that was his ultimate visit to AEC¬¬¬, the premier institute with which he was so spiritually associated.

The day was 27th March, 2016, Sunday.

Note : RENGONI ASSAM is a registered voluntary organization inspired by the ideals of Prof. A.K. Padmapati who acted as its Advisor at the fag end of his life.

(Er. Baneswar Khound retired as the Chief Engineer of ASEB. He is also an eminent writer.)

Message from the HOD

At the very outset I would welcome all and offer my best wishes for translating the long standing desire of an official communiqué for the Department of Mechanical Engineering into reality. Since its inception in 1957 as a full-fledged department of the premier institution Assam Engineering College, it is rendering yeoman's service for several decades in the interest of public service for the entire north eastern region. It has gradually developed in its capacity for providing service for post graduate education and technical research. Moreover, its effort in offering undergraduate education for Industrial and Production Engineering is commendable. Over the years many students are well placed in various organizations within the country and overseas. The present effort of the faculties, staff and students in publishing the bulletin Yantrik-Oyantrik is really commendable. I am sure it shall provide a sound platform for explicitly uncovering the potential in academic as well as non academic fields in years ahead.

Dr. R.K. Dutta

BRAINY QUOTES

- There is no path to happiness; happiness is the path. **Gautam Buddha.**
- Teaching is a very noble profession that shapes the character, calibre and future of an individual. If the people remember me as a good teacher, that will be the biggest honour for me. **A P J Abdul Kalam**
- All men who have achieved great things have been great dreamers. **Orission Swett Marden.**
- The great aim of education is not knowledge, but action. **Herber Spencer**
- Great minds discuss ideas; average mind discuss events; small minds discuss people. **Eleanor Roosevelt**
- Every great dream begins with a dreamer. Always remember, you have within you the strength, the patience and the passion to reach for the stars to change the world. **Harriet Tubman.**
- Good, better, best; Never let it rest; 'Till your good better and your better is best. **St Jerome**
- An investment in knowledge pays the best interest. **Benjamin Franklin**
- No man has a good enough memory to be a successful liar. **Abraham Lincoln**

Editor's column

We are happy to put forward the first issue of YANTRI OYANTRIK, the mouth-piece of the Mechan Engineering Department of Assam Engineering Colleg the readers. This is the first effort of this kind.

The department is on the verge of completing its six deca of existence, during which it had produced a good numbe highly talented engineers who have excelled in their field our country and abroad.

We are aware of the fact that technical institutions assigned the job of imparting technical knowledge and quality of the institution is reflected in the performance these students in practical field. As it is said, engineers a three types – the one who makes things happen, the one watches things happen and finally the one who just won what has happened. Engineers who make things happen ever curious and are always in active pursuit of soluti They are confident to discuss their ideas. They have audacious goals, daring, chivalrous and gallant in every They are the engineers of highest quality.

Our predecessors were successful in transforming a section of the bright aspirants of the degree from institution to ever-curious, ever-confident achievers and formed the basis of department's name and fame in outside the country. We are keen in continuing this le ahead.

This mouth-piece is thus an effort to focus on acad activities of the department and also to involve stu community in such activities so that they prosper in pursuit for knowledge. To encourage them into activities, we have chosen two of their best ge proficiency presentations and published in this issue.

Prof. A K Padmapati, former Principal with great n diminished love for the college, passed away last year have dedicated this issue of Yantrik- Oyantrik in the this great soul.

Dr. D.K. Mah

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Welding Electrode And Its Manufacturing

Nibir Saha (Ex-student)

Introduction :

Welding electrodes are used for arc-welding purposes. The electrode is coated with flux. The electrodes are used for fabrication work for joining the steel, alloy steel and cast iron parts for hard facing of jobs etc. The selection of electrodes for any particular job has always been a compromise between the requirements of weld quality and the overall cost of fabrication. Where quality is important, it is necessary to select an electrode type, which will give the appropriate weld metal properties. Earlier welding electrodes were manufactured in medium and large scale sectors, but now it is manufactured in small scale sectors with quality product and competitive prices. There is a large demand for welding electrodes due to large construction fabrication work. There is a sufficient gap between demand and supply.

Adhunik Electrodes

Adhunik Electrodes, a small scale unit situated at Lokhra Chariali, Guwahati manufactures various range of arc welding electrodes such as mild steel, hard facing, cast iron, low hydrogen, stainless steel as well as low heat input type of electrodes. It manufactures electrodes of various sizes and dimensions. The various machineries available in the industry are Wire Drawing Machine, Wire Cutting Machine, Extruding Machine, Air Drying Machine, Baking Oven and Packaging Machine.

Electrode Classification and Coding

The American Classification System (AWS Designation A.5.1 ASTM A 2233 for mild steel and A.5. 5 ASTM 316 for low alloy steel) consists of a prefix letter E, specifying an electrode, a group of two or three digits specifying weld metal strength in ksi in the 'as-weld' or stress relieved condition, and a final two digits specifying type of covering, weld position and current characteristics.

Nomenclature of electrode specification:

E60xx 60ksi (420 MPa)
E70xx 70ksi (490 MPa)
E80xx 80ksi (560 MPa)
E90xx 90ksi (630 MPa)
E100xx 100ksi (700 MPa)

Typical electrodes (those in brackets are widely used) are given in the following:

Exx10 (E6010): Cellulosic covering for the use with DC reversed polarity only. Deep penetration and all positions electrode for general purpose.

Exx11 (E6011): Cellulosic covering for AC or DC, all position, Deep penetration and thin slag, X-ray quality weld

Exx12 (E6012): Rutile covering AC or DC, all positions, Medium penetration, good choice for fit up work.

Exx13 (E6013): Rutile electrode, AC or DC, all position. Good performance in sheet metal welding.

Exx14: Iron powder rutile covering giving same characteristics as Exx13, but with a higher welding speed.

Exx15 (E7015): Basic low hydrogen covering requiring use of DC only, all positions for steel welds.

Exx30: Mineral covering similar to Exx20 but high deposition rates. F position only.

Several high tensile low hydrogen electrodes are classified with extra suffixes eg. Exxxx-A1-B2 etc, which indicate the chemical composition of the deposit, and gas content of manual metal arc welding deposits. AWS-specification A.5.5-69 prescribes the chemical requirements for low alloy shielded metal arc weld metal. Classifiaction is similar to that the mild steels covered electrodes with the addition of a suffix to indicate the alloy constituents of the deposited weld metal. Eg. E7010-A1 or E 8016-B1. A1 for carbon molybdenum steel and B1 for chromium-molybdenum steels.

Electrodes- IS and AWS classification and codes.

In the following are given some of the IS and AWS specifications for electrodes.

IS 814-1991 Covered electrodes for manual metal arc welding of carbon and carbon manganese steels.

This standard is primarily concerned with the mechanical properties of the weld metal and no limits have been specified on the chemical composition of the weld metal.

For weld metals with tensile strength higher than 610 MPa reference can be made to IS 1395-1982 "Low and medium alloy steel covered electrodes for MMAW".

The classification of electrode is given by letters and numerical as given below:

Ex xxxx

ER 4211

The first letter "E" indicates a covered electrode for MMAW, manufactured by extrusion process.

The second letter "R" indicates type of covering eg R=Rutile, A=Acid, B= Basic, C=Cellulosic, RR=Rutile heavy coated, S=any other type not mentioned here.

The first numerical "4" indicates strength (UTS=410-510 MPa) in combination with the yield strength of the weld metal deposit YS=330 MPa.

The second numerical digt indicates percentage elongation in combination with the impact value of the weld metal deposited. Thus "2" means 22 percent minimum elongation with impact 47J at zero degree celcius.

The Third digit "1" shows welding position in which the electrode may be used.

"1" means all positions.

2 = all positions except vertical.

3 = flat butt weld horizontal/ vertical fillet weld.

4 = flat butt and fillet weld.

5 = vertical down and flat butt.

6 = any position not mentioned here.

Process of Manufacturing of Welding Electrode

Wire Drawing:

Electrode-quality rimming wire with low carbon and low silicon is available in the open market. The wire rod coils are converted to the drawn wire coils of sizes such as 2. 5mm, 3. 15mm, 4mm and 5mm at the wire drawing machine plant. The operation of wire drawing is shown in fig 1.

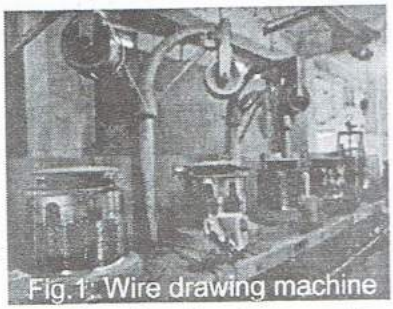


Fig.1: Wire drawing machine

Wire Cutting: The drawn wire coils are then straightened and cut into required lengths by 'Straightening and Cutting Machine'. The wires are mostly cut into standard lengths of 350 mm and 450 mm. The operation of wire cutting is shown in fig.2.


Fig.2: Wire cutting machine

Dry mixing: Rutile, Low carbon Ferro Manganese, Cellulose, Titanium Di-Oxide, Mica, Feldspar, quartz, etc., are some of the chemical powders used as the raw materials for the preparation of flux. These chemicals are available worldwide and they are weighed accurately as per the technology for each type of electrodes and they are mixed in a dry mixer to get homogeneous mixture. The operation of dry mixing is shown in fig.3.


Fig.3: Dry mixer

Wet mixing: Potassium Silicate is used as the Binding agent. The flux is mixed with Silicate in a correct proportion to obtain a wet mix in a mixer.

Slug making: The Wet mix is then pressed to form a briquettes (or cylinders) in a automatic slug press in order to load the flux in the flux cylinder of the extruder.

Extrusion: The coating of flux is done by the extrusion press (also called extruder machine) in which the flux fed through a cylinder under pressure. While the wire is fed from the wire magazine of the electrode press, the briquettes are introduced into the extrusion cylinder of the press. During extrusion the core wire is fed one by one from wire feeder and coated with the flux by way of nozzle/die box system incorporated in the extrusion press.

The electrode coming out from the press is passed through a conveyor to the brushing machine for brushing of holding end and cleaning the same on tip end side for easy striking. The operation of extrusion is shown in fig 4, fig 5 and fig 6 serially.

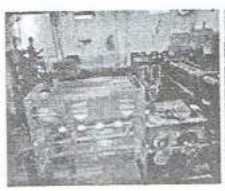


Fig. 4: Extrusion process

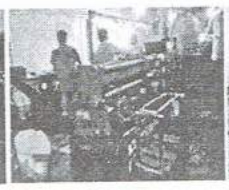


Fig.5: Extrusion process

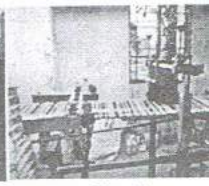


Fig. 6: Extrusion process

Air Drying: After that the electrodes are spread on t collecting tray for air drying. The image of a Air Dryi machine is shown in fig.7.


Fig.7: Air drying machine.

Baking: After air drying of the coated electrodes th are baked in oven. Depending on the type of electro the baking cycle will vary. The moisture content in electrode should not exceed 4 percent. The baking m be electric controlled or gas (LPG) controlled. T electrodes are then cooled for about one hour.

The image of a Baking oven is shown in fig.8

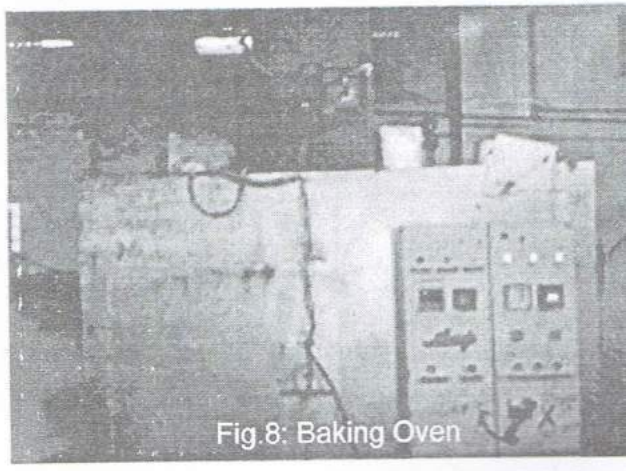


Fig.8: Baking Oven

Packing and Dispatch: The finished electrodes stored and wrapped in polythene or waxed paper packed in cartons. A packet contains approxima 100 (2.5*350) electrodes. They are then sealed dispatched for supply.

The operation of packing and dispatch is show fig.9 and fig.10.


Fig. 9: Packing


Fig.10: Dispatch

Products of The Industry (ADHUNIK ELECTRODES)

The industry manufactures various ranges of electrodes such as MILD STEEL, CAST IRON, HARD FACING, LOW HYDROGEN, STAINLESS STEEL as well as LOW HEAT input type of electrodes.

MATERIAL	PRODUCT NAME	APPLICATION	SIZE (mm) (CURRENT) (Amp)
MILD STEEL	STAR GOLD-XL (AWS : A(5.1) : E6013)	Light and medium mild steel fabrication jobs, truck bodies, rail wagons, furniture etc.	2.50*350 (60-90) 3.15*350 (90-130) 3.15*450 (90-130) 4.00*450 (140-180) 5.00*450 (190-230)
	STAR GOLD-S (AWS : A(5.1):E6013	Medium and heavy jobs in mild steel structures, truck bodies, pressure vessels, bridges etc.	2.50*350 (70-90) 3.15*350 (90-140) 3.15*450 (90-130) 4.00*450 (140-190) 5.00*450 (190-240)
	STAR GOLD-SS (AWS : A(5.1):E6013	Heavy construction jobs, boilers, bridges, tanks, build up jobs, auto bodies, pipelines and maintenance jobs.	2.50*350 (70-100) 3.15*350 (90-140) 3.15*450 (100-130) 4.00*450 (140-200) 5.00*450 (200-250)
CAST IRON	STAR GOLD-N.M. (AWS : E st)	Repair of rough castings, joining mild steel to cast iron, fillings of blow-holes dumps castings.	3.15*350 (80-120) 4.00*350 (120-140) 5.00*350 (170-200)
	STAR GOLD-Ni Fe. (AWS : E Ni Fe Ci)	Applicable for non-ferrous and ferrous material, heavy castings where machinery is required, engine head, pump castings, moulds, ingots.	3.15*350 (80-120) 4.00*350 (130-160) 5.00*350 (150-200)
	STAR GOLD-Monel. (AWS : E Ni Cu B)	Joining of cast iron parts, built up worn out cast iron machine components, join cast iron with steel.	3.15*350 (80-120) 4.00*350 (130-160) 5.00*350 (150-200)
	STAR GOLD-Ni. (AWS : E Ni Ci)	Applicable for all grades of castings, iron castings, gear housing, engine blocks, pump castings, valve bodies, cast iron components.	3.15*350 (80-120) 4.00*350 (130-160) 5.00*350 (150-200)
LOW HYDROGEN	STAR GOLD E-7018	Pressure vessels, pen stocks, ship constructions, restraint joints, dynamic loading, heavy thick plate joints, bridges.	2.50*350 (80-100) 3.15*450 (140-180) 4.00*450 (140-180) 5.00*450 (190-210)
	STAR GOLD E-7016	Applicable for unknown steels of high sulphur content, pressure vessels, tanks, earth moving equipments, rails, ships, oil tanks.	2.50*350 (80-100) 3.15*450 (100-130) 4.00*450 (140-180) 5.00*450 (190-210)
STAINLESS STEEL	STAR GOLD 308L-16	Applicable for stainless steel surfaces on centrifugal pumps, impellers and shafts, valve sheets, dairy equipments for welding.	2.50*350 (60-90) 3.15* 350 (80-120) 4.00*350 (130-170) 5.00*350 (150-210)
	STAR GOLD 309-16	Joining mild steel to stainless steel, low alloy steels.	2.50*350 (60-90) 3.15* 350 (80-120) 4.00*350 (120-170) 5.00*350 (150-240)
	STAR GOLD 309Mo16	Applicable for steels, welding 309 Mo type steels, surfacing and building up on carbon steels.	2.50*350 (60-90) 3.15* 350 (80-120) 4.00*350 (120-170) 5.00*350 (150-230)
HARD FACING	STAR GOLD H-250	Applicable for gears, shafts, pinion teeth, machinery parts where moderate hard surface is required, weld metal is easily machinable.	3.15*450 (90-130) 4.00*450 (130-170) 5.00*450 (180-210)
	STAR GOLD H-350	Applicable for wheels, rail ends, steel roll mills, break shoes,shear blades, worn out parts of tractor, conveyer parts.	3.15*450 (100-130) 4.00*450 (130-170) 5.00*450 (180-210)
	STAR GOLD H-550	Applicable for concrete mixers, blades, excavators teeth, cement die rings, screw conveyers, scraper blades, steel mill rollers.	3.15*450 (100-130) 4.00*450 (130-170) 5.00*450 (180-210)
	STAR GOLD H-600	Applicable for earth moving machinery, cane cutting knives, crushers, hammers, rollers, rod drills, scraper blades, oil expellers.	3.15*450 (100-130) 4.00*450 (130-170) 5.00*450 (180-210)

Fig.11: Image of a STAR GOLD packet

References:

1) V.M. Radhakrishnan, "Welding: Technology & Design," New Age International Publishers, pp53-57.
2) Raghuwanshi, B. S., "A Course in Workshop Technology," Dhanpat Rai and Co., Vol I, pp-576.
3) www.weldingelectrodesindia.com

Bell metal based Cottage Industry – A lifeline of Hajo

Sayedur Rahman Anchari (Ex-student, 2016)

The cottage industry is a gift of art and culture of a community. It is home based rather than factory oriented and the products are mainly made during leisure time. Products and services created by cottage industries are often unique and distinctive because those are usually not mass production techniques. Producers in this sector often face numerous disadvantages when trying to compete with larger factory-based companies.

The traditional cottage industry relies heavily on manual labour and craft skills. This sector has existed for centuries. At first the cottage industry originated due to need of the common people to meet their daily needs like food materials, clothing, different utensils and preservation of different materials. The common people engaged themselves in this home-based industry with the help of some natural products and easily available apparatus.

Hajo, the land of "Panchatirtha", is a place where different civilizations merged. The time of origin of the brass metal industry of Hajo cannot be established properly. It has been running traditionally since time immemorial. Originally this industry was run by the Hindu community, but later on it went to the custody of Mariya community. In 1533 AD, in the war between Kanseng Barpatra Gohain and Turbak, the later was defeated in the battle and many Muslim soldiers became prisoners of the Ahom king. These war-prisoners were engaged in Brass metal work by the Ahom king, Sargadeo Suhungmung. Later on, these people came to be known as "Mariya" due to their typical hammering of the metal, which is in Assamese called "mar". At present these peoples are solely engaged with the brass metal work in the midst of different unfavorable conditions and they are trying their level best against the extinction of such a traditional industry. At present about one hundred families of "Mariapatti" village and thirty families of "Bharalitola" village are associated with this cottage industry.

Materials and Methods

Brass is an alloy made of copper and zinc. But its proportion can be varied to create a range of brasses with varying properties. According to popular encyclopedia published by George Newnes Ltd., London, "Brass, an alloy of copper and zinc, has been used since about fifth century BC. In Greece and the Roman Empire, it remained comparatively expensive, but in India, it was used for household vessels from an early date". Thus it is imperative that these brass metals were also used in Assam for household vessels.

1. Raw Materials:

The principal raw material of the brass metal industry is the homogenous mixture that is the alloy of copper and zinc. The brass metal is bought from market in the form of plain sheet. Some other row materials used are "Pine", borax, coal, zinc, tin etc.

2. Tools Used:

Ball pin hammer, claw hammer, framing hammer and sledge hammers are used for hammering process. Different types of hammers used in the industry are shown in fig. 1(a). Cold chisel, hot chisel are use as cutting tool. Tongs of various sizes are used to hold the thing while it is heating. Anvil or a large piece of wood is also use for shaping. Steel foot roll, outside caliper and inside calipers are used as measuring tools. An ordinary hearth is used for heating the goods while manufacturing. Some of the above mentioned tools are shown in fig. 1(b).

3. Manufacturing Process:

i) Cutting of sheet: At first, the brass metal sheets are cut in required sizes using sniper. For example, if we consider the case of making a pitcher, for different parts of a pitcher like base, neck, mouth etc., sheet of required size and shape are cut out from the large brass metal sheet. Different parts of a pitcher before joining are shown in the fig. 2.

ii. Shaping and bending: The sheets of different size are bent in required shape by placing it on wood or anvil using hammer.

iii. Joining: It is the most important task on which the quality of goods produced depends. In the cottage industry of Hajo, an ordinary process which is similar to brazing is seen to be applied in the joining purpose, where pine is used as filler material, whose scientific name is not known. In the fig. 4, a piece of solid pine is shown. Borax is used as flux, which reduces the chances of formation of oxides while heating, as the heating operation is not done within an inert or reducing environment. The two parts to be joined are first made lap joint by placing one of them above other one and then hammered. A mixture of borax, "Pine" along with water is made and it is applied between two close fitting parts using a brazing rod. Then the two close fitting parts are heated above the melting point of the filler metal and after cooling they get permanently attached. Heating process employed is shown in fig. 3.

Fig. 1: Some of the tools used in manufacturing

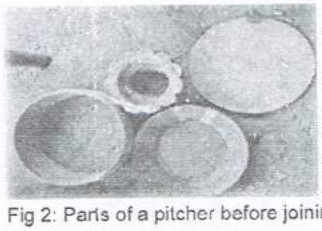
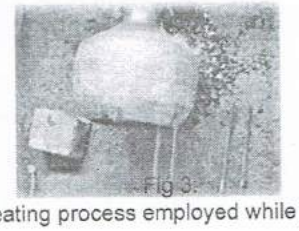


Fig 2: Parts of a pitcher before joining



Heating process employed while joining

iv. Cleaning and finishing: Cleaning is done to remove the rusts and increase the brightness of the manufactured goods. It is done by using concentrated nitric acid or sulphuric acid, which is diluted up to a level by adding water. The acid solution is gently applied on the metal surface, and with the help of brush, rust is removed. Thus the brightness of the goods increases which indirectly helps it to get good market value.

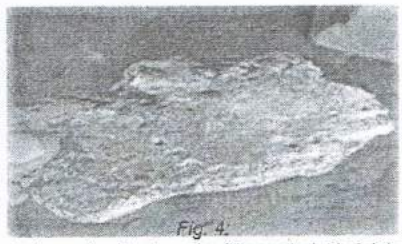


Fig. 4:
A piece of solid pine, the filler material in joints

4. Products:

In the traditional brass metal industry of Hajo different types of pots, pitchers, " sorai" and some other utensils and vessels are manufactured. Some of the products are traditionally used in the families and temples of Assam. The pitchers are mainly used for catching water and the brass "sorai" is considered to be very valuable in Assamese society as it is offered as a mark of respect.

5. Selling of goods:

The goods manufactured in the traditional industry of Hajo are mainly sold either by the craftsmen themselves or supplied to the owner who gives them raw materials to manufacture various brass metal products. Some of the craftsmen are often seen to go to different parts of Assam to sell the products. Figure 6 shows some of the products manufactured in the brass metal industry of Hajo are kept for selling in a local shop.

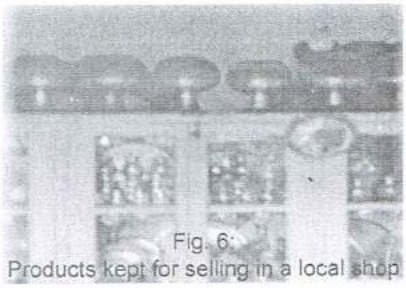


Fig. 6:
Products kept for selling in a local shop

6. DEFECTS IN MANUFACTURING:

Like all manually produced craftworks, these bell metal based products from Hajo also contain certain inherent defects. Some of such common defects are:

i) Since no modern welding process is used for joining different parts and instead a primitive joining process is still being used, the quality of products is not very good.

ii) It is often seen that for more profit low quality raw materials are used and as a result low standard products are manufactured.

iii) It is claimed that some dishonest worker recycles the old products and after recycling as it shines they sell them in the name of new products.

7. Problems faced:

The "Maria" community of Hajo is economically and educationally backward and till today they have not developed much. The increase in income has been disproportionate to the increase in population which is hampering their development. They give less importance to educating their offspring due to their weak economical conditions and engage them in their traditional business. Most of them bring raw materials from Guwahati on contract and process them, for which they get wages which are not sufficient to run their livelihood. In this modern age of civilization, the workers of the home-based brass metal industry of Hajo are suffering from various problems as they have to compete with the large scale mechanized industries. Here is brief description of the problems:

i. lack of capital which leads them to take raw materials on contract.

ii. No machines are used for which the number of goods produced is very less leading to low profit.

iii. Low demand of manually prepared vessels as it lacks shine and luster. the demand of different brass metal products from the brass metal industry of Moradabad, Uttar Pradesh has increased due to its shine.

v. Most of the workers work under their owner who supplies them raw materials and the owner pays them on basis of the weight of the goods produced by them. But during cleaning and joining some metal is lost for which the owner deducts the equivalent of the loss from their wage.

vi. The workers of this industry cannot engage themselves in their business during all the seasons because during flood the supply of raw materials stops as well as their place of manufacturing of goods goes under water and this makes them jobless for the rainy season.

As a result of this the traditional brass metal industry of Hajo is suffering a heavy loss. Neither the govt. of Assam nor the central government has undertaken any development program for the modernization of this cottage industry. Even the allotted funds are misused by the corrupted officials which is pushing the industry towards the oblivion.

CONCLUSIONS

1. The study was conducted on the traditional brass metal industry run by the "Marias" residing in the Mariapotty and Bhoralitola localities of greater Hajo. It is undoubtedly one of the unique cottage industries of Assam.
2. The prospect of the cottage industry in present day Assam is not good and the traditional industry of Hajo is also facing tough contest from the large scale industries like Muradabad brass metal industry as the products of these machine based industries are cheaper and brighter which attracts customers. Therefore, at present, the survival of the industry is at stake and it might become extinct in near future if the government and public take no protective measure.
3. The primitive joining process should be upgraded to various conventional welding processes, which will increase the durability of the products as well as improvement in the properties. Government of Assam should sanction a large fund for establishing machines required for these welding processes and proper training should be given to run these machines.

Academic Activities and Achievements

List of publications

Books:

1. U. S. Dixit, M. Hazarika and J. P. Davim, A Brief History of Mechanical Engineering, Series Title: Materials Forming, Machining and Tribology, Springer International Publishing AG, Cham, Switzerland, 2017.
2. M. Hazarika and U. S. Dixit, Setup Planning for Machining, Springer Briefs in Applied Sciences and Technology, Springer Cham Heidelberg New York Dordrecht London, 2015.
3. D. K. Mahanta and S. Das, 'Thermal Science and Engineering', The Institutions of Engineers-Study Material Series, Kolkata, 2016.

Published papers in last two years

SCI Papers

1. S K Deb, Improving Quality by Implementation of Capacity Planning in Fly Ash Brick manufacturing Industry. Global", J. on Advancement in Engg and Science (GJAES) ISSN 2395-1001. Vol 1, issue01, 2015, pp: 64-68.
2. S K Deb, Comparative Analysis of Different Micro Energy Resources under Distributed Generation", Asian J. of Electrical Sc, ISSN: 2249 - 6297 Vol. 5 No. 1, 2016, pp.40-42.
3. B. Bikash, N. D. Choudhury, Dilip Kumar Bora, Kalyan Kalita, Physico-chemical assessment of pumpkin (Cucurbita Pepo L.) seed oiol as viable feed-stock for bio-diesel production, Accepted by Springer.
4. Gautam Dutta, and Kalita Kalyan, "Emission Inventory of Vehicular Pollutants of Assam and Its Trend Analysis" Modern Envntl. Science and Engg (ISSN 2333-2581), Vol 2, No. 6, pp. 365-373, Academic Star Publishing Company, New York, NY 10024, June 2016.
5. Gogoi A, Das K.K, 2015, "Wind Related Destructions in the Eastern Region of India", J. of Wind and Engg (ISSN:0973-0613), Vol:12, No. 2, pp 1-6.
6. Das K.K., Das H.R, Ghosh A.K., Sinhamahapatra K.P, 2016, " Damage Potential of Extreme wind events – Downburst and Tornado", J. of Aerospace Engg and Technology (ISSN: 23487887), Vol:6, no.2,pp 28-46,2016.
7. Gogoi A, Das K K, 2016, Investigation of a Possibly EF2 Tornado That had occurred in the city of Shillong (India) on the 5th of April 2016", J. of Aerospace Engg and Technology (ISSN: 23487887), Vol:6, no.2,2016.
8. Anil Borah, A Study on the Effect of Ageing and Intermetallic Compound Growth on the Shear Strength of Surface Mount Technology Solder Joints, J. Inst. Eng. India Ser. D (January–June 2015) 96(1): Page 1–6. DOI 10.1007/s40033-014-0063-3, ISSN 2250-2122, Vol 96 No. 1.
9. M. Bardalai and D.K. Mahanta. 2016. Characterisation of the pyrolysis oil derived from bael shell (aegle marmelos). Envntl Engg Research, 21(2); 180 – 187; 2016.
10. M. Bardalai, N.K. Bordoloi and D.K. Mahanta. 2016. Production and biodegradability analysis of bael shell pyrolysis oil. Materials Today: Proceedings (Elsevier) (accepted).
11. M. Bardalai and D.K. Mahanta. 2016. Production of pyrolysis oil from areca tree using a fixed bed reactor. J. of Engg Research (IF: 0.128), Vol. 4 No 2; pp. 172 – 187; 2016
12. M. Bardalai and D.K. Mahanta. 2015. A review of physical properties of biomass pyrolysis oil. Int. J. of Renewable Energy Research, Vol. 5(1), 277-286.
13. M. Bardalai and D.K. Mahanta. 2013. Study of effects of some catalysts in biomass pyrolysis, Int. J. Current Research and Review, Vol.5 (20), 0975-5241.
14. Pradip Boishya and D K Mahanta, Fabrication and testing of a dry waste sorting machine, Intl research jls of engg and technology, Vol 2, Issue 9, Dec 2015.
15. Pradip Boishya and D K Mahanta, Waste composting a sustainable practice, Intl jl for innovative research in science and technology, Vol 2, Issue 11, Apr, 2016.
16. N. Saha, D. Talukdar, K. Upadhaya, C. Barbhuiya, M. Hazarika, 'An Experimental Study on Burr Formation in Turning', Int J. of Innovative Research in Science, Engineering and Technology, Vol. 5, pp. 3215–3222, 2016.
17. Rashed Mustafa Mazarbhuiya, P.K. Choudhury and M. Rahang, Taguchi-Grey Relational based Multi-Objective Optimization of Process Param-

eters in Elecric Discharge Machining of Aluminium with Copper Electrode, J. of Basic and Applied Engineering Research (JBAER), p-ISSN: 2350-0077; e-ISSN: 2350-0255; Vol. 3, Issue 13; October-December, 2016, pp: 1169-1171.

Conference papers:

International:

1. Dilip Kumar Bora, Study of Thevetia peruviana Schum. Seed Oil as Prospective Biodiesel Source for North East India, All India Seminar on Recent Trends in Mechanical Engg, Organised by The Institute of Engineers(India), Assam State Centre, Guwahati-13, 21-22 October 2016, pp 53-58.
2. M. Saikia, B. Bikash, B. Shyam, Dilip Kumar Bora, Kalyan Kalita, An Investigation of Effectiveness of Mesua Ferrea L. Seed Cakr As a Bnder In Brequettes Made From Rice Straw, Teak And Banana Leaves, Book Chapter, Aspect of Mechanical Engineering & Technology for Industry; ISBN 978- 93-8384-96-4; Vol. II, pp. 45-50, 2015.
3. M. Saikia, Dilip Kumar Bora, Kalyan Kalita, Comparative Study of Engine Performance Between Bio-diesel and Hybrid Bio-fuel Prepared From Yellow Oleander Seed Oil, Intl Conference on Recent Advances in Bio-energy, held in SSSNIRE Kapurthala , 2016.
4. N.K. Basumatary, B. Bikash, Dilip Kumar Bora, Kalyan Kalita, Prospects and Opportunities of Cucurbita pepo L. Seed Oil as a Viable Feed Stock for Bio Diesel Production in India, proceedings of FERIAP, organized by centre for energy, IITGuwahati,2015.
5. M. Saikia, Dilip Kumar Bora, Kalyan Kalita, A review on diesel engine applications of biodiesels from non edible resources in India" Recent Advances in Bio-energy Research, Held in SSSNIRE Kapurthala, Punjab, 2015.
6. S K Deb, Polygeneration solar air heater, 2015 Intl conference on alternative Energy in Developing Countries and Emerging Economies (2015AEDCEE), Proceedings, May 28-29, 2015, Bangkok, Thailand.
7. S.Rajbongshi, A.Borah and P.K. Choudhury, Optimization of process parameters in turning of grey cast iron with mixed oxide ceramic tool using Taguchi's Approach, Proc. of 5th Intl & 26th All India Manufacturing Technology, Design and Research Conference, December 12th – 14th, IIT Guwahati, Assam, India, 2014.
8. M. Bardalai and D.K. Mahanta. 2014. The pyrolysis oil production from bael (aegle marmelos) shell dust using a fixed bed reactor" in the proceedings of International Symposium on Aspects of Mechanical Engg & Technology for Industry, (AMETI2014), Vol. II, 64-70. 6-8 December, NERIST, Arunachal Pradesh, India. ISBN: 978-93-83842-96-4. (EXCEL INDIA PUBLISHERS).
9. Rashed Mustafa Mazarbhuiya, P.K. Choudhury and M. Rahang, Taguchi-Grey Relational based Multi-Objective Optimization of Process Parameters in Elecric Discharge Machining of Aluminium with Copper Electrode, Intl Conference on TECHNOVA-2016, jointly organized by G U, Assam and Krishi Sanskriti, New Delhi, on 22nd, 23rd Dec, 2016.
10. Das K.K, Numerical Investigation of the interference Effect of Prismatic buildings placed in tandem arrangement due to synoptic wind profile, Intal Conference CISBAT, held on 9-11th September 2015 Lausanne, Switzerland,
11. Das K K, 2015, "Physical investigation of the interference effect of Prismatic buildings under synoptic wind", Intl Conference PHYSMOD held on 7-9th September, Zurich, Switzerland.
12. Das H.R, Das K.K, S. Jain.2016, Optimization of slope for sloped roofed buildings under downburst wind flow using ANSYS, Intl Conference on Recent Trends in Engg and Material Sciences (17-19 March 2016), Jaipur National University, Jaipur, India
13. Das H.R, Das K.K, S.Jain.2016, Effect of Downburst Windon Buildings with various Geometrical Shapes, Intl NAFEMS Conference on Engg Analysis, Modeling, Simulation and 3D-Printing (NAFEMS-3D) – 2016 at Bangalore during 29-31 August 2016. (**Awarded as the best paper of the conference**).
14. Das K.K., 2016, Investigation of Damage Potential of Extreme Winds, Intl Conference on Civil Engineering for sustainable Development –Opportunities and Challenges (CESDOC2016), held at Assam Engg College, Guwahati781013 from 19-21 December 2016
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16. Anil Borah, Effect of welding parameters on -

mechanical properties in MIG Welding of 1050 grade aluminium alloys, Proceedings of the International Conference on Materials, Design and Manufacturing Process, ICMDM '16, February 17-19, 2016, College of Engg, Guindy, Anna University, Chennai, INDIA.

National Conference:

1. Anil Borah, A Comparative Study of CNC Milling of Aluminium using Flood Coolant and Air Cooled Machining, Proceedings of AICTE Sponsored National Conference on Innovative Trends in Mechanical & Automobile Engg [ITMAE-2016], 11–12 Feb, 2016, MVSR Engg College, Hyderabad.
2. Anil Borah, Analytical and experimental investigations on temperature distribution in laser line heating, Souvenir cum Technical Volume of All India Seminar on Recent Trends in Mechanical Engg, 21—22 October, 2016, Organised by IEI (India) Assam State Centre.
3. M. Bardalai and D.K. Mahanta. 2013, A comparative study of teak tree saw dust and rice husk as the feedstock for pyrolysis oil production at National Seminar on Frontiers in Sc and Technology (8-9 March) organised by Assam Science Society, hosted by G U.
4. S K Deb, Polygeneration Solar Thermal Collector, National Seminar on Solar Energy Utilisation and Opportunities in NER (NSSEU – 2015), pp 19-23, Apr 2015, AEC, Guwahati.
5. P.Sharma and P.K. Choudhury, Optimization of operating process parameters for minimization of pressure development in oil pipe line due to wax deposition using Taguchi method, All India Seminar on 'Recent Trends in Mechanical Engg' Mechanical Engg Division Board, IEI held on 21st-22nd October,2016..
6. Gogoi A, Das K.K., Wind related destructions in Eastern Part of India, Proceedings of the National Seminar of "Green Energy- Prospects and Challenges" organized by Assam Sc and Technology University held on 26th -27th April 2016(ISBN:978-93-83588-11-4.
7. Das H.R, Das K.K., Ghosh A.K, 2016, "A Numerical Study of Wind induced external and internal flow fields on Prismatic building with wall openings", Proceedings of the National Seminar of "Green Energy- Prospects and Challenges" organized by Assam Sc and Technology University held on 26th - 27th April 2016 (ISBN:978-93-58811-4).
8. Das H.R, Das K.K., Ghosh A.K, Pathak J.,2016, Effect of downburst wind on buildings and interference effect, Proceedings of the National Seminar of "Green Energy- Prospects and Challenges" organized by Assam Science and Technology University held on 26th 27th April 2016 (ISBN:978-93-83588-11-4).
9. Das K.K., Das. N., 2016, " Field Study of Tornado disaster in Bangladesh" ,Proceedings of the National Seminar of "Green Energy- Prospects and Challenges" organized by Assam Science and Technology University held on 26th -27th April 2016 (ISBN:978-93-83588).
10. Das H.R, Das K.K., Ghosh A.K, Pathak J.,2016, Comparison of downburst and synoptic wind effects on prismatic building, Proceedings of the National Seminar of "Green Energy- Prospects and Challenges" organized by Assam Science and Technology University held on 26th -27th April 2016 (ISBN:978-93-83588-11-4).

Publications of undergraduate students

1. B. Sarma, A. Dhar, B. Saikia, K. Borah, An Experimental Study on Burr Formation in Drilling, 2nd Mechanical Engineering Graduate Research Symposium *2015 (MEGRES 2015)*, Indian Institute of Technology Bombay, 21st March, 2015.
2. B. Sarma, K. Borah, B. Saikia, A. Dhar, M. Hazarika, An Experimental Study on Burr Formation in Miilling', All India Seminar on Recent Trends in Mechanical Engg, pp. 22–26, The Institution of Engineers (India), Assam State Centre, Guwahati, 21–22 October, 2016
3. N. Saha, D. Talukdar, K. Upadhaya, C. Barbhuiya, M. Hazarika, 'An Experimental Study on Burr Formation in Turning', Intl Journal of Innovative Research in Science, Engg and Technology, Vol. 5, pp. 3215–3222, 2016.

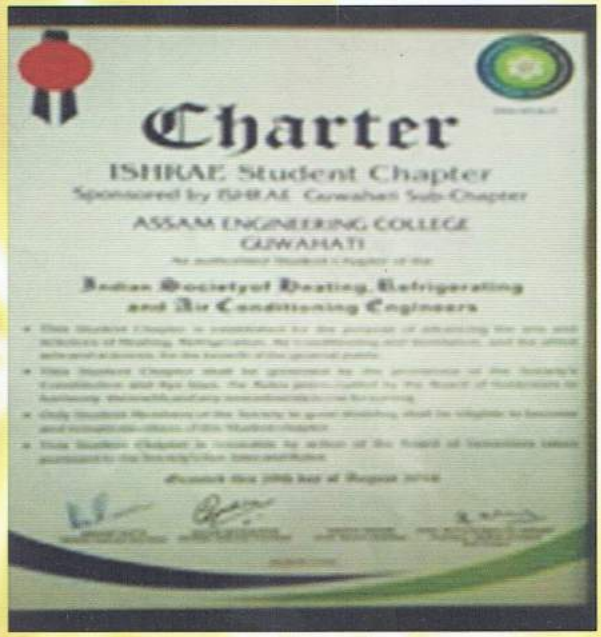
Research activities:

Ph.D Thesis submitted: (i) Pradip Baishya and Manoj Bardalai under the guidance of Dr. D K Mahanta & (ii) Gautam Dutta under the guidance of Dr. Kalyan Kalita.

Patent received: Pradip Boishya, Asstt Professor of the department received patent for his product related to municipal solid waste management.

List of Faculty Members

Name	Designation	Specialisation
Dr. R.K. Dutta	Professor	Manufacturing
Dr. D.K. Mahanta	Professor	Energy, Thermal Engineering
Dr. Sudip Kumar Deb	Professor	Industrial Engg and Management
Prof. A.J. Barthakur	Associate Professor	Fluid Mechanics
Dr. Pradeep Kr Mahanta	Associate Professor	Mechanical System Design
Dr. Kalyan Kalita	Associate Professor	Computational Fluid Dynamics
Dr. N. Saha	Associate Professor	Machine Design, Tribology, Rotor Dynamics, Comp. material
Dr. Plabon Kakoti	Associate Professor	Quality Control Engg
Dr. Anil.Bora	Associate Professor	Electro Magnetic Abr
Dr. S. Paul	Associate Professor	Advance Manufacturing
Dr. Rupanjali Nath	Associate Professor	Technology Initiated Change Mgnt
Dr. Dilip Bora	Associate Professor	Alternative Fuels, Internal Combustion Engine, Ren. Energy
Dr. Mrs. M.H. Goswami	Associate Professor	Computer Integrated Mfg, Green Machining
Dr. Kalyan Kumar Das	Associate Professor	Aerospace Engg & Applied Mechanics
Mr. B I Barbhuyan	Associate Professor	Thermal, Energy, Envnmt
Mr. Kamal Brahma	Assistant Professor	Energy
Mr. Prasanta Choudhury	Assistant Professor	Thermal Engineering
Mr. Jitul Baruah	Assistant Professor	Thermal Engineering
Mr. Basab Jyoti Phukan	Assistant Professor	Thermal Engineering
Miss Moushumi Gagoi	Assistant Professor	Manufacturing, Design
Mr Manash Hazarika	Assistant Professor	Advance Production System
Mr Pradip Kumar Boishya	Assistant Professor	Solid Waste Management
Mr Madhurjya Baruah	Assistant Professor	Machine Design, Vibration



ISHRAE Student Chapter was Chapter started on 29th August, 2016 in the College. A MOU was signed and ISHRAE has assured to provide jobs to two aeceans annually.

MSME-AEC MEET-2016 for enhancing industry-institute interaction was held on 12th March, 2016.

Respected Padmapati Sir

Bandita Phukan
Ex-Student (Mechanical)

In 1965, four girl students were admitted in the Assam Engineering College, Jalukbari. I was one of them. In the previous year, the first girl student was admitted in AEC; her name is Rita Dutta (now Ms. Rita Rajkhowa). At that time most of the people felt that the engineering is meant for boys only. My grand-mother strongly opposed my admission into Engineering college. But my mother, late Hiranya Moyee Devi (She was a novelist, poet and childrens' writer) inspired me to study engineering.

We four girl students were living in a part of a professors' quarter on a hillock. There were two other quarters near our one. In one, resided Prafulla Baruah Sir (Now he is in USA) and in the second one, Aparna Padmapati sir. Personally, I was virtually scared of him as he was always in a grave mood.

In the next year, when Rita baidew joined us, we were shifted to the guest house below the hillock.

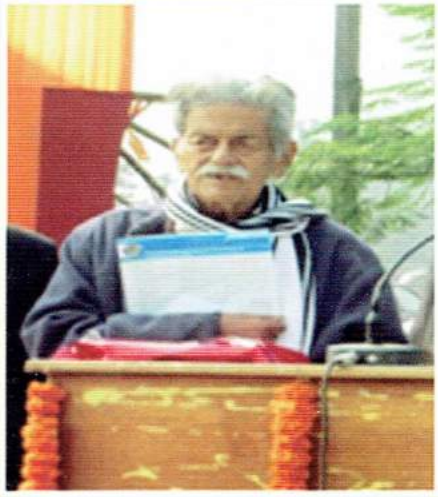
I had the chance of facing him in a class room only when I was in fourth year. As the only girl student in the class, I could never miss his classes like my other male class mates. I found Padmapati sir to be very attentive to the students who took genuine interest on the subject and asked questions. During our fifth year class, for some reasons ,classes of Thermodynamics – 2 were not held regularly. Finally before about twenty five days of the final examination, Padmapati sir came to teach us the same. He started taking classes for two hours each day to complete the course.

After completion of the fifth year, i.e., final year, after the theory classes were over and we had to finish our projects. I was staying in the hostel. One day, while I was crossing Padmapati sir, he stopped me and invited me for the lunch in the forth coming Sunday at his residence. He also told me that his younger sister Labanya (one year junior to me) with her friend Nayan would also be at his residence for helping his cook. I became emotional for this invitation, offered by such a apparently grave looking and respected senior professor, for biding farewell to the only outgoing girl student in his branch.

On that Sunday, I went timidly to his residence for the lunch at 1 PM. Labanya and Nayan were already in his residence. We three girls together sat on the dining table with sir for the lunch. I became so much nervous that I could not speak a single word to sir. I could not find out any topic for talking with sir. After finishing the lunch I went to the kitchen where Labanya and Nayan started to put the kitchen in order.

In the later years, whenever I met Padmapati sir, he always used to talk to me in very jolly good mood, inquiring about my husband- Syamanta and my children. Then only I found that Padmapati sir was very different person in the social life. I felt that he had good and kind feelings for all his ex-students. He always blessed us for our prosperous life in future. Now he is not with us anymore, but the memories of his grave personality as well as his kind nature will last in my mind for ever.

(Er. Bandita Phukan is an eminent assamese writer)



Padmapati sir – A great guide

Sanjib Sabhapandit

'Nothing falls from the heavens. Now you go'. So car the firm words from his weathered mouth and through t long disobedient hair dangling from his luxuriant cr ealize at unseen places.

I was urging him, along with a few of my student friend to convert the Assam Engineering College workshop in a learning cum production centre. The year was 1982 was working as a lecturer in the Mechanical Engineeri department then. I was then a part of a team eali alizing, planning and building the initial blocks to set up textile mill with an estimated project cost of Rs 25 crore a down stream industry of BRPL, which subsequen came into being as APOL. In that initial process itself was beginning to ealize where an entrepreneur in Assa faces difficulty in getting things done in a technical facili So the urge was building up to see a set up as mentione I came back dejected.

Next day, he called me to explain that my proposal w hollow, because I did not go with something in writin Unless one writes down the thoughts, it never concretise A technical person should not talk from the heart, but or from the brain. Through writing only, objectivity builds u The machines in the workshop were set up with particular purpose and to alter the set up, specific id was needed....not just wishful thinking.

This was Prof A K Padmapati.

And that was the greatest teaching that I learnt in r whole student life.

(Er. Sabhapandit is an eminent film director, writer and entrepreneu

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