



Development of Lightweight Materials for Automobiles

OBJECTIVE

■ CSIR-AMPRI and TATA Motors are jointly working for the development of cost-effective, high-strength, durable, environmental friendly and energy efficient lightweight materials /components for automobile applications

ABOUT TATA Motors

Part of 4000 Billion Indian Rupees - Tata Group. Turnover 950 Billion Indian Rupees. Fortune 500 Co. Producing close to 1 M Vehicles including Passenger Cars, SUV, LCV, MCV & HCV. First Automotive company to comply SA 1800.

Materials Technology Group is part of Tata Motors Engineering Research Centre and have major role in adopting new Materials technologies into Automotive Products. The Industry/Academia/Research Institutes and suppliers collaborative co-operation is a classical working model for such exploratory projects adopted by MTG. The group interact with various institutes and organizations to establish working relationship to initiate such projects.

Interactions for

- MMC Brake Drums
- Crash box and AI or ferrous foam for Seat channels,
- Aluminum Steering Knuckle
- MMC Con Rod

Way forward

Short term and immediate opportunities
Long term opportunities
Innovation opportunities



Development of Lightweight Materials for Automobiles

OBJECTIVE

■ CSIR-AMPRI and General Motors are jointly working towards the development of cost-effective, high-strength, durable, environmental friendly and energy efficient lightweight materials /components for automobile applications.

General Motors - Global Research and Development

The India Science Lab (ISL), located in Bangalore, is a critical part of GM's Global Research Network, and is chartered to deliver unique innovations in technology areas of strategic importance to GM. ISL has a diverse cross section of researchers of various backgrounds, education and experience, with a wide repertoire of interdisciplinary research skills. Amongst the various programmes underway at ISL, materials characterisation and modelling is an important area pursued with a special focus on virtual microstructure modeling and corrosion analytics. These efforts support the global lightweight materials technology and product development efforts at GM.

Key highlights of collaboration activities underway

- ◆ Development of Processing Maps for Al & Mg
- ◆ Natural fiber panels
- ◆ Development of high rate Mg extrusion capability
- ◆ Exploration of low cost production for Al & Mg manufacturing (eg. twin-roll caster)
- ◆ Development of in-house capability for advanced casting techniques for Mg
- ◆ Corrosion Mitigation Strategy

Way forward:

Explore short and medium term opportunities in the above areas
Further strengthen Institute-Industry collaboration to foster innovation



Bharat Heavy Electrical Ltd., Bhopal

Materials



Institute Industry Interactions

OBJECTIVE

- Cost and energy efficient materials development for Hydro turbines and Hydro generator
- Design Modification of Engineering Components amicable to new Materials
- Prototype Component Development
- Import Substitution
- Alternative Processes Development.

About BHEL Bhopal

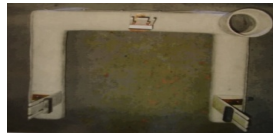
Heavy Electrical Plant Bhopal is mother plant of Bharat Heavy Electrical Ltd, the largest engineering and manufacturing enterprises in India in the energy generation, transmission and utilization sectors. The main products of BHEL Bhopal are Hydro Turbines, Hydro Generators, Power Stations, Transport Equipment, Ac Motors, Transformers and Switch Gears etc. Turnover of BHEL Bhopal is ~ Rs. 3708Cr.

Conformable Pipes for Cooling System for Hydrogenerator
Size : 0.025 X 0.065 m diameter



Implemented by BHEL for ease in maintenance

FRP Hopper for Hydrogenerator
Size : 0.5 m X 0.5 m X 0.25 m



Implemented by BHEL for efficient collection of harmful Dust

DT Cone for Hydro Turbine
Diameter & Height ~0.5 mb



Seamless casting and high strength joining

Oil Vapour Seal for Hydrogenerator
Size : 3 – 5 m diameter



Commercialized; Technology transferred to M/s. Associated Engineers and M/s. Quality Insulations

FRP Air Baffle for Hydrogenerator
Size : 3 – 5 m diameter



Lightweight and high strength component
In commercial use by BHEL

Asbestos free Brake Pad
Size : 0.3 m X 0.3 m X 0.04 m



Used for high speed hydrogenerator
Lightweight, high strength block

FRP V-Block



Technology transferred to M/s COEFF Friction Bands Pvt . Ltd. Pune
In commercial use by BHEL

Key Bar
Size : 1.5 m long 0.15 m diameter



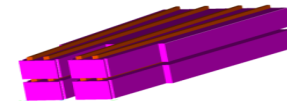
Better Surface Finish and Strength
Less Time Consuming; Cold drawing
Versus milling Demand : 2500 per year

Pole End Plate
Size : 0.6 m X 0.20 m



Substitution of Forging with Casting: Cheaper and Less
Cumbersome process
Demand : 100 0 per year

Ventilation Spacer Bar



Better ventilation
Optimization of Processing Cycle and Parameters
Demand : 20 tons per year Size : 0.4 m X 0.04 m



Service to the Nation



Development of Lightweight Materials for Commercial Vehicles

OBJECTIVE

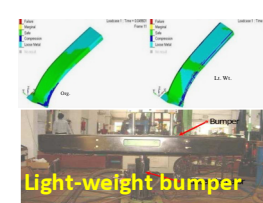
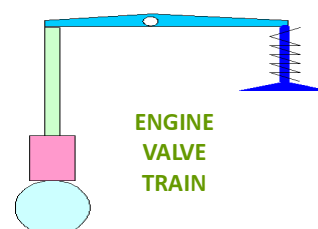
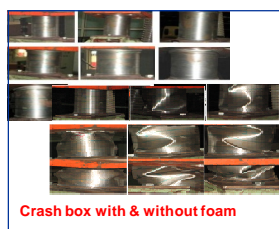
CSIR-AMPRI and Ashok Leyland are jointly working for the development of cost-effective, high-strength, durable, environmental friendly and energy efficient lightweight materials /components for automobile applications.

ABOUT ASHOK LEYLAND

Ashok Leyland is the flagship of the Hinduja Group and a leading manufacturer of commercial vehicles in India with 2009/2010 turnover of US \$1.6 billion. With seven manufacturing locations, the Company has a production capacity of 150,000 vehicles. Ashok Leyland has associate companies in the Czech Republic and the UAE and a joint venture in Sri Lanka, besides exports to over 20 countries worldwide.

COLLABORATIVE EFFORTS:

- Natural Fiber panels and for wind deflectors and trims
- Tailor Welded Blank for body panels, bumpers & Panels
- Foam impregnated engine mount brackets
- Al & Mg components for engine valve trains



Way forward:

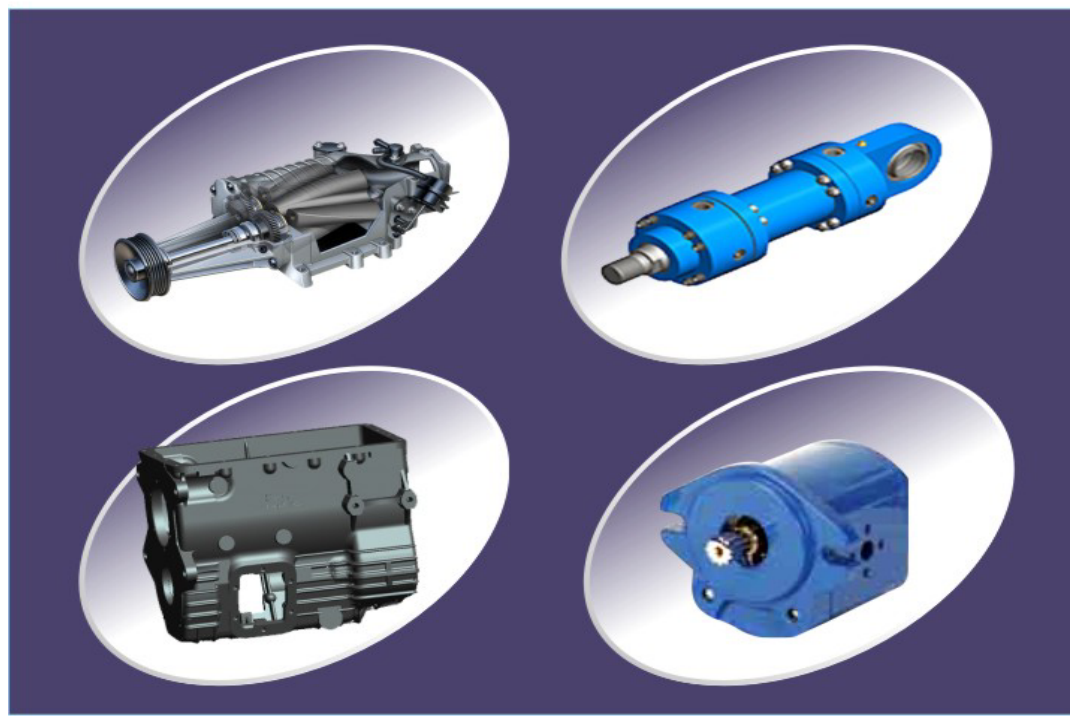
- Short term and immediate opportunities
- Long term opportunities
- Innovation opportunities





INSTITUTE – INDUSTRY PARTNERSHIP

CSIR-AMPRI and Eaton Corporation jointly working for the development of cost-effective, high-strength, durable, environmental friendly and energy efficient lightweight materials / components for vehicular applications.





IRON ORE BENEFICIATION: PLANT AUDITING & PROCESS DESIGN

Essar Steel is a global producer of steel with footprint in India, Canada, USA, the Middle East and Asia with current capacity of 8.6 MTPA. It operates 8 MTPA capacity iron ore beneficiation plant at Kirandul, Chhattisgarh, India. It boasts of a 267 km slurry pipeline (the second longest in the world) from Kirandul to its pellet plant at Visakhapatnam. It is setting up an iron ore beneficiation plant at Barbil, Orissa to produce 12 MTY iron ore concentrate, based on CSIR technology.

Essar Iron Ore Beneficiation Plant at Kirandul

The plant was commissioned to process 1440TPH of iron ore fines and slime from NMDC to produce pellet grade concentrate.



Beneficiation Plant, Kirandul



Problems faced

The plant could not achieve the desired rated capacity of 1440 TPH due to design and operational problems.

Role of CSIR

CSIR-IMMT was contacted for plant auditing and debottlenecking.

The plant performance was improved from 900 to 1440 TPH by simulation and optimisation with minor modifications in the flowsheet. The capacity was further enhanced to 1680 TPH by additional modification in the flowsheet.

Later on Essar decided to put up a 12 MTY iron ore concentrate plant at Barbil, Orissa at a cost of Rs. 1000 crore based on CSIR technology.

Signing of MOU with CSIR-IMMT



Innovative effort by CSIR-IMMT

Essar Steel inks MoU with IMMT

Plans to utilise indigenous technology developed by the scientists

Staff Reporter

BHUBANESWAR: Indian steel major Essar Steel Limited on Wednesday entered into an agreement with Institute of Minerals and Materials Technology (IMMT) to utilize the indigenous technology developed by the latter's scientists for deriving high iron values from low grade iron ore.

A memorandum of understanding to this effect was signed by IMMT Director Barada Kanta Mishra and Chief of Operations of Essar Steel.



M.K. Sampath, Chief of Operation ESSAR Steel, addressing the media after signing the MoU with IMMT in Bhubaneswar on Wednesday.

Courtesy: The Hindu dated 25.07.2008

Strength of CSIR R&D:

The key to the success of the collaboration was about reposing confidence in indigenous know-how and expertise of CSIR which is equal or better than any other technology available globally.



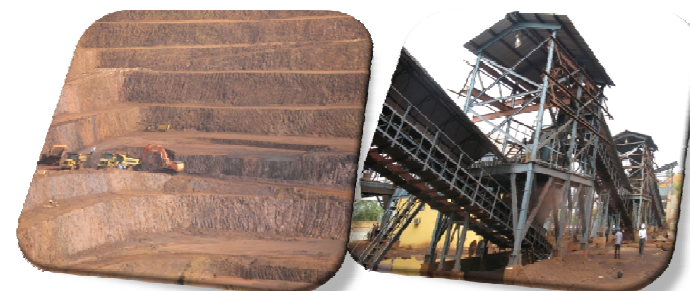
Service to the Nation



(Formerly Jindal Stainless Ltd.), Plot No 756 P, Jayadev Vihar,
Bhubaneswar, Orissa 751013

Chromite beneficiation plant

- A part of O P Jindal group, JSL Limited, is the India's largest and only integrated stainless steel manufacturer.
- Mining and beneficiation of chromite ore is key to the integration process of stainless steel. JSL has chromite ore open cast mines at Sukinda, Orissa to support 40,000 tpa capacity Ferro Chrome plant.
- Good quality lumpy chromite ore is in short supply and JSL decided to utilize low grade ore / tailings for resource conservation.
- A 500 tpd plant was conceived with technical assistance from CSIR-IMMT.
- The plant has been erected and expected to be commissioned shortly.
- CSIR-IMMT has also rendered their expertise on plant auditing of the existing high grade ore beneficiation plant resulting in improved plant performance after implementing suggested modifications .



National Aluminium Company Limited, Bhubaneswar



Incorporated in 1981, as a public sector enterprise of the Government of India, National Aluminium Company Limited (NALCO) is **Asia's largest integrated aluminium complex**, encompassing bauxite mining (6.3 MTY), alumina refining (2.1 MTY), aluminium smelting (0.46 MTY), casting, power generation, rail and port operations. Commissioned during 1985-87, NALCO has emerged to be a star performer in production, export of alumina and aluminium, and more significantly, in propelling a self-sustained growth.



R&D WITH CSIR - IMMT:

UTILIZATION OF WASTE PLANT SAND:

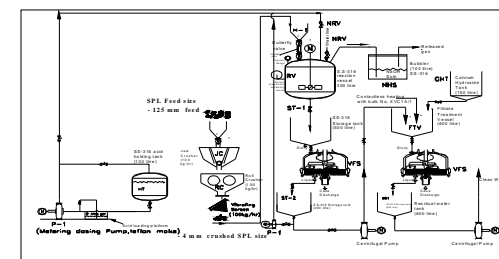
At NALCO's aluminium refinery at Damanjodi, about 2,72,000 tons of plant sand is generated as waste which contains 7-9% TiO_2 , 0.30-0.45% ZrO_2 and 65-70% Fe_2O_3 . A novel technology was developed by CSIR to recover the titanium and zircon values from this waste that ensures recovery of around 30,000 tons of Ilmenite containing ~40-45% TiO_2 and 1000 tons of Zircon sand containing 56-60% ZrO_2 annually. Further, the technical feasibility of producing value added products like TiC and TiO_2 rich slag by thermal plasma technique was established. The company is in the process of commercializing the process.



DECONTAMINATION OF TOXIC SPENT POT LINER (SPL) & RECOVERY OF CARBON VALUE:

Spent pot liner (SPL) the used cathode carbon blocks rejected by aluminum smelters is one of the highest category toxic waste (category K088) generated by the industrial world. The disposal of thousands of tons of such material generated annually is a challenge to the engineering and scientific community.

NALCO took up R&D on this challenging problem with CSIR in 2007. The aim was to decontaminate the SPL waste and recover its carbon value. Based on the philosophy of recovering the cost of chemical decontamination through high value industrial carbon byproducts, while simultaneously ensuring safe disposal of the highly toxic waste, CSIR developed the technology and demonstrated the same at 1 ton/day scale. Simultaneously a large number of important byproducts such as pencil lead, catalyst for generating Pyrogenic silica at lower temperature, dry cell electrode, electrically conducting carbon paste, silicon carbide etc. were developed from the recovered carbon material and patented in India, USA and Europe by CSIR. NALCO is in the process of commercializing the process.

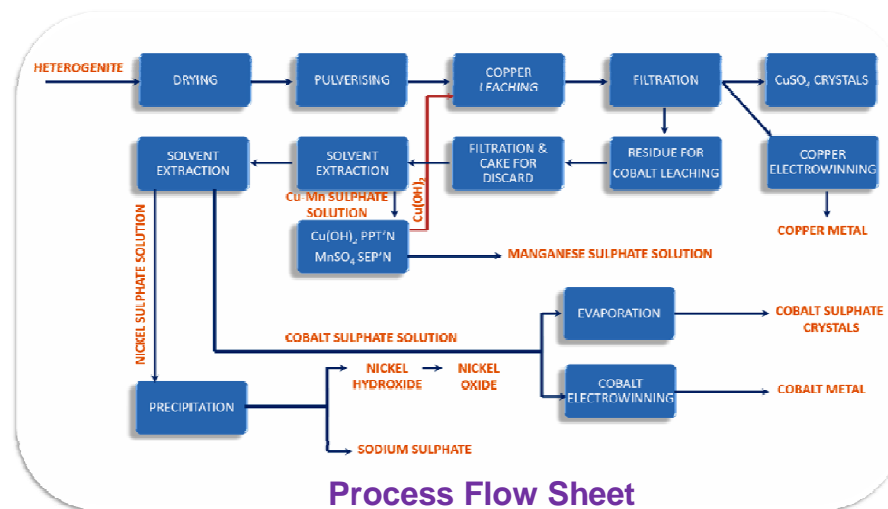


Schematic diagram of 100 kg/batch SPL treatment plant fabricated and operated by IMMT-Bhubaneswar for NALCO (India)



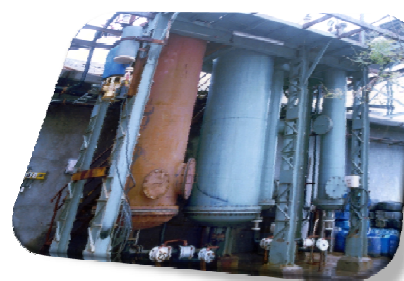
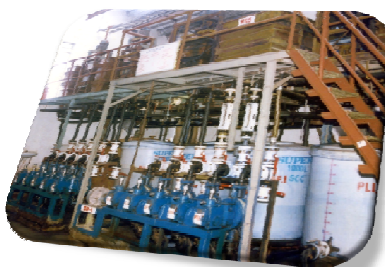
Cobalt from secondaries

- ✓ We are the leading producer of cobalt metal and cobalt salts in India.
- ✓ Cobalt metal is used in super alloys, hard facing alloys, batteries, magnets, cemented carbides, diamond tools, catalysts and pigments
- ✓ India is not having any economically viable primary resource of cobalt and need to depend on secondaries.
- ✓ Indigenous technology was not available and imported technology was prohibitively expensive.
- ✓ In 1995, we have decided to develop a technology in partnership with CSIR – IMMT, Bhubaneswar for recovery of cobalt from secondaries through Hydro & Electrometallurgical route.
- ✓ What resulted is a success story from an initial plant capacity of 100 tpa cobalt to a current capacity of 600 tpa and a planned expansion to 1500 tpa by 2011.



Capacity

Product	Current, tpa	In 2011, tpa
Cobalt	600	1,500
Copper	7,500	25,000
Zinc oxide	12,000	20,000



Indian Rare Earth Limited, Mumbai

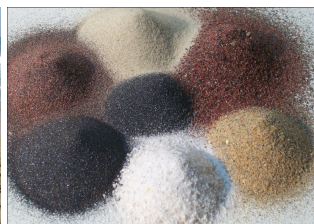
Minerals, Materials



Institute Industry Interactions

Brief introduction about IREL:

IREL is a Government of India undertaking under the administrative control of Department of Atomic Energy. It's a pioneer in the field of mining & processing of beach sand materials such as ilmenite, rutile, garnet, sillimanite, Zircon, Monazite etc. It has three processing units viz at Chavara (Kerala), Manavalakuruchi (Tamil Nadu) and Chatrapur (Orissa). It is also operating a chemical plant at Udyogamandal, Alwaye (Kerala). Products find use in manufacture of white pigments, welding electrodes, foundries, ceramics, refractories, abrasives for polishing glass/ TV tubes and in sand blasting etc. Sales turnover exceeds 3600 million with export component over Rs 1000 million.



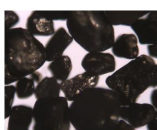
About Orissa Coast Operations 'OSCOM':

The mineral belt running over a coastal length of nearly 18km with a total area of over 26sq.km., is estimated to contain about 230 million tons of raw sand with 20-25% heavy minerals and is expected to last for about 100 years.

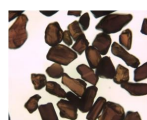
OSCOM was commissioned at a place called Chatrapur to produce 2,20,000 ton ilmenite having 50% TiO_2 content and associated minerals etc. Ilmenite is primarily exported to customers engaged in production of slag and sulphatable TiO_2 pigment. A Thorium plant is in operation since 1992 at OSCOM to produce 240 ton per annum mantle grade Thorium Nitrate.

How IREL is engaged in recovery values:

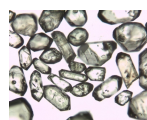
IREL is involved with processing of beach sand minerals and its main products are ilmenite, rutile, zircon, sillimanite, garnet, monazite etc.



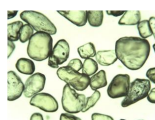
Ilmenite
Microscopic



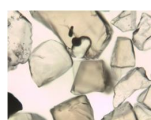
Rutile



Zircon
Microscopic



Monazite
Microscopic



Garnet
Microscopic



Pilot scale inflight plasma reactor
inaugurated by Dr. R.N. Patra, CMD, IREL,



Pilot plant inflight plasma reactor
at IMMT, Bhubaneswar



Titania rich slag



Pig iron

IREL has been funding to CSIR Laboratories: IMMT, Bhubaneswar, IICT, Hyderabad and NIIST, Trivandrum, NML Jamshedpur. Today IREL supports R&D activities of CSIR Labs. to the tune of 4.5 Crore.

Some of our long term plans are as follows:

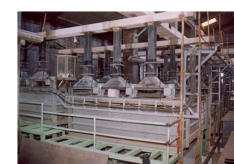
- Development of pilot plant for plasma smelting of ilmenite to produce titania rich slag and pig iron.
- Development of pilot plant for production of mullite and zirconia toughened mullite from sillimanite.
- Solutions to industrial problems through the R&D base of CSIR.



DREDGING &
BACKFILLING



View of dredge and wet
upgradation plant
(DWUP)



Mixer settlers used for solvent
extraction for separation of
rare earths.



Clariflocculator (In
Effluent Treatment Plant)



Service to the Nation



Initiatives towards Zero Waste

- Located in one of the most backward and under developed regions of the country
- An ISO 9001, ISO14001 and OHSAS 18001 certified Alumina refinery of capacity 1.0 Million MTPA
- First Alumina refinery in India to implement Zero Discharge system successfully
- Committed for overall socio economic sustainable development
- Continuous working to improve Education, Health, Infrastructure and Livelihood



R&D Projects in Collaboration with IMMT Bhubaneswar

Successful stories

✓Utilization of red mud and fly ash for commercial brick manufacturing process

Benefits: Minimizing Green House gas emissions and soil erosion. Optimum utilization of natural resources. High strength material at low cost.



Red mud and Fly ash bricks



Constructed wall

Projects under progress

✓Characterization & Beneficiation studies of Bauxite ores for reduction of Reactive silica and Iron

Benefits: Reduction in specific consumption of raw materials.

✓Manufacture of Slag Grade Iron and Slag from Red Mud by Plasma Arc

Benefits: Slag grade iron for the production of heavy duty machine parts and slag in cement manufacturing.

R&D Project on Extraction of Fine Iron from red mud has also been taken up in collaboration with NIT Rourkela



CSIR

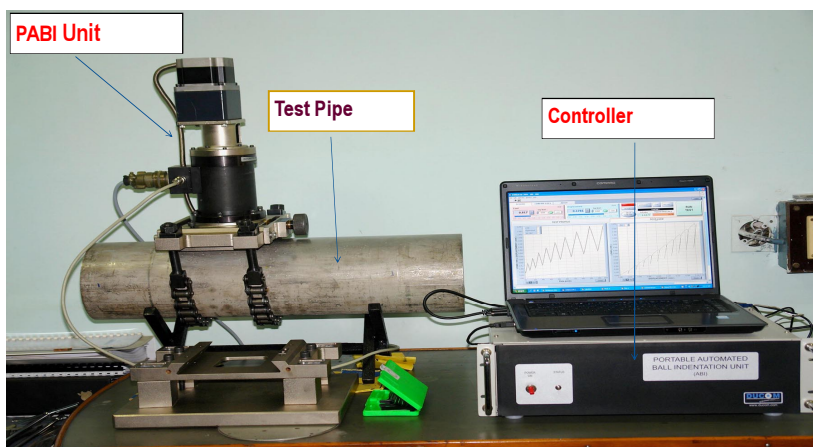


IN-SITU MECHANICAL PROPERTY EVALUATION OF COMPONENTS

OBJECTIVE: Design, Development, Standardization and fabrication of a Portable Automated Ball Indentation (PABI) system for evaluating mechanical and fracture properties of in-service components

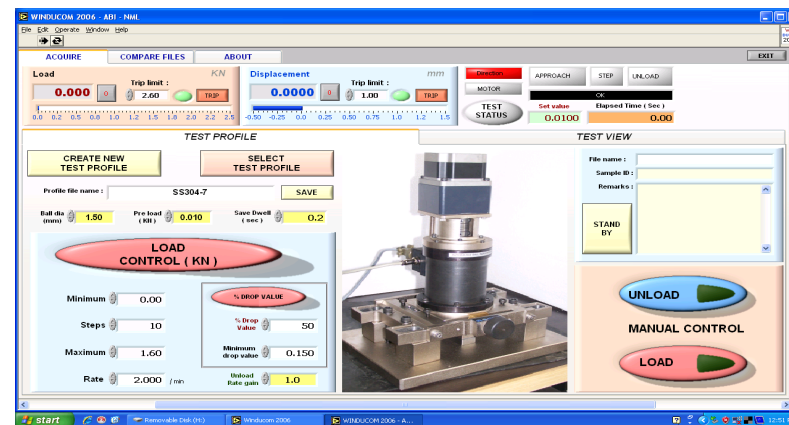
INNOVATION: PABI has been developed at NML from its conceptual stage, including design, development and fabrication. No such Commercial Portable unit to the best of my knowledge is available in the National/International Market;

ABOUT THE SYSTEM: This PABI system is capable of measuring yield strength (YS), ultimate tensile strength (UTS), true-stress vs. true-plastic-strain curve, strength coefficient (K), strain hardening exponent (n), hardness (BHN) and fracture toughness (K_{IC}). This unit can be mounted on components having curved or flat surfaces and properties of the material could be evaluated by making a very small indentation. It can also be used to test small specimen either in the laboratory or in at site.



PABI system is on actual pipe.

ABOUT DUCOM: DUCOM is an international leader in the field of tribological test instruments, with customers in over 40 countries and 1500 laboratories. DUCOM is also engaged in few other areas. DUCOM staff and application experts actively participate in research activities and projects. DUCOM research team works with several laboratories on joint research programmes.



Front page, operational software with test profile.

POTENTIAL USERS: Atomic Energy, Power Plants, Oil Refineries,

PRESENT USERS: BARC, Mumbai and IOC, Faridabad, BHEL Haridwar is expected to take one unit.

REMARKS: For in-situ application it is nearly non-destructive since no material is removed from the test surface. It helps to: (i) estimate the current key mechanical properties needed for damage assessments and (ii) periodic health monitoring of aging components.



Melt Spinning System for the preparation of Wide metallic glass ribbons

Objective: Development of a melt spinning system for the production of 25-35mm wide, 30micron thick, continuous ferrous and non-ferrous metallic glass ribbons

About Vacuum Techniques (P) Ltd.

Vacuum Techniques (P) Ltd, was founded in 1989 and is now one of India's largest suppliers of high vacuum equipment. The company has teams of engineers, designers, machinists, welders, finishers, and Quality Inspectors who are dedicated, highly skilled and have the expertise to make both Standard & Custom Built Equipments. The company has capabilities in design, manufacturing, and failure analysis. The industry has recently become an ISO 9001-2000 company.



Innovation: The system has been developed at NML from its conceptual stage including design, development and fabrication. Such indigenous system capable of producing wide iron based ribbon (metallic glass) was first of its kind developed in India.

Instrument Capabilities :

The instrument involves the Rapid solidification route through melt spinning technique for the preparation of the ribbons directly from the melt. In this technique the molten metal is induction melted and ejected into a rotating Copper wheel. The process can be carried out in air or in inert atmosphere. The instrument has the capability of melting and spinning 1kg of Fe-based alloy into ribbons. The process parameters include nozzle slit geometry, separation of Nozzle slit -copper wheel speed, ejection melt temperature and pressure.

The product:

Production of amorphous and nanostructured ribbons directly from the melt of :

- (i) Fe based alloys
- (ii) Non-ferrous alloys

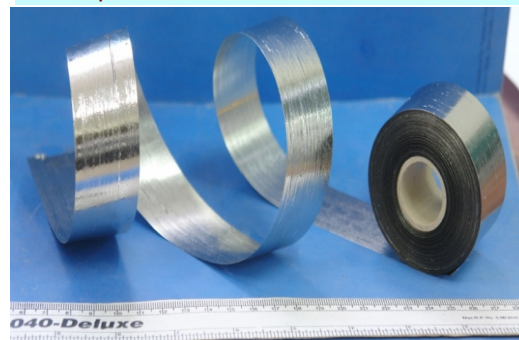
Ribbons of width 25-35 mm and thickness 25 to 50 μm

Potential Components:

Choke coils, Transformer cores & Sensors

Perspective Industrial Users :

Usha Amorphous Metals Ltd, Gurgaon
Vijaya Electricals Ltd, Hyderabad
Fibradite Products Pvt Ltd, Bangalore
Amod Stamping Pvt Ltd, Vadodara, Gujrat
Strategic Sectors (Defence & Space)



Remarks:

Fe-based materials exhibit extremely low core-loss suitable for transformer core applications



MANUFACTURING AND COMMERCIALIZATION OF SIALON CUTTING TOOL INSERTS AND OTHER PRODUCTS

Double
Dee

Institute Industry Interactions

SIALON-based materials have a combination of properties that result in superior resistance to wear, thermal shock and mechanical stress. These properties include high strength, toughness and creep resistance up to high temperatures, moderately high hardness and thermal conductivity in combination with low specific gravity, coefficient of friction and thermal conductivity compared to most other ceramic materials. Combination of the high toughness, strength, hardness, thermal shock resistance and low coefficient of friction allow Si_3N_4 -based materials to be premium candidates for highly stressed wear parts like cutting tool inserts, ball bearings, drawing dies etc.

Manufacturing Process

The process consists of super hard filler preparation, mixing, molding, de-waxing and consolidation.

Milling: SiAlON material is air dried to remove absorbed gases and moisture to create an active surface for binder mixing. These components were mixed with volumetric percentage of organic binder before injection.

Molding: The parts are then molded by injecting the powder plus binder mixture. The control of the green density when compounding the powder is critical. The part, after molding, is inspected before being dewaxed. At this point in the process the part can be reverted and re-melted and remolded if any deficiencies are found.

Dewaxing: The parts are then placed in a organic media for 5hrs (depending up on the cross sectional area) for partial dewaxing and subsequently thermally de-waxed.

Consolidation: The parts are then sintered under pressure in a HIP for critical porosity call-outs. After sintering, the parts will be evaluated for metallurgical properties. Further after this depending upon the product, diamond grinding and polishing may be applied.

Technology Advantages

1. Greater wear resistant products using SiAlON material.
2. Near net shape production route, thus reducing scrap and lesser secondary operations.
3. Products will have near full density thus giving better mechanical properties.
4. Costing to be similar to normally available TC based tools.
5. Products will have around 100-200% higher life as compared to regular TC based products.
6. Low capital investment as the company has developed near net shape manufacturing techniques and as it has already installed a mini HIPer.
7. Concept is modular and can be used for various applications as listed in the Project Objectives.
8. By introduction and development of these products a global industry worth 100 billion dollars will be added to the Indian manufacturing sector which currently has numerous strategic advantages.

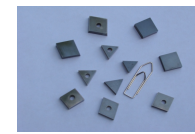
CGCRI In the laboratory scale a large pool of experiences for studies in phase relationships, microstructure and sintering have already been generated at the Non Oxide Ceramic Division of Central Glass & Ceramic Research Institute, Kolkata since few decades which are proposed to be exploited for the development of manufacturing of SiAlON based cutting tool inserts.

Double-Dee Technology Pvt. Ltd. is producing diamond tools for the stone and the construction industries. The company's plants are located at Nerul, Navi Mumbai and Nalagarh, Himachal Pradesh. The company is producing diamond tools using the sophisticated hot isostatic pressing (HIP) technology. The acquired experiences in HIPing and MPIM are being successfully employed for the development of SiAlON products.

Products



Diamond Tools



SiAlON Cutting Inserts

PRESENT WORK:

Diamond Tools: Presently Double-Dee produces various diamond tools for stone mining using synthetic diamonds. We are going to replace the synthetic diamonds with SiAlON as it has better properties in rock cutting applications. With the help of CGCRI the costing would also be beneficial. This is a course of present work.

Cutting Inserts: SiAlON based cutting inserts have a wide application in the metal forming industry. Tools produced from this material have a high hot hardness and high fracture resistance. This allows for faster cutting speeds and better tool life. This in comparison with HSS, TC and other ceramics is thus far superior. This process has already been initiated by the company.

FUTURE WORK:

Shot Blasting Nozzles / Milling Media: Shot blasting is usually done with an abrasive grit such as alumina and sand which causes the nozzle to wear. When produced with SiAlON the nozzles have a higher life as the hardness of the material withstands such tough conditions.

Welding Location Pins: Used in the resistance welding of captive nuts in the automotive and commercial vehicle assembly. In comparison to steel pins the life of the SiAlON material is extremely high.

Ball Bearings: SiAlON ceramics have good shock resistance compared to other ceramics. Therefore, ball bearings made of SiAlON are used in performance bearings. SiAlON ball bearings are harder than metal which reduces contact with the bearing track.

Extrusion and Drawing Dies: The process of Extrusion and Drawing is extremely demanding on the die that is used. The die must be chemically stable, which is possible in SiAlON. continuous measurement of temperature in the non-ferrous industry. The non-wetting characteristics that lead to non-contamination from the melt and has a higher life due to high temperature corrosion-resistance for degradation.





www.wood-without-trees.in

WvT
WOOD WITHOUT TREES
Shivaye Namah Manufacturing Co. Pvt. Ltd.

In association with
CBRI

SNMC wood without trees, products are made from Natural Fiber (derived from agricultural waste e.g. rice husk, rice straw, wheat straw, etc.) and recycled plastics, without using wood in any form.

Our manufacturing process adopts advanced Indigenous technology and enjoys Back-up support from Central Building Research Institute, Roorkee (INDIA). Our company products aim to maintain the Earth's ecological balance. In our formulation, we consume agricultural residues, which creates environmental hazards as they pollute the air in absence of their proper disposal techniques.

At the same time we use recycled plastic granules thereby reducing the CO₂ content and subsequently reducing global warming. Moreover, all products are 100% recyclable and can be used over various cycles.

About SNMC wwt Products
Natural fibre/ filler filled thermoplastic is a newly developed engineering material used as a replacement of natural wood. The typical applications includes: door and window profiles, frames, decking, fencing, lumber, furniture and other industrial applications. Researches are focusing on finding wood fibre alternatives in the melt blend processing.

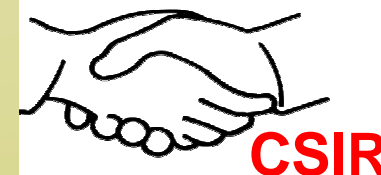
The profiles can even be specifically developed & produced for the customer. These profiles can be easily compared with the structural natural wood.

Usage and Applications

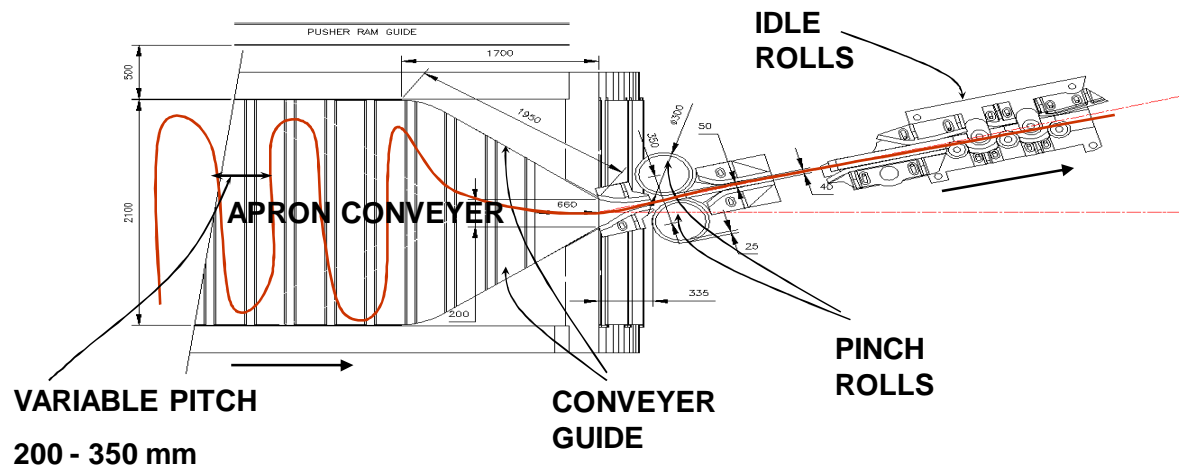
1. Door & Window frame
2. Decking/Fencing, Walkways etc.
3. Outdoor furniture, Park & Public Place Sitting Bench
4. Structural /Semi Structural Installations
5. Pallets for Shipping and Storage
6. Flower Pots/ Dustbins etc.

Supra Institutional
Know How Transfer
Manufacturing of Rice Husk Fibre
(28th January 2019)
केन्द्रीय भवन अनुसंधान संस्थान, रा.
Central Building Research Institute, Ra.
केन्द्राधिक तत्वा औद्योगिक अनुसंधान सं.
CSIR-INDIA

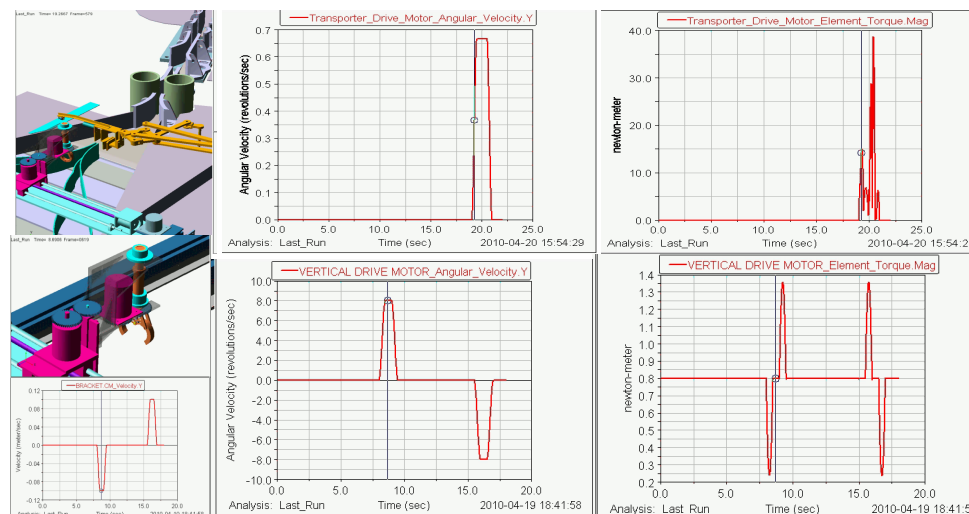
SNMC
Shivaye Namah Manufacturing Co. Pvt. Ltd.
(SFMC Group Companies)



AUTOMATION OF SKELP FEEDING & CLIP FIXING



CSIR-CMERI, Durgapur, in collaboration with the Durgapur Steel Plant (SAIL) undertook the task of automating the Skelp Feeding and Clip Fixing Processes in the Skelp Mill to replace the traditional method of manual intervention in an ambience of high temperature, thereby increasing productivity.



Commercialization of Nano Hydroxyapatite Know-how



CSIR-NML

The process for production of nano-sized hydroxyapatite powder was transferred and commercialized based on NML-CSIR Know-how. The product has been launched in the market under the brand name of "EUGRAF and SYBOGRAF / SYBOGRAF Plus".

The product EUGRAF has been positioned in the dental segment.



Somo Organo-Chem Pvt. Ltd., Bangalore



Institute Industry Interactions



SOCPL

A Saga of innovation and Excellence

Manufacturers of:

- Speciality Fine Chemicals
- Ore Flotation Reagents

Industrial - Scientific Establishment tie-up with National Metallurgical Laboratory

Working with **National Metallurgical Laboratory** for the development of Ore Flotation Reagents for the beneficiation of specific ores. The Reagents manufactured by **Somu Organo-Chem Pvt. Ltd.**, are evaluated by National Metallurgical Laboratory. This Industrial - Scientific tie up enabled us to commercialise of our reagents for industrial applications. Under this Industrial - Scientific tie up, recently, we have commercialised our Ore Flotation Reagent **SOKEM 522C** for the beneficiation of Iron Ore at **Ms. JSW Steel Ltd.**, Toranagallu, Bellary, Karnataka State, India. Thanks to CSIR - NML.

SOCPL is an ISO 9001:2008

ISO 14001:2007

OHSAS 18001:2004

Certified Company

Contact Manufacturers:



Somu Organo-Chem Pvt. Ltd.

" SOMU CENTRE ", 29th Main, 1st Phase, 2nd Stage,
BTM Layout, Bangalore - 560 076. INDIA.

Phone : +91-80-26780855, 26783595, 26783596, 26783728,

Fax : +91-80-26783729, 26781255

E-mail : sshivakumar@somugroup.com

Website : www.somugroup.com

CSIR-NML

New mineral reagent systems for the beneficiation of ores, flotation reagents were developed and successfully evaluated for beneficiation of various ores for organisations like – M/s Tata Steel, West Bokaro; M/s Jagannath Steels; M/s Sesa Goa; M/s Jindal Steel & Power Ltd., Raipur; M/s JSW Steel Ltd. and many more. The product has been commercialized and being used at Jindal Steel Works.



Service to the Nation

Gujarat Mineral Development Corporation Ltd.

Minerals



Institute Industry Interactions



Panoramic View of Ambadungar Fluorspar Mine, GMDC , Kadipani, Dist. Baroda, Gujarat



View of Classifier at Fluorspar Beneficiation Plant at GMDC, Kadipani



View of Beneficiation Plant designed by M/s. NML in 1970 Operating with 500 TPD capacity at GMDC, Kadipani



View of ETP at Fluorspar Beneficiation Plant at Kadipani

CSIR-NML-GMDC

The process for production of Acid-grade and metallurgical grade Fluorspar was transferred and commercialized in 1970 based on NML-CSIR technology. This is the only fluorspar plant still in operation in India. The products are in constant demand by chemical and metallurgical industries.



Service to the Nation