

NATIONAL METAL AND MATERIALS TECHNOLOGY CENTRE

By

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The National Metal and Materials Technology Centre (MTEC) is one of the research centres under the National Science and Technology Development Agency (NSTDA). It has about 300 researchers in nine interlinked research units in the areas of design and engineering, computer-aided technology, polymers, ceramics, materials characterization, biomedical engineering, environment, materials for energy, and materials reliability. Besides its own research, MTEC also undertakes contract research for the industry and other research organizations, as well as testing for characterization according to international standards.

MTEC has developed a number of industrial technologies and successfully transferred them to the Thai industry. Some of these are listed below.

1. High-performance flocculant for natural rubber latex centrifuge machine wash water

Issues identified:

- Very long recovery time for recovering rubber from washing wastewater; and
- Aeration, sulphuric acid and costly polymer are needed for the recovery, but these affect the quality of rubber and increase the cost of process and environmental impact.

Research outcome:

MTEC's Rubber Laboratory developed a high-performance flocculant called GRASS2, which improved the process by:

- Reducing the recovery time of high-quality rubber from centrifuge machine washing water from 7 days to 15 minutes;
- Reducing process cost by 67 per cent; and
- Minimizing the release of hydrogen sulphide gas from the serum and sulphuric acid used, with direct benefit on environment and operator health.

Technology transfer:

- Technology has been transferred to Chalong Latex Industry Co. Ltd.; and
- Major companies that have expressed interest in technology transfer include: Inter Rubber Latex Co. Ltd., Tavorn Rubber Industry Co. Ltd., Thai Rubber Latex Corporation Public Co. Ltd. and Sri Trang Agro-Industry Public Co. Ltd.

2. Development of leadless glaze for low-temperature glost firing

Issues identified:

- Lead glaze leaching into food stored in the ceramic ware, thereby creating a health hazard; and
- Overseas market restrictions, as lead glazes are prohibited in many countries.

Research outcome:

The CDM Lab developed leadless glaze on ceramic products at glost firing temperature below 1,000°C. Benefits of the research include:

- Lower energy consumption;
- The leadless glaze has excellent gloss, and no visible change was detected after dishwasher test; and
- The amount of lead and cadmium released from glazes are well below the acceptable limit.

Technology transfer:

Technology has been transferred to Unique Pottery Co. Ltd. A patent was obtained for leadless glaze formula GP-3.

3. Porous media derived from rice husk ash

Products:

All products are made from 100 per cent rice husk ash obtained from biomass power plants through environmentally sound and cost-efficient processes. These products include:

- Mullite ceramics that can be formed into various shapes to suit specific applications;
- Toys and souvenirs;
- Lightweight aggregates for use in construction or as part of decorative items;
- Ceramic ware tested according to ISO 6486 and certified for food-contact application; and
- Biofilter media, with a surface area 1.2 times greater than that of natural coral.

Achievements:

- Mullite ceramics – a petty patent, a Gold Medal at Brussels Eureka!2004, and an award from World Intellectual Property Organization (WIPO);
- Toys and souvenirs – a petty patent application and Appreciation Invention Award 2006 from the National Research Council of Thailand;
- Lightweight aggregates – two trade secrets;
- Ceramic ware – Gold Medal at the 34th International Exhibition of Invention of Geneva 2006, and Appreciation Invention Award 2006 from the National Research Council of Thailand; and
- Biofilter media – a patent application and Gold Medal at the 38th International Exhibition of Invention of Geneva 2007.

Technology transfer:

The technology has been licensed to Environment and Energy Technology Co. Ltd.

4. Electrical energy saving in electric arc furnace (EAF)

Issue:

Electrical energy is the major source of heat for steel scrap melting using EAF. EAF is the heart of a mini mill and a more efficient EAF would be a strong base for a company's competitiveness. Electrical energy saving in EAF project was developed with cooperation from Iron and Steel Institute and Bangkok Steel Industry Corp.

Research result:

Annual electrical energy consumption expense was reduced by 3 million baht.

5. Biodegradable Testing Laboratory

The testing laboratory, which is Thailand's first for biodegradability of plastics, has conducted research, developed testing devices and taken a systematic approach for developing test methods for biodegradability of plastics in accordance with international standards. The laboratory is able to provide testing service for plastics manufacturers and researchers across Thailand.

6. Production of bio-resins for plastic industry

Issue:

Resins use corn starch, which is costly. A locally produced cheaper starch was needed to replace the expensive corn starch in resins.

Research result:

The cassava starch that MTEC developed could be used in compound resins for processing into plastic sheets, films, etc. The biodegradable plastic products (sheet, film and bag) have the same appearance and mechanical properties as those made with corn starch-based resins, but could be sold at a more competitive market price.

Achievement:

Silver Medal at the 38th International Exhibition of Invention of Geneva 2007.