

Meanwhile, Back in Tokyo



The Japanese have been very busy for at least the last 15 years attempting to construct, expand, and maintain a total rare earth supply chain for the Japanese domestic manufacturing industry, so that it can break free of China and Chinese involvement. Recent moves by

Japanese rare earth permanent magnet (REPM) makers, such as, for example, Hitachi, to move some production to China a step that Hitachi, among others, said just 4 years ago, that they wouldn't do – has been interpreted I think wrongly as a “surrender” to the inevitable dominance of China in the sourcing of raw materials for rare earth permanent magnets. In fact, I suspect that even though Hitachi most likely moved production of commodity (i.e., wide-spec or no spec) REPMs to China, it has, in true Japanese fashion, kept the production of specialized proprietary tight-spec REPMs as well as R&D for REPMs at home, or close to home but not in China.

Hitachi, as an example, is a Tier One supplier to the German OEM automotive transmission supplier, ZfF at its, ZfF's, manufacturing plant in China Grove, North Carolina. REPM alloy made, I suspect, in both China and Japan is shipped from those places to Malaysia where the blocks are machined to shape. Then the shaped magnet alloy is shipped to North Carolina where it is installed and magnetized in ZfF automatic transmissions for, among others, the Ford Motor Company. I doubt that Malaysian labor rates and utilities are much cheaper than their equivalents in mainland China but I think they are no more or not much more than Chinese rates for the

same overheads. Malaysia, however, offers Hitachi an added value, a venue where its trade secrets can be less likely to be stolen. Additionally, and perhaps most important of all, the Malaysian machining facility can switch suppliers without political fallout. Magnet alloy made in Japan, Vietnam, or even one day Malaysia or the USA can be substituted for Chinese made material at any time.

The recent fuss over the operating license for Lynas LAMP facility in Malaysia was due to a previous attempt by Japan's Mitsubishi to process local monazite bearing sands for rare earths in the late 1990s. The result of that venture was a fiasco where the Malaysian government had to pay a substantial sum along with Mitsubishi to clean up a thorium residue issue, and the project was terminated. This did not endear either rare earths or Mitsubishi to Malaysian regulators, and the residue of ill will was the main driver behind the ludicrously named Save Malaysia Stop Lynas movement that held up the license for the LAMP for at least two expensive years.

Nonetheless the Japanese REPM industry has for the last two years been looking at the viability of Malaysia for additional supply chain development due to the availability of didymium from the LAMP and of terbium and dysprosium from xenotime extracted from tin processing residues and from ionic adsorption clays in Sarawak (Malaysian Borneo).

Nearby to Malaysia in Vietnam there is already a variety of Japanese investment in a total rare earth supply chain. The REPM manufacturer, Shinetsu has a magnet alloy/magnet plant there using, among other feed stock, REPM scrap. The Japanese magnet alloy producer, Showa Denko, also has an operation in Vietnam. Toyota operates a plant in Vietnam recovering rare earths from Nickel Metal Hydride batteries as does, I believe, Honda. Toyota is also a principal investor in the development of the Dong Pao rare earth deposit in Vietnam and if and when production begins there it can be apportioned for separation to the two Chinese owned total rare earth separation

facilities already operating in Vietnam as well as to the Shinetsu, Showa, and Toyota facilities with separation capabilities and/or alloy and or magnet making capacity. There are at least four solvent extraction plants in Vietnam for the separation of rare earths.

Toyota is also a principal investor in the large (8000 ton per annum capacity) monazite fed separation plant in Kerala, India that is either ready for operation or in operation today.

In Brazil Mitsubishi and/or Sumitomo is processing tin-processing tailings from Pitinga to extract some of the substantial xenotime resident in it. I believe that the separation processing of this xenotime is done in Vietnam, but it may be done in Japan or even China for the account of Mitsubishi's Japanese clients.

In North America we know that Toyota's trading company took a position in Matamec and has looked extensively at many other properties, but politics and environmental issues seem to have inhibited any further Japanese investment in North America.

The Japanese REPM industry has voted with its pocketbook and its engineers for involvement in the global rare earths trade. The purpose of all of this is to make Japanese REPM manufacturers independent of the Chinese total rare earth supply chain.

The USA is very far behind the Japanese in this. Basically this can be ascribed to two reasons:

1. The demand for REPMs in the USA as component parts of goods to be assembled in the USA is less than 1000 tons per year, and
2. No one has re-established even a minimal total domestic American rare earth supply chain here since Magnequench departed.

What the USA needs right now is a 500-1000 ton capacity total

rare earth supply chain that is profitable at current pricing. Such an operation would seed a larger capacity supply chain when it becomes necessary due to Chinese internal absorption of their entire output or a real cutoff of our supply, whichever comes first.