
PROGRESS ON FAST CYCLE RETORT FURNACE OPTIMISATION

*Pilot retort testing shows alumina tiles outperforms silicon carbide lining
Condenser trains working at desired temperatures to collect liquid magnesium*

29 June 2018, Sydney Australia: Latrobe Magnesium Limited (ASX:LMG) is pleased to report strong progress over the past two months refining the operation of its Fast Cycle Retort furnace (FCR).



Developments have resolved issues involving the cracking and corrosion related to the silicon carbide (SiC) lining and the operational performance of the FCR condenser train that collects liquid magnesium and sodium.

Retort Lining

Since the beginning of May the FCR furnace has been heated up seven times, nearly on a weekly basis. These runs were mainly to optimise the operating performance of the furnace and the condenser train.

Simultaneously LMG also investigated the performance of SiC and alumina tiles lining the retort. LMG built a small retort approximately 0.6m high for this testing.

In the case of the SiC lining, the retort was heated up to 1250°C and vacuum was applied. It was then allowed to cool. Upon opening the retort, extensive corrosion was apparent owing to the SiC liners.

In addition, 92% and 99% alumina tiles (150mm*100mm*12mm) were tested under various conditions with both types of alumina tiles performing well without cracking or corrosion issues.

A replacement retort has been designed for the alumina tiles and is being built. Some parts of the existing retort will be reused.

The timetable for building and testing the new FCR furnace is summarised:

- June
 - new design finalised
 - testing of condenser train successfully completed
 - retort materials ordered
- July
 - complete replacement retort
- August
 - installing and final commissioning
- September
 - processing of RWE fly ash

LMG believes its FCR will be superior to the horizontal retorts currently used for the Pidgeon Process in the following ways:

- Retort charge mass will be larger
- Reduction time will be greatly decreased
- Less energy usage due to more efficient heat transfer within a vertical retort
- Quality lining should greatly increase the retort's life
- The FCR offers a competitive advantage over other vertical retort designs.

These benefits should produce a significant reduction in capital and operating costs.

Magnesium and Sodium Condensers

The condenser train has been designed to capture liquid magnesium and sodium. Capturing the magnesium in a liquid form and transporting it to the refinery section of the plant saves energy otherwise required to re-smelt solid magnesium crowns, and reduces the size and capital cost of the refinery.

The desired operating conditions for the metal vapour passing through the condenser train are summarised:

- Furnace is heated to 1180°C
- Magnesium begins condensing at 720-730°C, mainly to a solid at >650°C
- Operating the magnesium portion of the condenser train down to 460°C, only 0.2% of the magnesium remains in the vapour
- Sodium begins condensing at 430-445°C
- Sodium is all condensed by 190°C
- Potassium begins to condense at 250°C
- Still a tiny amount of potassium left at 100°C, at the end of the condenser train

Recent FCR test runs have achieved these desired temperature levels through the condenser train.

Once the replacement retort is installed into the FCR it will undergo a two-week commissioning. This commissioning is scheduled for the last two weeks in August.



David Paterson
Chief Executive Officer

About Latrobe Magnesium

Latrobe Magnesium is developing a magnesium production plant in Victoria's Latrobe Valley and another plant near Cologne in Germany using its world-first patented extraction process. LMG intends to extract and sell magnesium metal and cementitious material from industrial fly ash, which is currently a waste stream from brown coal power generation.

LMG has completed a preliminary feasibility study validating its combined hydromet / thermal reduction process that extracts the metal. Construction is estimated to start on its initial 3,000 tonne per annum magnesium plant in the third quarter of 2019 year with production commencing 12 months later. The plant will then be expanded to 40,000 tonne per annum magnesium 18 months later. The plant will be in the heart of Victoria's coal power generation precinct, providing immediate access to feedstock, infrastructure and labour.

LMG plans to sell the refined magnesium under long-term contracts to Australian and overseas customers. Currently, Australia imports 100% of the 8,000 tonnes annually consumed.

Magnesium has the best strength-to-weight ratio of all common structural metals and is increasingly used in the manufacture of car parts, laptop computers, mobile phones and power tools.

The LMG project is at the forefront of environmental benefit – by recycling power plant waste, avoiding landfill and is a low CO₂ emitter. LMG adopts the principles of an industrial ecology system.