



Bühler AG
and PRIMIX
Corporation.

Exclusive cooperation
agreement in field of
lithium ion batteries.

Bühler AG and PRIMIX Corporation. Cooperation in the field of lithium ion batteries.

Bühler shall under an exclusive cooperation agreement with PRIMIX Corporation offer electrode slurry production plants for lithium ion batteries in Europe and North America. The key technological element utilized is the FILMIX™.

Bühler and PRIMIX Corporation based in Osaka/Japan signed an exclusive cooperation agreement in the field of lithium ion battery (LIB) production technology. Under the cooperation agreement, Bühler will offer in the territory of Europe and North America complete solutions for the production of LIB electrode slurries, i.e. for the anode, cathode and the separator layer. Within 2012 Bühler will setup a fully fledged pilot plant at its test center in Switzerland for customer trials, and in 2013 a similar pilot plant shall follow at its North American location, as both continents undertake to build its own respective LIB industries. A core technology element of those plant solutions is the FILMIX™ mixing technology from PRIMIX Corporation, to which under the cooperation agreement Bühler is the exclusive partner for the territory mentioned.

Ideal match of skills and capabilities

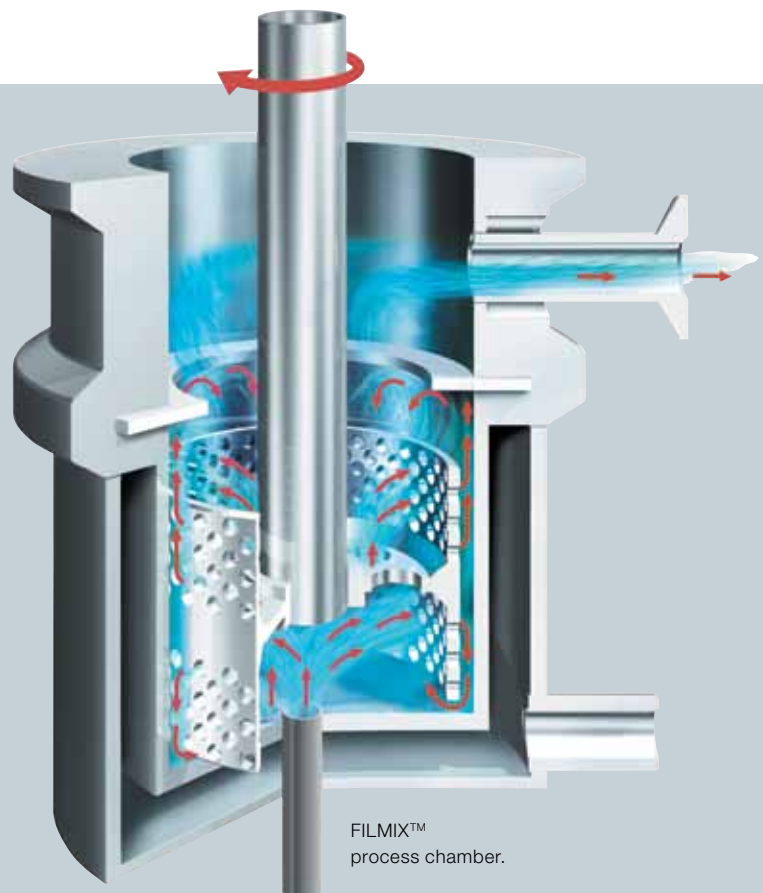
PRIMIX Corporation brings to the collaboration its proven FILMIX™ technology applied in the CDM – Continuous Dispersion Mixing – process for the quasi-continuous production of LIB electrode slurries. Bühler, in the present case particularly its business unit Grinding & Dispersing Technologies belonging to the Division Advanced Materials, brings to the collaboration its market presence, its plant engineering, integration and automation capabilities and its test center, laboratory and customer service network in Europe and North America, and its own complementary activities in the field of LIB raw materials grinding.

FILMIX™ technology: An industrially proven and leading solution from Asia now available in the western hemisphere.

PRIMIX Corporation is with its process the technology leader and has supplied roughly 50 production systems in Japan, South Korea and China, together delivering a total capacity of between 10 and 20 tons of battery slurry per hour.

Close to 100 laboratory scale systems are in developer's labs worldwide, including also Europe and North America.

Major automotive players and battery consortia are relying on the technology for their LIB production.



FILMIX™
process chamber.



Bühler AG – full-volume bead mill Centex™ and nano bead mill MicroMedia™

Bühler Partec GmbH – Small Molecule Surface Modification

PRIMIX Corp. – FILMIX™ technology



Attractive market prospects

With the cooperation agreement, Bühler and PRIMIX Corporation ideally position themselves to support customers in the territory for a considerable number of projects to be invested. All these projects will need LIB electrode slurry sections.

Technological advantages

Conventional LIB electrode slurry production relies on planetary mixers, a technology that was mainly used for handheld electronic devices. The 2nd generation process based on FILMIX™ because it is quasi continuous allows significant gains in productivity and linear scalability, yielding large economies of scale important to automotive application. The highly effective turbulent mixing process leads across more homogeneous dispersion of the conductive material and the active material in the cathode slurry also to better battery properties such as the charge/discharge behaviour and unprecedented coating accuracy below 1% through control of rheology of the slurry. The ingredients of success of the mixing process are high effectivity with just a gentle touch in order not to destroy the sensitive materials involved.

Future technological synergies across value chain

In future, the LIB precursor material grinding and the LIB raw material grinding, an area where Bühler has activities in the LIB field, will be in much stronger interaction in terms of processing requirements at the corresponding interface

in the value chain, which require special precautions to be observed. Precautions for which Bühler has solutions.

With activities in both areas, Bühler and PRIMIX Corporation will be ideally positioned to enable new materials trends and innovations across the entire LIB value chain before cell assembly – especially because in future more and more nanomaterials shall be utilized.

About Bühler

Bühler is a global leader in the field of process engineering, especially production technologies and services for producing foods and advanced materials. Bühler operates in over 140 countries and has a global payroll of about 8800. In fiscal 2011, the Group generated sales revenues (turnover) of CHF 2131 million.

About PRIMIX Corporation

PRIMIX Corporation is the Asian leader in the field of mixing and emulsifying technologies for cosmetics, electronics and lithium ion battery slurries. PRIMIX is headquartered in Osaka and has production plants in Saitama and Shanghai, having roughly 200 employees generating sales of roughly CHF 80 million.

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