

Metal Injection Molding Technical Newsletter

World's Finest MIM Technology from Japan "μ-MIM®"

Volume 10

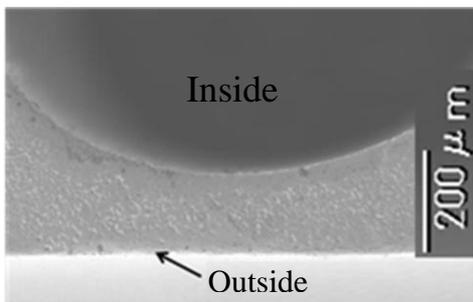
Issued by : TAISEI KOGYO CO., LTD.

1. Thin-walled MIM that used to be impossible can be achieved with Taisei Kogyo μ-MIM.

In MIM manufacturing, because distortion can easily occur at the time of degreasing or sintering, in many cases secondary processing becomes necessary or molding is impossible. In general, stable production of MIM where the difference in thickness is double or more is said to be difficult. Therefore, when designing MIM components, not making thin-walled parts is the key to achieving stable mass-production. In practice, however, in order to achieve miniaturization and higher performance, in some cases there may be no choice other than to make thin-walled parts.

Considering the characteristics of MIM and the increasing need for thin-walled parts and fine shapes, for more than 10 years, we have been refining our μ-MIM technology and conducting research and development of thinner walls.

The below is a SEM observation image of μ-MIM. The distance between the curved cavity and the side is 180 μm at the smallest part. This thickness would not be possible without μ-MIM technology. Furthermore, one place in this part has a thickness of just over 5mm, so one place can be more than 10 times the thickness of another.



▲SEM photograph of thin-walled μ-MIM part,

We are promoting the development of manufacturing technology for MIM components with even thinner parts; it depends on the shape but we have achieved the capacity to manufacture parts as thin as 20μm.

We look forward to hearing from you about MIM mass production of thin/fine shapes.

2. The technology for achieving μ-MIM

The kneading stage determines accuracy.

We have stated that the binder is indispensable for high accuracy of μ-MIM. The binder is mixed with metal powder, and the pellets resulting from this combination are called MIM material or feed stock.



MIM material (feedstock)

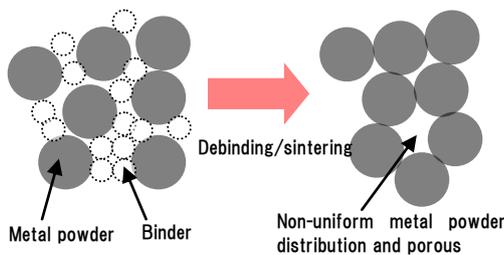
▲We make MIM feedstock by kneading metal powder & binder.

This step of mixing the metal powder and binder is called "kneading", and it is one of the most important steps that determines the quality of the μ-MIM.

What is required in this kneading process is not simply a matter of mixing the metal powder and the binder, but how to uniformly distribute the metal powder and the binder.

After the binder decomposes and disappears, the metal powder will continue to be bound by sintering. At this time, if the metal powder particles are not distributed with uniform spacing between them, the shrinkage that occurs upon binding will not be uniform, leading to defects such as holes, cracks and other distortions.

Image of the influence of non-uniform distribution of the metal



Since the specific gravity of the metal powder and binder are significantly different, kneading requires special know-how. Furthermore, in order to produce a feed stock that is suitable for high-precision, finely shaped μ-MIM parts, following repeated meetings with manufacturers of kneading machines, we even use kneading machines that are almost to made-to-order.

In our Research and Development Office, we have collected a micro resin kneading and extrusion molding machine made in Germany, in addition to an ultra-micro kneading injection molding machine, together with various analytical instruments, which we use to research the optimal feed stock for high-accuracy μ-MIM.

In the future, we will push forward the development of MIM and other world-first technology that other companies cannot do. If you have any questions about high precision μ-MIM, we look forward to hearing from you.



▲German-made compact resin kneading and extrusion molding machine

3. Reporting on industry-university cooperation and joint research

Taisei Kogyo has been conducting joint research with domestic and foreign universities, companies and research institutes. We are conducting research and development with a large number of universities and research institutes, for example, research with Tohoku University on precious metal MIM and study of porous metals with energy companies. As a top MIM manufacturer, we are taking advantage of our expertise and facilities to promote joint research ranging from basic research to mass production, and thus making contributions to society.

Taisei Column



Hi! I am Moeko Simizu. I started working for Taisei Kogyo a few years ago, fresh from school. I belong to Quality Control dept. and am in charge of the final inspection of MIM products that are to be delivered to the customer in no time. As my inspection is final before delivery, no mistakes are allowed, and I always work under tension.

After day's work or on holidays, I read books. I like detective stories and mystery novels. Recently I have glued myself to a series of "Kindaichi Kousuke" by the author Seisi Yokomizo, a bit of classic though. The characters and the way of his writing are very attractive in such a way I can't say how. I like contemporary novels too. I strongly recommend you to read them.