Many think that "semiconductor manufacturing requires a mega fab and huge investment in facilities," or that "mass production is required in order to achieve financial break-even."
But what if semiconductors could be manufactured even in places like offices, and on demand, in just the quantities required?
Minimal fab is a new semiconductor production system that achieves just that, overturning all such presumptions.
Yokogawa Solution Service Corporation provides comprehensive support for customer requirements, ranging from device prototyping and process development through selection and introduction of facilities and after-sales support.
That is a one-stop solution for minimal fab.
Minimal fab is a completely new concept in production systems that is not bound by the conventional wisdom of mass production. Here are some number-based facts about minimal fab that clearly portray its many features.

### 1/1000

- **Minimal fab is a system that is optimized for high-mix low-volume production of semiconductors that can be as small as a single chip.**
- **Localized clean technology,** which simultaneously shuts out both particles and gas molecules, is used to achieve localized clean room conditions in an environment that is “1/1000 the scale of a mega fab” with respect to factory construction cost, scale of production, cost of raw materials, tool size, and all aspects of the fabrication process. Minimal fab thus greatly reduces the overhead of manufacturing compared to the large sites, the huge investments, and the vast resources that are required by mega fab facilities, allowing all processing tools to be compactly accommodated in an ordinary office environment.

### 0.5

- **Minimal fab uses wafers with a half-inch diameter. These are very small compared to the 12-inch wafers used in mega fab facilities.**
- **Minimal fab’s use of such small wafers makes it possible to fabricate even a single semiconductor chip.**

### 42

- **Wafer edges are beveled to a bullet shape.**
- **Polished on both sides.**

### 1440

- **The housing size of each minimal fab tool is determined according to the minimal fab standard.**
- **Whatever the process of each tool, all tools are the same size.**
- **The tool height is 56.7 in. This height is based on the premise that an adult of average size will be standing at the front of the tool. When standing before an array of these tools, the process name is prominently displayed above the touch screen, making it easy to identify the process that each tool performs at a glance.**
- **The tool width is not imposing, and the touch screen is located at a height that allows easy operation even by a person of small stature. The compact housing is an integral aspect of a human interface that facilitates ease of operation and a feeling of easy accessibility.**

### 100

- **All minimal fab tools operate on 100VAC household mains power.**
- **Based on the concept of producing just the required quantity at the required time, minimal fab achieves a high level of energy efficiency, consuming minimum power needed for high-frequency power and plasma generation. Consumption of required gasses and chemicals is also minimized, and the tools do not require a factory with large-scale utilities, but can be installed in office-like spaces.**
It’s What We Do: Minimal Fab One-stop Solution

Offering full solutions to customers who need minimal fab

Taking advantage of technology developed in our 80-year history, we offer a full range of products and services for developing new processes in the lab and transitioning them into mass manufacturing. We help customers create a comprehensive service system. We also provide comprehensive support for customer operations and management.

Experienced engineers are permanently assigned to the lab, which is located at the Technology in Tsukuba, north of Tokyo. By providing tool development of minimal fab and technological advances, the lab works to achieve ever greater operational stability.

In such cases, we can leverage a vast fund of experience accumulated over many years, as well as our connections within the industry, to provide tools that meet such requirements within a short period of time.

YOKOGAWA also fulfills many roles, such as supporting the adoption and development of minimal fab and technological advances.

Because minimal fab targets the high-mix, low-volume market, there are cases in which a required tool is not included in the current line-up. In such cases, we can leverage a vast fund of tool improvement based on feedback regarding problems that arise during lab operation and corresponding countermeasures, the lab works to achieve ever greater operational stability.

We provide full support for all considerations related to installation environment, from design and layout to installation and commissioning.

For example, the maskless exposure tool that is one of the features of minimal fab can be introduced into the lithographic process, greatly reducing development time over that which would be required using only existing tool.

To rely on us for post-installation management and maintenance. We support customers with a comprehensive service system. We also provide comprehensive support for customer operational management.

“What can we do?” At YOKOGAWA, we constantly ask ourselves this question. Minimal fab offers the world an unlimited range of possibilities, and can be utilized in a wide variety of ways. The mission of YOKOGAWA Solutions Corporation is to create new value and make proposals in response to our customers’ requirements.

In other words, our work begins with the question of how to give form to customer original ideas.

At the Yokogawa Minimal Fab Application Laboratory, customers can verify for themselves the processes for prototyping and evaluation trials based on premise, and for R&D purposes. Elemental process development & evaluation for Proposal of hybrid processes

Support for prototyping by customer

Device prototyping & evaluation

Presentation of actual tools and process demonstrations

Total Care, from Preparation for Introduction to S&S

Learn Legal and Conclusion issues in EN

Consultation Service Fee Support for

We also provide consulting services regarding material, handling, safety equipment, without which customers cannot rely on the commercialization of prototyped tools.

There is no need for customers themselves to engage many engineers.

There is no need for customers to be manufacturers and can sell or build necessary equipment. There is no need for customers to be manufacturers and can sell or build necessary equipment.

We also provide consulting services regarding storage, handling, safety equipment, and laws and regulations. Rely on us for post-installation management and maintenance. We support customers with a comprehensive service system.
The “Yokogawa Minimal Fab Application Laboratory” opened at Yokogawa Solution Service headquarters is the world’s first incubation center where customers can become directly familiar with minimal fab. Hosting a line of several minimal fab tools within an 861-ft² floor space, the lab is a place where customers can see, touch and actually use minimal fab.

Not only does this lab provide process support to customers, such as device prototyping and process development, but it can also be used for training or for educating engineers.

In-depth knowledge of semiconductors is not needed in order to benefit from the lab. Engineers who were directly involved with development of equipment and processes at the National Institute of Advanced Industrial Science and Technology are permanently stationed at the lab, and can extend comprehensive support to customers.

We hope you will experience minimal fab for yourself in this environment that does not require any clean room. We look forward to seeing you!