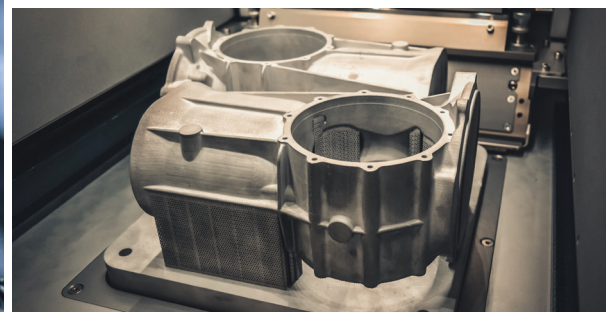
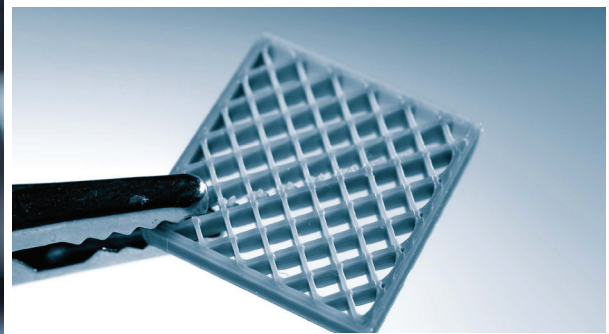
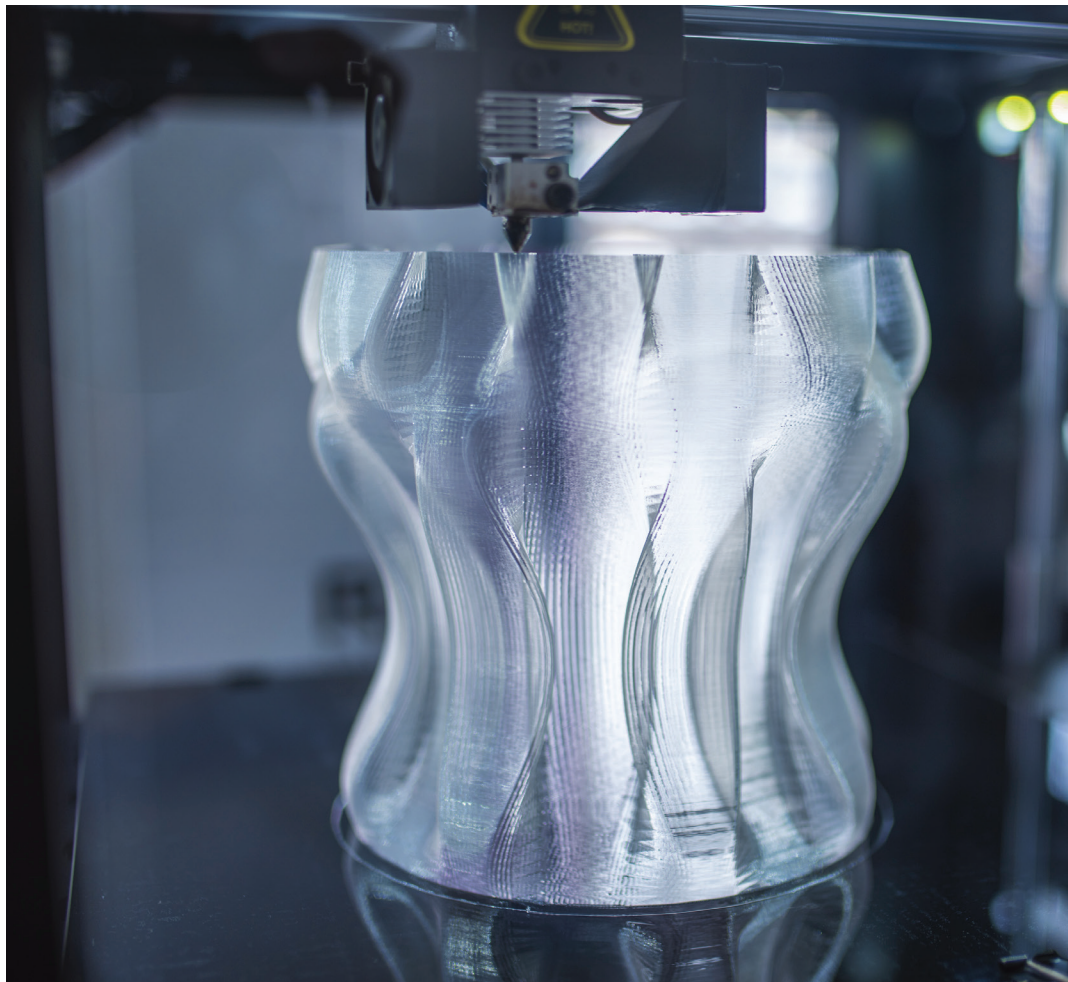


Business Unit

Technology



# Additive manufacturing solutions



Additive Manufacturing

**Think Asia. Think DKSH.**

# About DKSH



**DKSH** is the leading Market Expansion Services Group with a focus on Asia. We help companies who are looking for a reliable outsourcing partner to grow their business in new or existing markets.

Headquartered in Zurich and publicly listed on the SIX Swiss Exchange since 2012, we blend Swiss reliability, professionalism and best practice corporate governance with 150 years of uninterrupted business presence in Asia.

We operate in 825 business locations in 37 countries - 800 of them in Asia. We have more than 30,000 specialized staff. We provide our business partners with sound expertise, on-the-ground logistics and tailor-made services based on a comprehensive network of unique size and depth.



## **Business Unit Technology**

We offer you one-stop-shop and customized technology solutions. Operated as a trusted link between suppliers from Asia, America and Europe and customers in Asia, we provide you with access to products from around the world. Our services cover the entire product life cycle including installation and commissioning, final acceptance testing, production start-up support, training maintenance, after-sales services, repair spare parts and consumable supply, as well as refurbish-ments and trade-ins.

Other than additive manufacturing, we also offer total solutions in the areas such as hospitality, industrial materials and supplies, infrastructure, precision machinery, scientific instrumentation, semiconductor, photovoltaic and electronics, specialized industrial applications as well as textile machinery. We operate in 18 countries from 80 business locations and around 1,250 specialized staff, including 500 service engineers.



## **Business Line Additive Manufacturing**

DKSH is shaping the development of a new technology – additive manufacturing. By partnering with the top industry leaders, we are bringing the latest technologies and integrated solutions in additive manufacturing to Thailand.

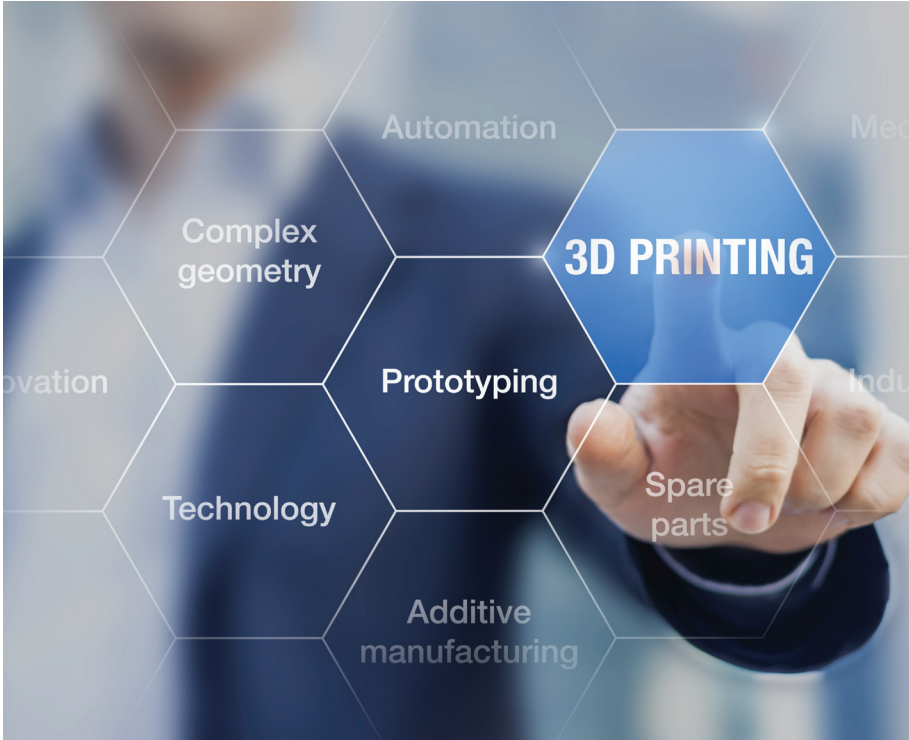
We offer an integrated solution that can help facilitate your transition from conventional to additive manufacturing. We offer consulting services to help you define the right roadmap and identify the right usage cases. Our multi-disciplined experts understand the different types of additive manufacturing and functional applications that can help you overcome

challenges arising from a wide span of applications and industries.

In addition, not only our showroom enables you to be hands-on with the latest additive manufacturing technology, but also proving tailor-made solutions to fit your specific needs.

Our service is designed with your needs in mind. We strive to support you in taking advantage of this digital transformation. We have the confidence that we can help to advance your product quality, capability and competitiveness into a whole new level

# 3D Printing Overview



3D printing or additive manufacturing is a process of creating a three dimensional solid objects from a digital file.

This method creates complex structures and components by laying down successive layers of material which are then gradually building up to the desired shape. Unlike traditional subtractive processes such as machining, drilling, or other cutting processes that creates a work piece by removing materials from an initial volume, additive manufacturing produces objects by adding material in order to obtain the desired shape.

3D printing can eliminate the traditional manufacturing set-up requirements such as fixtures and cutting tools. Thus opens up new possibilities as complex geometric forms can now be produced quicker and cheaper even in small quantities.

## Subtractive Processes VS Additive Processes

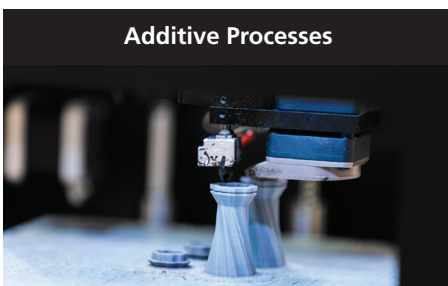


### Process

Create a product by removing sections from a block of material. It is starting from something unformed to making something specific.

### Pros and Cons

- Generate waste through the excess removed material
- Require complicated manufacturing chains
- Limit design capabilities



Create a product through adding materials to the object layer by layer until printing is finished. It is starting from nothing to making something specific.

- Utilize standard materials in an environmental-efficient way
- Automate the manufacturing to improve efficiency
- Allow for complex and intricate designs

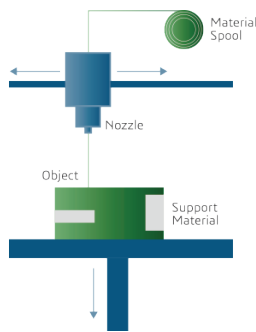
# 7 types of 3D Printing Process

The term "3D Printing" is used to represent all additive manufacturing processes. However, there are several different

methods in terms of layer manufacturing. In 2010, the American Society for Testing and Materials (ASTM) group formulated a

set of standards classifying the range of Additive Manufacturing processes into seven categories.

## 1. Material Extrusion (ME) – Fused Deposition Modeling (FDM)



- Fused Deposition Modeling (FDM) : Material is heated and then in controlled quantities deposited directly on previous layers. Eventually layers are built up to complete the entire part.
- FDM materials includes ABS, PC-ISO polycarbonate, casting wax, elastomer, polyester and others.

### Industry

- Automotive
- Commercial
- Medical
- Aerospace
- Consumer

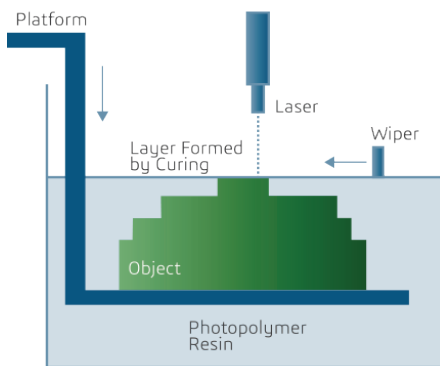
### Pros

- A variety of office-friendly materials are available
- Low maintenance cost
- Some newer machines offer water-soluble supports

### Cons

- Generally, a slower process than SLA and SLS
- Detectable layering requires finishing
- Support within process is needed

## 2. VAT Photopolymerisation (VP)



- Vat polymerisation uses a vat or tank of liquid photopolymer resin, out of which the model is constructed layer by layer.
- Stereolithography Apparatus (SLA) uses an ultraviolet (UV) as the light source.
- Digital light processing (DLP) uses conventional light source, such as an arc lamp, with a LCD panel.

### Industry

- Medical
- Consumer
- Dental
- Design and art
- Jewelry
- Automotive (only DLP)
- Aerospace (only DLP)

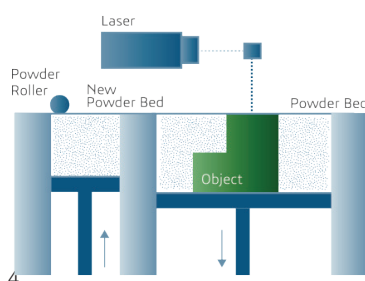
### Pros

- Provides an excellent combination of speed, accuracy, and surface finish (almost layerless)
- No need for post-finishing

### Cons

- Limited material selection and properties
- Raw material isn't pleasant to environment
- Photopolymer exposed to light can become brittle

## 3. Powder Bed Fusion (PDF) – Selective Laser Sintering (SLS) / Selective Laser Melting (SLM)



- SLS / SLM are interchangeable terms that refer to a laser based 3D printing process that works with powdered materials. The laser is traced across a powder bed of tightly compacted powdered material, according to the 3D data fed to the machine.

### Industry

- Aerospace
- Automotive
- Consumer
- Commercial
- Dental Copings
- Medical Instrument

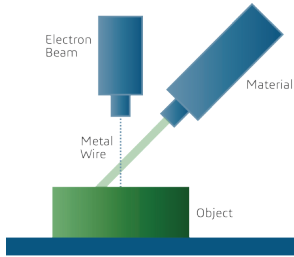
### Pros

- The powder bed serves as an in-process support structure for overhangs and undercuts, and therefore complex shapes can be manufactured without support structures.

### Cons

- Due of high temperature, cooling times can be long
- Some applications still necessitate infiltration with another material to improve mechanical characteristics

#### 4. Directed Energy Deposition (DED) – Electron Beam Melting (EBM)



**• Electron Beam Melting (EBM):**

This method is similar to SLM but uses an electron beam as heat source, which necessitates that the procedure is carried out under vacuum conditions.

**Industry**

- Aerospace
- Industrial
- Automotive
- Medical

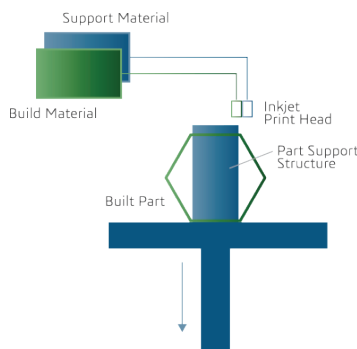
**Pros**

- Has the capability of creating fully-dense parts in a variety of metal alloys, even to medical grade
- Wholly safe and eco-friendly

**Cons**

- Not able to compete in the production of complex geometries and the build size is limited to the size of the feedstock

#### 5. Material jetting (MJ)



**• Material Jetting (MJ):** A 3D printing process whereby the actual build materials (in liquid or molten state) are selectively jetted through multiple jet heads.

However, the materials tend to be liquid photopolymers, which are cured with a pass of UV light as each layer is deposited.

**Industry**

- Jewelry
- Dental
- Aerospace
- Medical

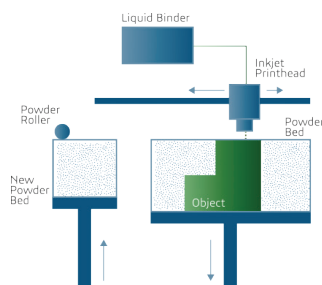
**Pros**

- Allows for the simultaneous deposition of a range of materials, which means that a single part can be produced from multiple materials with different characteristics and properties
- A very precise 3D printing method, producing accurate parts with a very smooth finish

**Cons**

- Due to the type of material, parts are rather fragile. The build process is slow.

#### 6. Binder Jetting (BJ)



**• Binder Jetting (BJ):** The material being jetted is a binder, and is selectively sprayed onto a powder bed of the part material to fuse it a layer at a time to print the required part.

**Industry**

- Food
- Commercial
- Consumer
- Industrial

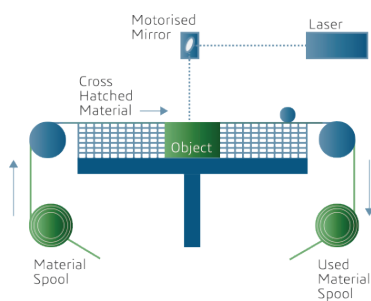
**Pros**

- A range of different materials can be used, including ceramics and food
- The ability to easily add a full color palette which can be added to the binder
- Do not need support because the powder bed itself provides this functionality

**Cons**

- Not as strong as the SLS process
- Require post-processing to ensure durability

#### 7. Sheet Lamination (SL)



**• Sheet Lamination (SL)** builds parts layer by layer using standard copier paper. Each new layer is fixed to the previous layer using an adhesive, which is applied selectively according to the 3D data supplied to the machine

**Industry**

- Commercial - Art
- Consumer

**Pros**

- Produce full color 3D printed parts
- Do not need post-process

**Cons**

- Dimensional accuracy is slightly less than SLA
- Difficulty in producing hollow parts

# Additive Manufacturing Experts



The team at DKSH Additive Manufacturing is dedicated to bring the best solutions and services to our customers. With years of hands-on experience, the team will provide you tailored solution to your current production problems, and at the same time anticipating for future adjustment and enhancement.

We welcome our customers to visit our additive manufacturing showroom for a live demonstration on how 3D printing technology can turn design into sample parts.

## Our service

### Consultation



Many customers today are not sure how additive manufacturing can benefit their overall production. Our experts are ready to answer all your questions. Contact us so we can help you discover how 3D printing technology can be a game changer to your business.

### Tailor made solution



By understanding your pain point, our specialists then provide you with a tailored solution that is compatible with your current production line to maximize your productivity and efficiency.

### Training



We will be with you every step of the way from conducting a thorough on-site inspection, recommending solutions, setting up machines to organizing trainings for your staff. We are determined to help you gain the most benefits from 3D technology and the machines you are purchasing.

### After sales service



Our service team will support you by providing fast and reliable repair service that can minimize your machinery downtime. Whenever you have a question, please contact our 24/7 call-center for instant problem-shooting and consultation.

# Our Partners

**It is time to change how we produce things.  
BigRep aims to make the world of manufacturing more individual, creative and affordable.**



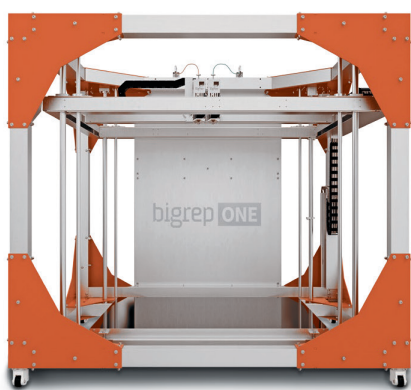
Founded in 2014, BigRep set sail to transform the 3D printing and manufacturing business. With its 1m3 volume, the BigRep ONE opens the gateway to a new dimension of 3D printing and 3D manufacturing. BigRep Studio provides fast and precise large-scale 3D printing service to the customers.

From furniture to vehicles to robotics, BigRep believes everything is possible and wants its customers to envision everything from human scale robot parts, sculptural artworks in full-dimensional.

With BigRep, you can dream and realize the world-changing designs of tomorrow.



## Highlighted products



**BigRep ONE**



**BigRep STUDIO**

# Our Partners

## Unlock the full potential of 3D printingz



HP transforms part properties voxel by voxel and enables a future of limitless applications, materials, and colors. HP's technology enables future where we can produce 'smart parts' with embedded electronics, integrated traceability and intelligence.

With HP's 3D Printing solutions, customers will be able to reinvent how they prototype and produce functional parts at high-volume and lower cost per part. The printers also offer superior, consistent part quality, continuous printing, fast cooling and breakthrough productivity with minimal intervention.

HP is accelerating the path to industrial 3D manufacturing with its Jet Fusion 3D Printing Solutions and expanded materials portfolio.



## Highlighted products



HP Jet Fusion 4200



HP Jet Fusion 300/500 series



# Our Partners

Powerful, affordable 3D printers for professionals



Formlabs consists of a passionate team of engineers, designers, and problem-solvers. Started out of MIT in 2011, Formlabs is now over 500 people across Boston, North Carolina, Hungary, Germany, Japan, and China. The team is committed to bringing powerful and accessible fabrication tools into the creative hands of professionals around the world.

With a range of 3D printer and solution including Form 2 SLA 3D printer, Fuse 1 SLS 3D printer, Form Cell manufacturing solution, and Pinshape marketplace of 3D designs, Formlabs is establishing the industry benchmark in 3D printing for professionals from a variety of industries. Formlabs is excited about creating powerful tools that change the way we work and live.



## Highlighted products



Form 2



Form Wash



Form Cure

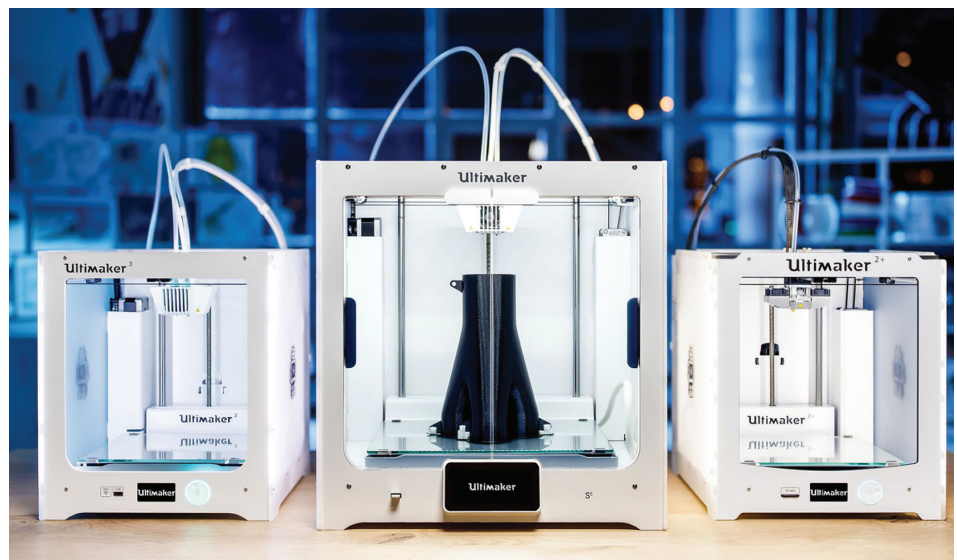
# Our Partners

## Professional 3D printing made accessible

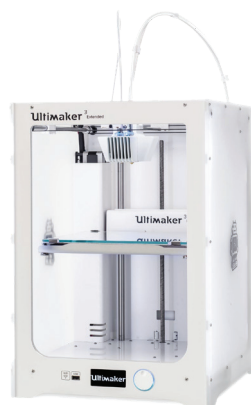
**Ultimaker**

Driven by technology, inspired by people, and passionate about creating genuinely meaningful innovation, Ultimaker is a unique team of talented engineers, developers, and forward-thinkers. From the very beginning, Ultimaker's mission has been to accelerate the world's transition to local digital manufacturing. They are proud of their culture of innovation that's driven by a team of talented people. Together they develop and realize the next big thing in 3D printing.

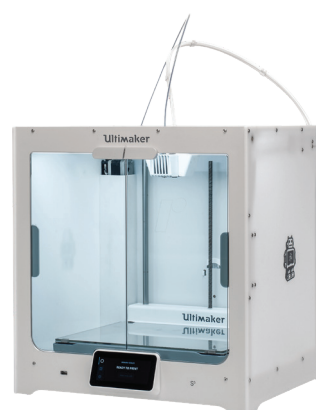
Flexible, future-proof and ready to turn your creative concept into reality, Ultimaker ensures accurate, consistent results – tailored to your needs. Enjoy a seamlessly integrated 3D printing experience – where hardware, software and materials work in a perfect harmony.



## Highlighted products



**Ultimaker 3 Extended**



**Ultimaker S5**

...the first of these is the fact that the ...

...the second of these is the fact that the ...

...the third of these is the fact that the ...

...the fourth of these is the fact that the ...

...the fifth of these is the fact that the ...

...the sixth of these is the fact that the ...

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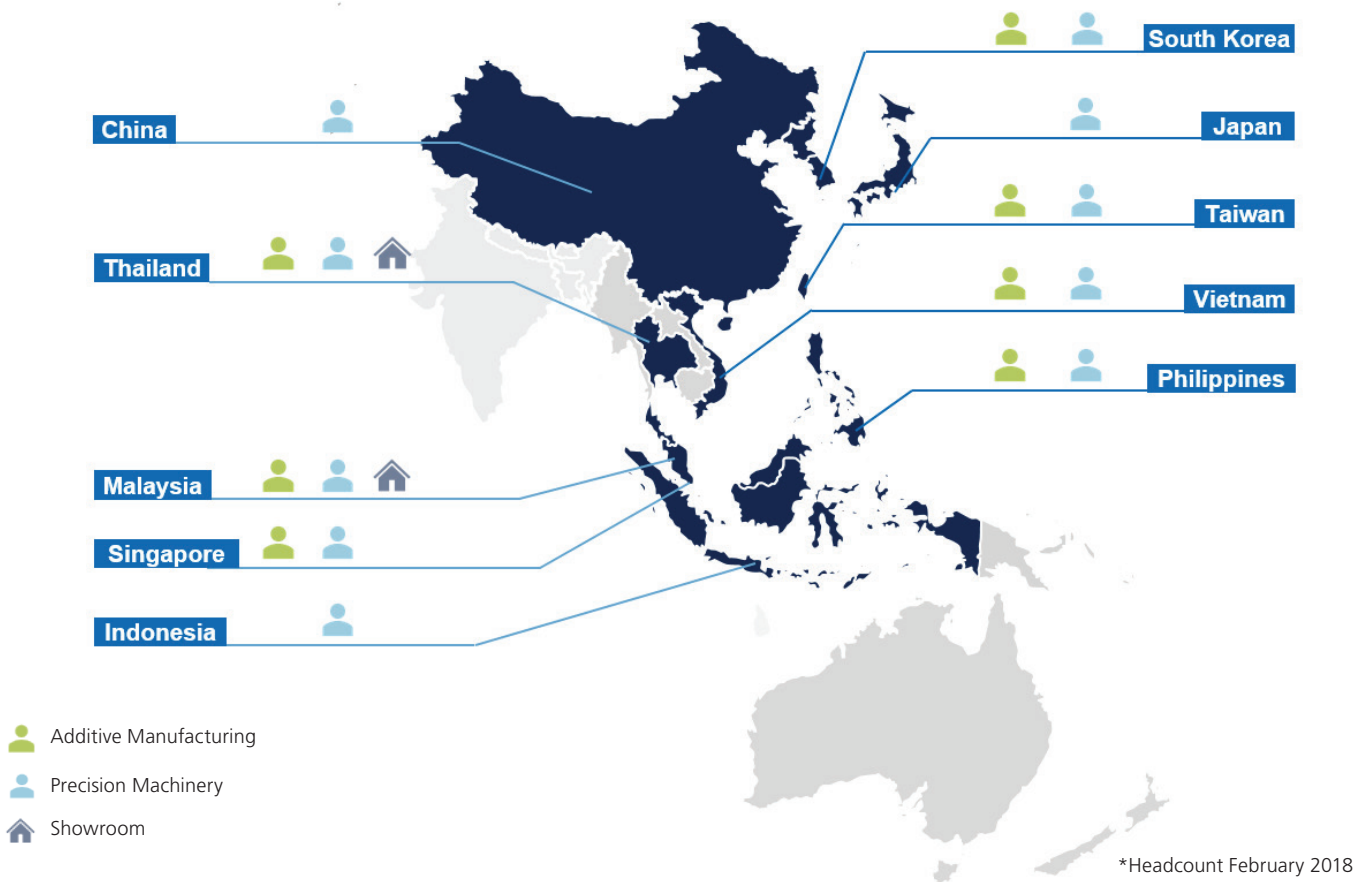
...the fifteenth of these is the fact that the ...

...the sixteenth of these is the fact that the ...

...the seventeenth of these is the fact that the ...

...the eighteenth of these is the fact that the ...

# Markets we serve



**DKSH (Thailand) Limited**  
 2106 Fantree 4 Building, Sukhumvit Road, Phrakhanong-Tai, Phrakhanong, Bangkok 10260, Thailand  
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**0 2639 7000**