

# Supply chain resilience through monozukuri engineering support

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## Summary

This article describes purchasing engineering activities carried out by the Purchasing Division to support efforts to improve the competitiveness of our parts suppliers. It also includes examples of activities for Business Continuity Management and digital transformation that we have been emphasizing in recent years. JATCO aims to further strengthen the resilience of our supply chain through support for suppliers' monozukuri reforms.

### 1. Introduction

In 2003, JATCO launched a monozukuri improvement program as a collaborative activity with our suppliers.<sup>(1)</sup> Initially, emphasis was put on reducing costs (C), but quality improvement (Q) based on quality checkups was added later.<sup>(2)-(3)</sup>

After the Chuetsu earthquake in Niigata prefecture in 2004, a business continuity management (BCM) activity was also started together with suppliers. Through the implementation of measures to disperse production centers and to ensure stocks of parts, among other things, certain results have been obtained for ensuring delivery (D) even in the event of subsequent earthquakes, floods or other natural disasters. Moreover, in more recent years a fire at a semiconductor factory, an infectious disease pandemic and other concerns have occurred that have wide-ranging and long-lasting effects. Accordingly, there is growing interest in further strengthening the resilience of the supply chain and in methods of collaboration in this age of the new normal.

This article describes the current status and envisioned future of support for supplier monozukuri engineering. It presents specific examples of supplier BCM support following recent natural disasters, and remote improvement activities through the use of information and communications technology (ICT) under the current COVID-19 pandemic.

### 2. Activities of the Purchasing Monozukuri Support Department

Suppliers, too, have their own production engineering

and process engineering functions, but their systems and actual capabilities vary depending on the size of the company and its policies. Sometimes they cannot respond to JATCO's QDC management system requirement immediately. Resolving QDC issues that straddle suppliers and JATCO is also within the scope of the activities of the Purchasing Monozukuri Support Department as part of its production engineering function (Table 1).

Table 1 Activities of Purchasing Monozukuri Support Department

Objective	New products	Existing products
<b>Q</b> Quality	<ul style="list-style-type: none"> <li>- Support for production preparation                             <ul style="list-style-type: none"> <li>• Simultaneous engineering</li> <li>• 4M interviews/design reviews</li> <li>• PPAP (Production Parts Approval process)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Quality checkup score improvement                             <ul style="list-style-type: none"> <li>• Process improvements, GK (workplace management)</li> <li>• Failure analysis and recurrence prevention</li> </ul> </li> </ul>
<b>D</b> Delivery	<ul style="list-style-type: none"> <li>- Project schedule management</li> </ul>	<ul style="list-style-type: none"> <li>- BCM                             <ul style="list-style-type: none"> <li>• Serious failure support</li> </ul> </li> </ul>
<b>C</b> Cost	<ul style="list-style-type: none"> <li>- Production design</li> <li>- Investment reduction proposals</li> <li>- Planned JEPS (Jatco Excellent Production System)</li> </ul>	<ul style="list-style-type: none"> <li>- Improvements based on IE (industrial engineering) methods</li> <li>- Tooling improvements/logistics improvements</li> <li>- Introduction of in-house process improvements</li> </ul>
<b>M</b> Management	<ul style="list-style-type: none"> <li>- Employee education support                             <ul style="list-style-type: none"> <li>• Information on JATCO in-house training programs</li> <li>• QC circle activities</li> <li>• Monozukuri exchange meetings</li> </ul> </li> </ul>	

\* Purchasing Monozukuri Support Department

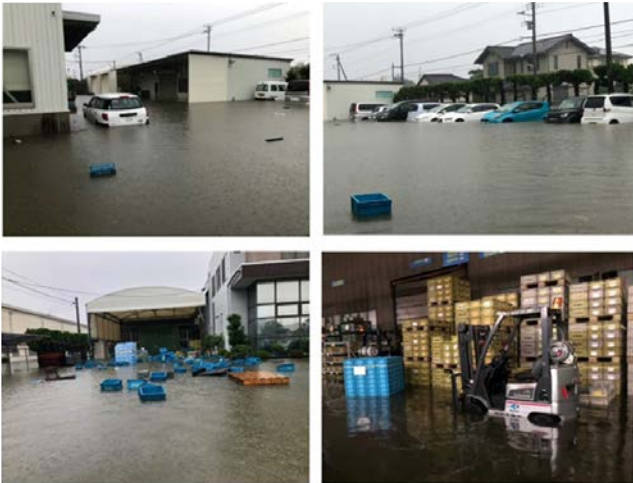


Fig. 1 Flooding caused by torrential rainfall in eastern Shizuoka prefecture (July 2021)

In addition to its regular activities for improving quality, reducing costs, etc., the department flexibly deals with various problems that occur irregularly. The following section describes examples of irregular efforts that were undertaken in fiscal 2021.

3. Examples of irregular efforts

Japan is struck by natural disasters nearly every year, and some suppliers suffer damage from flooding and landslides caused by torrential rain. Another issue caused by the spread of COVID-19 infections in 2020 has been the difficulty of visiting suppliers' plants to carry out activities according to the "Sangen Principles" (i.e., actual place, actual object and actual condition).

Presented here are examples of BCM carried out to deal with flood damage suffered by suppliers and remote improvement activities under the pandemic situation.

3.1 Damage at a parts supplier due to flooding above the floor level

In July 2021, a stationary front that formed over the eastern part of Shizuoka prefecture caused a torrential downpour. The parking lot in JATCO's Head Office district was partially flooded and the factory of a parts supplier partner was also inundated with water above the floor level (Fig. 1).

Figure 2 outlines JATCO's supplier risk management scheme. The Purchasing Administration Department carries out supplier risk management activities through a cloud network like that shown in Fig. 3. During normal times, information on suppliers' recovery lead time is managed in

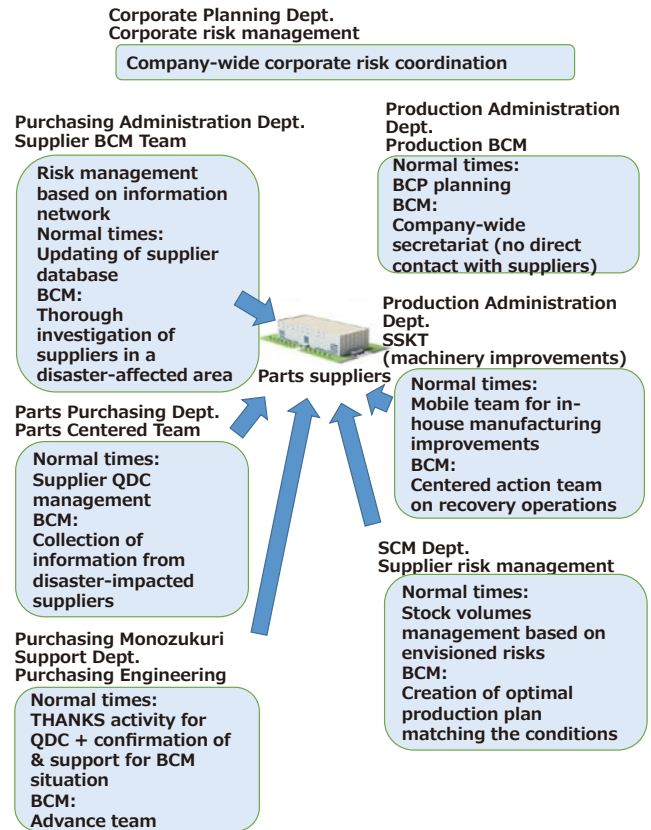


Fig. 2 Supplier BCM scheme

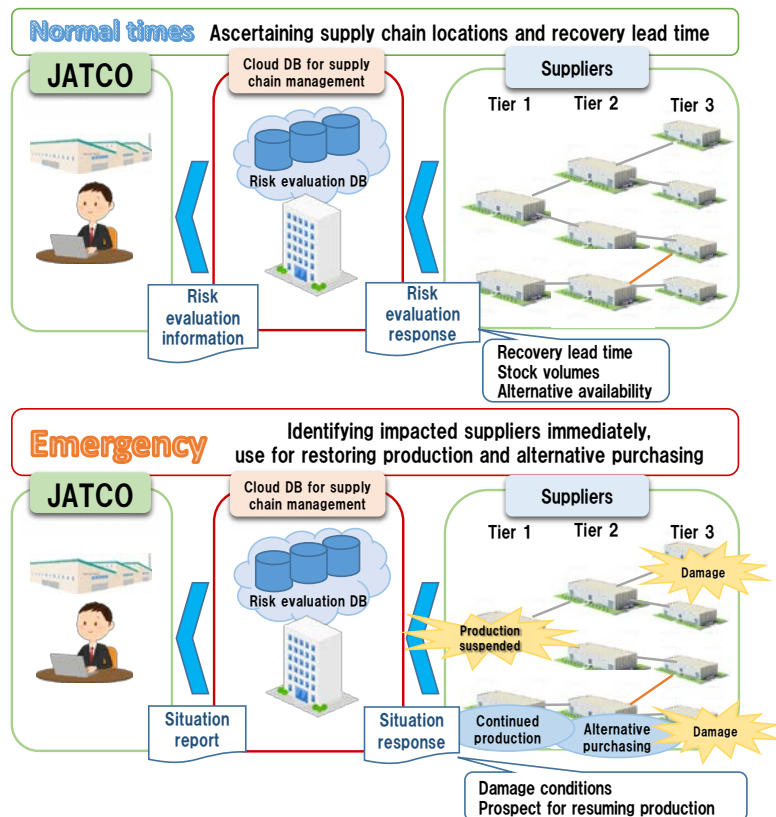


Fig. 3 Supply chain database management

a database, and a report on damage conditions following the occurrence of a disaster is requested through the system.

In the event a supplier needs recovery support, the Production Administration Department dispatches a mobile improvement team called SSKT. This team was active in the past following disasters, including torrential flooding in Saga, earthquake damage in Kumamoto and a factory fire in Ibaraki.

However, when damage has actually occurred, it sometimes takes time to judge whether or not to dispatch a working team on account of confused or delayed information from a supplier. Often it is necessary to start gathering information anew after arriving at the disaster site. In order to deal with this problem, the initial response system for emergencies was reviewed in fiscal 2021. If disaster information is available, an advance team from the Parts Purchasing Department and the Purchasing Monozukuri Support Department heads to the site before additional information is obtained from the supplier. Based on an action guide, they judge whether information needs to be gathered and whether support for the working team is needed, ascertain the scale of the damage, and determine what supplies and materials are required.

This recently created action guide was utilized following flood damage in the eastern part of Shizuoka prefecture. The advance team members reached the area in the morning on the first day of the recovery activities. After confirming the parts stock status and the extent of the damage, they requested the Production Administration Department via a hot line to dispatch the SSKT team and subsequently collaborated with the SCM Department and the supplier in drawing up a recovery plan. The SSKT recovery team also joined them in the afternoon on the first day and immediately initiated support activities. In this way, the flow of recovery efforts progressed smoothly.

Although some parts delivered to overseas had to be transported by air, the production schedule of JATCO's assembly line was not seriously affected. The recovery work was nearly completed within two weeks. The importance of obtaining accurate information in advance from suppliers on their parts stocks and plant facilities during normal times also became a point for reflection. Accordingly, an activity was launched to actually visit the plants of suppliers having a potential risk of damage from natural disasters and to confirm their production workplace conditions as well as to build a communications system focused on BCM as a key point.

### 3.2 Remote improvement activity with parts suppliers

THANKS is an acronym for Trusty and Harmonious Alliance Network Kaizen activity with Suppliers, which is a collaborative effort with suppliers for improving production lines. In this activity, JATCO personnel visit suppliers' plants, and suppliers and JATCO people share their wisdom for promoting improvements based on the "Sangen Principles." However, the impact of COVID-19 infections that expanded into a world-wide pandemic from the beginning of 2020 resulted in restrictions on overseas travel as well as requests for self-restraint regarding travel in Japan and face-to-face activities. Subsequently, online meeting applications became more familiar than before, but the following are examples of activities conducted with overseas suppliers around the autumn of 2020 at a time when some of them were not yet used to having remote meetings.

In conducting an online meeting about production workplace improvements, a manager at a supplier brought a PC connected to a Web camera to the shop floor. Observations were made of the workplace in accordance with methods for workplace improvements, and measures for improvements were proposed and implemented (Fig. 4).

This activity was carried out when both sides were unfamiliar with a remote meeting environment, and there were anxieties about how much could be accomplished. Yet, once we began to hold online meetings, various good aspects beyond our expectations became apparent.

First, many participants were able to focus on observing the same place of an operation simultaneously. Ordinarily, only around one or two observers can come close to the place of an operation on a narrow production line especially in assembly operations. However, using a live camera to transmit the scene remotely enabled many meeting participants to confirm the work operation with their own eyes (Figs. 5 & 6). Everyone from the employees in charge to the managers on both sides were able to confirm simultaneously an operation in a production workplace at an overseas plant. It became clear that this enabled the participants to notice things and actually propose more ideas for improvements. In this example, the manager, who normally does not go along on a plant visit, was able to participate remotely from home. He was able to point out differences from JATCO's in-house manufacturing methods, which enabled work procedures to be improved and eliminated the need for double checking.

Another benefit that can be cited is that meetings were held efficiently in terms of frequency and duration. Travel

time that has no added value was eliminated because meetings were attended without traveling, so short meetings could be scheduled frequently. For example, a 30-minute morning meeting was held to determine the details of a production trial that day, preparations were made, and the results were confirmed in a 30-minute evening meeting after the trial. Activities were carried out without any lost

time. Naturally, confirmation of the production workplace based on the “Sangen Principles” is absolutely necessary, but it was found that skillfully combining the “Sangen” and remote meetings made it possible to speed up activities. As a result, more proposals for improvement were accumulated in this example than the fiscal year target without traveling overseas once.

#### 4. Future issues

Accompanying the progress of hardware/software in the digital realm, we are also working to promote a digital transformation (DX) of our monozukuri activities. The procedures for emergency treatment of actual objects in workplaces and for promoting improvement activities will not change, but we believe that activities can be further quickened and efficiency enhanced by utilizing drones, smart glasses and other new devices.

The above-mentioned BCM example concerned flood damage, but dealing with earthquake risks is also necessary in Japan. When a production plant is damaged by an earthquake, we cannot enter the plant and check damage to the production equipment until the safety of the building is confirmed. Although this is still a proposal at the conceptual level, we are examining the possibility of using home-delivery drones to check the conditions inside the plant before the safety of the building is determined. Together with the Production Administration Department, we are now investigating drones, qualifications for operating them, applicable laws and regulations, training methods and other details.

Smartphones and PCs are currently the mainstream devices brought into production workplaces as communications tools, but trials are also being conducted on wearable devices with respect to safety and operability. Smart goggles that support mixed reality (MR) and smart glasses for video communications have also been acquired and their usability, ease of operation and other aspects are being confirmed. MR devices superimpose a virtual model or a PC screen on a real-world view, enabling actual equipment and devices to be scanned, and the results are converted to data. However, smart goggles have certain issues such as a heavy feeling when worn and requiring a large communications capacity (Fig. 7).

In contrast, smart glasses like those in Fig. 8 resemble a hands-free smartphone and represent devices that we want to adopt for the time being because of their convenience and ease of use.



Fig. 4 Remote improvement at an overseas plant

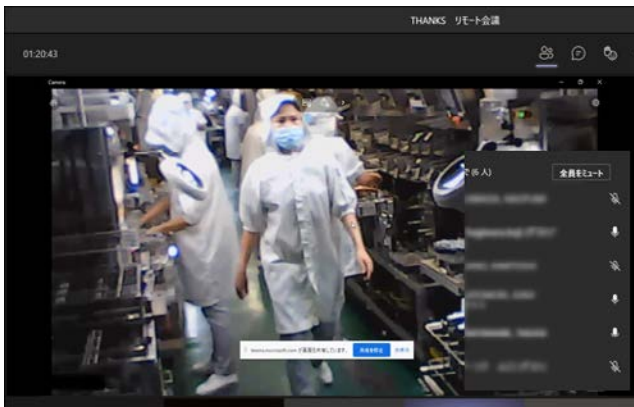


Fig. 5 Live online meeting via a Web application



Fig. 6 Work observation



Fig. 7 Smart goggles for mixed reality



Fig. 8 Smart glasses

## 5. Conclusion

This article has described the activities of the Purchasing Monozukuri Support Department that provides a production engineering function. In the area of supplier BCM, the ability to take immediate action is essential in disasters. Our aim is to have the capability to identify process-like problems and the power to energize a network within and outside the company to implement solutions, even if we do not have specific support technologies. Toward that end, in addition to activities to improve the

QDC competitiveness of our suppliers in normal times, we confirm the status of their BCM preparations and provide support. In this way, we confirm their production workplace conditions and build communications links with suppliers.

We are continuing to further strengthen supply chain resilience through these activities.

## 6. References

- (1) Naofumi Kawada, THaNKS Activity through Cooperation with Suppliers, JATCO Technical Review No. 14, pp. 79-83.
- (2) Kouichi Hasegawa and Tadashi Kaneko, Quality Health Check Aimed at Further Improving Suppliers' Product Quality, JATCO Technical Review No. 17, pp. 89-94.
- (3) Tadashi Kaneko, Reduction of quality risks through quality checkups and improvement activities, JATCO Technical Review No. 18, pp. 85-90.

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