

Guidance Documents for Aviation, Space and Defence Organizations

Appendix-3

- Handling of Work Instructions -

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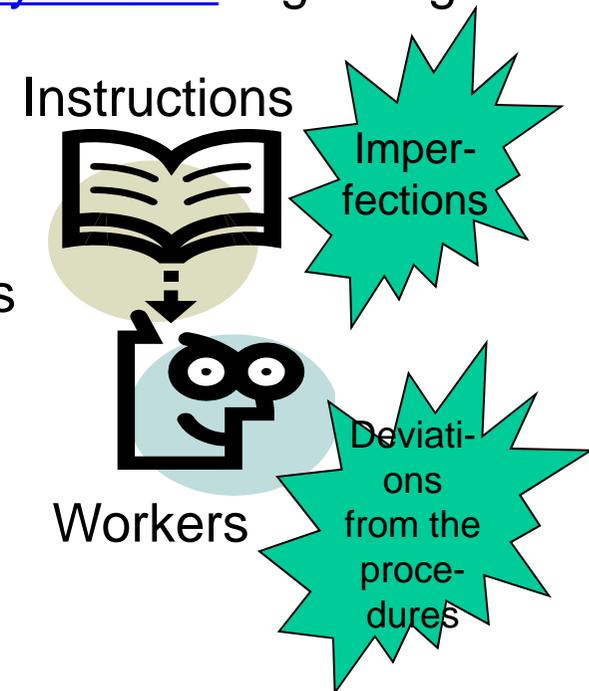
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1. Objective

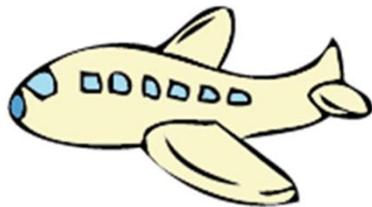
It has been recognised recently that in the aviation, space and defence industries, the following sorts of risks have potentially existed regarding the handling of work instructions.

- There are imperfections in the work instructions. The work instructions are difficult to understand. There are impossible demands/unnecessary works in the instructions. (These are problems mainly on the process designer side)
⇒ *Refer to Section 4.1*
- During the manufacture, the work instructions are not used, there are deviations from the stipulated procedures, and the procedures are changed based on judgments in the workplace. (These are mainly problems mainly on the workers side)
⇒ *Refer to Section 4.2*



1. Objective

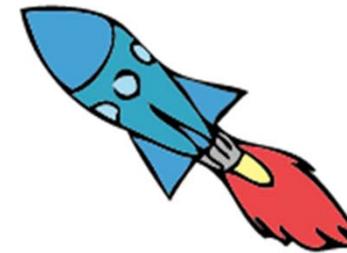
The objective of this document is to provide the guidelines and best practices for reducing these potential risks related to the handling of work instructions in the aviation, space and defence industries.



2. Scope

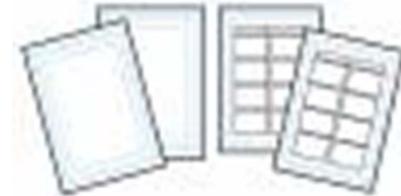
- This document is applicable to organizations in the Aviation, Space and Defence industries

Note : this document can be used in other industries as well.



3. Terms

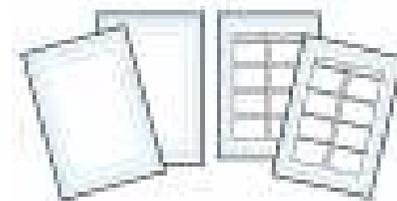
- Work instructions
Documents specifying the details that must be followed when performing works, including the sequence, criteria for each task in the manufacturing process (including inspections). It may be called the work (inspection) procedures, the work (inspection) manuals, or the QC process sheets, etc. In this document, the word of “work instructions” is used as a general term.
- Worker
Person who performs works (including inspections) in accordance with the work instructions.



4 Handling of work instructions

4.1 Writing and approval of work instructions

4.2 Use of the work instructions at the work sites



4.1 Writing and approval of work instructions

<Risks>

- In writing the work instructions there are the following risks, which are problems mainly on the process designer side.

- There are imperfections in the work instructions. The customer / design requirements are not met.
- The work instructions is difficult to understand, and it is easy for workers to misunderstand.
- There are impossible demands / unnecessary works in the work instructions, resulting deviations from the instructions.

<Risks>

- imperfections in the instructions
- Easy to make mistakes
- Deviations from the instructions



Work instructions

4.1 Writing and approval of work instructions

<Main Causes>

- The customer / design requirements are unclear.
- The customer / design requirements are highly varied, huge, complex, and there are many revisions made. (For example, special processes)
- Reflection in the work instructions for the customer / design requirements (including the instructions of the suppliers) is insufficient and incomplete.
- The work instructions are not revised appropriately.
- The content of the work instructions is difficult to understand, so they are interpreted in multiple ways.



Customer /
design
requirements



Process
designer



Work
instructions



Worker

4.1 Writing and approval of work instructions

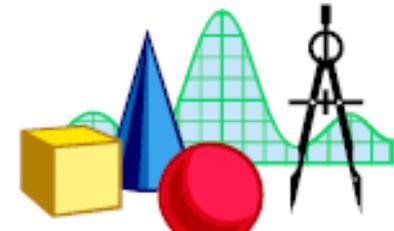
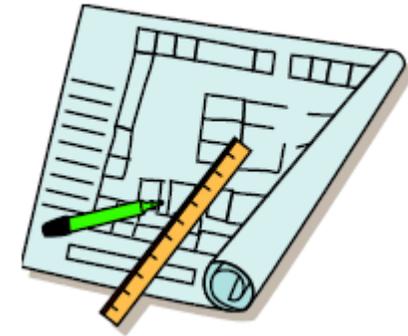
< Main Causes > ... continued

- The content of the work instructions **cannot realistically be complied with**, or is difficult to comply with. For example, the work performance is bad under the described procedures, or the designated tools and measuring instruments are difficult to use or difficult to obtain (including the case in which they are unaffordable), etc.
- The guidelines for writing the work instructions are insufficient so there are variations in the **level of the content recorded in the instructions**.
- **There is insufficient ability** to write the work instructions for the process designer.
- **Human error** in the writing of the work instructions.
- **Reviews are insufficient** at the time of confirmation and approval.

4.1 Writing and approval of work instructions

<Examples of countermeasures / best practices>

- Construction and improvement of a mechanism for reflecting the customer / design requirements (drawings, standards, manuals, etc.) quickly and reliably the work instructions. For example, use of a **check sheet**, attaching a seal to drawings and manuals for **reconciliation** (elimination). Ideally, automation of the requirement deployment is suggested.
- In the case that the customer / design requirements are unclear, **coordinate with the customer / designer** to clarify them. As necessary, get the changes reflected in the requirement document.



4.1 Writing and approval of work instructions

<Examples of countermeasures / best practices> ... continued

- Aim for instructions that can be complied with and are easy to comply with, incorporate feedback from the work sites, and coordinate with the customers and design department as necessary while continuously implementing **improvement activities for the work instructions**.



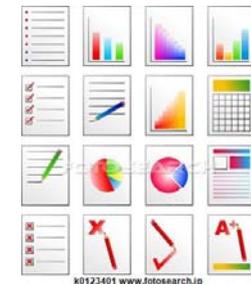
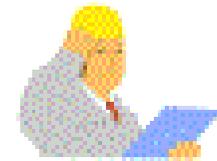
- In the case that the customer requirements are highly varied, huge, and complex, construct a mechanism which can **manage and process them efficiently**.

Even in the case that there are frequent revisions, take into consideration the differences in the content of the requirements so as to ensure that the revisions are reflected in the processes and that the timing of application of the revisions can be set. (For example, special processes)

4.1 Writing and approval of work instructions

<Examples of countermeasures / best practices> ...
continued

- Eliminate **human error** in the writing of the work instructions. Utilization of automation, etc.
- Take into consideration the experience and level of the person using the work instructions to set the **recording level** (including common sense matters).
- Use **diagrams and photographs** to clarify the procedures and status.
- Reflect the content of **know-how and tacit knowledge** in the work instructions too, taking into consideration the necessity to do so. It is also good to develop it as supplementary materials.
- People who have experience and competency carry out the **confirmation and approval**.



4.2 Use of the work instructions at the work sites



Japanese Aerospace Quality Group

<Risks>

• During the manufacture, there are the following risks, which are problems mainly on the workers side.

- The work instructions **are not being used**.
- There are **deviations** from the stipulated **procedures**.
- **Procedures are changed** based on judgments in the workplace.

<Risks>

- Non-use of the instructions
- Deviations from the procedures
- Change of procedures



Work at manufacturing sites

4.2 Use of the work instructions at the work sites



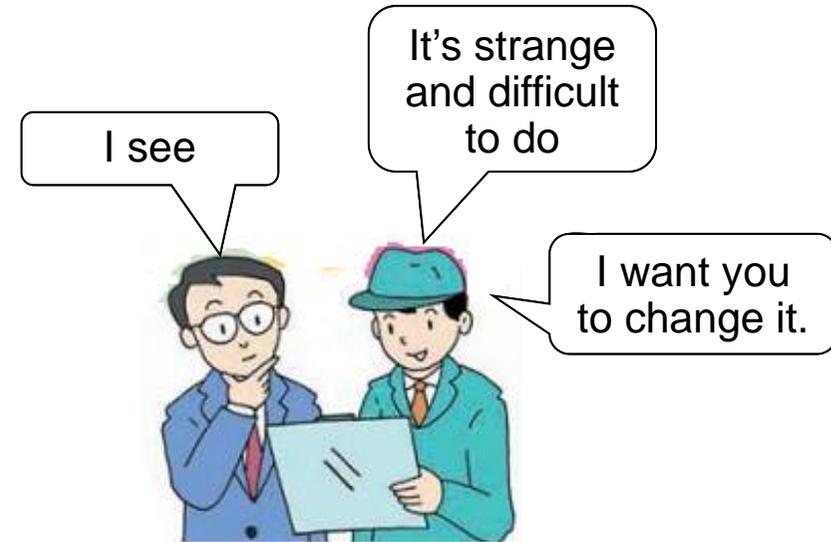
< Main Causes >

- **Workers' excessive self-confidence** and misapprehensions that arise from the accumulation of experience, familiarity with the work, the similarity of the products, etc.
- **The work instructions cannot be followed practically.** For example, the instructions is not easy to be followed, or the designated tools and measuring instruments are not easy to handle or are not available (including the case in which they are too expensive to obtain).

4.2 Use of the work instructions at the work sites

< Main Causes > ... continued

- The work instructions are **difficult to understand**, and they can be interpreted in multiple ways.
- **Misunderstanding** or misapprehensions of the work instructions (ex. the worker has not noticed deviation from the instructions).
- **Lack of the knowledge** necessary for understanding the work instructions.
- Skipping of processes and work due to **interruption of the work** (ex. go to the toilet, telephone calls.).



4.2 Use of the work instructions at the work sites

< Main Causes > ... continued

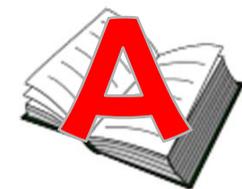
- The worker is not in a **working environment** in which he can look at the work instructions carefully. For example, he is in a situation where there are high noise levels, low light intensity, high temperature and high humidity, high places, or strong wind, etc.
- Working in accordance with work instructions that are **not the latest edition**.
- There is no **record** of which work instructions were followed to perform the work.



Drawing Rev.



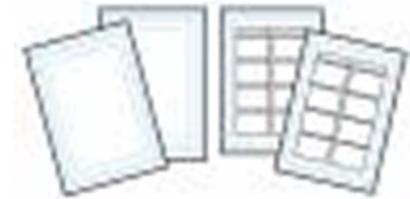
Instructions Rev.



4.2 Use of the work instructions at the work sites

<Examples of countermeasures / best practices>

- Educate and inform the workers repeatedly to ensure they are aware of the **importance and necessity of complying with** the work instructions. For example, Use regular educations and to notice in the work sites, etc.



- In the case that there are **doubts about the instructions** during the work, stop the work and report to the manufacturing process designer.

Furthermore, activities to receive feedbacks from the workers are also effective. (Refer to the Guidance Documents for Aviation, Space and Defense Organizations Appendix-4.)

4.2 Use of the work instructions at the work sites

<Examples of countermeasures / best practices> ...
continued

- **Confirm** that the process designer or highly experienced workers, etc. are **present** during the work and that the work is being implemented in accordance with the instructions. This is particularly effective in the case of a first-time process or work task and in the case that the worker is a beginner or inexperienced personnel.
- Construct a mechanism capable of confirming that the work instructions are always the **latest edition** and ensuring that the latest edition is reliably used.



4.2 Use of the work instructions at the work sites



<Examples of countermeasures / best practices> ... continued

- The **supervisor regularly patrols the workplace** to confirm that appropriate work instructions are being used and complied with. Carrying this out as part of an internal audit is also effective.
- In order to **improve the skill levels and awareness** of the workers, **regularly provide education** to the workers about compliance, flight safety, quality first, the human factor, the related latest technologies, basic knowledge, and key points in the work, etc.

4.2 Use of the work instructions at the work sites

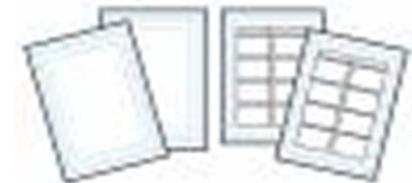
<Examples of countermeasures / best practices> ...
Continued

- Improvement of the **bad work environment** such as high noise and low light intensity.
- Report problems and issues to the top managements** and resolve them with the involvement of the managements.
- Appropriately write and store **records** on which work instructions were followed to perform the work.



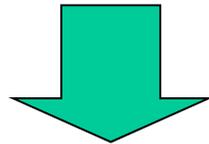
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5. Example (1)



(Case)

- It was difficult to obtain the measuring instruments stipulated in the work instructions, so other type of functionally-equal measuring instruments were being used.



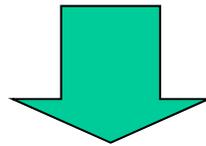
(Countermeasures)

- Aiming for instructions that can be complied with on the work sites, they coordinated with the customer/design department while engaging in activities to revise the work instructions.

5. Example (2)

(Case)

- Tools different from the designated tools were being used based on the work site judgment from the viewpoint of work performance in the assembly work.



(Countermeasures)

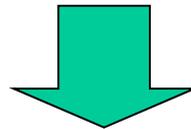
- Re-education about worker compliance with instructions, confirmation by the supervisor of the work status, and meticulous implementation of reviews by the related departments when a change happens.



5. Example (3)

(Case study)

- When shifting from the prototype to mass production, the structure was changed a little, the part number changed and the instructions were newly prepared. The worker thought that only the part number had been changed for the mass production and, based on his/her experience at the time of prototype assembly, performed the work without looking at the instructions in detail and so made a mistake in the adjusting work, the point which had been changed.



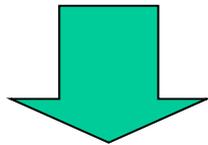
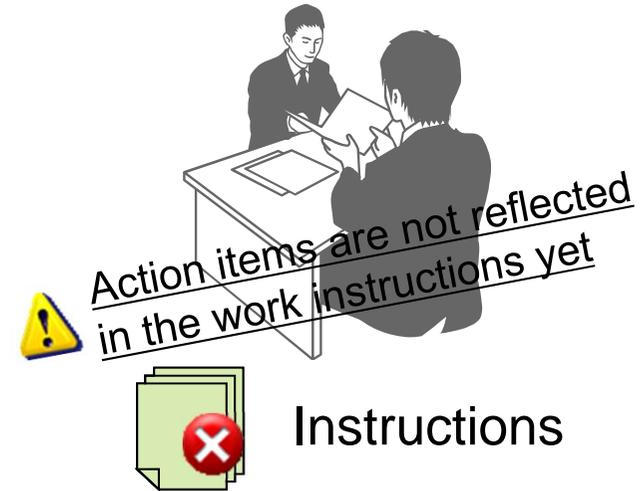
(Countermeasures)

- It was decided that when shifting from the prototype to mass production, a list clearly stating the points which had been changed would be written by engineering, and distributed at the same time as the drawing issue. the production engineering section and the workers would look at that when performing the work.

5. Example (4)

(Case)

- Regarding the deployment of the customer requirements, a meeting was held with the suppliers regarding the content of the work instructions, but the action items were not reliably reflected in the work instructions of the suppliers.



(Countermeasures)

- The system was changed so that the supervisor on the organization's side now confirms that the action items are reflected in the instructions.



6. Editor's Note

- The requirements of the customer must be reflected appropriately into the work instructions, and the work must be performed in accordance with the instructions. These have been promised to the customers and supervisory government agencies.
- Not handling the work instructions appropriately is to disobey the customers and supervisory government agencies, and therefore threatens the safety of the end users (ex. aircraft passengers). In this industry, such organization cannot continue to do their business.
- Each organization is expected to handle the work instructions appropriately with reference to this guidance document.