

Injury during machining work and preventive measures against the recurrence of the accident

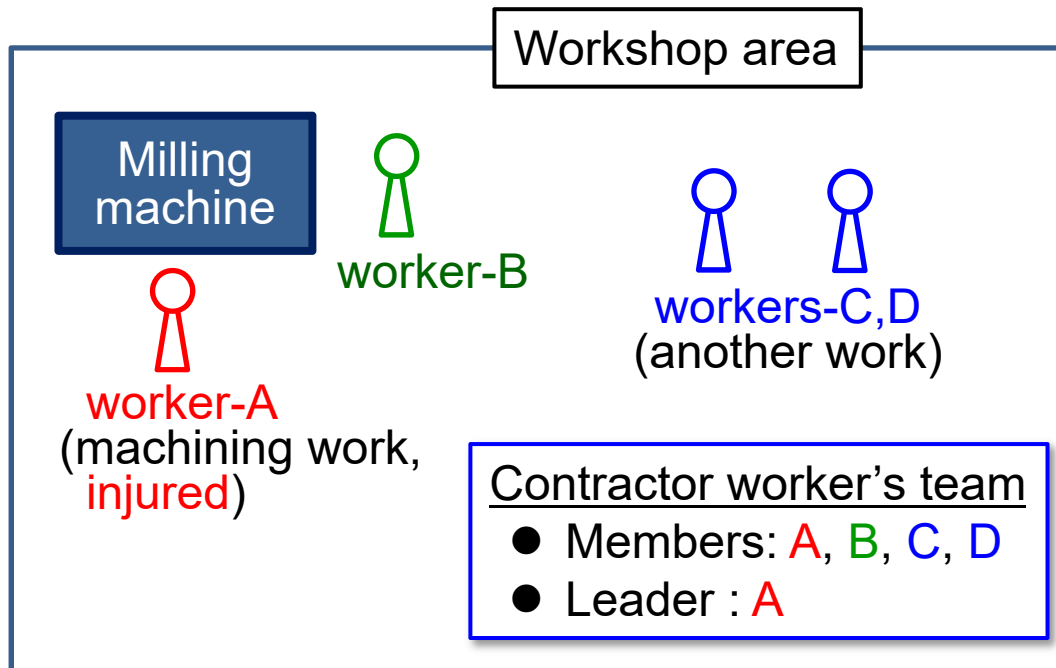
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Outline

- ◆ **Injury during machining work**
- ◆ **Direct causes and problems** leading to the incident
- ◆ **Root causes** leading to inadequate actions
- ◆ **Preventive measures** against the recurrence of the accident **(Various efforts for safety)**

Injury during machining work using a milling machine

August 2018



Worker's location in occurrence of the injury

Manufactured parts

The accident occurred in manufacturing small parts for magnetic-field measurements using a milling machine.

Injured person : a contractor worker (leader of the team)

Injury during machining work using a milling machine

**Machining work
wearing gloves
(Prohibited)**



The injured worker-A was brushing off the machining dust by hand with wearing gloves.

His middle finger of the right hand was caught in the rotating mill and got serious injury.

Direct causes and problems leading to the incident

- ✓ **The worker did not stop the rotation** of the machine.
- ✓ He tried to **remove dust with hand**, not using tools (brush, air..)
- ✓ He engaged in the machining work **putting on the gloves**.

These procedures violate the regulations.

- The company of the worker received a corrective instruction from the Labor Standard Inspection Office.

- ✓ **Team members could not caution the injured worker**, although they noticed he used a milling machine wearing gloves.

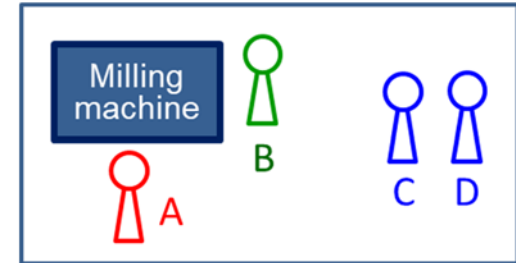
Root causes of the incident and the **preventative measures** investigated by the working group
interview, inspection, analysis, discussion

Important root causes leading to inadequate actions

1) Lack of concentration on the work

← Insufficient Tool Box Meeting (TBM)

Unclear task for each worker



- The *injured worker-A (leader)* planned to let another *worker-B* to do the machining work. However in the TBM, the assignments of the tasks to each member was not enough confirmed.
- Just before starting the machining work, the *worker-B* hesitated to use the milling machine, thus the *worker-A* did the machining work by himself.
- The *worker-A* intended that he only attached an endmill (cutting tool) to the milling machine wearing gloves. Before starting the machining work, he forgot to take off the gloves.
- The *team members (including A)* could not stop their own works when their roles were changed.

⇒ **Insufficient readiness before starting the work**

Important **root causes** leading to inadequate actions

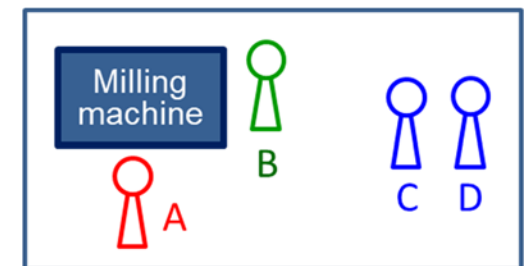
2) **Insufficient skill for safety confirmation**

- 2-1) **Confirmation of wearing basic safety equipment (not wearing gloves) was not developed into habit.**
- 2-2) Other **team members (B,C,D) could not caution the worker-A**, although **they noticed the worker-A kept wearing gloves** during the machining work.

Insufficient recognition of danger

Other team members knew that wearing gloves are prohibited.

*However **they could not imagine a serious result** caused by this violation.*



Strengthening of **safety measures** after the accident

1) In the TBM, a work manager (J-PARC staff) must confirm

- ✓ **Tasks are clearly assigned to each worker.**
- ✓ **The (supervisory) foreman does not engage in the high-risk works*.**

*High-risk works : Mistakes in work procedures / operation lead to serious incidents, such as occupational accidents, fire, radiation exposure, radioactivity release, *etc.*

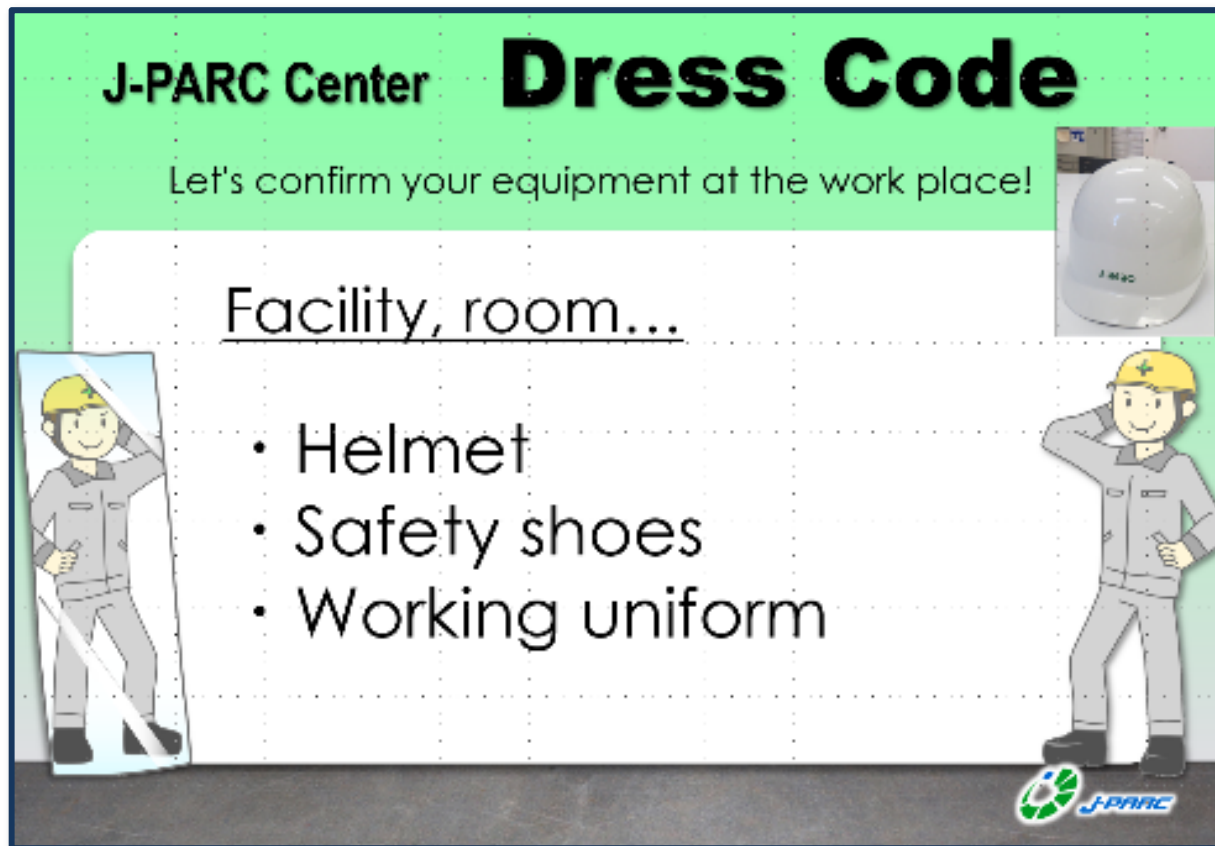
(examples of *high-risk works)

machining work, crane operation, electrical insulation works, handling radioactivated materials

In these high-risk works, **the work manager must have the worker concentrate his/her work.**

Strengthening of **safety measures** after the accident

- 2-1) Introducing the **Dress Code** and applying to all workplaces
- **the rule for safety equipment defined at each workplace**



Example

Strengthening of safety measures after the accident

2-2) Continuation and developments of the **hazard training based on experience** since FY2016

More than 70% of 400 J-PARC staffs already took this training.

J-PARC's new rule : **All work managers must take this training.**



Caught in a rotating drill



Inflammable gas spray



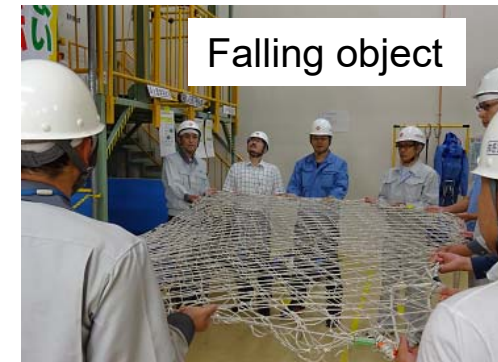
Stepladder



Safety belt



Tracking phenomenon

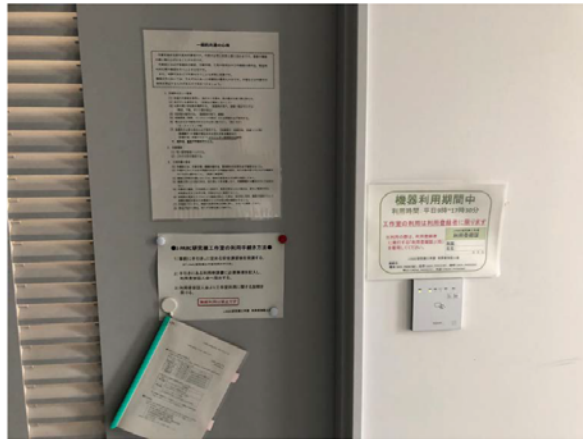


Falling object

Improving safe working environments at workshops

- Preparation of machines, places, equipment for safe works
- Setting directions, manuals, checklists at workplaces
- Confirming clothes, protectors for oneself and others

Good examples at a common use workshop



Directions for the workers on the entrance door of the room

Mirror for checking safety equipment
Safety glasses on hand



Directions for handling each machine tool



Close wristband of the clothes.
Bind long hair. / Put on working cap.
Don't use waste cloth for removing the machining dust (brush, air ..)

Safety glasses OK!
No gloves OK!

Setting expert group on machining work

- Regulating matters required for safe works and guidelines
- Preparing the rulebook for safety in machining work, which must be followed by all the J-PARC members.
- Providing basic directions, manuals, checklists, and education materials for improving safety in machining works
- Mutual inspection of workplaces and machines ; Technical suggestions to the workplace managers

J-PARC センター・機械工作作業における安全基本ルール

2019 年 1 月
J-PARC センター 工作機械連絡会


本ルール は、J-PARC センター及び関連建屋に設置された工作機械を利用及び管理するすべての者が遵守すべきルールである。

※ 工作機械及び設置場所

- 各工作機械には、工作機械管理責任者、工作機械担当者(正/副)を定める。
- 工作機械の管理者(工作機械管理責任者、工作機械担当者(正/副))は、安全に機械工作作業を行うことができる環境を整備・維持する。機械工作作業を行うエリアを明確にし、工作機械の定期的な点検・整備、作業場所の整理・整頓・清掃等につとめる。
- 工作機械の設置場所には、工作機械連絡会が定める事項を含む安全事項に関する掲示を行う。
- 緊急時の連絡先を、作業場の分かりやすい場所に掲示する。
- 各工作機械には、取扱説明書、使用記録簿(使用者、使用時間、使用前/使用后点検結果、等)、定期点検記録を備え付ける。
- 工作機械のうち、ボール盤・旋盤・フライス盤・帯鋸盤(コンターマシン)・グラインダーは、原則として台に設置(固定)する。台が安定していない場合には、台を床に固定する。
 - キャスター台への設置は不可とする。

← Rulebook
for safety in
machining work
(6 pages)

→
Requirements
for safe works
(Poster)



機械工作作業での必須事項

- ◆ 異常に気づいた場合は機械を停止し、管理者に連絡する。
- ◆ 手袋をしない。
- ◆ 保護メガネを着用する。
- ◆ 加工中は、回転している刃物や工作物に手を近づけない。
- ◆ 切りくずはハケやエアで取り除く。

※ その他、「機械工作作業における安全基本ルール」もご確認ください。

Other efforts for safety at J-PARC



J-PARC Center Work Flow Standard

since FY2015 (after the fire) —

Work manager (*1):

Site manager (*2):

(*1) A J-PARC staff member who is in charge for the work.

(*2) A J-PARC staff member or a contractor who is in charge for the work place.

【Placing an Order】

0. Checking Contents of an Order

【Obtaining Knowledge】

0. Obtaining Necessary Knowledge

【Work Planning】

1. Work Planning

Work manager

Work manager

2. Risk Analysis

Work manager

3. Reducing Risk

Section Leader

4. Coordinating the Work with Other Works

Placing an order

- Make the contractor to provide the necessary documents to confirm the safety of equipments.
- Confirm the safety with the provided documents.

Training and Information sharing

- It is important to make workers obtain necessary knowledge about their work and is insufficient to do too formal training.
- The work manager and the site manager should have necessary knowledge and awareness on their responsibility.
- The work manager should confirm site manager's ability to manage the work safely.

Work planning

- The safety of work should be confirmed by each division, not a work manager alone. Especially, works corresponding to the 3H keywords (*Hajimete, Henko, Hisashiburi*: First time work, Changing work process, Work after long term break) should be paid special attention.
- The division should check the safety of the work under their own responsibility. The work with potential risks, like an on-site test of equipment without a facility test, should be confirmed in the Division Safety Review Meeting.
- The work manager should check the contractor's work plan and make the contractor revise the plan if necessary.
- It is the section leader that approves finally the work plan with reducing the risk.
- Risk analysis is not only the evaluation of major risks. Investigating various potential risks in the processes is

Other efforts for safety at J-PARC



J-PARC Center Work Flow Standard

【Placing an Order】

0. Checking Contents of an Order

【Obtaining Knowledge】

0. Obtaining Necessary Knowledge

【Work Planning】

1. Work Planning

2. Risk Analysis

3. Reducing Risk

4. Coordinating the Work with Other Works

Work name: _____

Work manager (*1): _____

Site manager (*2): _____

(*1) A J-PARC staff member who is in charge for the work.
 (*2) A J-PARC staff member or a contractor who is in charge for the work place.

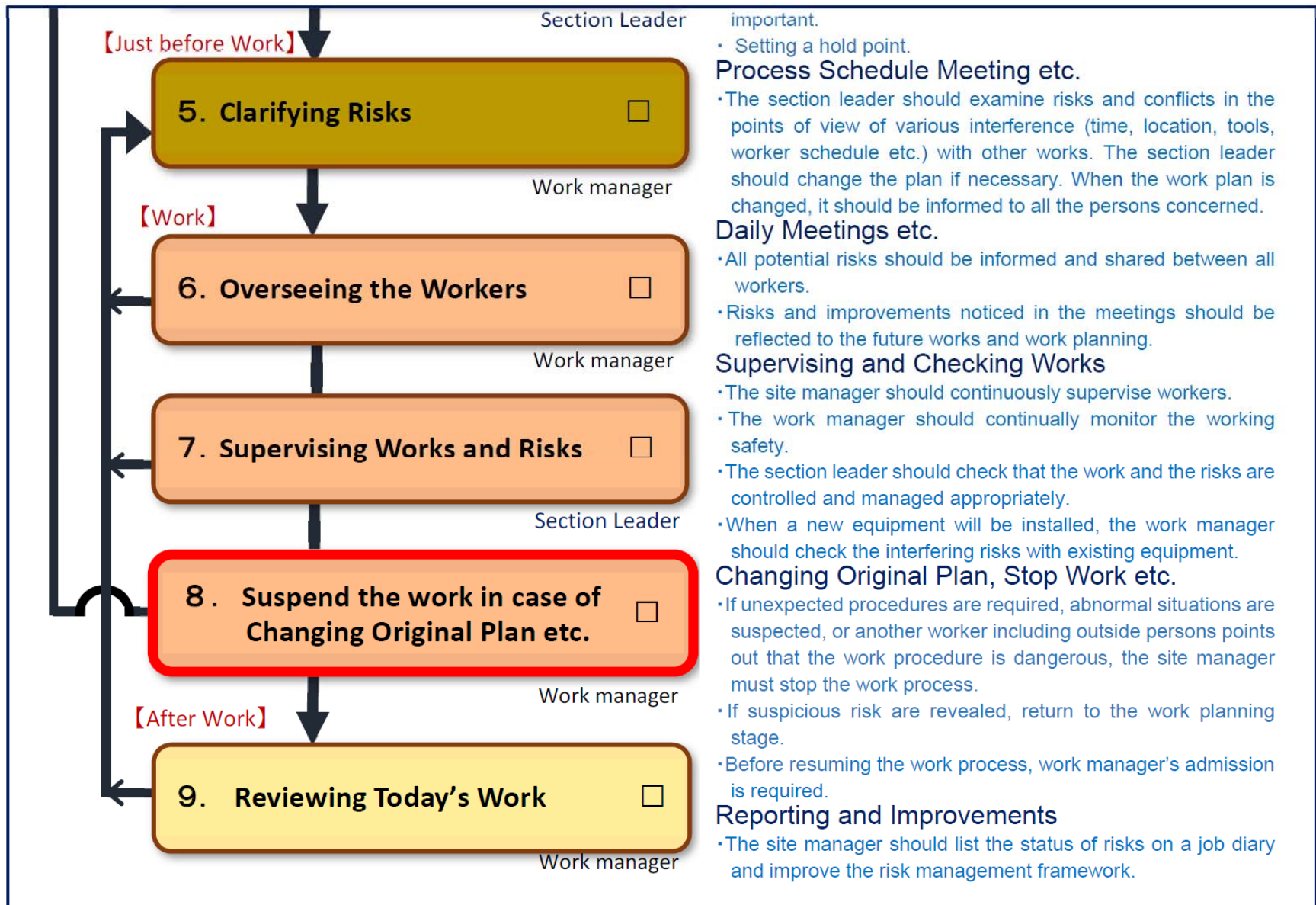
Placing an order

In the **3H keywords situations**,
Hajimete : First time
Henko : Changing
Hisashiburi : After a long interval
special attention must be payed.

3H keywords (Hajimete, Henko, Hisashiburi: First time work, Changing work process, Work after long term break) should be paid special attention.

- The division should check the safety of the work under their own responsibility. The work with potential risks, like an on-site test of equipment without a facility test, should be confirmed in the Division Safety Review Meeting.
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Other efforts for safety at J-PARC



important.

- Setting a hold point.

Process Schedule Meeting etc.

- The section leader should examine risks and conflicts in the points of view of various interference (time, location, tools, worker schedule etc.) with other works. The section leader should change the plan if necessary. When the work plan is changed, it should be informed to all the persons concerned.

Daily Meetings etc.

- All potential risks should be informed and shared between all workers.
- Risks and improvements noticed in the meetings should be reflected to the future works and work planning.

Supervising and Checking Works

- The site manager should continuously supervise workers.
- The work manager should continually monitor the working safety.
- The section leader should check that the work and the risks are controlled and managed appropriately.
- When a new equipment will be installed, the work manager should check the interfering risks with existing equipment.

Changing Original Plan, Stop Work etc.

- If unexpected procedures are required, abnormal situations are suspected, or another worker including outside persons points out that the work procedure is dangerous, the site manager must stop the work process.
- If suspicious risk are revealed, return to the work planning stage.

- Before resuming the work process, work manager's admission is required.

Reporting and Improvements

- The site manager should list the status of risks on a job diary and improve the risk management framework.

Other efforts for safety at J-PARC

“ **Mindful of Others** ” since FY2016

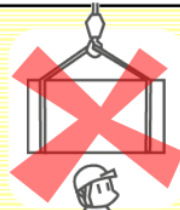


Mindful of others

Speak out, if you find an **act of danger** !



- Certainly wear protectors (helmet, safety shoes, etc.).
- Be sure that you hook your safety belt on a support.
- Do not stand on a stepladder.
- Do not stay under heavy loads.



Thank you.
That was close.



Your attention saves others.

Other efforts for safety at J-PARC

Safety Information Exchange Meeting **inside J-PARC** since 2017

(held in the Safety-Day around 5.23)



Award for good practices from the director



Talk on safety works at a facility

Symposium on Safety in Accelerator Facilities since 2013

- to share information on safety issues **between various institutions**
- 100-150 participants from accelerator facilities, universities in Japan

(Topics) High-press. / Cryo. gas; Emergency response; Electrical safety;
Heavy load transportation; Fire safety, *etc.*

**Invited speakers from the ITSF community
introduced Japanese workers precious works!**

***Courtesy* : R. Trant (CERN), Y. Loertscher (PSI),
C. Balle (CERN), A. Manzlak (J-Lab), F. Saretzki (DESY)**



Summary

Strengthening of safety measures at J-PARC

- ◆ Confirmation of assignments of the tasks for the workers
- ◆ Application of the Dress Code at workplaces
- ◆ Hazard training based on experience
- ◆ Improving safe working environments
- ◆ Expert group on machining work
(Preparing documents for safe machining works,
inspection of workplaces, technical suggestions)
- ◆ Other efforts (Work Flow Standard, Mindful of Others,
Sharing information)