

Preliminary Competition for the Plant Disaster Prevention Challenge of the WRS Disaster Robotics Category Regarding Methods to Reproduce Abnormalities of Mission P3

1. Deterioration of Wall (Halved Tank/Chimney)

Common Requirements:

- Baseboard (4 rows × 6 columns of 900mm square wood boards) shall be fastened by screws to the large wall made from wood with a radius of 6m and a height of 3.6m to 4m.
- 9-16 boards (200mm square boards) for test objects (test pieces) shall be adhered or embedded to the baseboard to replicate each abnormality in the baseboard.
- The three types of abnormalities (deterioration) to be replicated shall be cracking, rusting and flaking.
- An abnormal test board shall be assigned to each baseboard.
- Healthy test piece boards shall also be prepared.
- No change to the layout of test boards is currently planned.
- The material for the baseboard is expected to be plastic or aluminum.

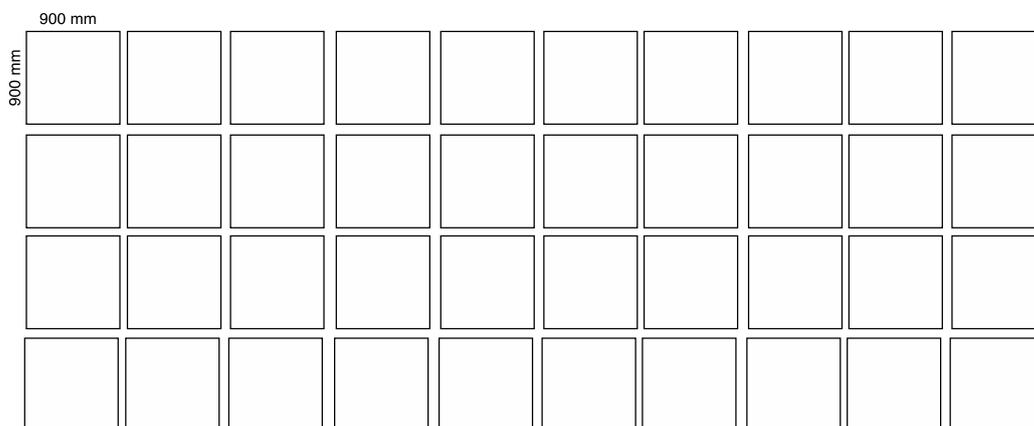
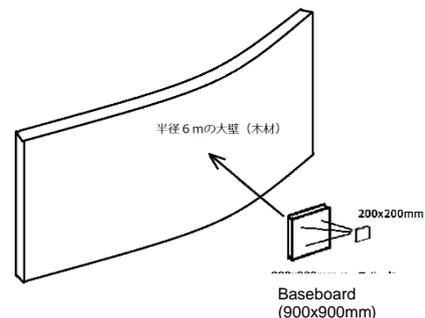


Figure 1: Layout of Baseboard

2. Test Pieces Boards

2.1 Cracking

- Presumes visual inspection.
- Teams report linear cracking and the width and length of cracks
- Cracks shall have a width (t) of 0.2mm to 1mm and a length (a, b, c) of 30mm to 200mm.
- Vertical, horizontal and slanted (45 degree angles) are planned.
- Refer to the inspection requirements such as the bridge

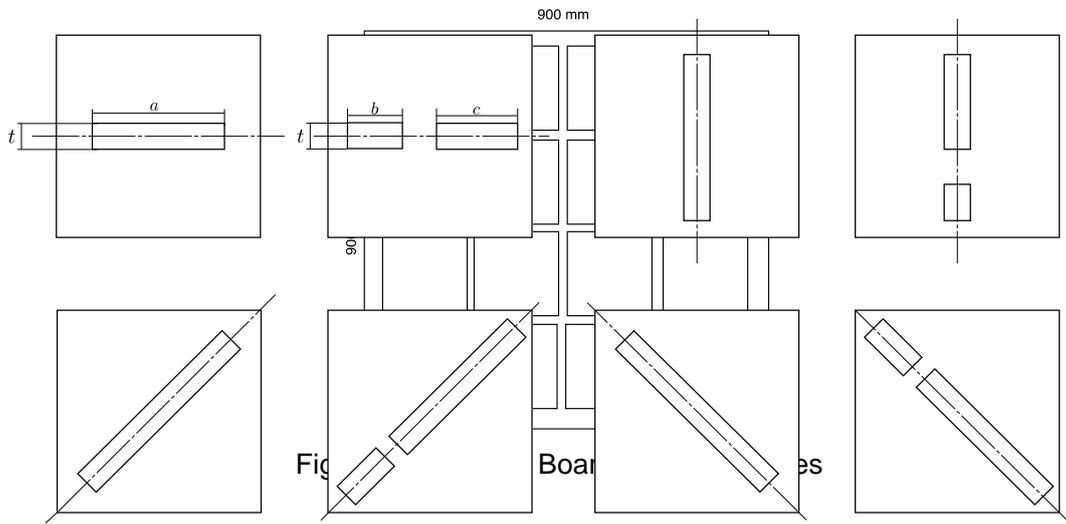


Figure 3: Reproduction Method of Cracking

2.2 Rusting

- Presumes visual inspection.
- Teams shall report rusting as a ratio [%] for the amount of rusting (distribution rate) in sections for a standard area (900mm²) in accordance with the ASTM D610 evaluation criteria.
- Rusting shall be actually replicated on thin iron plates with a circular geometry. The distribution pattern of rusting shall only be spot rusting.

ASTM D610

Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces

<https://www.astm.org/DATABASE.CART/HISTORICAL/D610-01.htm>

<file.yizimg.com/175706/2011090909552699.pdf>

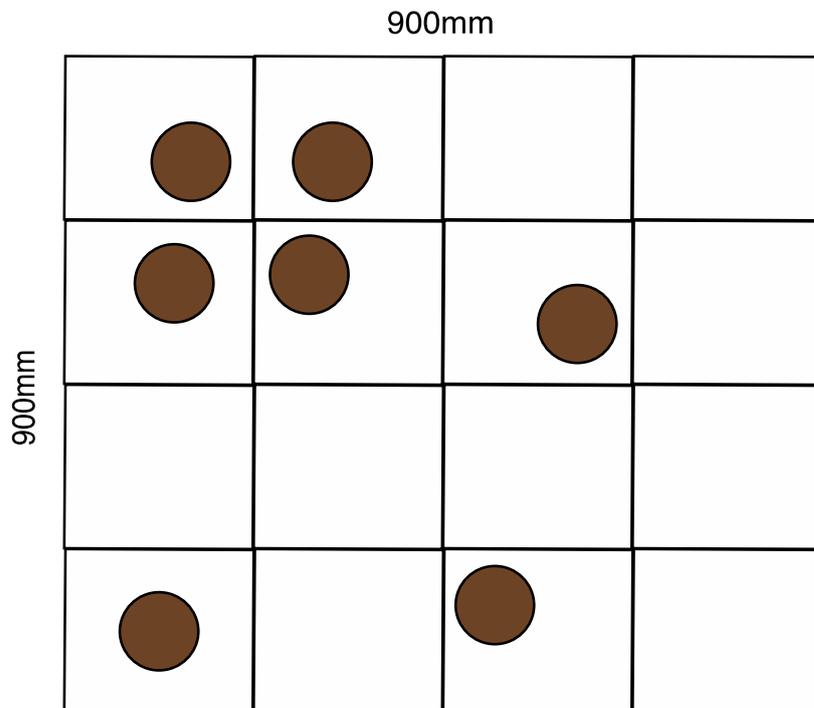


Figure 4: Reproduction Method of Rusting

2.3 Flaking

- Presumes a hammering test.
- Teams shall report the existence of an abnormality and the location.
- Flaking shall be reproduced by a method (peeling/cavities) so that it is in the training facility for the teams inspecting the structural integrity of infrastructure.
- The boards for test objects shall have a multi-layer structure which creates gaps and injects chemicals such as foaming agents.
- The material shall be made of concrete.

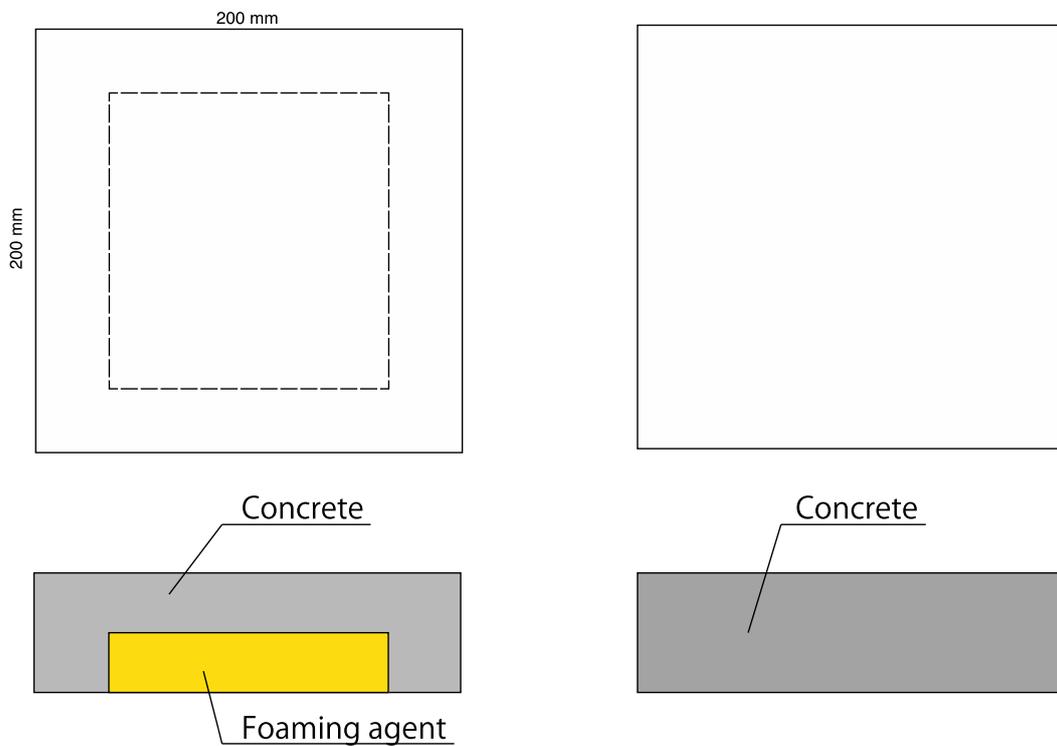


Figure 5: Reproduction Method of Float