Humanitarian Air Drop

This is your secure and confidential Project Room for the Challenge. From here, you can receive the Challenge details, submit your solution proposal, ask questions, and receive answers confidentially from the InnoCentive team.

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Humanitarian Air Drop

AWARD: **$20,000 USD** | DEADLINE: **5/02/11** | ACTIVE SOLVERS: 782 | POSTED: 3/02/11

Source: InnoCentive **Challenge ID:** 9932741 **Type:** Theoretical-licensing

Team | Share | 0 Messages | Agreement

Detailed Description & Requirements

Background

Current humanitarian resupply procedures generally don't allow for parachute-based airdrop of bundles or containers due to a lack of drop zone control. Large containers of food and water supplies suspended from uncontrolled chutes can pose a serious threat to personnel on the ground. Instead cardboard containers sitting on 4'x4' plywood skid-boards are ejected from the aircraft, with the container tearing apart due to the airflow, and the thousands of smaller food and water packages falling to the ground. The Army is working efforts to ensure that the smaller food and water packages do not cause physical harm to the recipients below. Unfortunately with this method, there is a definite risk that the airdrop container and plywood skid-board will cause harm since it stays intact after exiting the aircraft. Therefore, this system (referred to TRIADS) is limited to use over unpopulated areas. The Haiti earthquake disaster in January 2010 re-emphasized the need for the US to be more capable of rapidly responding to disaster affected populations anywhere in the world with delivery of food and water within the first few days or weeks following a disaster, and not be limited to geographical areas where collateral damage will be kept to a minimum due to the limitations of our airdrop capability.

This InnoCentive Challenge call is focused on novel techniques/ideas on getting food and water packages out of the aircraft while avoiding falling components that can cause harm to the intended recipients. Please note that the individual food and water packages are intentionally "scattered" so more people have access to them and prevent hoarding. A successful idea would allow the US to drop food and water packages anytime and anywhere throughout the world without causing undue harm or injury to humans below.

The Current System – EXTENDED TRI-WALL AERIAL DELIVERY SYSTEM (TRIADS)

The current delivery system, TRIADS is described in Chapter 2 of a document that can be downloaded here (http://bit.ly/TRIADSmanual). Each container is basically a cardboard box (tri-walled cardboard square tube with cardboard endcaps) with the following dimensions.

Weight: Minimum load allowed ..... 747 pounds

Maximum load allowed..... 1,375 pounds

Height: ..... 80 inches

Width: ..... 42 inches

Length: ..... 50 inches

Each full container (~1400 lbs) contains about 610 food items known as Meals Ready-to-Eat (MREs) or Humanitarian Daily Rations (HDRs). The C-130 aircraft can deliver 16-24 containers. The C-17 aircraft can deliver 40 containers. All containers are prepped and loaded on the ground then placed on the aircraft.

The containers are rigged together and secured to a roller system inside the cargo bay of a C-130 or C-17 aircraft. At the drop point the load is released and quickly rolled out the back of the aircraft. The prevailing conditions cause the containers to rip apart spreading the load consisting of MREs or HDRs over the drop target area. The MRE's and HDR's are designed to fall in a way that will not cause harm to people below and the cardboard tears apart and also falls harmlessly below. However, the skid-board which is a 4' X 4' X ¼" piece of plywood can cause serious harm when it hits the ground as well as any other non-food items. The skid-board assembly is necessary because a very hard surface is required to contact the roller system for quick and smooth deployment. The cardboard container itself tends to buckle and bind up on the rollers if no skid-board is used. As can be seen from the following video of the TRIAD deployment, (http://bit.ly/TRIADSvideo) this is a very precise and quick maneuver so any sticking or binding of the containers would be an extreme safety hazard to the aircraft and crew. If you look closely at the video, you can see the cardboard endcaps fly off some of the containers as they leave the aircraft. The attached document has photos of C-130 that uses the TRIAD system. It is important to note that the complete roller system in the pictures can be removed from the aircraft so you have the option of modifying the existing system, or coming up with a new one to replace it. We have provided some dimensions of the C130. The C17 aircraft has essentially the same system, except it can hold a lot more cargo. For the purpose of this Challenge, you only need to have a system for the C130. That can be scaled up for the C17 later. All requirements below will be based on the C-130 aircraft unless otherwise stated.

The Challenge

The Challenge is to modify the delivery system or come up with a new system that can quickly get these food and water packages out of the aircraft at the drop point and have them scatter the contents on the ground. Ideally, only the food and water packages would hit the ground which has been designed to not cause harm to humans below. If anything else falls to the ground, it should be light enough not to cause damage to humans.

Any proposed solution should address the following **Technical Requirements**:

1. The system must be able to release 22,400 lbs. for the C-130 (56,000 lbs. for the C-17), with meal packages ranging from 0.12 to 2.25 lbs. and corresponding volumes of 3 to 180 cubic inches.
2. The whole load (or a partial load) should be able to be released at the drop point in 10 seconds or less. Note: Currently, the whole load is released at multiple drop point limited by the number of containers. It would be desirable if the system was flexible enough such that a load could be split up into groups and dropped at different drop points. (e.g. drop 5 containers at point 1, 4 containers at point 2 and 7 containers at point 3)
3. Once released, the food and water items should scatter and fall independently of each other and any other material.
4. Any non-food item that is released by the aircraft during the drop must be light and/or small enough to not be a falling hazard to humans on the ground. It is preferable if nothing but the food items actually leaves the aircraft.
5. The system must be compatible with current C-130E/H/J and C-17 aircraft. It cannot require changes/alterations to the airframe and must be considered safe for the aircraft and crew members. **Note:** The current roller system may be removed/stowed and new equipment can be placed inside the aircraft for

Submit Solution

Solver Agreements

These are the Solver Agreements you have signed for this Challenge.

- Solver Terms of Use
- Challenge-Specific Agreement
- Challenge-Specific Agreement Summary

Information for Academics

If you are a US University or College Professor, student (graduate student or undergraduate), or you work at a similar type of institution...

- Click Here for Important Info.

Additional Information

- Frequently asked questions

Challenge Attachments

- Humanitarian PAD C-130 Pictures.pdf

deployment. Alternatively, you can modify the roller system. All equipment should be modular and removable.

6. The airdrop altitude can be no lower than 2,000 ft. AGL (above ground level) and no higher than 35,000 ft. MSL (mean sea level).
7. The system should be able to handle Inflight g-loading at 2G vertical, 3G forward, 1,5G aft& lateral.
8. The proposed system must be able to be preloaded in a separate storage area and able to load onto the aircraft in a matter of hours using a standard loader, forklift or palette mover.
9. The proposed system should offer the Seeker client “freedom to practice” and be available for licensing. There should be no third party patent art preventing the use of specific equipment and materials for their commercial application.

Project Criteria

A detailed description of the solution is required, supported by notional drawings and diagrams. In addition, the Solver should provide an assessment of the practicality of the idea based on existing technologies or technologies that can reasonable be developed over the next 5 years. And finally, the Solver should describe what technologies need to be developed to enable such a solution.

This is a Theoretical Challenge that requires only a written proposal to be submitted.

The submitted proposal should include the following:

1. Detailed description of a system that could meet the above technical requirements.
2. Rationale as to why the Solver believes that the proposed system will work. This rationale should address **each** of the Technical Requirements described in the Detailed Description and should be supported with any relevant examples. This should include the method of delivery of the system. This rationale will be very important in the evaluation of solutions.
3. List of all hardware needed for the system and approximate costs.
4. Drawings/Schematics of the system. **Note:** We cannot provide schematics of the aircraft so exact measurements are not expected. You may have to make some assumptions about the space you are working in and that is OK. Please state any assumptions you make so your submission can be judged accordingly. Also, the loadmaster and professional riggers will have to determine how things are locked down and released. You are not expected to provide those exact details. Just show where things need to be held in place and released. It is OK to provide suggestions, but a detailed rigging system is not required.

The proposal should not include any personal identifying information (name, username, company, address, phone, email, personal website, resume, *etc.*)

The Challenge award will be contingent upon theoretical evaluation of the proposal by the Seeker.

To receive an award, the Solvers will not have to transfer their exclusive IP rights to the Seeker, instead, they will grant to the Seeker *non-exclusive license* to practice their solutions.

Team-based Proposals We value the diverse nature of the Solvers in our Network, and are now encouraging you to strengthen your Proposals by recruiting team members to work on this Challenge. Past experience shows that collaborating with multi-disciplinary colleagues and submitting Proposals as a team can truly yield great results. To support team collaboration, we have added new functionality called a "Team Project Room". A Team Project Room is a secure online workspace that allows a group of Solvers to securely collaborate and solve an InnoCentive Challenge. Team Project Room functionality will only be available for selected Challenges. By encouraging Solvers to work together, we believe that the quality and quantity of solutions to more complex or multidisciplinary Challenges will be improved. If you want to read more about Team Project Rooms, click here. Here’s how to do it.

1. Find team members using the discussion forum found in this Challenge Project Room or and have them register as a Solver on InnoCentive.com.
2. Once you have your team, click on the Team Room Form tab found in the Project Room for this Challenge and fill in the required fields.

That’s it! All inquiries will be responded to within 1 business day. We look forward to seeing your teams collaborate in our new work environment, and would greatly appreciate any feedback.