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MAINTENANCE OF LR65 TANKS

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ABSTRACT

The LR65 tank is used to transport uranyl nitrate between AREVAs' La Hague and Tricastin plants in France. Periodic maintenance is carried out by SOCATRI which is becoming part of the Industrial Services Directorate of AREVA NC Tricastin. Amongst other activities this directorate is a specialist in maintenance, as well as liquid and solid waste treatment.

In the past the maintenance of the LR65 tank required a man to work inside the cavity. The operation has a high-risk potential:

- The access is via a small man-hole on the top only.
- The tank is divided by surge plates into several sections. Again, access is by small man-holes only.
- Because of the inner contamination, full protection equipment has to be worn by the operator.
- Working in a confined environment presents a high safety risk in case of even minor incidents.
- A specially trained emergency intervention team needs to be present.

In collaboration with a local supplier, AREVA NC Tricastin has developed a tele-commanded robot which is capable of carrying out all of the cleaning and the control operations.

The advantages of this new equipment are:

- lower dose rates for the operator
- work in confined space avoided
- no more need for any particular emergency team or equipment
- overall higher safety
- faster turnaround of tank maintenance requiring less human resources
- easily adaptable to other types of tanks

INTRODUCTION

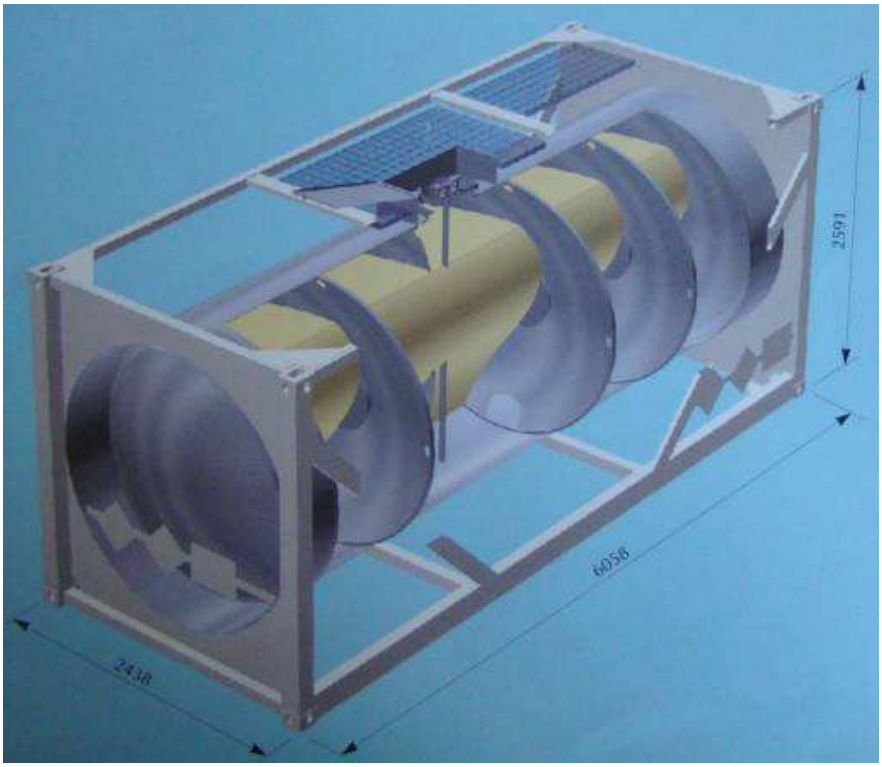
The LR65 tank is used to transport uranyl nitrate between AREVAs' La Hague and Tricastin plants in France. The total fleet is composed of 56 tanks of which about 20 have to undergo periodic maintenance per year. SOCATRI, which is becoming part of the Industrial Services Directorate of AREVA NC Tricastin, is a specialist in maintenance who carries out this maintenance.

Figure 1 shows the LR65 tank on its road trailer and Figure 2 shows several tanks awaiting maintenance. Figure 3 shows the inner structure of an LR65 tank with notably four surge plates. The access to the cavity is by means of a man hole having a 500 mm diameter.

Figure 1. LR65 tank on its road trailer

Figure 2. LR65 tanks awaiting maintenance

Figure 3. Inner structure of a LR65 tank with surge plates



In the past maintenance required an operator to work inside the closed cavity. Figure 4 shows an operator in full protective clothing (including independent air supply) entering the inside.

Figure 4. Operator in ventilated protective clothing entering the cavity

This operation has a high risk potential:

- Work inside a closed, dark cavity (risk of claustrophobia)
- Risk of lack of oxygen
- Potentially high dose rate
- Full protection clothing to be worn
- Presence of special emergency intervention team required

This operation required skilled operators at the best of their physical and mental strength.

DEVELOPMENT OF A TELE OPERATED ROBOT

In order to reduce the risk of the maintenance operation a tele operated robot has been developed together with a local supplier.

Figures 5 to 7 show this telescopic arm equipped rotating jets for the washing operation and an embarked camera for guidance and inspection. The operator now uses a modern remote control system and is no longer required to enter the cavity. The emergency intervention team does not need to be present anymore.

Figure 5. Automation of Inner Cleaning

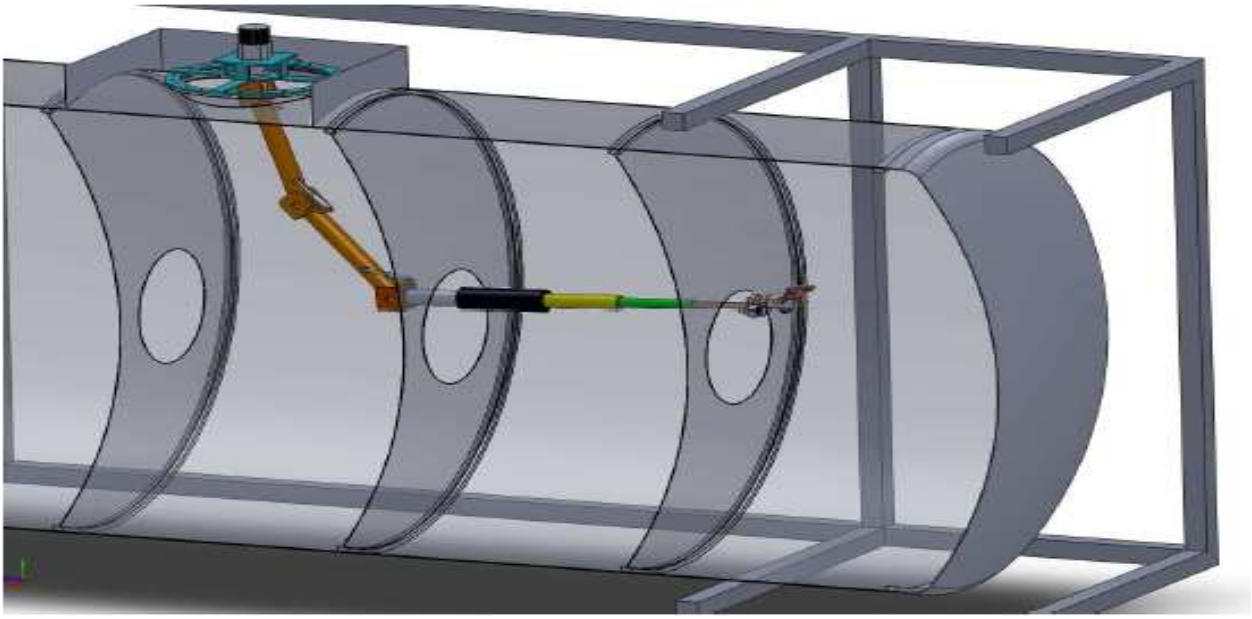


Figure 6. Tele Operated Robot

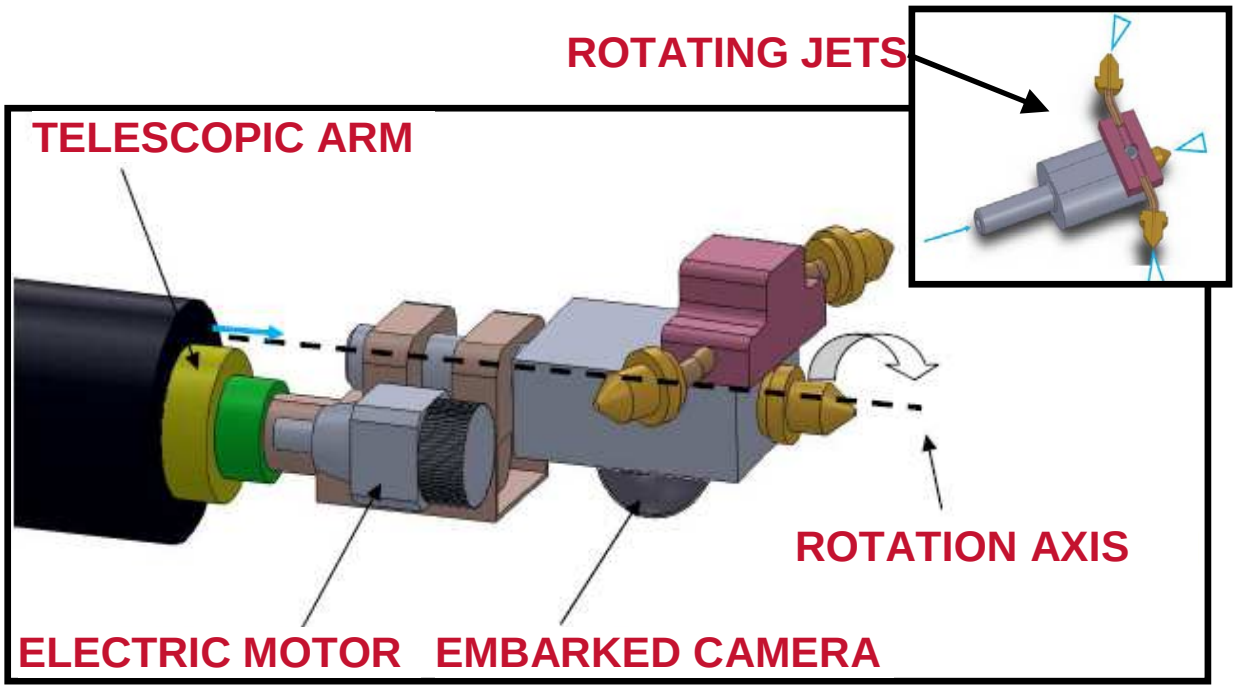
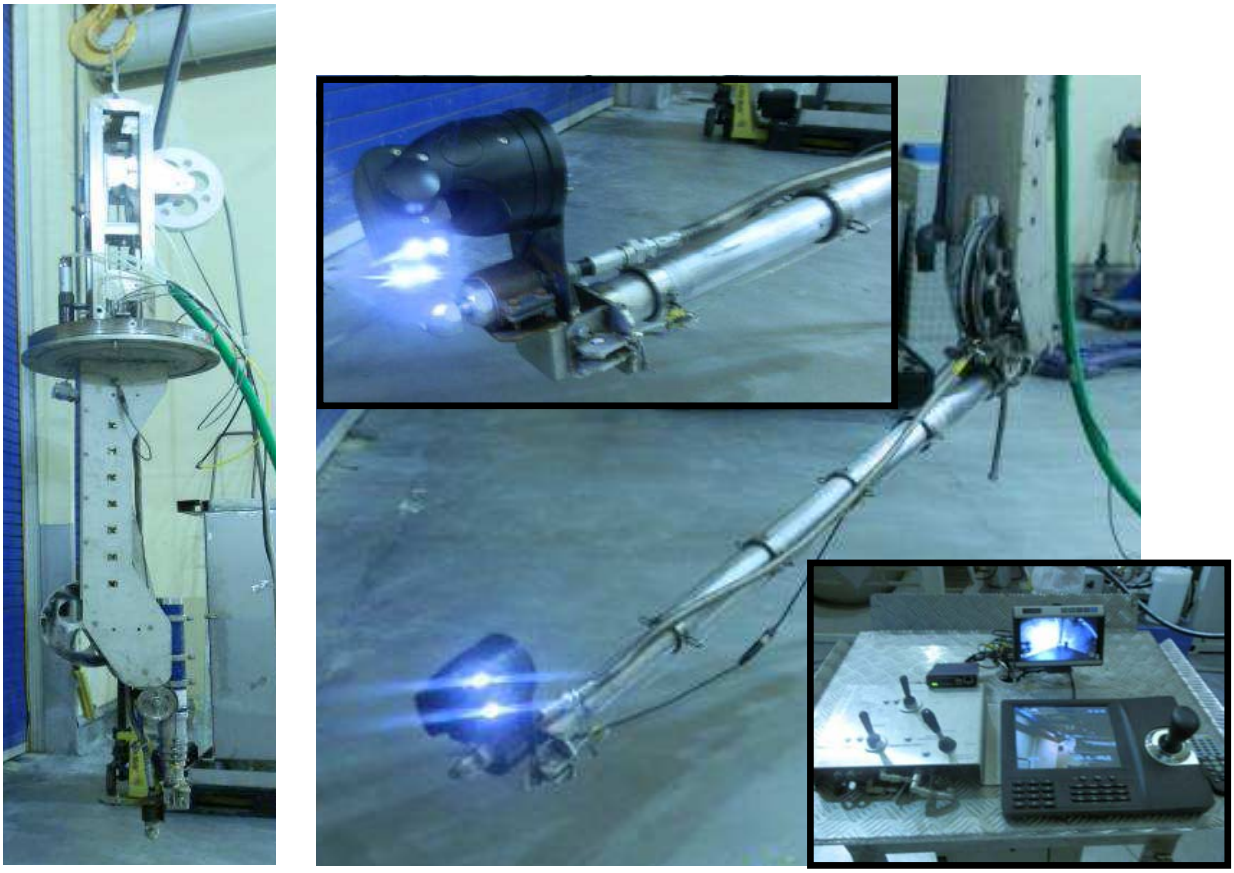


Figure 7. Telescopic Arm with Rotating Jets, Embarked Camera and Remote Control Unit



The new robot has been qualified by an independent authorized inspector. The result of the cleaning operation has improved considerably. The versatile telescopic arm has a better access and a better coverage of the cavity than the previous manual operator. Figure 8 shows a screen shot from the inspection control monitor. The result of the cleaning is virtually perfect.

Figure 8. Cleaning Result

ADVANTAGES

The advantages of the new cleaning system are manifold:

- Safety:
  - No more work in a confined space
  - No more risk of lack of oxygen
  - No more risk of accidental falls
  - No more risk of malaises
- Occupational health:
  - Reduction of dose rate for workers
  - No more need for specially skilled operators in perfect physical and mental health
- Working conditions:
  - No more work in ventilated protection suits
  - No more stress before intervention

- Economic:
    - Reduction of intervention time
    - Less human resources required of the same service
- Flexibility :
    - Can be easily adapted to other types of tanks, for example:
        - UF4 tanks
        - Liquid radioactive waste tanks