# Anti-Crash lightweight fuel bladder Tank Integrated on a new RotorCraft

## Informe

Información del proyecto

**ACTIonRCraft**

Identificador del acuerdo de subvención:
714249

**DOI**
10.3030/714249

Proyecto cerrado

**Fecha de la firma de la CE**
17 Junio 2016

**Fecha de inicio**
20 Junio 2016

**Fecha de finalización**
19 Diciembre 2020

**Financiado con arreglo a**
SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

**Coste total**
€ 1 250 163,75

**Aportación de la UE**
€ 800 000,00

**Coordinado por**
SAFRAN AEROSYSTEMS
France

## Este proyecto figura en...


# Periodic Reporting for period 3 - ACTIonRCraft (Anti-Crash lightweight fuel bladder Tank Integrated on a new RotorCraft)

**Período documentado:** 2019-06-20 hasta 2020-12-19

## Resumen del contexto y de los objetivos generales del proyecto

The objectives of the ACTIonRCraft project are to design, develop and manufacture seven anti-crash lightweight fuel bladder tanks which will integrate for the very first time ASY robust, light and ecofriendly innovative technologies:
ASY functionalized liner,
ASY lighter fabric,
ASY solvents without pictogram
These anti-crash lightweight fuel bladder tanks with limited environmental footprint will be tested, verified and validated for the high speed compound helicopter.

We have developed Seven fuel tanks with the new light weight tank wall.
The tank wall is made of a functionalized liner and a textile fabric.

A new generation of functionalized liner (without any solvent for the production) has been studied but is not included in the new tank wall right know because the development is not ended.
However a patent is ongoing covering the new generation of functionalized liner.

A new textile reinforcement has been developed in this project.
The anti-crash resistant fabrics are usually made of polyamide. For this project a new fiber type choice has been identified and used. The weaving of the fabric has been optimized so has to achieved the mechanical properties required.

For the hand making of the fuel tank we usually use MEK “Methyl Ethyl Ketone” solvent.
The use of MEK is widespread in the rubber industry.
MEK solvent is of concern for VOC emissions in the environment is highly flammable and is irritating

for operators.
A new solvent has been identified and qualified up to TRL6 with no pictogram and no VOC (max 0,01 KPa at 20°C).
This new solvent has been used for the making of the 7 tanks of the RACER.
We plan to implement this new solvent in serial production for making fuel tanks. The qualification of this new solvent for current production is ongoing.
This will be a real improvement regarding the environmental impact of the VOC emission in production and for operators health concerns.

The ActionRCraft project is still going on with the StrongRCraft project which is for us the implementation of the complete fuel systems in the RACER demonstrator.
This will permit to experiment in services (including real flight test) the new fuel tanks solutions developed in ActionRCraft project.

## Trabajo realizado desde el comienzo del proyecto hasta el final del período abarcado por el informe y los principales resultados hasta la fecha

ASY used the time to:
- Stabilize the specification of the fuel storage by adjusting it between the real need for the major functions according to what can be technically produced.
- Design the 7 tanks according to the structure
- Adjust the right quantity of material to respect the minimal resistance according to the max weight.
- Design has been validated and frozen with the topic manager.
- The weight of the fuel storage is in accordance with the requirement of the topic manager and lighter than standard.
- A new solvent COV free has been validated and and used for fuel tank manufacturing.
- Technical functions has been designed and produced successfully to reduce the weight.
- The complete fuel storage has been manufactured and delivered to the topic manager.

A new textile reinforcement has been developed in this project.
The anti-crash resistant fabrics are usually made of polyamide. For this project a new fiber type choice has been identified and used. The weaving of the fabric has been optimized so has to achieved the mechanical properties required.
The choice of the fabric has also been challenged so has to reduce the amount of the rubber coating needed to bond the fabric to the liner.
This new textile and coating optimization has permit a weight reduction of more than 25% for the tank wall and of 10% for the fuel tanks (fuel tanks comprising metallic interfaces and other rubber parts).
The mechanical bondings of the new coated fabric to the metallic interfaces and other rubber parts has been studying and optimized to be adapted to the new coated fabric mechanical properties so as to resist to crash.
The originality of this new approach is that the design of the tank wall takes into account the deformation and energy absorption of the helicopter structure at the crash.

For this purpose crash resistance of a standard test cube (700 mm) comprising a fuel tank make with the new tank wall and the customer structure surrounded was studied both by simulation and correlated to real crash test.
Both simulation and cube crash test demonstrated that the cube passed the crash test.
This new approach for crash test resistance taking into account the customer structure and the fact that we dispose know of a new lighter generation tank wall will be a strength to answer to the need of the market in the future.

For the hand making of the fuel tank we usually use MEK “Methyl Ethyl Ketone” solvent.
The use of MEK is widespread in the rubber industry.
Hand making of fuel tank with MEK consists of the assembly by bonding of the different part of the fuel tank together (rubber coated fabric, inner liner, metallic parts, rubber cured parts).
MEK solvent is used to re-activated the bonding glue and giving “tack” for the purpose of assembly making by operators on the manufacturing line.
MEK solvent is of concern for VOC emissions in the environment is highly flammable and is irritating for operators.
We made a study for the replacement of MEK “Methyl Ethyl Ketone” Solvent.
To identify the candidate solvents we first made works to identify a solvent which was compatible with our materials and process including curing cycle.
The selected solvents where then tested comparatively in the different needed bonding assembly.
And finally the bonding assembly were tested for ageing including fuel immersion (Kerosene type), humidity and temperature ageing.

A new solvent has been identified and qualified up to TRL6 with no pictogram and no VOC (max 0,01 KPa at 20°C).

This new solvent has been used for the making of the 7 tanks of the RACER.
The VOC reduction reached 40% of the total emissions of the fuel tank making (included also material coatings (coated fabric and liner), bonding glues).

We plan to implement this new solvent in serial production for making fuel tanks. The qualification of this new solvent for current production is ongoing.
This will be a real improvement regarding the environmental impact of the VOC emission in production and for operators health concerns.

## Avances que van más allá del estado de la técnica e impacto potencial esperado (incluida la repercusión socioeconómica y las implicaciones sociales más amplias del proyecto hasta la fecha)

The ambition of ACTIonRCraft is to be a showcase project to demonstrate in a relevant environment (i.e. flight tested) the installation of the combined ASY technological breakthrough (the ASY lighter fabric and with the ASY solvents without pictogram) integrated into new products (i.e. the next generation of crash resistant lightweight fuel bladder tanks).

The main objectives of this ambition has been reached.
This new tank wall technology can be proposed for the next generation of helicopters.
The new solvant is currently being qualified to replace the old solvent (with COV) on the serial products.

The ActionRCraft project is still going on with the StrongRCraft project which is for us the implementation of the complete fuel systems in the RACER demonstrator.
This will permit to experiment in services (including real flight test) the new fuel tanks solutions developed in ActionRCraft project.

Logo Projet

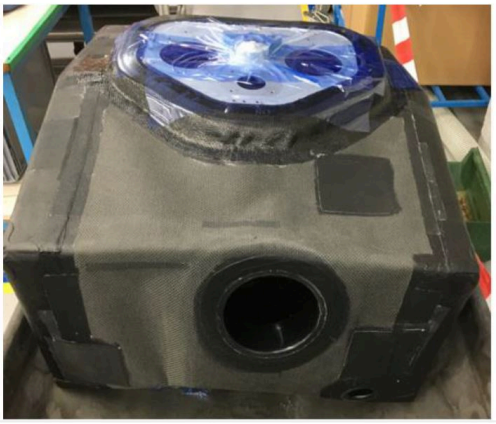
**Tank 2 :**

tank-2.jpg

**Tank 3 :**

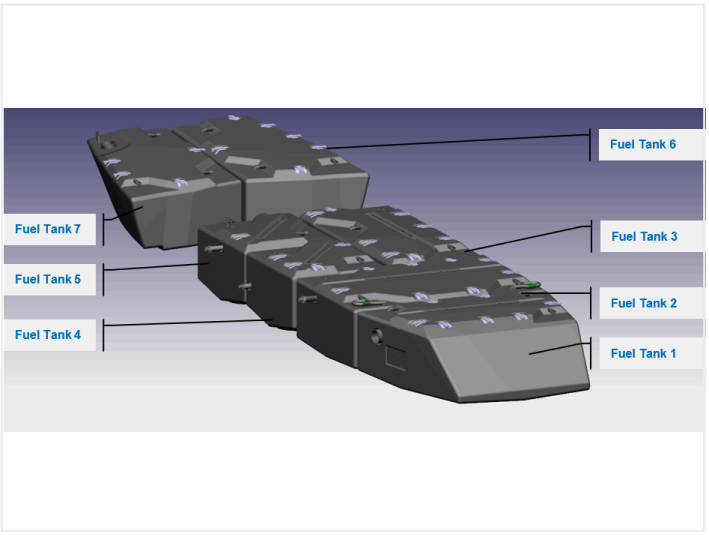
tank-3.jpg

**Tank 4 & 5 :**



tank-4-and-tank-5.jpg


tank-1.jpg




actionrcraft-fuel-tanks.png


tank-6-and-tank-7.jpg

**Última actualización:** 16 Agosto 2021

**Permalink:** https://cordis.europa.eu/project/id/714249/reporting/es