Appendices

This will be our appendices

A Table of drone specifications

Technical specifications		Flight specifications			
Weight	2500 g	Endurance	19 min		
WxLxH	578 x 578 x 330 mm	Payload capacity	700 g		
Wingspan	832 mm	MTOW	3200 g		
Material	Plastic/carbon fiber	Operating temperature	5 - 45 °C		
Airframe	Hexacopter				

Table 2: Technical and flight specifications for the UAV platform

Taken from the paper on BlackBoard "Experts in Team Innovation / Project in Robotics" by: Jes Grydholdt Jepsen, Kristian Husum Terkildsen and Ulrik Pagh Schultz

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B OSO

Table for SORA operational safety objectives compliance:

Table 1: Operational Safety Objectives Compliance

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		7S	SAIL VI	
	OSO number	Technical issues with the UAS re	required level	Method of compliance
OSO#1	Ensure the UAS ope	Ensure the UAS operator is competent and/or proven	Н	The airport authority as an operator will ensure compliance
OSO#2	UAS manufactured b	UAS manufactured by competent and/or proven entity	Н	The drone will be manufactured, tested and certified by the competent authority
OSO#3	UAS maintained by	UAS maintained by competent and/or proven entity	Н	The airport authority and Lorenz technology will ensure the optimum maintenance of the drone
OSO#4	UAS developed to a	developed to authority recognised design standards	Н	This will be ensured that the drone comply with required design standards
S#OSO	UAS is designed cor	is designed considering system safety and reliability	Н	The features and drone operation will be designed and developed keeping in mind the safety aspects
9#OSO	C3 link performance	ink performance is appropriate for the operation	Н	C3 Link performance is appropriate for this operation
080#7	Inspection of the UAS (produconsistency with the ConOps	Inspection of the UAS (product inspection) to ensure consistency with the ConOps	Н	The drone operator will ensure inspection of UAS
8#OSO	Operational procedures are defined, validated and adhered to	res are defined, d to	Н	The workflow and operational procedures will be developed and provided to the operator
6#OSO	Remote crew trained and current and able to control the abnormal situation	ote crew trained and current and to control the abnormal situation	Н	Training to the remote crew will be provided to enable safe operation of the drone
OSO#10	Safe recovery from a technical issue	rechnical issue	Н	The drone has features to recover in case of technical failures
Deterioration (f external systems su	Deterioration of external systems supporting UAS operations		

is designed to manage the deterioration al systems supporting UAS operations services supporting UAS operations atte for the operation al procedures are defined, validated red to rew trained and current and able to the abnormal situation w coordination w coordination w coordination tew is fit to operate trow is fit to operate the abnormal situation from human error human error from human error human error H H H H H H H H H H H H H H H H H H	OSO#11	Procedures are in-place to handle the deterioration of external systems supporting UAS operations	н	External System include the Ground control station and RC controller. The drone will automatically land in case of malfunction of external systems
#13 External services supporting UAS operations are adequate for the operation #14 and adhered to #15 Control the abnormal situation #16 Multi-crew coordination #17 Remote crew is fit to operate HI #18 Automatic protection of the flight HI #18 envelope from human error #18 Automatic protection of the flight envelope from human error #18 Automatic protection of the flight envelope from human error #18 Automatic protection of the flight envelope from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to conditions and adhered to conditions and conditions and to avoid them	OSO#12	The UAS is designed to manage the deterioration of external systems supporting UAS operations	Н	This is builtin in the flight controller
#14 Operational procedures are defined, validated and adhered to and adhered to control the abnormal situation #15 Remote crew trained and current and able to control the abnormal situation #16 Multi-crew coordination #17 Remote crew is fit to operate H #17 Automatic protection of the flight H #18 Automatic protection of the flight H #18 covery from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operational procedures are defined, validated and adhered to Operational conditions and to avoid them The remote crew is trained to identify critical environmental conditions and to avoid them	OSO#13	External services supporting UAS operations are adequate for the operation	Н	External services are adequate for the operation
#14 Operational procedures are defined, validated and adhered to Remote crew trained and current and able to #15 control the abnormal situation #16 Multi-crew coordination #17 Remote crew is fit to operate #17 Remote crew is fit to operate #18 Automatic protection of the flight envelope from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operational procedures are defined, validated and adhered to The remote crew is trained to identify critical environmental conditions and to avoid them	Human Erro)r		
#15 Remote crew trained and current and able to #16 Multi-crew coordination #17 Remote crew is fit to operate #18 Automatic protection of the flight #18 envelope from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to The remote crew is trained to identify critical environmental conditions and to avoid them H H H H H H H H H H The remote crew is trained to identify critical environmental conditions and to avoid them	OSO#14	Operational procedures are defined, validated and adhered to	Н	Adherence to operational procedures will be ensured by the operator
#16 Multi-crew coordination #17 Remote crew is fit to operate Automatic protection of the flight envelope from human error Safe recovery from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to The remote crew is trained to identify critical environmental conditions and to avoid them	OSO#15	Remote crew trained and current and able to control the abnormal situation	Н	Crew will be trained to operate the drone and handle abnormal situations
#17 Remote crew is fit to operate Automatic protection of the flight envelope from human error Safe recovery from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission operating conditions Operational procedures are defined, validated and adhered to The remote crew is trained to identify to avoid them to avoid them	OSO#16	Multi-crew coordination	Н	Not required in this operational scenario
Automatic protection of the flight envelope from human error Safe recovery from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to validated and adhered to remote crew is trained to identify eritical environmental conditions and to avoid them	OSO#17	Remote crew is fit to operate	Н	This will be ensured by the drone operator
Safe recovery from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to validated and adhered to The remote crew is trained to identify to avoid them	OSO#18	Automatic protection of the flight	Н	This will be ensured by the pilot in-charge
Safe recovery from human error A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to validated and adhered to The remote crew is trained to identify to avoid them		envelope moman enor		or operating the grone
A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission Operating conditions Operational procedures are defined, validated and adhered to validated and adhered to The remote crew is trained to identify to avoid them	OSO#19		ш	This will be achieved through coordination with the aimort control tower and
A human factors evaluation has been performed and the human machine interface (HMI) found appropriate for the mission operating conditions Operational procedures are defined, validated and adhered to The remote crew is trained to identify critical environmental conditions and to avoid them	71#050		11	with the airport control tower and automatic landing features
ocedures are defined, adhered to ew is trained to identify nmental conditions and H	OSO#50	en	Н	The HMI being used is standard QGroundControl which makes the evaluation unnecessary for this operational scenario.
Operational procedures are defined, validated and adhered to The remote crew is trained to identify critical environmental conditions and to avoid them	Adverse operati	ng conditions		
The remote crew is trained to identify critical environmental conditions and to avoid them	OSO#21	procedures are defined, dadhered to	Н	The drone will only be operated in favorable weather conditions.
critical environmental conditions and H to avoid them		The remote crew is trained to identify		The drone operator will be trained
	OSO#22		Н	to avoid flying the drone in adverse
		to avoid them		environmental conditions

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The limits on operation of drone in	different environmental conditions	will be provided to the drone operator	and implemented by the airport authority	Since the UAS will only operate in	favorable weather conditions,	this design and qualification is not necessary.
н			H fa			
Environmental conditions for safe operations are defined, measurable and adhered to			TIAC is described for	OAS IS designed and quantified for	adverse environmental conditions	
OSO#23			OSO#24			

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