



Temasek Defence Systems Institute

Enhancing combat survivability of fighter aircraft using Self-protect High Energy Laser Demonstrator (SHiELD)

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Aim: Evaluate effectiveness of SHiELD in enhancing combat survivability of 4th and 5th generation fighter aircraft

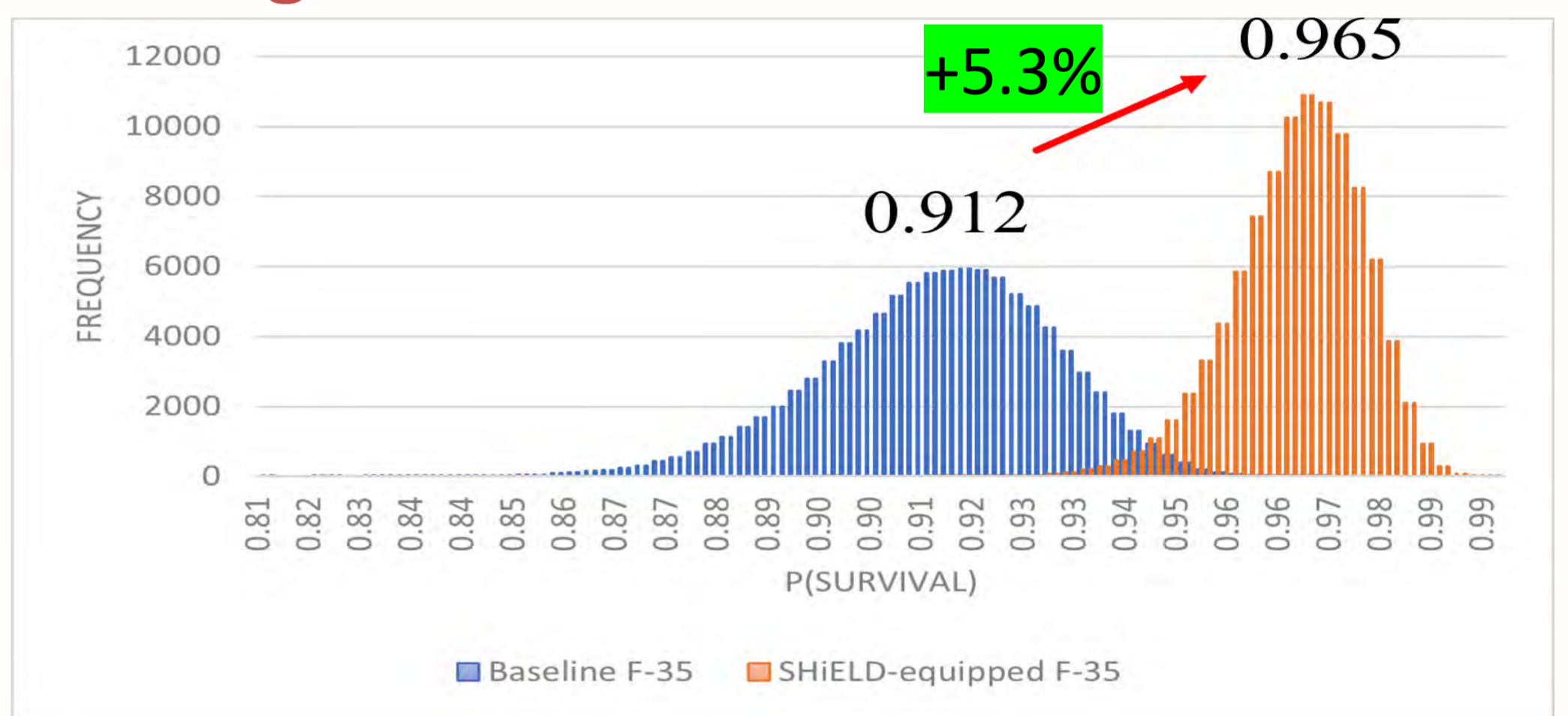
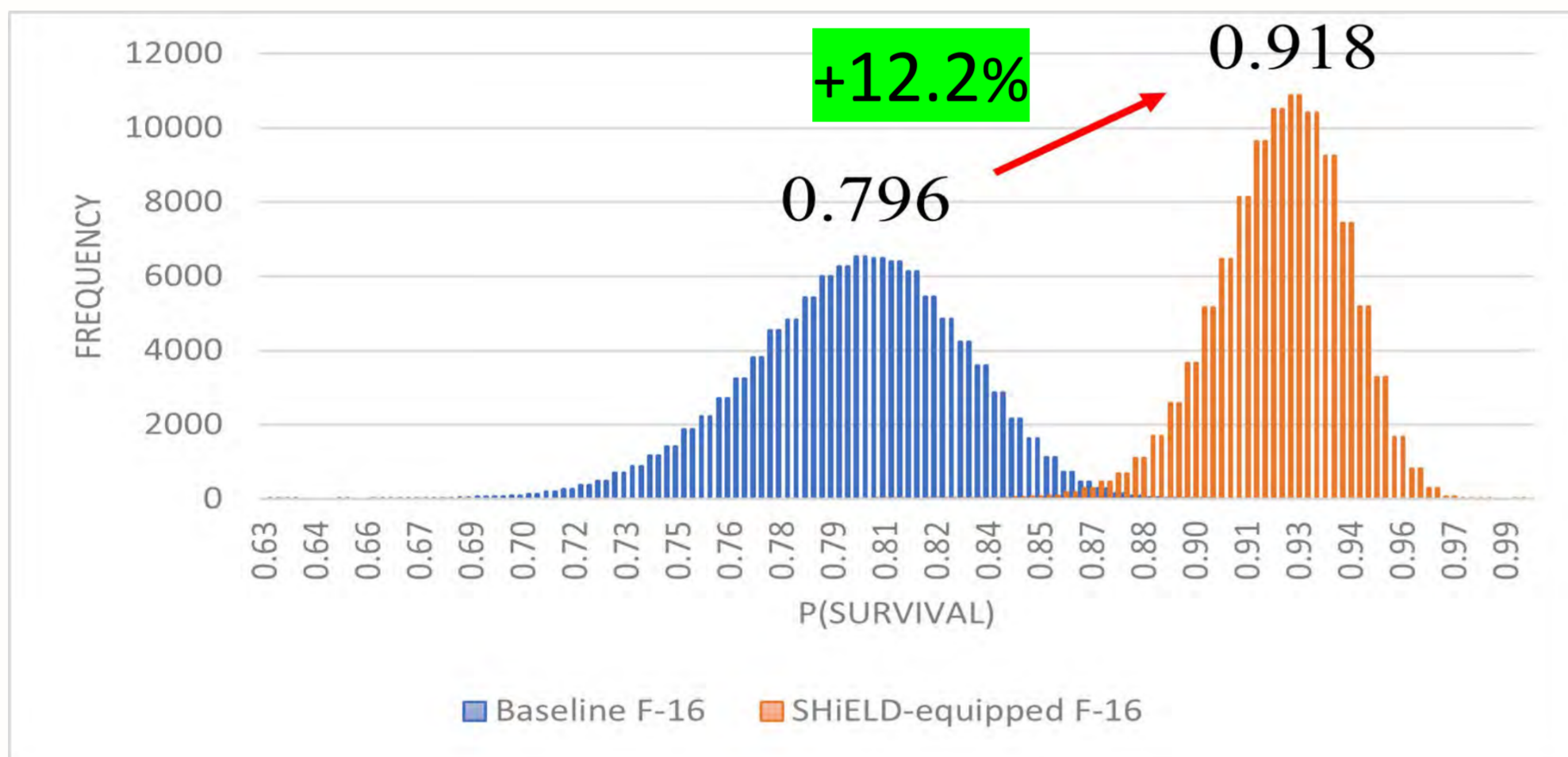
SHiELD: Self-protect High Energy Laser Demonstrator

- External aircraft high energy laser (HEL) pod
- Fiber laser with tens of kilowatt power

SHiELD's Capabilities

- Enhances combat survivability of fighter aircraft by defeating incoming missiles
- Directs HEL to engage threats without needing aircrew to execute evasive maneuvers
- Compensates for attenuation due to effects of transonic and supersonic flight and the associated turbulences

Monte Carlo Modelling Results



Aircraft type	Cost of SHiELD per SQN (24 jets)	Replacement Cost per fighter	10 Engagements		
			Expected no. of fighters killed	Total Replacement Cost	Savings
Baseline F-16	\$0	\$30M	22	\$660M	\$164M
SHiELD-equipped F-16	\$48M	\$32M	14	\$496M	
Baseline F-35A	\$0	\$80M	15	\$1,200M	\$496M
SHiELD-equipped F-35A	\$48M	\$82M	8	\$704M	
Baseline F-35B	\$0	\$115M	15	\$1,725M	\$741M
SHiELD-equipped F-35B	\$48M	\$117M	8	\$984M	

Unit Cost of SHiELD	Baseline F-16	SHiELD-equipped F-16	Baseline F-35A	SHiELD-equipped F-35A	Baseline F-35B	SHiELD-equipped F-35B
\$2M		✓		✓		✓
\$7M	✓			✓		✓
\$18M	✓		✓			✓
\$26M	✓		✓		✓	

Recommendations

- Hasten R&D, acquisition and operationalisation of HEL systems
- Integrate omni-directional HEL system onto aircraft fuselage to reduce RCS

Conclusion

- SHiELD enhances combat survivability of 4th and 5th-gen fighter aircraft
- SHiELD-equipped F-16 has comparable combat survivability as baseline F-35