

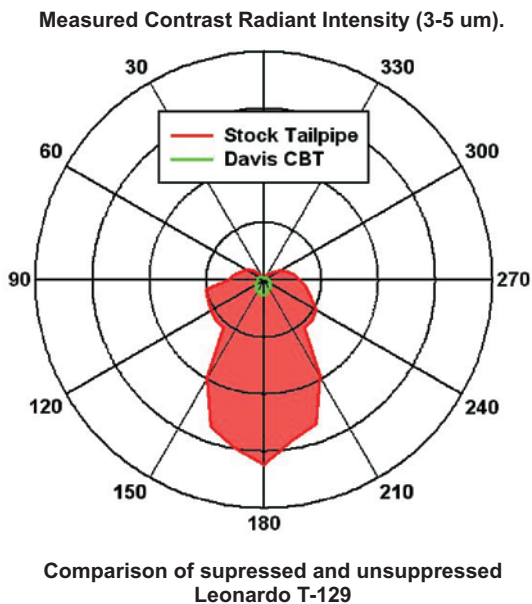
Infrared Signature Suppression for Aircraft



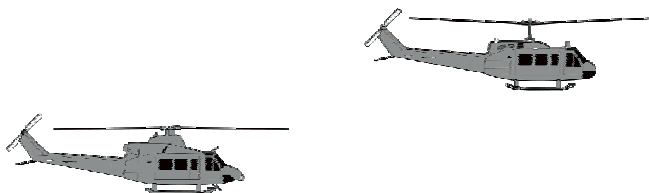
Aircraft IR Signature Suppression for Improved Survivability

The largest threat to helicopters and fixed wing military transport aircraft is the Man-Portable Air Defense System (MANPADS), also commonly referred to as the shoulder launched surface to-air-missile (SAM). The majority of these systems use infra-red guidance to detect and intercept an aircraft. IR MANPADS are relatively inexpensive, widely used, portable, and difficult to detect. Since the threat cannot be eliminated, the most effective countermeasure is to equip aircraft with self protection (i.e. Aircraft Survivability Equipment (ASE)).

Reducing IR signature is the first step in equipping an aircraft for self protection. IR suppression has a dual benefit: it reduces the range at which the IR missile can detect and lock-on to the aircraft; and it improves the effectiveness of the jammer and flares by increasing the jammer-to-aircraft signal ratio (J/S).

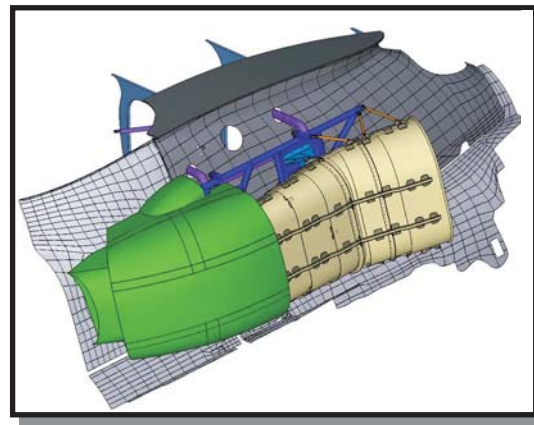


Davis has specialized in IR signature management for over 30 years, and has produced engine exhaust IR suppressors for both warships and aircraft. The company supplies flight qualified off-the-shelf suppressors for several aircraft types, including: the Bell 212/412; Bell 205/UH-1H; Bell 407; MIL Mi-17; MIL Mi-24; Boeing CH-47; Airbus AS332 Super Puma; the Airbus CASA CN-235; Leonardo T-129; AW139; and Beechcraft KA350.



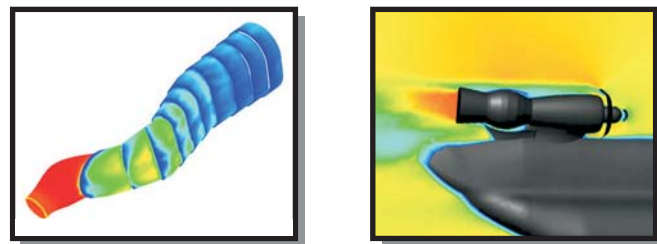
Bell 412

Bell 205/UH-1H



3D aircraft integration model of the AS332 IRSS.

Davis possesses or has access to all the design, manufacturing, and test facilities required to quickly develop IR suppressors for any aircraft type. Modern Computational Fluid Dynamics (CFD), structural analysis, IR signature prediction tools, and specialized simulation codes developed by Davis, allow for the efficient development of high performance and robust designs. Davis also maintains a Hot Gas Wind Tunnel (HGWT) on site, which is able to simulate engine exhaust flow conditions, and is used to test early prototype suppressor designs. In each design, Davis takes into consideration all the key integration issues like: maintenance access; fluid flows in and around the engine; and operability of other systems on the aircraft.



CFD analysis results of both internal (left) and external (right) flow.

As part of the development process, engine test and shock and vibration qualification are performed in order to prepare the device for flight test. Davis has the expertise to plan the flight test, instrument the aircraft, and measure the platform IR signature.



Bell 407

MIL Mi-17

AS332 Super Puma

1995

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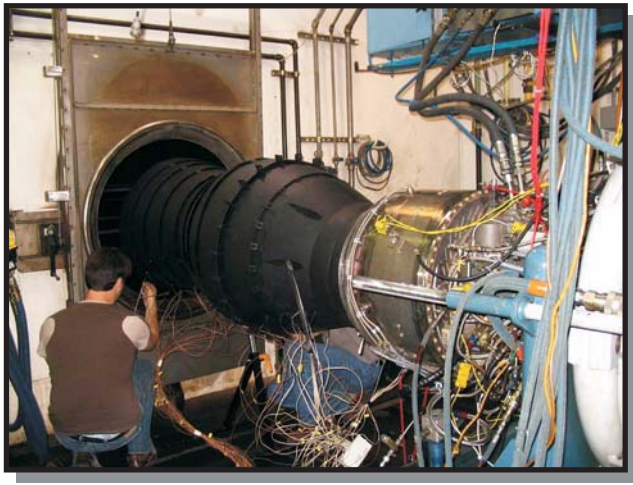
1999

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2003

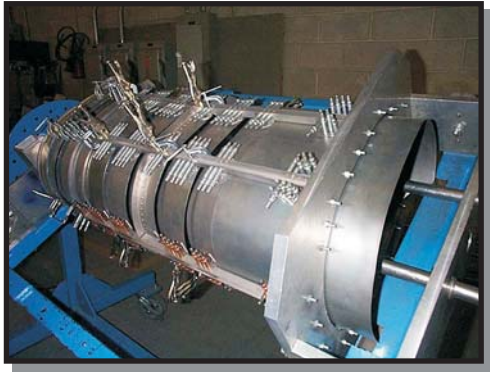
2004

2005



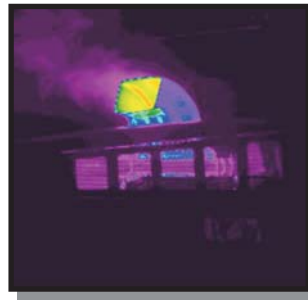
CH-47 IRSS on T55 engine test cell.

Davis is an ISO 9001-2015 and AS9100D certified design and manufacturing facility.



B412 IRSS under manufacture.

Davis IR suppressors reduce signature by cooling the exhaust plume and tailpipe metal, and obscuring the view to the hot engine machinery. Exhaust gas cooling is achieved with low backpressure ejectors, and metal temperature reduction is achieved with film cooling. Both of these techniques allow for passive designs with minimal power loss and low maintenance. The devices are also designed to minimize the impingement of the exhaust gases on the aircraft skin, which has the dual benefit of reducing IR signature and alleviating airframe structural fatigue.



IR camera images of unsuppressed (left) and suppressed (right) Bell 407.

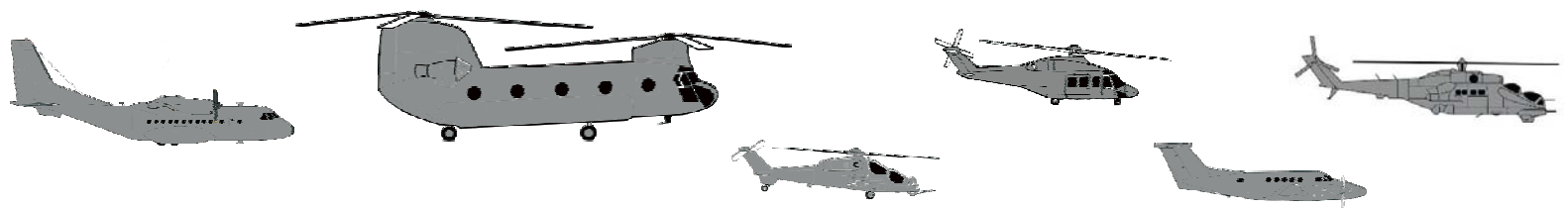
The Davis Centre Body Tailpipe (CBT) is an IRSS device which uses a film cooled object in the centre of the exhaust flow to obstruct the view of hot engine machinery from any angle. The performance of the CBT has been optimized through an intensive internal research and development effort. The CBT can be adapted to most axial exhaust systems, and has so far been applied to the UH-1H, CH-47, CN-235, and T-129.



Center Body Tailpipe installed on CH-47 Chinook.

All Davis IR suppressors are sold as mission kits. The A-kit, which is the part permanently installed on the aircraft, is designed so there are minimal or no changes to the airframe, and the B-kit is designed for easy installation and removal.

As a specialist in the field of IR signature management, Davis has the unique capability to quickly produce high performance IR suppressors for any aircraft type. The application of proven technology, and a streamlined development process, enables the low risk production of a flight qualified IRSS device for a new aircraft type in less than one year.



CASA CN 235

Boeing CH-47

AW T129

AW 139

KA 350

MIL Mi-24

2006

2008

2010

2011

2014

2016

