MAGELLAN AEROSPACE

HELICOPTER ACCIDENTS

- Wire Strike Helicopter Accidents in the **United States**

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Number of wire strike accidents	14	10	8	9	13	12	14	12	16	11	5
Number of fatal accidents	7	6	2	1	5	2	4	5	6	2	1
Number of serious injuries	8	8	0	3	4	5	4	3	6	1	3
Number of minor injuries	8	6	1	4	4	1	5	4	4	5	0
Uninjured	6	1	4	5	8	12	4	7	9	7	8
Number of fatalities	11	9	2	4	9	3	5	8	9	3	2

There is a 40% decrease in the number of wire strike accidents in 1994-2004 compared to those in 1970-1979. However, there is an increase of 76% in the number of fatalities; the number of serious injuries has decreased by 13% between 1994 and 2003.

US Army studies indicate Wire Strike Protection Systems have contributed to:

- 28% reduction in fatal mishaps

- 80% reduction in disabling injuries

- 69% reduction in “total loss” mishaps

- 51% reduction in mishap damage per flight hour

- Comparison of Wire Strike Statistics for two Decades

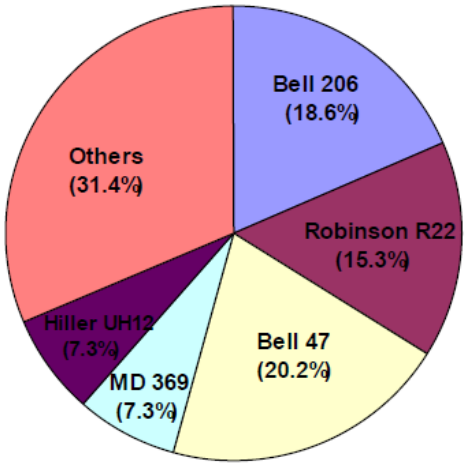
Period	1970-1979	1994-2003
Total number of wire strikes	208	124
Number of fatalitites	37	65
Number of serious injuries	52	45
Number of minor injuries	85	42
Total number of injuries and fatalities	174	152
Number of injuries and fatalities per wire strike	.84	1.24

- Helicopters Involved in **Fatal** Wire Strike Accidents

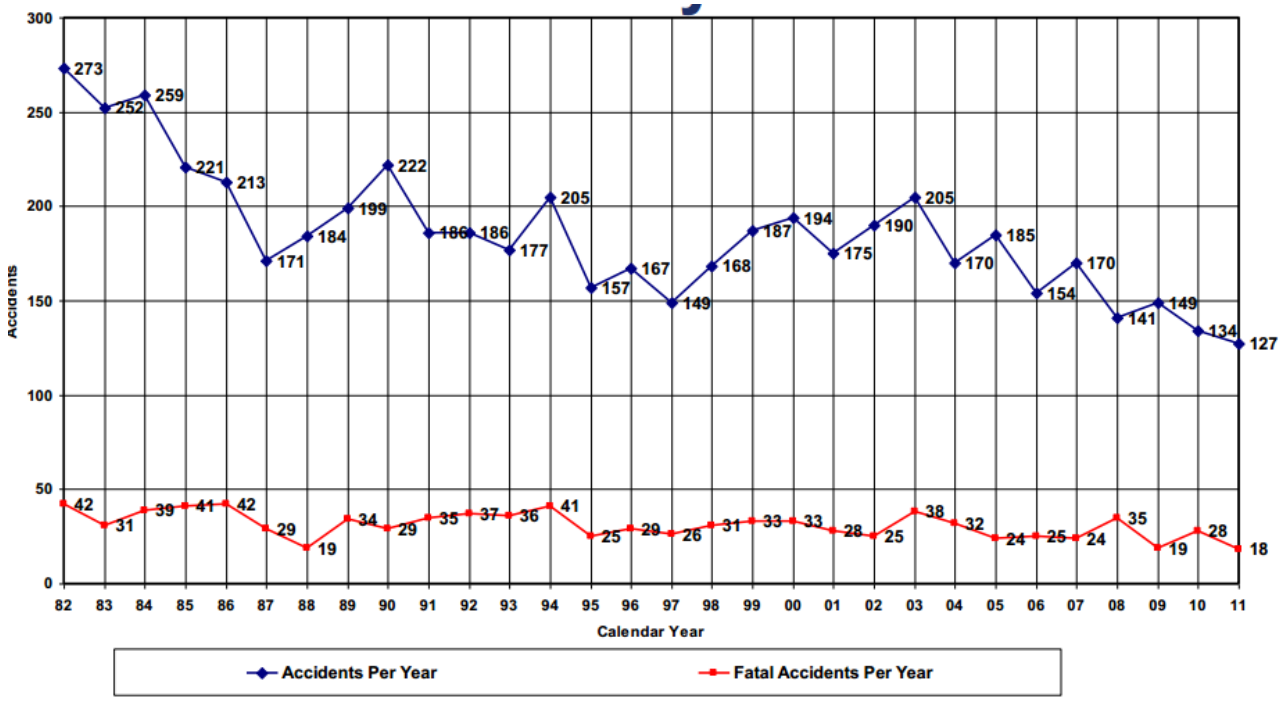
Type	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Percent
Bell 206	1	3	1		1			1	1	1	1	25.6
AS-350	1					1	1					7.0
Tomcat MK5A	1											2.3
Robinson R22	2				2			1	2	1		20.9
Hiller HU-12E	1											2.3
BO-105S	1											2.3
Bell 47		1			1		1	1	1			11.6
MD 369		2	1		1		1	1				14.0
Bell 407				1								2.3
Bell UH 1B						1						2.3
Hughes 269							1					2.3
Enstrom 280FX								1				2.3
Robinson R44								1				2.3
Sikorsky S58ET									1			2.3

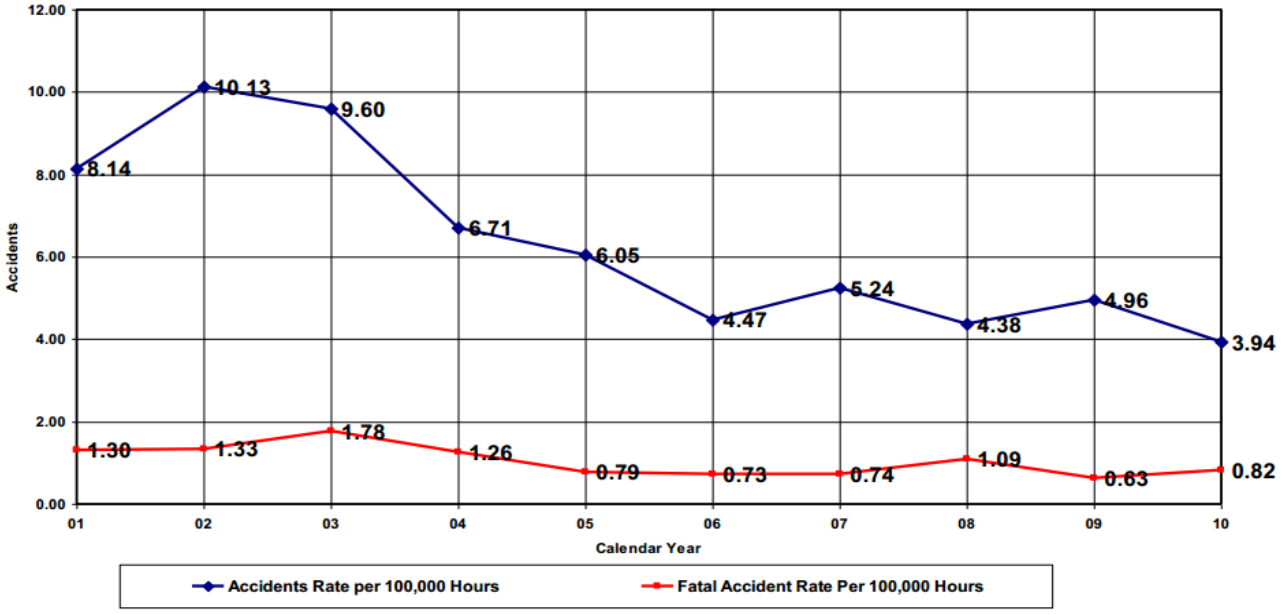
- Helicopters Involved in Wire Strike Accidents

Type	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Bell 206	4	3	2	1	2	1	1	1	3	3	2
MBB BO-105S	2										
Airbus AS-350	1					1	1	1	1		
Robinson R22	3				4	4		3	3	3	2
Hiller HU12V	1			2		2	3			1	
Bell 47	2	3	2	2	3		4	2	5	2	
MD 369		3	3		1		1	1			
Hughes 269		1		1			1	3			
Enstrom F-280				1	1			1	2		
Bell 407				1							
MD-900					1						
BK-117						1					
Bell 212						1					
Bell OH-58						1					1
Sikorski S 58							1		1		
Others	1		1	1	1	1	2		1	2	

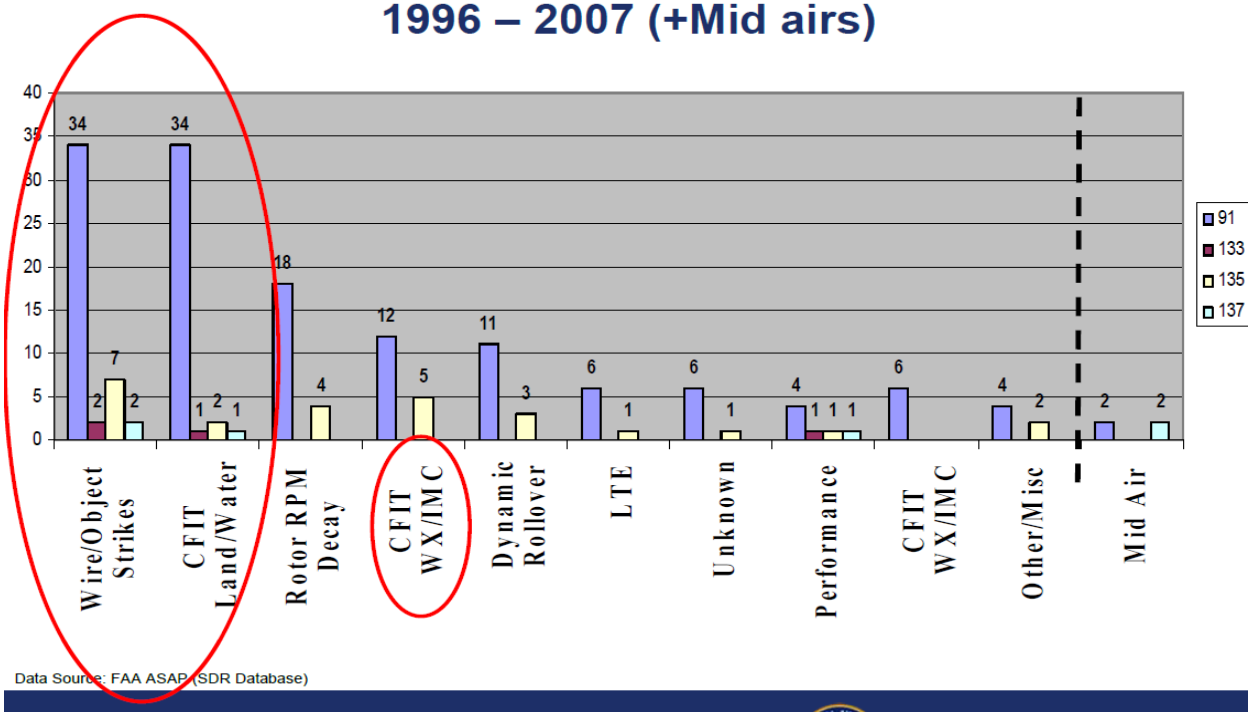


- Registered Helicopter Accidents (1982-2011)



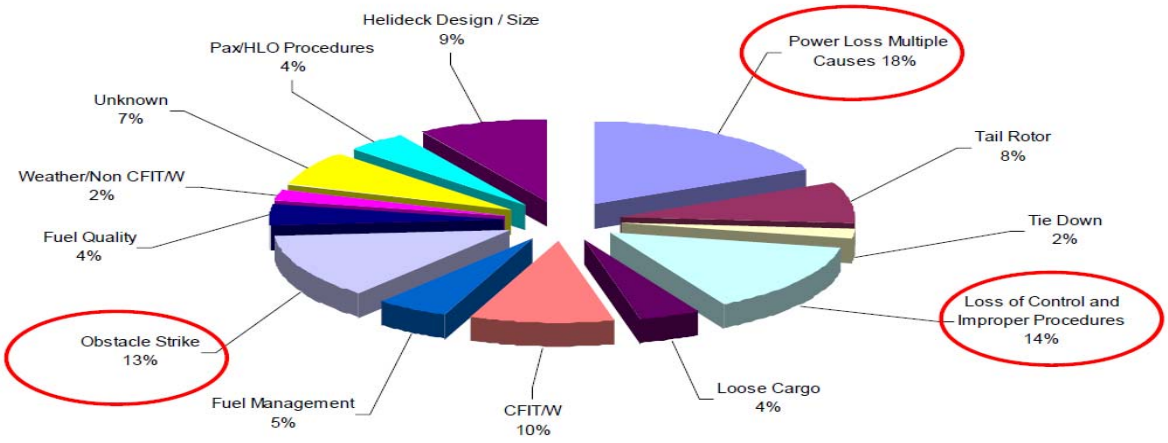


Top Operational Causes of Fatal Rotorcraft Accidents 1996 – 2007 (+Mid airs)



Data Source: FAA ASAP (SDR Database)

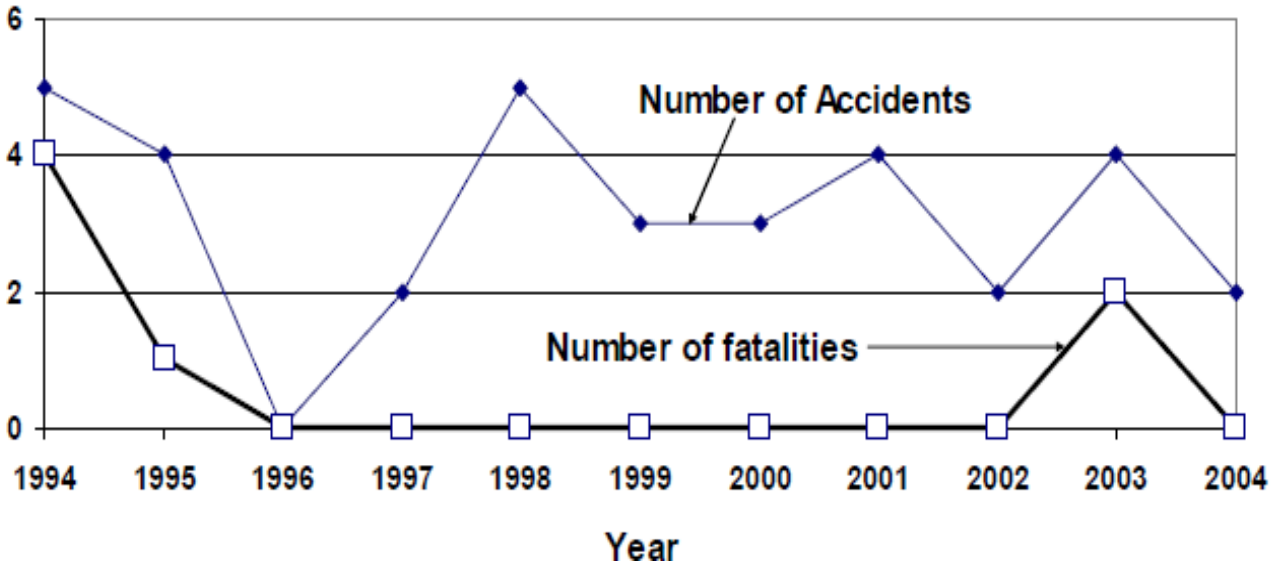
Gulf of Mexico Accident Causes 1999-2008



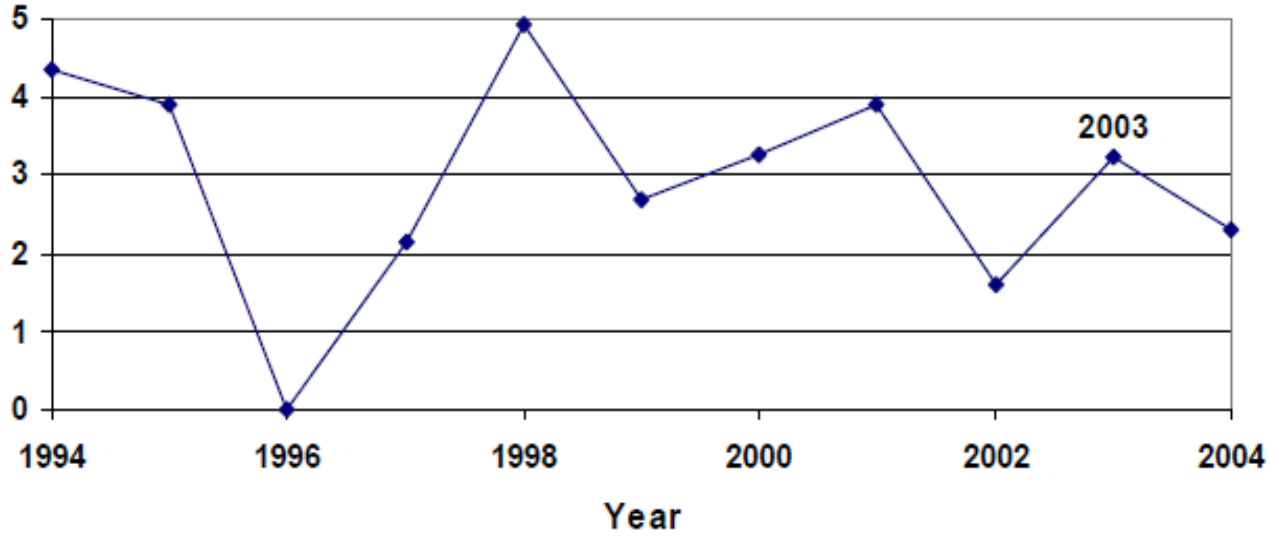
Data Source: HSAC Safety Statistics

U.S. ARMY

- Wire strike accidents per year

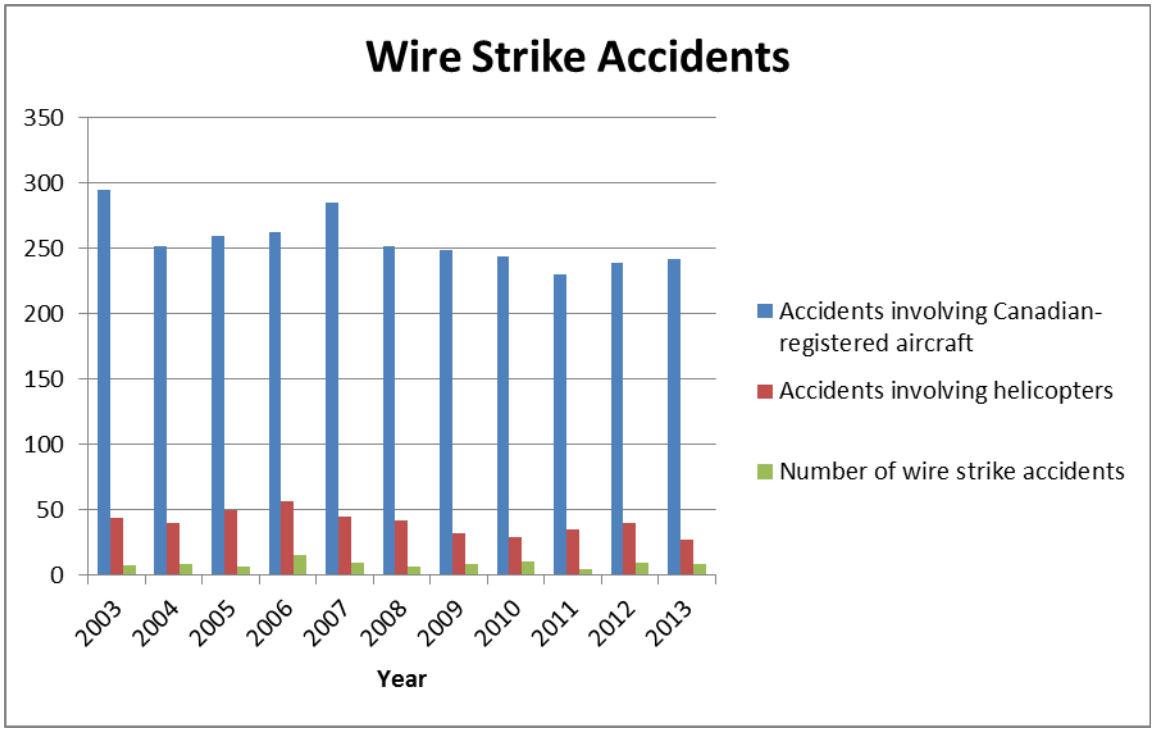


- Wire Strike Accidents as percentage of total accidents



- Wire Strike Helicopter Accidents in **Canada**

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Accidents involving Canadian-registered aircraft	295	252	259	262	285	252	249	244	230	239	242
Accidents involving helicopters	44	40	49	56	45	42	32	29	35	40	27
Number of wire strike accidents	7	8	6	15	9	6	8	10	4	9	8



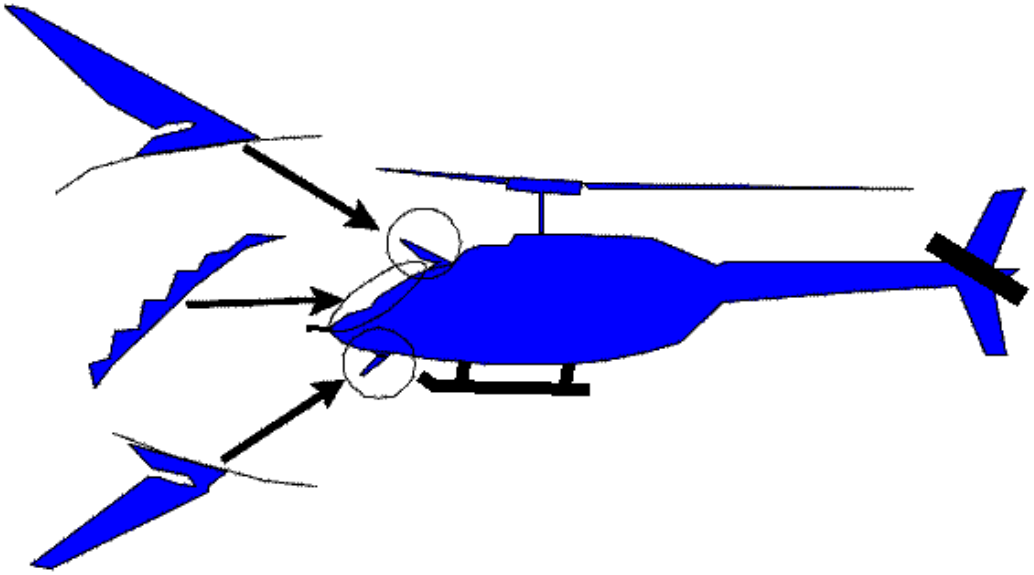
PREVENTING ACCIDENTS

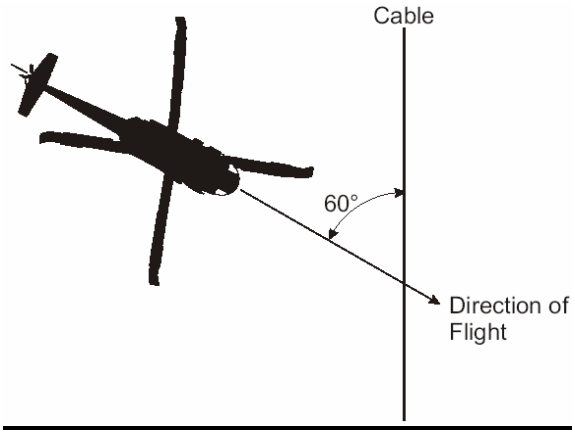
The U.S. Army study summarized above, found that the WSPS system protects 90% of the frontal area of the helicopter, and reduces the hazard from most wire strikes. In 1992, the US Army began equipping all of its helicopters with WSPS.

Since the U.S. Army installed the Wire Strike Protecting System on all of its helicopters it leads to the reduction in accidents and fatalities. There was a noticeable decrease in the number of wire strike accidents when all military helicopters were equipped with WSPS. **There were no fatalities in wire strike accidents between 1996 and 2002.** Worldwide, more than 20,000 WSPS kits have been installed - led on 65 different helicopter types. In 2006 there were **11 accidents involving a wire strike which three had the WSPS kit installed.**

During the period 1994-2004, there were 41 fatal accidents. The majority of the accidents involved pilots between the ages of 40 and 59 (78%) and who had more than 2000 hours (56%) of rotorcraft flight experience. The average age of the pilots was 47.3 years and the average flight experience was about 3575 hours. This clearly shows that experience is not an asset to prevent wire strike accidents.

The system is engineered to prevent entry of a wire into the cockpit area, reduce the possibility of flight control damage during a wire strike, and decrease the chance of wires becoming entangled in the landing gear. The WSPS installation usually includes several components such as: Upper cutter, lower cutter and windshield deflector. The WSPS has the capability to deflect cables and wires to reduce the risk of loss of aircrafts and lives. The cutters to be effective, the helicopter must be flying at speeds greater than 30 knots and between 60^{o}- 90^{o}. The system is designed to cut a 3/8-inch steel cable.





In response to the Board's recommendations, Transport Canada concluded that, because the fitment of a WSPS is not possible on all helicopters, installation of a WSPS will have to remain at the discretion of the operators. However, in its advisory circular, Transport Canada strongly urged helicopter operators to consider installation of a WSPS where possible, as the benefits greatly outweigh the costs of both equipment and crews in the event of a wire strike

Sources

- Air Traffic Organization Operations Planning Office of Aviation Research and Development

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- Army Aviation Research and Development Command

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- Transportation Safety Board of Canada

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