



# Relatório Final do Acidente de ção do Conselho Nacional de Segurança nos Transportes

<b>Localização:</b>	Robbinsdale, MN	<b>Número do acidente :</b>	CHI06LA027
<b>Data e Hora :</b>	11/08/2005 , 0858 CST	<b>Cadastro:</b>	N30NM
<b>Aeronave:</b>	Agusta A109-E	<b>Danos de Aeronaves :</b>	Substancial
<b>Definindo Evento :</b>		<b>Lesões :</b>	3 Nenhum
<b>Vôo Conduzido Abaixo:</b>	Parte 91: Aviação Geral - Posicionamento - Air Medical (não especificado)		

## Análise

O helicóptero sustentado danos substanciais durante uma decolagem abortada de um heliponto de pouso. O piloto afirmou que ele começou o helicóptero e "realizou uma corrida completa de ambos os motores e todos os sistemas". Ele relatou, "Ambos os Switches de Gerenciamento de Energia (PMS) FADEC [Controle de Motor Digital de Autoridade Completa] foram verificados como estando na posição 'Voo', o comutador 100% / 102 por cento montado coletivamente estava na posição '102', e o número 1 da Unidade de Display Eletrônico (EDU) mostrou três linhas verticais amarelas representando a rotação de ambos os motores como estando a 102% e que a rotação do rotor (Nr) foi co-unida a elas." Ele relatou que puxou o helicóptero para um voo de cinco pés. Após cerca de 30 segundos de voo normal, o piloto ouviu um "estruído". O piloto relatou que o helicóptero começou a pousar verticalmente para baixo, e que ele olhou para a Unidade de Display Eletrônico número 1 e viu "múltiplas luzes de advertência e advertência". Ele relatou que a aeronave estava oscilando lateralmente enquanto se assentava, e que houve uma rápida perda de rotações do rotor. Ele usou a alavanca de arremesso coletiva para amortecer a aterrissagem com a rotação restante do rotor. Ele relatou: "Assim que a roda principal esquerda tocou suavemente a aeronave, houve uma oscilação lateral violenta que era claramente ressonância do solo. Essa oscilação ressonante aumentou em gravidade, embora eu tivesse a alavanca de arremesso coletiva totalmente para baixo." O trem de pouso principal esquerdo desabou e o helicóptero pousou no seu patrocínio esquerdo. As pás do rotor de cauda contataram o solo. O helicóptero continuou a oscilar lateralmente e o nariz do helicóptero girou para a esquerda após a rotação do rotor principal. O piloto desligou os motores e as pás do rotor principal pararam. O exame no local revelou que o dano ao helicóptero era consistente com a ressonância do solo. Ambos os motores foram executados em um suporte de teste do motor e nenhuma anomalia era evidente, o que impediria a operação normal do motor. O exame da memória não volátil dos controles eletrônicos do motor (EEC) para ambos os motores não revelou qualquer anomalia preexistente ou códigos de falha associados ao vôo do acidente. A inspeção dos controles de vôo e dos sistemas da aeronave não revelou anomalias associadas a condições pré-existentes. O exame no local revelou que o dano ao helicóptero era consistente com a ressonância do solo. Ambos os motores foram executados em um suporte de teste do motor e nenhuma anomalia era evidente, o que impediria a operação normal do motor. O exame da memória não volátil dos controles eletrônicos do motor (EEC) para ambos os motores não revelou qualquer anomalia preexistente ou códigos de falha associados ao vôo do acidente. A inspeção dos controles de vôo e dos sistemas da aeronave não revelou anomalias associadas a condições pré-existentes. O exame no local revelou que o dano ao helicóptero era consistente com a ressonância do solo. Ambos os motores foram executados em um suporte de teste do motor e nenhuma anomalia era evidente, o que impediria a operação normal do motor. O exame da memória não volátil dos controles eletrônicos do motor (EEC) para ambos os motores não revelou qualquer anomalia preexistente ou códigos de falha associados ao vôo do acidente. A inspeção dos controles de vôo e dos sistemas da aeronave não revelou anomalias associadas a condições pré-existentes. s) para ambos os motores não revelou qualquer anomalia preexistente ou códigos de falha associados ao voo do acidente. A inspeção dos controles de vôo e dos sistemas da aeronave não revelou anomalias associadas a condições pré-existentes. s) para ambos os motores não revelou qualquer anomalia preexistente ou códigos de falha associados ao voo do acidente. A inspeção dos controles de vôo e dos sistemas da aeronave não revelou anomalias associadas a condições pré-existentes.

## Causa provável e descobertas

O Conselho Nacional de Segurança nos Transportes determina que a (s) causa (s) provável (s) deste acidente seja: A perda de sustentação por motivos indeterminados.

### Resultados

Ocorrência # 1: DIVERSOS / OUTROS  
Fase de Operação: DECOLAGEM - ABORTADA

Constatações  
1. (C) RAZÃO PARA OCORRÊNCIA NÃO DETERMINADA  
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Ocorrência # 2: EM COLISÃO DE VOO COM TERRENO / ÁGUA  
Fase de Operação: EMERGÊNCIA DESCIDA / aterragem

Descobertas  
2. GROUND RESSONÂNCIA - ENCONTRADOS - piloto em comando  
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Ocorrência # 3: ENGRENAGEM DESMORONADA  
fase da operação: DESCIDA DE EMERGÊNCIA / aterragem

Descobertas  
ENGRENAGEM 3. aterragem, trem principal - Falta  
4. ENGRENAGEM DE ATERRAGEM, ENGRENAGEM PRINCIPAL - SOBRECARGA

## Informação factual

### HISTÓRIA DO VÔO

Em 8 de novembro de 2005, no horário padrão central de 0858, um helicóptero Agusta A109-E, N30NM, operado pela North Memorial Health Care, sofreu danos substanciais durante uma decolagem abortada do heliporto North Memorial Medical Center (MY77), localizado em Robbinsdale, Minnesota. O piloto de transporte da companhia aérea, a enfermeira de voo e o paramédico de voo não ficaram feridos. O vôo de posicionamento partiu do heliporto a caminho do Aeroporto de Cristal (MIC), Minneapolis, Minnesota. Condições meteorológicas visuais prevaleceram no momento do acidente. Um plano de voo da empresa de regras de voo visual (VFR) foi apresentado.

The pilot reported that after he preflighted the helicopter, he pushed the helicopter out of the hangar and onto the heliport (120 feet by 100 feet, concrete) in preparation for a short positioning flight to MIC. He reported that he started the helicopter and "performed a full run-up of both engines and all systems." He reported, "Both engine FADEC [Full-Authority Digital Engine Control] Power Management Switches (PMS) were verified as being in the 'Flight' position, the collective-mounted 100 percent/102 percent switch was in the '102' position, and the #1 Electronic Display Unit (EDU) showed three vertical yellow lines representing the rpm of both engines as being at 102 percent and that the rotor rpm (Nr) was co-joined with them."

The pilot reported that he pulled the helicopter into a five-foot hover and repositioned it northwards on the heliport for takeoff. After about 30 seconds of normal hovering flight, the pilot heard a "bang." The pilot reported that the helicopter started to settle vertically downwards, and that he glanced at the number 1 Electronic Display Unit (EDU) and saw "multiple caution and warning lights." He reported that the aircraft was oscillating laterally as it settled, and that there was a rapid loss of rotor rpm. He used the collective pitch lever to

cushion the landing with the remaining rotor rpm. He reported, "As soon as the left main wheel gently touched down the aircraft went into a violent lateral oscillation which was clearly ground resonance. This resonant oscillation increased in severity even though I had the collective pitch lever in the full down position."

The pilot reported that the helicopter was oscillating laterally and "pounding" the main landing gear. He reported that the left main landing gear collapsed and the helicopter settled onto its left sponson. He reported that the tail rotor blades contacted the ground and he lost tail rotor control. He prevented the main rotor blades from contacting the ground by imputing full right cyclic.

The pilot reported that the helicopter continued to oscillate laterally and the nose of the helicopter swung to the left following main rotor rotation. He released the collective and with his left hand he shut down both engines using the PMS switches and the rotor brake. He reported the engines shut down, but the rotor brake was ineffective and the main rotor blades coasted to a stop.

The flight nurse reported that everything was routine as the helicopter lifted into a hover and the pilot "backed up" into his normal takeoff position. The flight nurse reported that she looked up at the cockpit panel and observed a red light on. She reported that helicopter landed harder than the pilot's usual "soft landing." The helicopter began to rock from side to side and it became more violent. She reported that the helicopter ended up on its left side with the blades still turning slowly.

The flight paramedic was facing aft in the helicopter. She reported that the pilot completed the aircraft checks and the helicopter lifted into a hover. She reported, "The pilot backed to the right as he always does." She reported that she heard a "noise" and the helicopter began to shake and then "landed hard." She reported the helicopter began to "violently shake and rock and proceeded to make a 180 degree turn."

#### PERSONNEL INFORMATION

The pilot held an airline transport certificate with a helicopter rating. He held a commercial certificate with single-engine land airplane, single-engine sea airplane, multiengine land airplane, glider, and instrument airplane ratings. He was type rated in numerous helicopters that included: A-109, BH-206, BH-214, HH-12, HU-500, SA-365, SK-55, SK-58, and SK-61. He was a certified flight instructor (CFI) in helicopters, single engine airplane, and a helicopter and airplane instrument instructor. The pilot had a total of 14,445 flight hours with 4,000 hours in Agusta A109's. He had flown 35 hours in the last 90 days and 18 hours in the last 30 days.

#### AIRCRAFT INFORMATION

The helicopter was an Agusta A109-E, serial number 11065. The helicopter seated four and was configured in an emergency medical services (EMS) configuration. The maximum gross weight was 6,283 pounds. The helicopter was equipped with two Pratt & Whitney Canada PW206C turboshaft engines that developed 732 pounds of shaft horsepower. The helicopter was part of an approved aircraft inspection program (AAIP) and was last inspected on October 2005. The airplane had flown approximately 37 hours since the last inspection and had a total time of 2,481 hours.

#### METEOROLOGICAL CONDITIONS

The 0853 surface weather observation at Minneapolis-St.Paul International Airport (MSP) located about 12 nautical miles to the southeast was: Winds 120 degrees at 9 knots, visibility 10 statute miles, sky clear, temperature 7 degrees Celcius (C), dew point 1 degrees C, altimeter 30.03 inches of mercury.

#### WRECKAGE AND IMPACT INFORMATION

The on-site examination revealed that the helicopter's left main landing gear had collapsed and the helicopter was leaning on its left side sponson. The nose landing gear tire had made about a 180-degree skid mark that was located on the right side of the helicopter. Both composite tail rotor blades exhibited blade strike damage at the tips of the blades.

The visual inspection of the tail boom stinger revealed no visible deformation, but lateral abrasions were present. The tail stinger was compared to an exemplar tail stinger. The comparison revealed that the tail stinger from the accident helicopter exhibited permanent deformation consistent with an upward bending load. An impact mark was observed at the edge of the landing pad that was consistent with a tail stinger strike.

The inspection of the main rotor revealed that three of the four dampers installed had their rod ends sheared off at the base of the threaded portion. The inspection of the main rotor blades revealed substantial damage to the top and bottom skins in the area close to the trim tab (about 3/4 blade span). Chordwise and spanwise cracking with skin delamination was observed. No other damage to the blades was observed, including the blade tip cap areas. The inspection of the flight control system did not reveal any evidence of pre-impact failure or malfunction.

## TESTS AND RESEARCH

The engines were sent to Pratt & Whitney Canada for inspection. The Transportation Safety Board of Canada provided oversight for the inspection. Both engines were run on an engine test stand and no anomalies were evident that would preclude normal engine operation.

The engine electronic controls (EEC's) for both engines were sent to the manufacturer, Pratt & Whitney Canada, for examination. The Transportation Safety Board of Canada provided oversight for the inspection. The non-volatile memory in the EEC's logged faults that were recorded by the EEC's between the last engine start and engine shutdown. The Pratt and Whitney report stated, "According to the data retrieved from EEC EEPROM, the fault logged would not have reverted any of the 2 engines to a manual mode."

## ADDITIONAL INFORMATION

The FAA, Agusta Aerospace Corporation, and Pratt & Whitney Canada were parties to the investigation. The helicopter was released to North Memorial Health Care, Brooklyn Center, Minnesota.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Agusta	<b>Registration:</b>	N30NM
<b>Model/Series:</b>	A109-E	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	11065
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	10/01/2005, AAIP	<b>Certified Max Gross Wt.:</b>	6283 lbs
<b>Time Since Last Inspection:</b>	37 Hours	<b>Engines:</b>	2 Turbo Shaft
<b>Airframe Total Time:</b>	2444 Hours at time of accident	<b>Engine Manufacturer:</b>	Pratt & Whitney Canada
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	PW206C
<b>Registered Owner:</b>	North Memorial Health Care	<b>Rated Power:</b>	732 hp
<b>Operator:</b>	North Memorial Health Care	<b>Operating Certificate(s) Held:</b>	On-demand Air Taxi (135)

### Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual Conditions	<b>Condition of Light:</b>	Day
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<b>Observation Facility, Elevation:</b>	MSP, 841 ft msl	<b>Distance from Accident Site:</b>	12 Nautical Miles
<b>Observation Time:</b>	0853 CDT	<b>Direction from Accident Site:</b>	135°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 Miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	9 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	120°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.03 inches Hg	<b>Temperature/Dew Point:</b>	7° C / 1° C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Robbinsdale, MN (MY77)	<b>Type of Flight Plan Filed:</b>	Company VFR
<b>Destination:</b>	Crystal, MN (MIC)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	0858 CST	<b>Type of Airspace:</b>	

## Airport Information

<b>Airport:</b>	North Memorial Heliport (MY77)	<b>Runway Surface Type:</b>	Concrete
<b>Airport Elevation:</b>	930 ft	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	120 ft / 100 ft	<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	3 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	3 None	<b>Latitude, Longitude:</b>	45.026389, -93.565556

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Jim Silliman	<b>Adopted Date:</b>	03/26/2007
<b>Additional Participating Persons:</b>	Lyman Roeder; FAA-Minneapolis FSDO; Minneapolis, MN Paolo Ferreri; Agusta Aeospace Corporation; Philadelphia, PA Tom Berthe; Pratt & Whitney Canada; South Burlington, VT		
<b>Publish Date:</b>			
<b>Investigation Docket:</b>	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		