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# Multidiscipline Approach to IndyCar Series Racing

Marcel Staniak, Senior Vehicle Dynamics Engineer,  
**Newman Haas Lanigan Racing**



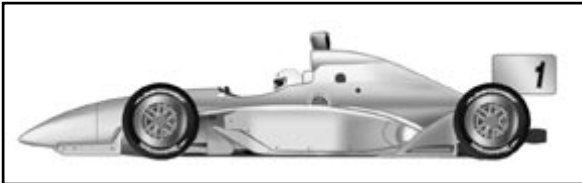

# Newman Haas Lanigan Racing Background



- Eight-time Champ Car World Series Champions ('84, '91, '93, '02, '04-07\*)
- Mario Andretti, Michael Andretti, Nigel Mansell, Paul Tracy, Cristiano da Matta, and Sébastien Bourdais.
- Founded by the late Paul Newman and Carl Haas. Partner Michael Lanigan joined in 2007.
- Race shop based in Lincolnshire, IL.
- Current Drivers Graham Rahal and Robert Doornbos
  - 2004-2007 championships won by Sébastien Bourdais, never-before have 4-consecutive championships been achieved!



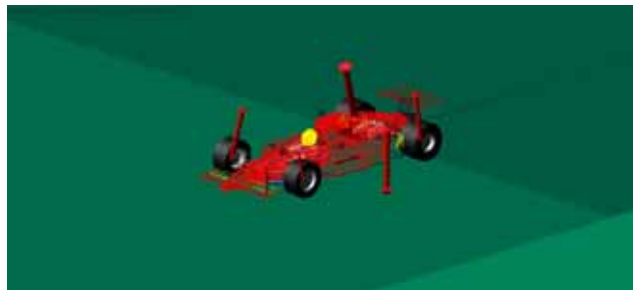
# Anatomy of a IRL Car vs. Champ Car

- **TOP SPEED**  
Approx. 230 mph (240)
  - **HORSEPOWER**  
Approx. 650 (750)
  - **FUEL**  
Ethanol (Methanol)
  - **TRACTION CONTROL**  
Not Allowed
- 

- **Engine:** 3.5-liter V8, 32-valve dual-overhead cam (DOHC), Normally aspirated  
(Turbocharged, 2.65-liter V-8 )
  - **Gearbox:** XTRAC gearbox (standard), six forward gears, sequential shifter  
(Hewland Manual with six or seven forward gears , sequential shifter)
  - **Tires:** Bridgestone/Firestone (Same)
  - **Wheelbase:** 118-122 inches (123)
  - **Min. Weights:** 1,550 pounds minimum, including all lubricants and coolants used during the event, but does not include fuel or driver (1,565 pounds in same condition)
  - **Max. Height:** Approximately 38 inches (32 inches)
  - **Max. Width:** 78.5 inches (outside wheel rims) maximum (same)

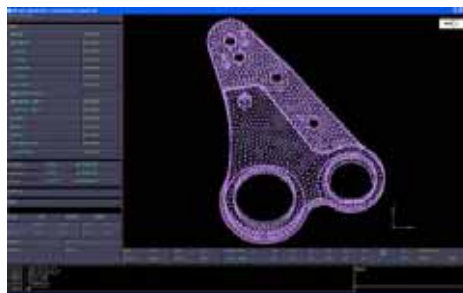


# Multi-Discipline CAE at NHLR

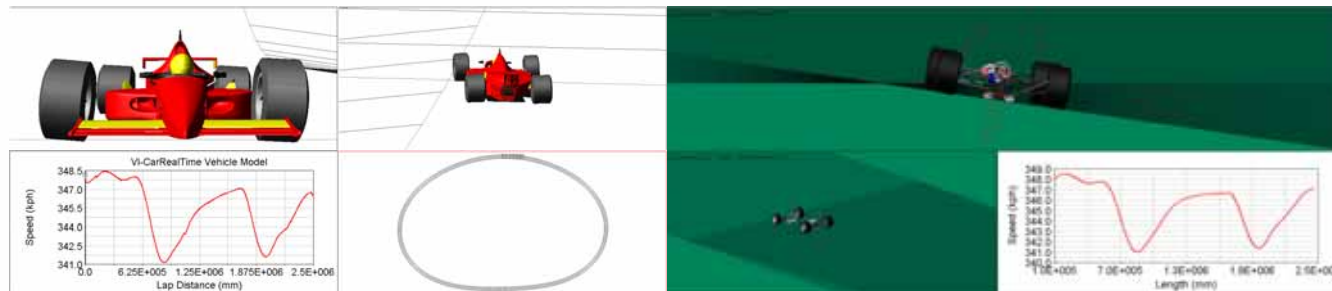
- MD ADAMS/VI-SportsCar



- MD Nastran/Marc



- VI-Car Real Time



# Validation = Successful CAE

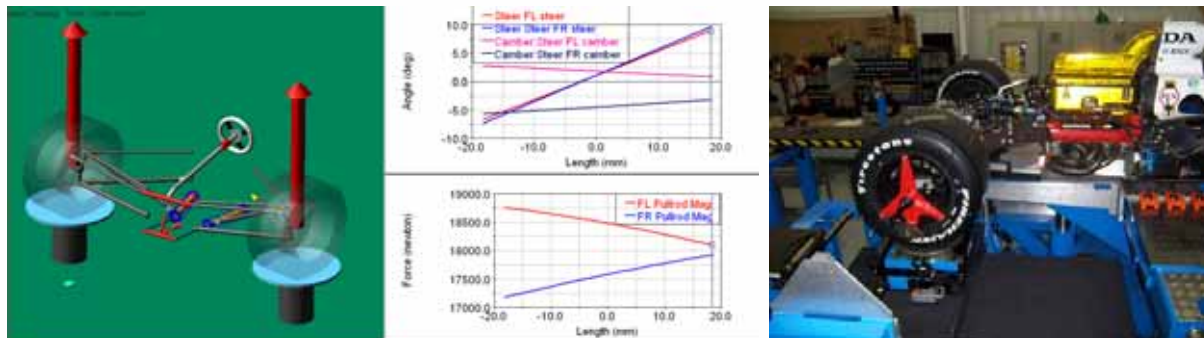
## • Component Level Validations

- Springs/Anti-roll bars/dampers
- Tires
- Links
- Aerodynamic elements



## • System Validations

- K&C
- Aerodynamics
- Engine/drivetrain
- Tracks

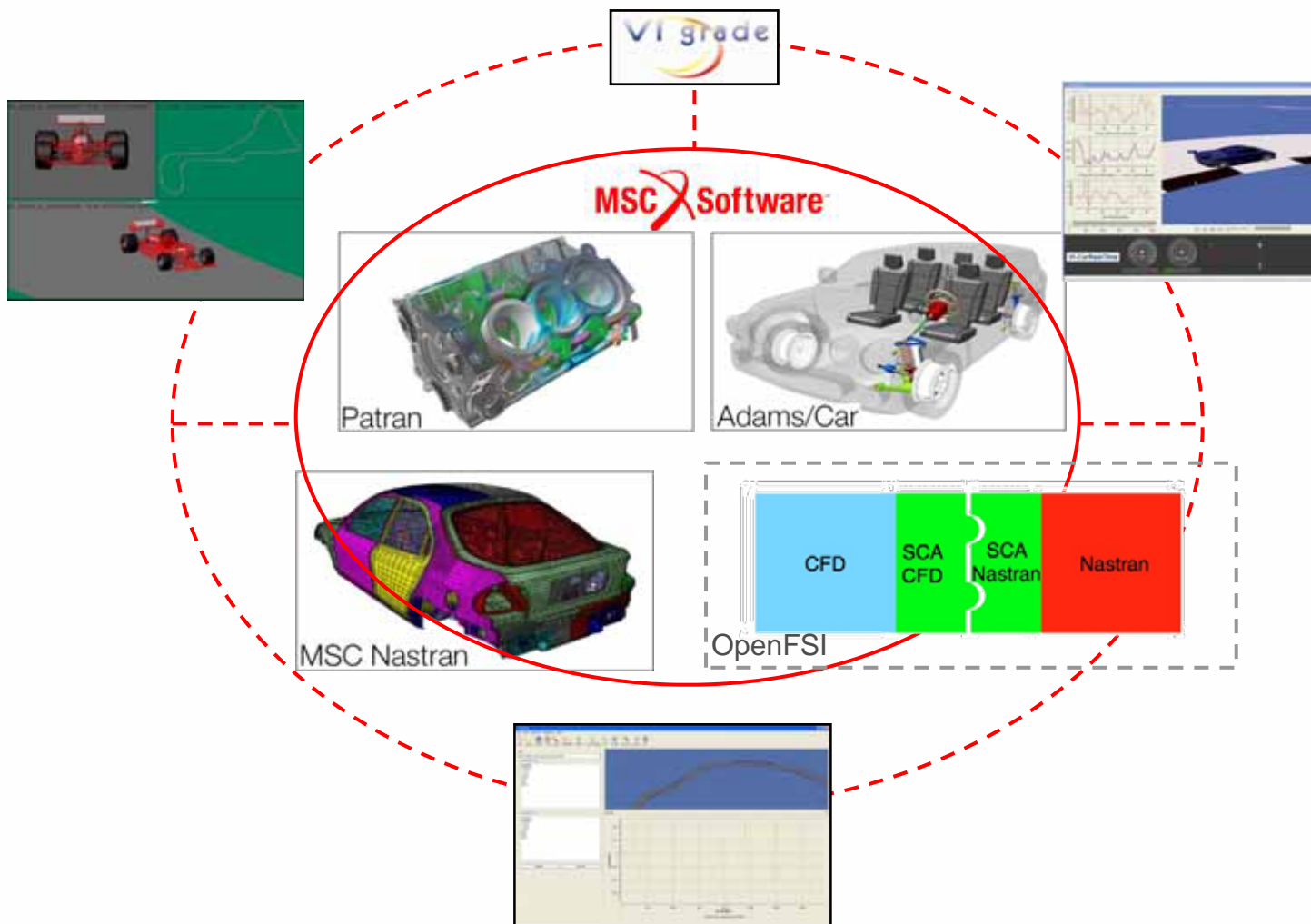


## • Vehicle Validations

- Objective tests
- Vehicle stiffness
- Mass/Inertia
- Shaker rig (modal)
- Lap simulations/track replays



# Leveraging Multi-Discipline to the Podium







# Contact Details :

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