



**indra**

SECURITY AND DEFENSE

# HELICOPTER SIMULATORS

Adaptable to change simulation solutions

[indracompany.com](http://indracompany.com)

# HELICOPTER SIMULATORS



A brand new concept for helicopter simulators

## Introduction

More than 25 years of Indra experience in simulation culminate in a two main lines of helicopter simulators:

- Optimus Line. Our level D (JAA or FAA) qualifiable helicopter simulators. The top of the range

- Evolution line. Our most innovative solution, up to level B (JAA or FAA) qualifiable, a brand new concept for helicopter trainers that is:

- Affordable
- Fully modular and upgradeable
- State-of-the-art, using technologies and models developed for level D simulators
- Creditable for flight hours for more than 80% of the tasks and procedures (according to JAA & FAA requirements)



Acquisition	Operation	Upgrades and updates
<ul style="list-style-type: none"> <li>• Typical average configuration price is ~40% of a comparable FFS level D</li> <li>• Less demanding facility requirements, leading to savings when preparing the building</li> </ul>	<ul style="list-style-type: none"> <li>• Estimated average direct operation costs: <ul style="list-style-type: none"> <li>- FFS level D: ~US\$100 / hour</li> <li>- Indra-evolutiOn: ~US\$30 / hour</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Due to the higher price of the systems used in level-D simulators (motion system, visual systems, et al.) these types of simulator are harder to upgrade</li> <li>• Indra-evolutiOn is designed from the beginning to be easily upgradeable</li> </ul>

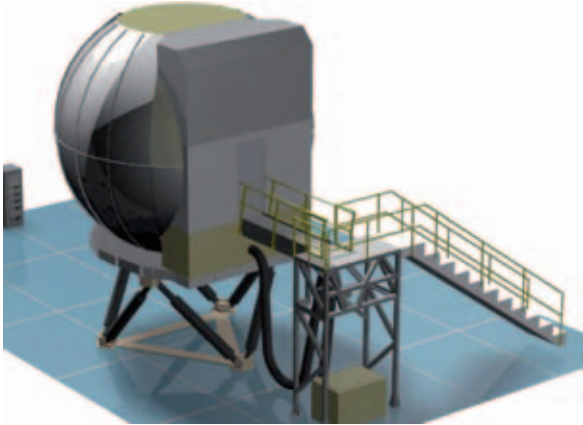
	Optimus (level D)	Evolution
Plus	100% training (zero flight time)	Total lifecycle cost (acquisition and operation) Availability Joint mission training capability Reliability Inexpensive to upgrade Cost reduction can be used in improvement of other systems
Minus	Cost Availability No joint mission training Reliability Expensive upgrades/updates	Approx. 16 % training must be in real aircraft or FFS level D



Essential differences optimus (standard level-D simulator) vs. evolution

	Optimus (level D)	Evolution
Motion System	60" Stroke	36" Stroke
Data	Basic data + ground/mach effect + aeroelastic effects + thrust effect on control surfaces	Basic data

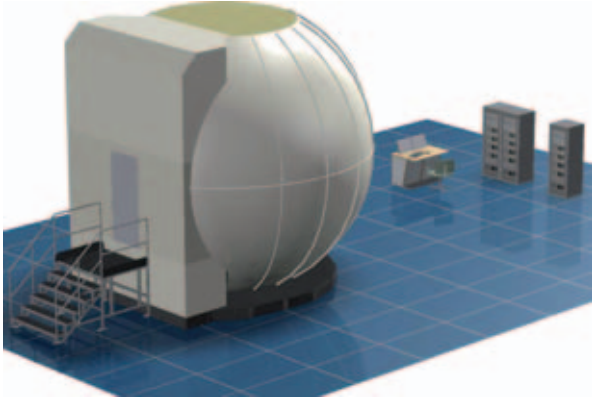




**Indra-evolutiOn**  
FFS level B JAR/FAA



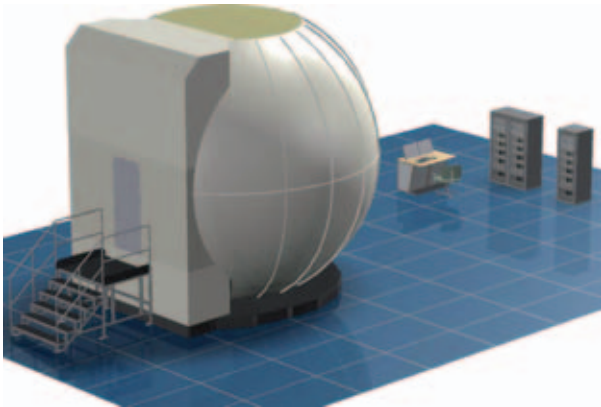
- 
- Upgraded QTG
  - Motion system
  - Vibration platform
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**IDP-evolutiOn**  
FTD level 3 JAR/level 6 FAA



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- Full data package
  - Upgraded software
  - Upgraded QTG
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**I-evolutiOn**  
FTD level 2 JAR/level 5 FAA



## Training credits under JAR-FCL 2

	Dual	Solo	SPIC	Total	Evolution
<b>ATPL(H)/IR INTEGRATED</b>					<b>CREDIT</b>
Visual	75 hrs	15 hrs	40 hrs	130 hrs	30 hrs
Basic instrument	10 hrs	-	-	10 hrs	5 hrs
Instrument rating training	40 hrs	-	-	40 hrs	20 hrs
MCC	15 hrs	-	-	15 hrs	15 hrs
<b>Total</b>	<b>140 hrs</b>	<b>55 hrs</b>	<b>55 hrs</b>	<b>195 hrs</b>	<b>70 hrs</b>
<b>ATPL(H)/VFR INTEGRATED</b>					<b>CREDIT</b>
Visual	75 hrs	15 hrs	40 hrs	130 hrs	30 hrs
Basic Instrument	10 hrs	-	-	10 hrs	5 hrs
MCC/VFR	10 hrs	-	-	10 hrs	10 hrs
<b>Total</b>	<b>95 hrs</b>	<b>55 hrs</b>	<b>55 hrs</b>	<b>150 hrs</b>	<b>45 hrs</b>
<b>CPL(H)/IR INTEGRATED</b>					<b>CREDIT</b>
Visual	75 hrs	15 hrs	40 hrs	130 hrs	30 hrs
Basic Instrument	10 hrs	-	-	10 hrs	5 hrs
Instrument rating training	40 hrs	-	-	40 hrs	20 hrs
<b>Total</b>	<b>125 hrs</b>	<b>55 hrs</b>	<b>55 hrs</b>	<b>180 hrs</b>	<b>55 hrs</b>
<b>CPL(H) INTEGRATED</b>					<b>CREDIT</b>
Visual	75 hrs	15 hrs	35 hrs	125 hrs	30 hrs
Basic Instrument	10 hrs	-	-	10 hrs	5 hrs
<b>Total</b>	<b>85 hrs</b>	<b>50 hrs</b>	<b>50 hrs</b>	<b>135 hrs</b>	<b>35 hrs</b>
<b>CPL(H) MODULAR</b>					<b>CREDIT</b>
Visual	20 hrs	-	-	20 hrs	5 hrs
Basic Instrument	10 hrs	-	-	10 hrs	5 hrs
<b>Total</b>	<b>30 hrs</b>	<b>-</b>	<b>-</b>	<b>30 hrs</b>	<b>10 hrs</b>
<b>IR(H) MODULAR</b>					<b>CREDIT</b>
Single engine	50 hrs	-	-	50 hrs	35 hrs
Multi-engine	55 hrs	-	-	55 hrs	40 hrs
<b>MCC(H) MODULAR</b>					<b>CREDIT</b>
MCC / VFR	15 hrs	-	-	15 hrs	15 hrs
MCC / IR	5 hrs	-	-	5 hrs	5 hrs
<b>MCC (VFR+IR)</b>	<b>20 hrs</b>	<b>-</b>	<b>-</b>	<b>20 hrs</b>	<b>20 hrs</b>

ATPL(H)	• Airline Transport Pilot License (Helicopter)
CPL(H)	• Commercial Pilot License (Helicopter)
SPIC	• Student Pilot-in-command
PPL(H)	• Private Pilot License (Helicopter)
IR(H)	• Instrument Rating (Helicopter)



PREFLIGHT PROCEDURES
A. Preflight inspection (cockpit only)
B. Power plant start
C1. Taxiing - ground
TAKEOFF AND DEPARTURE PHASE
A. Normal and crosswind takeoff
B. Instrument takeoff
C. Power plant failure during takeoff
D. Rejected takeoff
E. Instrument departure
INFLIGHT MANEUVERS
A. Steep turns
B. Power plant failure - multi-engine helicopters
C. Power plant failure - single engine helicopters
D. Recovery from unusual attitudes
INSTRUMENT PROCEDURES
A. Instrument arrival
B. Holding
C1. Precision instrument approach (normal)
C2. Precision inst. Approach (manual/power plant failure)
D. Non-precision instrument approaches
E1. Missed approach (normal)
E2. Missed approach (power plant failure)
LANDINGS AND APPROACHES TO LANDINGS
A. Normal and crosswind approaches and landings
B. Approach and landing with simulated power plant failure - multiengine helicopter
C. Rejected landing
NORMAL AND ABNORMAL PROCEDURES
A. Power plant
B. Fuel system
C. Electrical system
D. Hydraulic system
E. Environmental system
F. Fire detection and extinguisher systems
G. Navigation and aviation systems
H. Automatic flight control system, electronic flight instrument system and related
I. Flight control systems
J. Anti-ice and deice systems
K. Aircraft and personal emergency equipment
L. Loss of tail rotor effectiveness
EMERGENCY PROCEDURES
A. Emergency descent
B. Inflight fire and smoke removal
C. Emergency evacuation
POSTFLIGHT PROCEDURES
A. After-landing procedures
B. Parking and securing

## Evolution technical specs

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- Cockpit: full scale replica
- Visual system:
  - INVIS 2TM IG: PC-based, 6 channels
  - Display:
    - 170° x 80° (+30°,-50°) FOV. Full chin window coverage. Expandable to 240° x 80°
    - Exceeds level-D vertical FOV requirements (180°x60°)
    - Visual dome 6.50 m dia. for larger aircraft, 5.0 m dia. for smaller ones
- Standard or specific databases, compatible with industry and government standards such as US Navy PSI format
- Easy database generation and mission rehearsal capability
- Forward-looking "Kirk" instructor station, with full control and monitoring
- Four-channel control loading system, level-D compliant
- Level-D full digital audio and communications system
- Advanced debriefing station
- Record and playback capabilities
- FLIR simulation and NVG compatibility
- Full motion:
  - 6 DoF with electrical actuators, 36" stroke
  - 4500 kg capacity for light aircraft, 8000 Kg for larger ones
  - Proven solution for fielded level-B simulators
  - Vibration platform
- HLA/DIS interconnection capability
- Air traffic generator
- Rapid delivery schedule
- Remote maintenance features
- Trainee management database
- Automatic QTGs (Qualification Test Guides)

## Evolution training capabilities

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### Normal and standard operation

- Start-up
- Refuel
- Ground and hover taxi
- Hoist/sling loading
- Takeoff
- Hover
- Climb and descent
- Cruise
- Maneuvering flight
- Low-level, mountain, and formation flight
- Landing (spot, confined area, slope and ground effect)
- Shipboard operations

### Abnormal and emergency procedures

- Auto-rotation
- Helicopter system malfunctions and failures (engine, transmission, rotor, fuel, hydraulics, electrical system and landing gear)
- Avionics system malfunctions and failures (navigation and communication systems, control panels and instruments, AFCS, mission and warfare equipment)
- Flight control failures

### Standard and recurrent training

- Type rating
- Emergency refresher
- IFR (Instrument Flight Procedures)
- GPS approaches
- Recurrency training
- Missions
  - Night flight
  - NVG standard, emergency, and tactical training
  - Flight with external and internal loads
  - Confined area procedures
  - Day/night transit flight
  - Crew reaction in deteriorating conditions (single engine, MET conditions, low fuel, et al.)
  - Platform or rooftop landings
  - Firefighting procedures



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Indra reserves the right  
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