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Číslo nabídky: 20.035/HP  
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## Nabídka Altair HyperWorks

Vážený pane [REDACTED]

děkujeme Vám za Vaši poptávku .

HyperWorks nabízí širokou paletu CAE softwarových řešení, která lze využívat velmi flexibilně. Obsahuje produkty pro modelování, analýzu, optimalizaci, vizualizaci a automatizaci procesů v oblastech strukturální mechaniky, multi-body simulací nebo simulací výrobních procesů.

S licenčním konceptem firmy Altair získáte největší možnou flexibilitu při využívání tohoto softwaru – (viz. příloha „The Altair HyperWorks Licensing Concept“).

V tabulce dole jsou uvedeny ceny za používání softwarových produktů firmy Altair.

Poz.	Množ.	Popis	EUR
001	50	HWU-FLT-AN-R Altair HyperWorks Units lease license for Windows, Linux and Unix Licenční doba: 1 rok DPH 21%	[REDACTED]
		<b>Celkem</b>	[REDACTED]
002	50	HWU-FLT-AN-R Altair HyperWorks Units lease license for Windows, Linux and Unix Licenční doba: 4 měsíce DPH 21%	[REDACTED]
		<b>Celkem</b>	[REDACTED]

Cena softwaru (pronájem a podpora) zahrnuje podporu při instalaci, kompletní dokumentaci, podporu a bezplatný update během licenční doby.

Poz.	Množ.	Popis	CZK
003	1	Školení <b>Hypermesh + Optistruct optimalizace</b>	██████████
		Doba trvání školení: <b>5 dnů</b>	
		Počet účastníků: až <b>3 osoby</b>	
		DPH 21%	██████████
		<b>Celkem</b>	<b>90.750,00</b>

**Platební podmínky:**

Splatnost faktury 14 dní.

**Další podmínky:**

Tato cenová nabídka je platná do 7. září 2020.

Nabídka je založena na všeob.podm. Altair Engineering a podm. pro využití softwaru Altair Engineering.

Rádi Vám v případě potřeby poskytneme další doplňující informace.

S přátelským pozdravem,



Ing. Hynek Purš, PhD.

Advanced Engineering s.r.o.

*V případě, že přijímáte tuto nabídku, vyplňte prosím údaje v rámečku dole a pošlete nám oskenovanou kopii spolu s podpisem oprávněné osoby na naši e-mailovou adresu.*

Přijímáme Vaši nabídku a tímto objednáváme pozici \_\_\_\_\_ Vaší nabídky č. 20.035/HP

Datum: \_\_\_\_\_, Jméno: \_\_\_\_\_, Podpis: \_\_\_\_\_

# The Altair HyperWorks Licensing Concept

## More flexibility with HyperWorks Units

With HyperWork’s flexible unit-based licensing system organizations can pool and centralize their global software investment maximizing utilization and availability throughout the global enterprise delivering far greater value than traditional licensing systems. Instead of licensing individual HyperWorks products for each user, the HyperWorks licensing model allows companies purchase a pool of HyperWorks Units (HWU) for both individual users as well as for engineering departments. When a user launches a HyperWorks application, the required number of units to run the application is automatically checked out from the local or departmental pool of HWU. These HWU are automatically returned to the pool when the application is closed. This licensing model also allows users to run multiple HyperWorks applications simultaneously without checking out more HWU. With the exception of stacked applications and an application which requires more HWU than any active application, no additional HWU will be drawn from the pool. This is a key differentiator to most token based licensing models.

On the following pages you will find some more details on the Altair Alliance Enabled Partner Applications, on our solvers OptiStruct, RADIOSS and AcuSolve, and a short product overview. The required number of HWU for the most common HyperWorks products is listed below.

HyperWorks Units (HWU)	
HyperViewPlayer	0
PBS Professional	0.03 per CPU-
HyperGraph 2D/3D	6
Evolve	10
AcuConsole	21
HyperMesh	21
HyperCrash	21
HyperView	21
AcuFieldView	21
MotionView	21
Manufacturing Solutions	30
Inspire	15
SimLab	25
AcuSolve	30
OptiStruct (Analysis)	30
RADIOSS	30
HyperForm	30
MotionSolve	30
HyperStudy	25
HyperXtrude	50
OptiStruct (Optimization)	50
Compose	10
Activate	15
Eeko	30
Flux	30
SimSolid	30
Multiscale Designer	25
Tailored Solutions	35+
Virtual Wind Tunnel	21
Partner programs	45+ see p 4

<sup>(\*)</sup> depending on CPU-cores per Run (see Solvers Unit Chart)  
<sup>(\*\*)</sup> solver stacking rules apply

### HWU Usage Examples:

**Example A:** There are 50 HWU on your server.

One user opens HyperMesh (21 HWU). Those are drawn from the server – there are 29 HWU left. The same user also opens HyperGraph (6 HWU) at the same time. There are still 29 HWU available on the server - only the highest HWU drawing application draws HWU (in this case HyperMesh). The user closes both applications. There are again 50 HWU on the server.

**Example B<sup>(\*)</sup>:** There are 60 HWU on your server.

During the day, two users simultaneously use HyperMesh to build FE-models (2x21=42 HWU), perform analyses with OptiStruct (2x30=60 HWU), post-process the results with HyperView (2x21=42 HWU). At the end of the day, users close the open HyperWorks applications and there are again 60 HWU left on the server. One of the users can now run a topology optimization overnight using OptiStruct (50 HWU).

**Example C:** There are 60 HWU on your server.

One user opens MotionView (21 HWU) to build a MBD model. Starting MotionSolve (30 HWU) on the same machine draws only additional 30-21=9 HWU from the server. Starting HyperMesh (21 HWU) on the same machine and running a topology optimization using OptiStruct (50 HWU) draws only additional 60-30=30 HWU from the server. 50 HWU are in use.

## Adapt HyperWorks to your needs

All Altair software products can be adapted to your specific needs and integrated in your business processes. Through customization of HyperWorks you can achieve even more efficiency in your engineering projects. Our support and development projects guarantee the best possible benefit in the development of your solutions.

## Discover our products and customizing solutions

The best way to discover and learn how to use our products efficiently is to attend one of our many product training courses. Regular courses are available for both the novice and experienced user and are taught by our product specialists. Training dates and course descriptions can be found by visiting [www.altairhyperworks.de/trainings](http://www.altairhyperworks.de/trainings). In addition, we can provide custom training courses onsite your location or at our offices.

## What is the Altair Partner Alliance?

With the *Altair Partner Alliance*, Altair is expanding the HyperWorks suite for lease licenses by including third-party products. The customers who participate in the alliance can use their existing pool of HWU for both HyperWorks and participating partner applications at no or little incremental costs. Each partner application draws a different quantity of HyperWorks Units while running (Partner applications will always stack).

The alliance ([www.altairalliance.com](http://www.altairalliance.com)) grows continuously and currently includes the following applications:

Fatigue Analysis	<b>DesignLife</b> by <i>nCode</i> (starts from 50 HWU) <b>DigitalClone</b> by <i>Sentient Science</i> (5 HWU) <b>FEMFAT</b> by <i>ECS (MAGNA PowerTrain)</i> (starts from 40 HWU)
Crash & Impact Analysis	<b>Crash Cad Calculate</b> von <i>Crash Cad Calculate</i> (50 HWU) <b>MADYMO</b> by <i>TASS-safe</i> (starts from 40.01 HWU for coupled version)
CFD Analysis	<b>AcuNexus</b> von <i>Novus Nexus</i> (21 HWU) <b>SC/Tetra, STREAM</b> by <i>Software Cradle</i> (starts from 50 HWU)
MBD Analysis	<b>CarSim, BikeSim, TruckSim</b> by <i>Mechanical Simulation</i> (starts from 60 HWU) <b>ChassisSim</b> by <i>ChassisSim</i> (starts from 20 HWU) <b>FTire</b> by <i>cosin scientific software</i> (25 HWU)
Stress Analysis	<b>StressCheck</b> by <i>ESRD</i> (starts from 50 HWU)
Thermal Management	<b>ElectroFlo, ThermoFlo, TESuite</b> by <i>TES International</i> (starts from HWU) <b>RadTherm</b> by <i>ThermoAnalytics</i> (starts from 50 HWU)
Composite Modeling	<b>Digmat</b> by <i>e-Xstream</i> (starts from 50 HWU) <b>ESAComp</b> by <i>Componeering</i> (starts from 40 HWU) <b>GENOA, MCQ-Composites</b> by <i>AlphaSTAR</i> (starts from 30 HWU) <b>LAP, CoDA</b> by <i>Anaglyph</i> (starts from 30 HWU) <b>MultiMech Suite</b> by <i>MultiMech R&amp;D</i> (starts from 40 HWU) <b>Multiscale Design System</b> by <i>MDS, LLC</i> (starts from 15 HWU) <b>SwiftComp Micromechanics</b> by <i>AnalySwift</i> (40 HWU)
Manufacturing	<b>Click2Cast</b> by <i>Quantech ATZ</i> (25 HWU) <b>CONVERSE</b> by <i>PART Engineering</i> (50 HWU) <b>Moldex3D</b> by <i>CoreTech System</i> (starts from 35 HWU) <b>NovaFlow &amp; Solid CV</b> by <i>NovaCast Systems</i> (starts from 40 HWU)
NVH Analysis	<b>AlphaCell</b> von <i>MATELYS</i> (35 HWU) <b>Coustyx</b> by <i>ANSOL</i> (starts from 50 HWU) <b>EFEA</b> by <i>Michigan Engineering Services</i> (50 HWU) <b>SEAM</b> by <i>Cambridge Collaborative</i> (55 HWU) <b>VMAP</b> by <i>TechPassion</i> (starts from 21 HWU)
Material Library	<b>KEY to METALS, KTM Premium Ed.</b> by <i>Key to Metals</i> (starts from 40 HWU) <b>Materiality Database Pro</b> by <i>Materiality</i> (35 HWU)
Mathematics & Analytics	<b>Maple, MapleSim</b> by <i>Maplesoft</i> (starts from 25 HWU)

In addition Altair Partner Alliance offers solutions for 1D System Simulation (**DSHplus**), Tolerance Analysis (**3DCS Analyst**), Projektmanagement (**PTB**), Complexity Management (**DesignProfit**, **OntoNet**), Rendering (**LinceoVR**) and Elektromagnetics Analysis (**JMAG**).

## HyperWorks Solvers Unit Chart

For multiple CPU-core jobs, the number of base HWUs drawn by RADIOSS, AcuSolve and OptiStruct depends on the number of machine CPU-cores used per run as described in the following table. This base number may be altered depending on how many simultaneous copies of these solvers are running. See below regarding the Decay Function.

<b>HyperWorks Solvers</b>	<b>HWU</b>	<b>HWU</b>
	<b>RADIOSS, AcuSolve</b>	<b>OptiStruct</b>
<i>Number of CPU-cores per Run</i>		
1 – 4	30	50
5 - 8	35	55
9 – 16	40	60
17 – 32	50	70
33 - 64	60	80
65 – 128	70	90
129 – 256	80	100
257 – 512	90	110
513 – 1024	100	120
Each duplication	+10	+10

A decay function is applied across all Radioss, AcuSolve and OptiStruct licenses running simultaneously off the same license server. The decay function is a multiplier on the unit amount drawn for a job. Once a job has finished, the next job will backfill into the vacated slot. Hence, once a job has started, the checked-out unit amount for that job will not change.

<b>Job Number</b>	<b>Decay Factor</b>
1	1.0
2 – 10	0.9
11 – 20	0.8
21 – 30	0.7
31 – 40	0.6
41 – 50	0.5
50+	0.4

Solvers level or stack HWUs according to the following rules:

- At the first invoke of a Solver application, the HWUs will level against HyperWorks applications already running on the same machine.
- Similarly, at the first invoke of a different Solver application, the HWUs still level.
- The HWUs stack when starting the second and so forth invoke of the same batch application.
- When the leveled job finishes, the next invoke levels again.

**Example:** If the user launches HyperMesh first (21 HWU), and then launches RADIOSS (30 HWU), 30 HWU will be drawn. If the same user on the same machine adds an OptiStruct job (50 HWU), the total units drawn is 50 HWU. If the user now adds a second OptiStruct job, the total units drawn will be increased to 95 HWU (50+0.9×50 HWU).

## What is RADIOSS?

RADIOSS is a state-of-the-art finite element solver uniting implicit and explicit integration schemes for the solution of a wide variety of engineering problems, from linear statics and linear dynamics to complex nonlinear transient dynamics and mechanical systems. This robust, multidisciplinary solver enables designers to maximize performance related to durability, NVH, crash, safety, manufacturability, and fluid-structure interaction, in order to bring innovative products to market faster.

RADIOSS' comprehensive analysis capabilities for linear and non-linear finite element analysis, sheet metal stamping, and multi-body dynamics are accessible via two input formats.

### Finite element solutions via Nastran-type Bulk Data Format include:

- Linear static analysis
- Non-linear implicit quasi-static analysis
- Linear buckling analysis
- Normal modes analysis
- Complex eigenvalue analysis
- Frequency response analysis
- Random response analysis
- Linear transient response analysis
- Response spectrum analysis
- Geometric non-linear explicit and implicit analysis
- Linear fluid-structure coupled (acoustic) analysis
- Linear steady-state heat transfer analysis
- Coupled thermo-mechanical analysis
- Inertia relief analysis with static, non-linear contact, modal frequency response, and modal transient response analyses
- Component Mode Synthesis (CMS) for the generation of flexible bodies for multi-body dynamics analysis
- Reduced matrix generation
- One-step (inverse) sheet metal stamping analysis
- Fatigue analysis

### Finite element solutions via RADIOSS Block format include:

- Explicit dynamic analysis
- Non-linear implicit static analysis
- Transient heat transfer and thermo-mechanical coupling
- Explicit Arbitrary Euler-Lagrangian (ALE) formulation
- Explicit Computational Fluid Dynamics (CFD)
- Smooth Particle Hydrodynamics (SPH)
- Incremental sheet metal stamping analysis with mesh adaptivity
- Linear static analysis
- Normal modes analysis
- Linear and non-linear buckling analysis

### Multi-body dynamics solution integrated via Nastran-type Bulk Data format for rigid and flexible bodies includes:

- Kinematics analysis
- Dynamics analysis
- Static and quasi-static analysis
- Linearization

All typical types of constraints like joints, gears, couplers, user defined constraints, and high-pair joints can be defined. High pair joints include point-to-curve, point-to-surface, curve-to-curve, curve-to-surface, and surface-to-surface constraints. They can connect rigid bodies, flexible bodies, or rigid and flexible bodies. For this multi-body dynamics solution, the power of MotionSolve has been integrated with RADIOSS.

## What is AcuSolve?

AcuSolve is a leading general-purpose finite element based Computational Fluid Dynamics (CFD) flow solver with superior robustness, speed, and accuracy. AcuSolve can be used by designers and research engineers with all levels of expertise, either as a standalone product or seamlessly integrated into a powerful design and analysis application. Quality solutions can be obtained quickly without iterating on solution procedures or worrying about mesh quality or topology. The FSI (fluid structure interaction) capabilities available in AcuSolve enable the user to perform multi-physics analysis of complex scenarios in an efficient manner.

The interfaces in HyperMesh and HyperView ensure a smooth integration into the HyperWorks framework.

### Benefits:

#### Conservation Equations in 3D

- Incompressible and weakly compressible Stokes and Navier-Stokes equations
- Thermal analysis and conjugate heat transfer
- Multi-layered thermal shell equations
- Multi-species transport equations

#### Radiation

- Gray body enclosure radiation support
- Distributed memory parallel view-factor computation
- Solar radiation model support

#### Turbulence Models

- One and two-equation RANS models
- Smagorinsky and Dynamic sub-grid scale LES models
- Hybrid RANS/LES (DES & DDES) models

#### Arbitrary Lagrange Eulerian (ALE) Formulation

- Flexible mesh movement
- Free surface simulation
- Guide surface technology
- Sliding/non-conformal mesh technology

#### Powerful User-defined Function (UDF) Capability

- Allows definition of material models, source terms, boundary conditions, etc.
- Client-server interface with external programs

#### Component Technology

- Fan component
- Heat exchanger component

#### Multi-physics Capabilities

- Rigid body dynamics coupling
- Practical Fluid/Structure Interaction (P-FSI)
- Direct-Coupling Fluid/Structure Interaction (DC-FSI)

#### Computational Aero Acoustics Support

- Output interface to Actran/LA

#### Unstructured Mesh Support

- 4-node tetrahedron, 5-node pyramid, 6-node prism, 8-node brick, and 10-node tetrahedron elements

#### Highly Effective Solver Technology

- Novel and highly efficient iterative solver for fully coupled pressure/velocity equations systems
- Fully coupled temperature/flow iterative equation solver

Fully parallel on shared and distributed memory machines, transparent to the user

# Altair HyperWorks 19 product overview

## *The Platform for Innovation™*

### Finite Element Meshing and Modeling

#### **HyperMesh**

Universal finite element pre- and post-processor.

#### **HyperCrash**

Finite element pre-processor for automotive crash and safety analysis.

#### **BatchMesher**

Geometry cleanup and auto-meshing in batch mode for given CAD files.

#### **AcuConsole**

Powerful, yet easy to use GUI-Based Computational Fluid Dynamics (CFD) pre-processor for AcuSolve.

#### **SimLab**

Process oriented, feature based finite element modeling environment to capture and automate simulation processes.

### Multi-body Dynamics Modeling

#### **MotionView**

Multi-body dynamics pre- and post-processor.

### Solvers, Study and Optimization

#### **OptiStruct**

Design and optimization software using finite elements and multi-body dynamics.

#### **RADIOSS**

Finite element solver for linear and non-linear problems.

#### **AcuSolve**

General, all-purpose finite element computational fluid dynamics (CFD) solver.

#### **MotionSolve**

Multi-body dynamics solver.

#### **HyperStudy**

Integrated optimization, DOE, and robustness engine.

#### **HyperForm**

A unique finite element based sheet metal forming simulation software solution.

#### **HyperXtrude**

An hp-adaptive finite element program that enables engineers to analyse material flow and heat transfer problems in extrusion and rolling applications.



## Altair HyperWorks 19 product overview (cont.)

### *The Platform for Innovation™*

#### Post-processing, Data Analysis, and Math Scripting

##### **HyperView**

High performance finite element and mechanical system post-processor, engineering plotter, and data analysis tool.

##### **HyperGraph**

Engineering plotter and data analysis tool.

##### **HyperGraph 3D**

Engineering 3-D plotter and data analysis tool.

##### **HyperView Player**

Viewer for visualizing 3-D CAE results via the Internet or desktop.

##### **AcuFieldView**

CFD post-processor with the ability to manage large and complex CFD data visualization requirements.

##### **HyperMath**

Mathematical scripting language for numerical computation.

##### **Templex**

General purpose text and numeric processor.

#### Industrial & Conceptual Design

##### **solidThinking Evolve**

Industrial design software that combines NURBS curve, surface, solid, polygonal and point cloud modeling tools alongside a photorealistic rendering engine.

##### **solidThinking Inspire**

Conceptual design software for running basic topology optimization on solid models. A simple user experience hides the topology optimization details but supports features like draw directions, symmetry and pattern repetition.

## Altair HyperWorks 19 product overview (cont.)

### *The Platform for Innovation™*

#### **Data Management, Process Automation and Engineering Intelligence**

##### **Collaboration Tools**

A solution that organizes, manages, and stores CAE and test data throughout the simulation life cycle.

##### **Process Manager**

Process automation tool for HyperWorks and third party software. Processes can be created with the help of Process Studio.

##### **ScriptView**

HyperWorks IDE (Integrated Development Environment) for developing and debugging TCL and HyperMath Language (HML) scripts.

#### **Workload- & License-Management** (HWU-enabled, not part of HyperWorks 12.0 installation)

##### **PBS Professional**

Simplifies and automates the process of scheduling and managing compute workload across clusters, SMP and hybrid configurations. Enables implementation and optimization of site-specific scheduling policies.

##### **Compute Manager**

Web-based job submission and management portal to run, monitor and manage workloads and results on distributed resources.

##### **Display Manager**

Web-based application for remote visualization of CAE models and results through graphic nodes without data latency.

##### **PBS Analytics**

Web-based portal for visualizing HPC usage data (like job runtimes, wait times, queue loads) as well as application license usage.

#### **Altair SAO (Software Asset Optimization)**

Web-based application for Management, IT and Engineering to monitor and analyze usage of CAE/CAD software licenses.