

The background of the slide is a close-up, blurred image of fire, showing bright orange and yellow flames against a dark, smoky grey background. In the center of the slide, the word "DIFUSEK" is written in a bold, sans-serif font. The letters "D", "I", "F", "S", "E", and "K" are black, while the letter "U" is red. The "U" is stylized with a vertical bar on its left side. Surrounding the "U" is a circular arrangement of twelve yellow five-pointed stars, similar to the flag of the European Union.

DIFUSEK

Računalniški programi za požarno analizo
konstrukcij

Zahteva pri požarno odpornem projektiranju

R

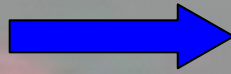
odpornost konstrukcije med požarom

>

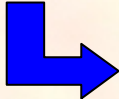
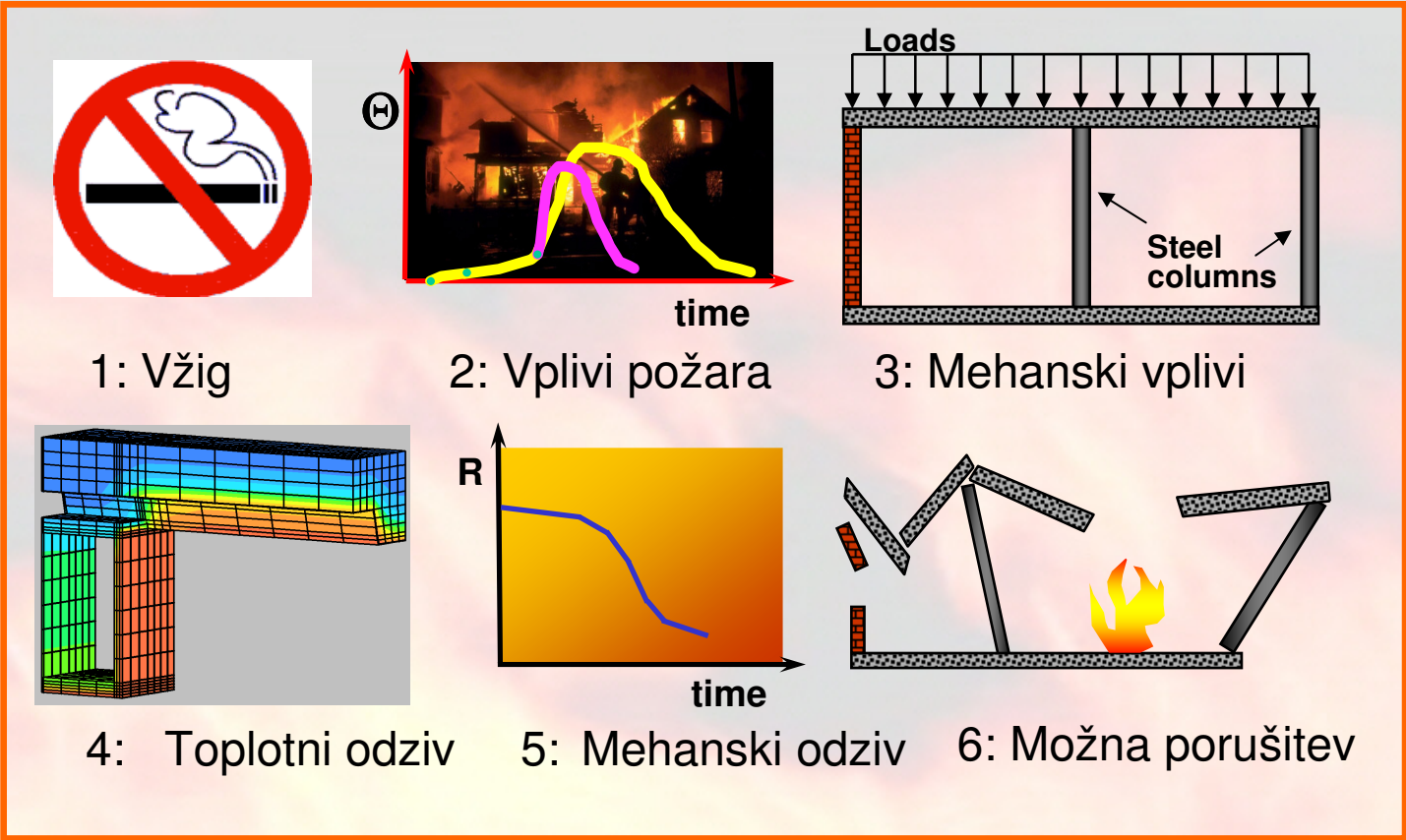
R_{req}

požarna odpornost konstrukcije, ki zagotavlja varnost

R



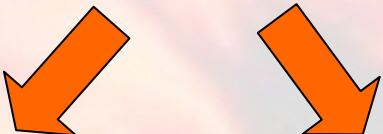
Veriga dogodkov med požarom



Metodologija izračuna - Evrokodi



$R_{required}$: Kriterij je zadovoljen, kadar se funkcija nosilnosti konstrukcije ohranja med zahtevanim časom izpostavljenosti požaru.



Pristop s predpisi:
nacionalni standardi
za požar

Pristop z določitvijo
zahtevane odpornosti:
Požarno odporno
projektiranje

Programska oprema za požarno odporno projektiranje

KLASIFIKACIJA

Običajna klasifikacija zajema 5 kategorij:

- Termični požarni modeli
- Model za odpornost proti požaru



R

- Evakuacijski modeli
- Modeli odziva detektorjev
- Drugi modeli



R_{req}

(načrtovana nosilnost)

Termični požarni modeli

Termični modeli

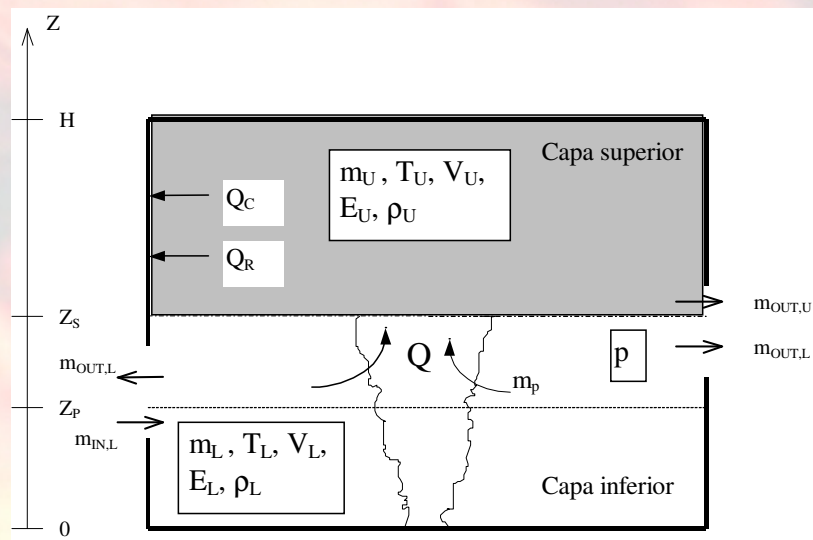
| Termični modeli | | |
|--|---------------------------------------|--------------------|
| Nominalna krivulja temperatura – čas (predpisni pristop) | Standardna krivulja temperatura - čas | |
| | Zunanja požarna krivulja | |
| | Hidrokarbonska krivulja | |
| Naravni požar (odzivni pristop) | Požarni modeli | Požarni sektorji |
| | | Lokalizirani požar |
| | Napredni požarni modeli | Conski modeli |
| | | Prostorski modeli |

Conski modeli

Conski modeli

Dva tipa conskih modelov:

- Dvoconski modeli: požarni sektor je razdeljen na dva dela (hladno, vroče) s homogenimi lastnostmi
- Enoconski modeli: požarni sektor se obravnava kot peč.



Conski modeli lahko zajemajo enega ali več požarnih sektorjev, ki se priključujejo eden k drugemu.

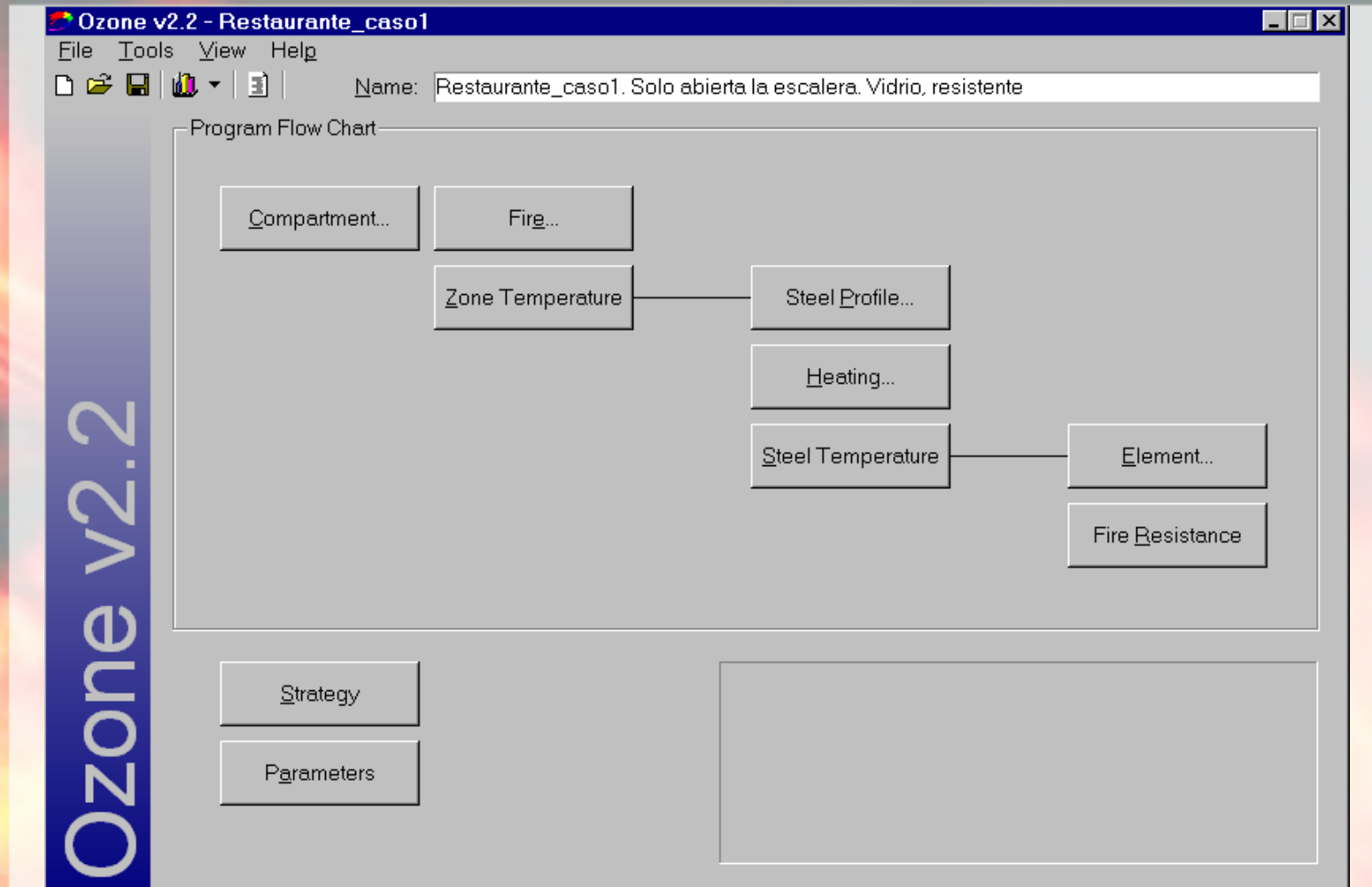
Gostota mreže za opis z enačbami:

- Ravnovesje mas
- Ravnovesje energij

Conski modeli- Ozone

| Splošen opis programske opreme: | | | |
|---------------------------------|---|----------|------------|
| Ime | OZone | | |
| Verzija | 2.2.2 | Leto | 2002 |
| Država | Luxembourg | Jezik | Angleščina |
| Sistem | Windows | Velikost | 5 MB |
| Avtorji | J. F. Cadorin, J. M. Franssen (Uni. Liège) L.G. Cajot, M. Haller, J.B. Schleich | | |
| Organizacija | Arcelor LCS Research Centre | | |
| Področje uporabe | Termični modeli – conski modeli | | |
| Dostopnost | Brezplačno – www.ulg.ac.be Brezplačno – www.sections.arcelor.com | | |
| Kontakt | Arcelor ASC: asc.tecom@arcelor.com | | |
| Formulacija | Temelji na enačbah ravnovesja mas in energij | | |
| Kratek opis | Model za oceno požarnih vplivov na konstrukcijo med določenim požarom. Vsebuje prehod toplote za enostavne elemente in čas do porušitve (ENV 1993-1-2). | | |

Ozone – glavni meni

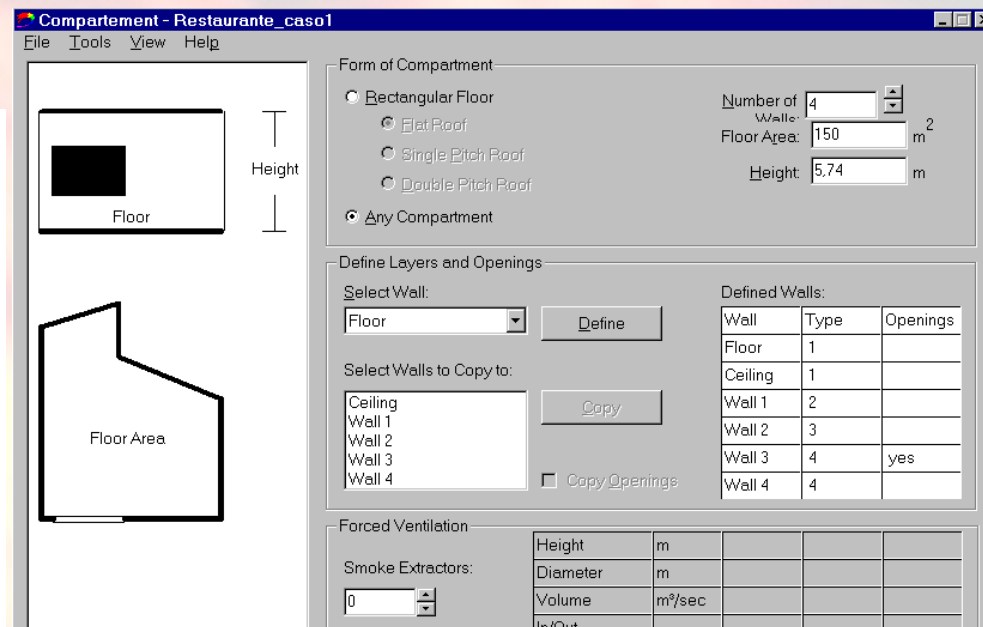
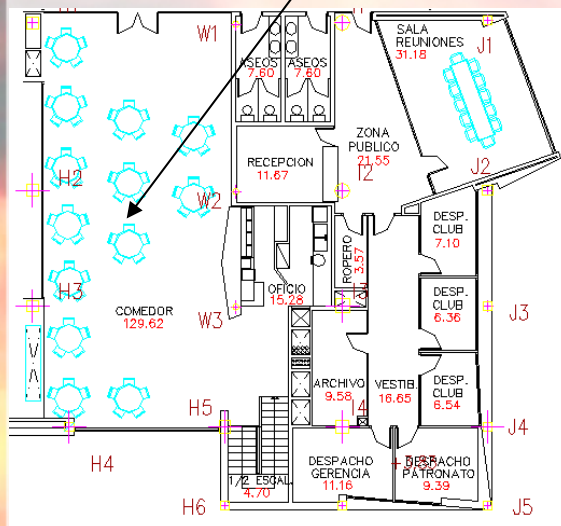


Ozone - Primer

Požarni scenarij: požar v 3. nadstropju restavracije
Projektni požar: polno razvit požar - t_{α} faza naraščanja
Namen: požarna odpornost jeklenih nosilcev
(Zahteve po R90)

Definicija požarnih sektorjev:

Območje
požara



Ozone – Vhodni podatki

Fire - difisek_restaurant

File Tools View Help

Fire Curve

NFSC Design Fire User Defined Fire

Max Fire Area: m²

Fire Elevation: m Fuel Height: m

| Occupancy | Fire Growth Rate | RHRf [kW/m ²] | Fire Load q _{f,k} 80% Fractile [MJ/m ²] | Danger of Fire Activation |
|--------------|------------------|---------------------------|--|---------------------------|
| User Defined | 150 | 250 | 300 | 1 |
| Description | Fast | | | Medium |

Automatic Water Extinguishing System $\gamma_{n,1} = 1$
 Independent Water Supplies (1 2) $\gamma_{n,2} = 1$
 Automatic Fire Detection by Heat $\gamma_{n,4} = 0,73$
 Automatic Fire Detection by Smoke $\gamma_{n,4} = 0,73$
 Automatic Alarm Transmission to Fire Brigade $\gamma_{n,5} = 1$
 Work Fire Brigade $\gamma_{n,7} = 0,78$
 Off Site Fire Brigade $\gamma_{n,7} = 0,78$
 Safe Access Routes $\gamma_{n,8} = 1$

Design Fire Load

Fire Risk Area: m² $\gamma_{q,1} = 1,42$

Danger of Fire Activation: $\gamma_{q,2} = 1$

Active Measures: $\prod \gamma_{n,i} = 0,8541$

$q_{f,d} = \gamma_{q,1} \cdot \gamma_{q,2} \cdot \prod \gamma_{n,i} \cdot m \cdot q_{f,k} = 291,1$ MJ/m²

Combustion

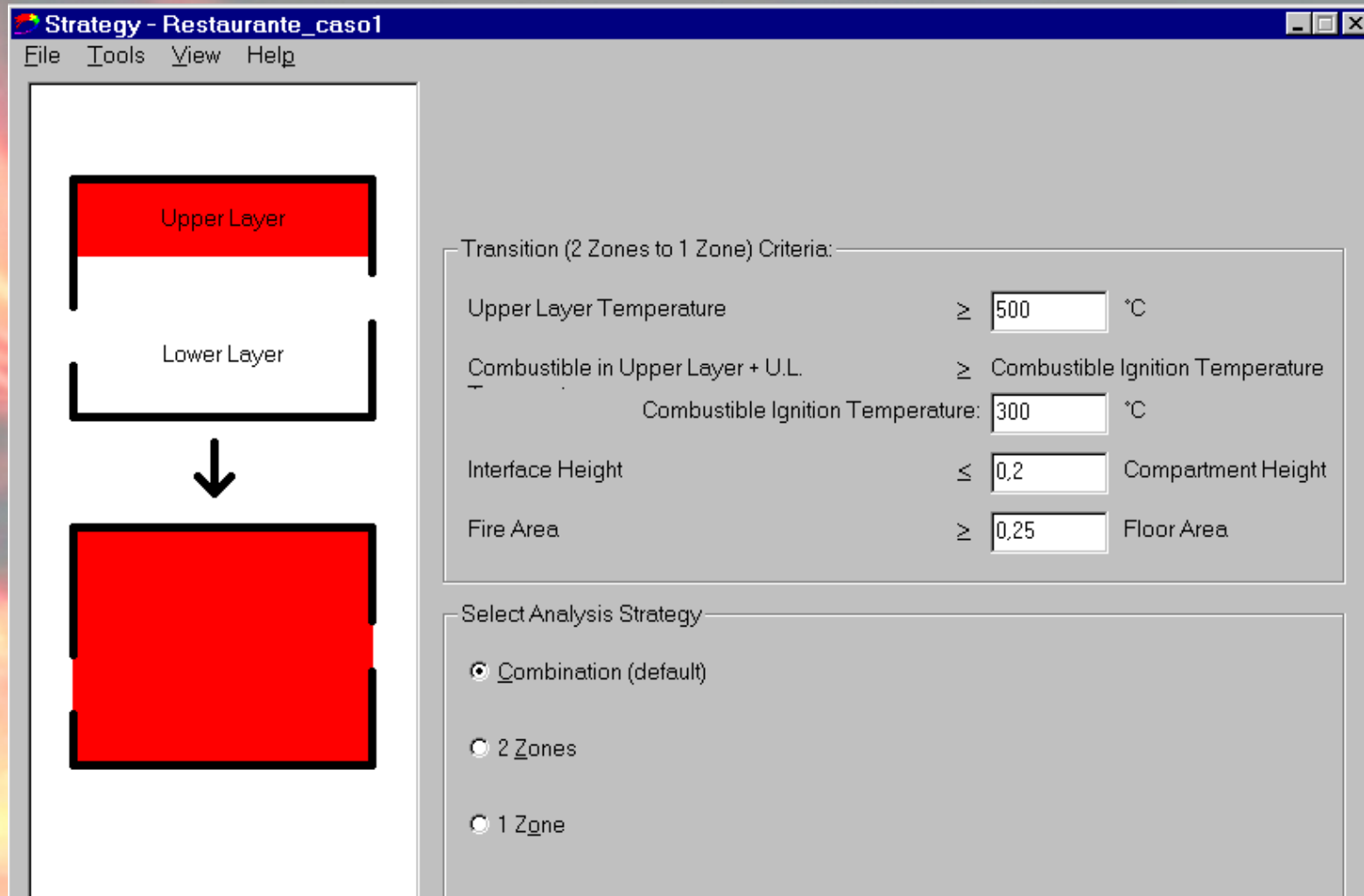
Combustion Heat of Fuel: MJ/kg

Combustion Efficiency Factor:

Combustion Model:

OK Cancel

Ozone – Vhodni podatki: Kriterij za izbiro med 2 conama in 1 cono



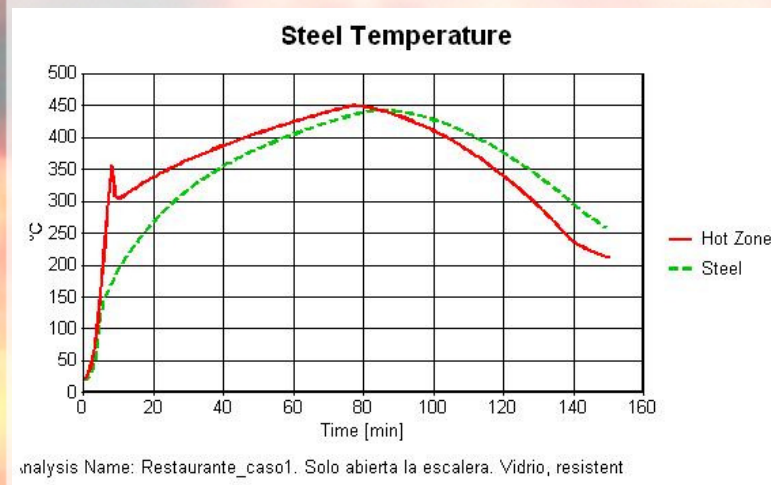
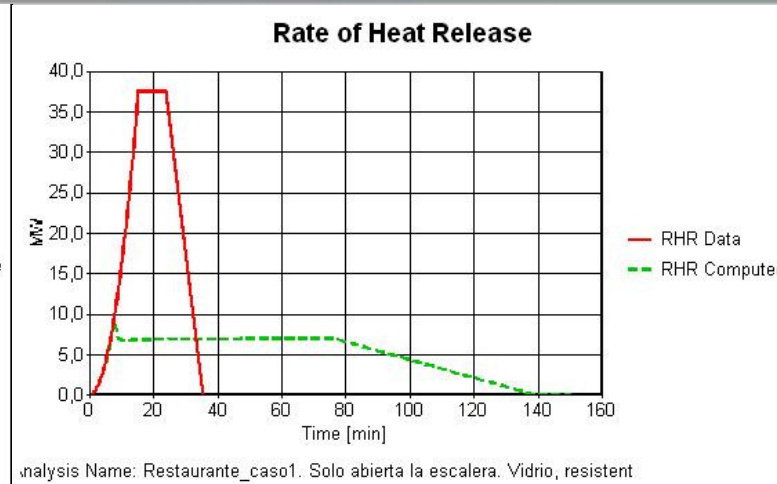
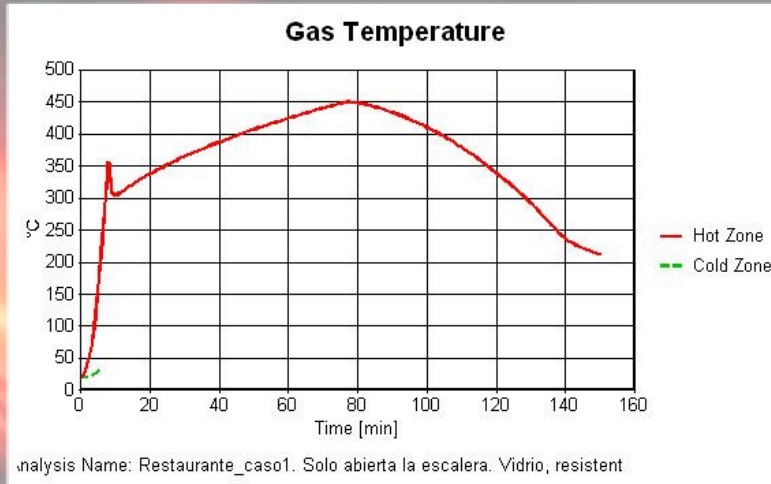
The screenshot shows a software window titled "Strategy - Restaurante_caso1" with a menu bar (File, Tools, View, Help). On the left, a diagram illustrates the transition from a two-zone fire (Upper Layer and Lower Layer) to a single-zone fire. On the right, the "Transition (2 Zones to 1 Zone) Criteria:" section includes the following settings:

| | | | |
|-----------------------------------|--------|----------------------------------|--------------------|
| Upper Layer Temperature | \geq | 500 | °C |
| Combustible in Upper Layer + U.L. | \geq | Combustible Ignition Temperature | |
| Combustible Ignition Temperature: | | 300 | °C |
| Interface Height | \leq | 0,2 | Compartment Height |
| Fire Area | \geq | 0,25 | Floor Area |

The "Select Analysis Strategy:" section has three radio button options:

- Combination (default)
- 2 Zones
- 1 Zone

Ozone – Izhodni podatki



Preklop med 2 in 1 cono:
120"
(prevladujoč vpliv na širitev
ognja - ventilacija)

Modeli temperaturnega polja

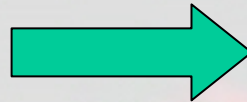
CFD – računske metode dinamike tekočin

Modeli temperaturnega polja (CFD)

Požarni model

+

CFD Koda



Področni modeli

Splošen opis fenomena požara.

Opis fizikalnih spremenljivk.

Tipi CFD kod

Specifične CFD

Fizikalni modeli za opise požara:

SOFIE, FDS...

Splošni CFD

Bolj fizikalni modeli in materialne karakteristike, uporabniška prilagoditev na določen model: Fluent, CFX, PHOENIX..

Področni modeli - Fluent

| Splošen opis programske opreme: | | | |
|---------------------------------|--|----------|------------|
| Ime | Fluent | | |
| Verzija | 6.3 | Leto | 2002 |
| Država | Luxembourg | Jezik | Angleščina |
| Sistem | Windows/UNIX | Velikost | 5 MB |
| Organizacija | Fluent Inc. | | |
| Področje uporabe | Termični, modeli temperaturnega polja. | | |
| Dostopnost | Commercial software | | |
| Kontakt | www.fluent.com | | |
| Formulacija | Temelji na ravnovesju mas in energije. | | |
| Kratek opis | Splošen CFD | | |

Fluent – Vhodni podatki

The image shows three overlapping dialog boxes in ANSYS Fluent. The 'Viscous Model' dialog is on the left, showing the 'k-epsilon Model' selected with 'Realizable' and 'Full Buoyancy Effects' options. The 'Materials' dialog is in the center, showing the material 'co' with properties like Cp, Molecular Weight, and Standard State Enthalpy. The 'Radiation Model' dialog is at the bottom right, showing the 'P1' model selected.

Viscous Model

Model

- Inviscid
- Laminar
- Spalart-Allmaras (1 eqn)
- k-epsilon (2 eqn)
- k-omega (2 eqn)
- Reynolds Stress (7 eqn)
- Large Eddy Simulation

k-epsilon Model

- Standard
- RNG
- Realizable

Near-Wall Treatment

- Standard Wall Functions
- Non-Equilibrium Wall Functions
- Enhanced Wall Treatment

Options

- Viscous Heating
- Full Buoyancy Effects

Model Constants

C2-Epsilon: 1.9

TKE Prandtl Number: 1

TDR Prandtl Number: 1.2

Energy Prandtl Number: 0.85

User-Defined Functions

Turbulent Viscosity: none

Prandtl Numbers

TKE Prandtl Number: none

TDR Prandtl Number: none

Energy Prandtl Number: none

Materials

Name: co

Material Type: fluid

Order Materials By: Name Chemical Formula

Chemical Formula: co

Fluid Materials: co

Mixture: pdf-mixture

Properties

Cp (j/kg-k): piecewise-polynomial

Molecular Weight (kg/kgmol): constant, 28.01055

Standard State Enthalpy (j/kgmol): constant, -1.105396e+08

Standard State Entropy (j/kgmol-k): constant, 197535.7

Radiation Model

Model

- Off
- Rosseland
- P1
- Discrete Transfer (DTRM)
- Surface to Surface (S2S)
- Discrete Ordinates

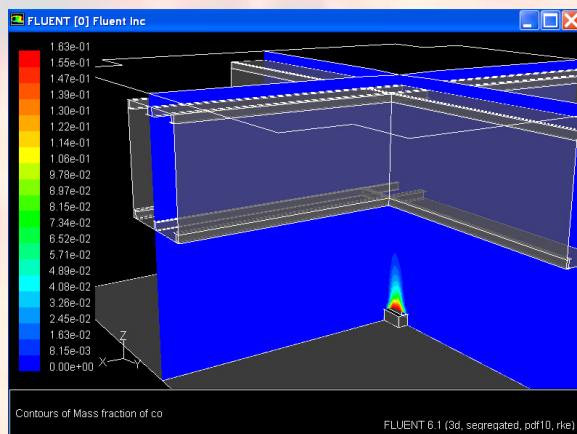
Potreba po definiciji materialov,
fizikalnih modelov in robnih pogojev.

Fluent- Izhodni podatki

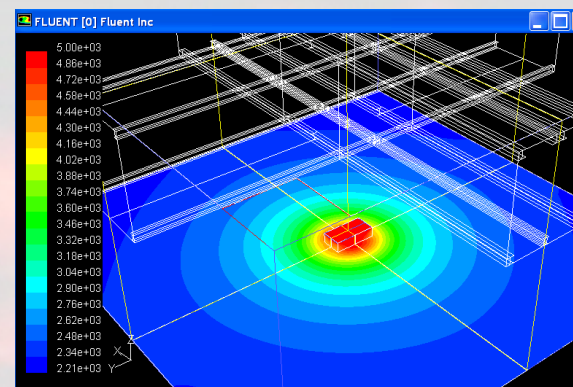
Uporabniku prijazno postprocesiranje.

Potrebno podrobno znanje o požarnem inženirstvu in CFD modelih.

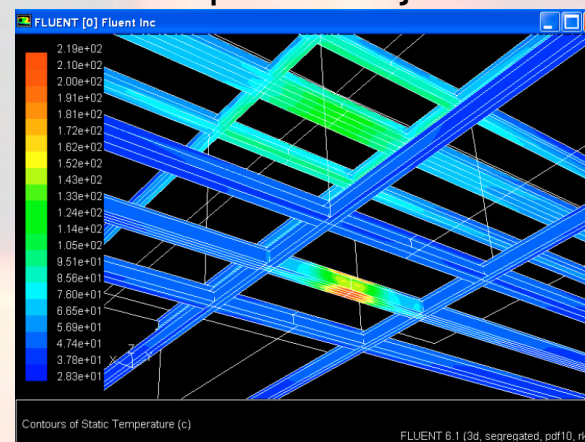
Kontrola dima: koncentracija CO



Vrednosti sevanja



Temperatura jekla



Modeli požarne odpornosti

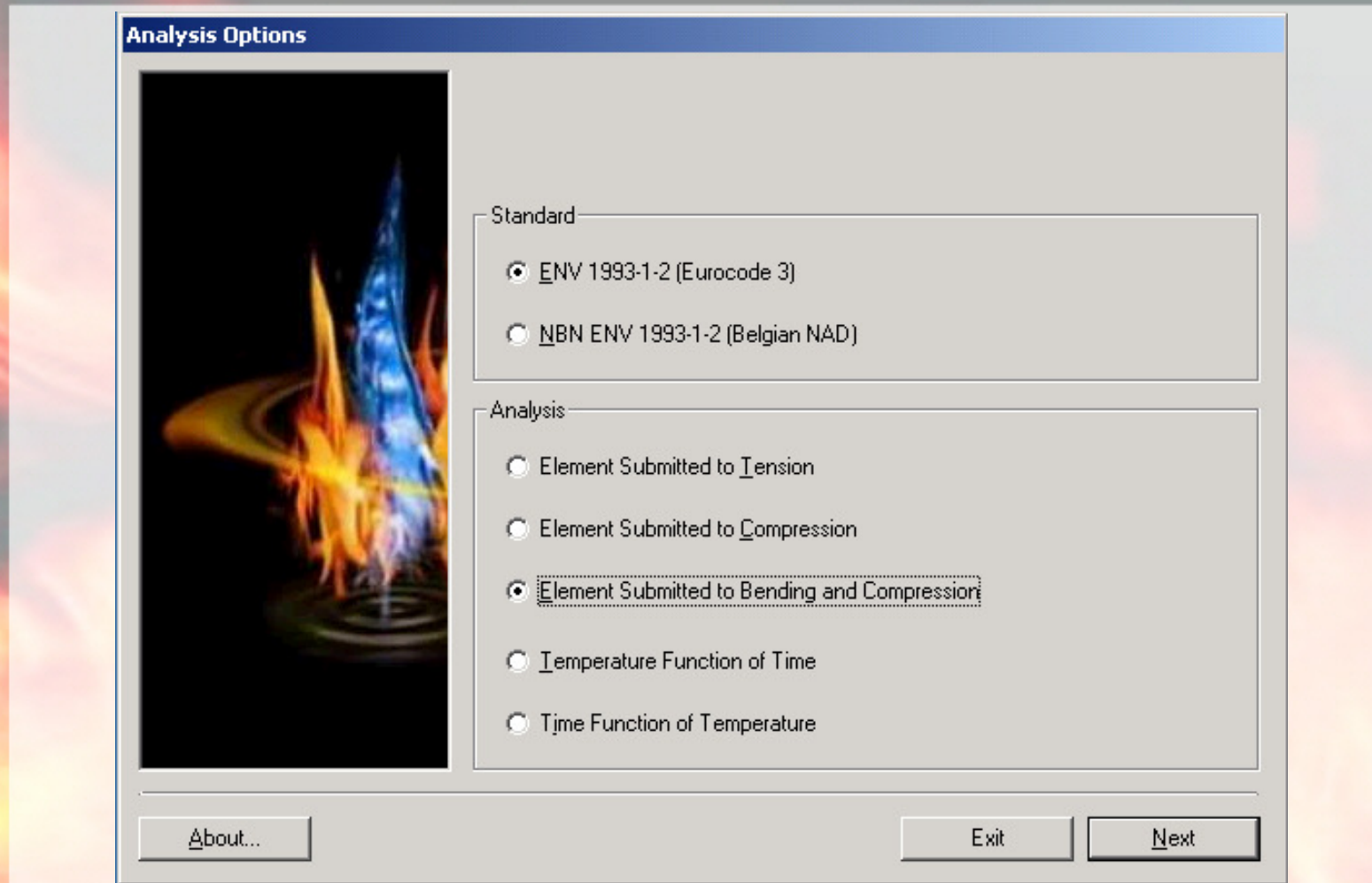
Modeli požarne odpornosti (FRM)

| Postopek računa | | Tabele s podatki | Enostavne računske metode | Napredne metode | |
|-------------------|---------------------------|---|---------------------------|---------------------|----|
| Predpisni pristop | Analiza elementov | Račun mehanskega vpliva in robnih pogojev | Da | Da | Da |
| | Analiza dela konstrukcije | | Ne | Da (če je na voljo) | Da |
| | Globalna analiza | Izbira mehanskega vpliva | Ne | Ne | Da |
| Odzivni pristop | Analiza elementov | Račun mehanskega vpliva in robnih pogojev | Ne | Da (če je na voljo) | Da |
| | Analiza dela konstrukcije | | Ne | Ne | Da |
| | Globalna analiza | Izbira mehanskega vpliva | Ne | Ne | Da |

Poenostavljeni FRM - Elefir

| Splošen opis programske opreme: | | | |
|---------------------------------|--|----------|------------|
| Ime | Elefir | | |
| Verzija | 2.1 | Leto | 1998 |
| Država | Belgija | Jezik | Angleščina |
| Sistem | Windows | Velikost | 8 MB |
| Avtorji | D. Pinteá, L. Mievis, G. Gustin, J. M. Franssen | | |
| Organizacija | University of Liege | | |
| Področje uporabe | Model požarne odpornosti (poenostavljen) | | |
| Dostopnost | Brezplačno – www.ulg.ac.be | | |
| Kontakt | University of Liege - www.ulg.ac.be | | |
| Formulacija | Temelji na ENV 1993-1-2 (EC3) | | |
| Kratek opis | Izračun požarne odpornosti enostavni odprtih prerezov . | | |

Elefir – Glavni meni



Elefir – vhodni podatki

Loads

Select Load: In-plane lateral loads + End Moments

In-plane lateral loads + end moments

M_1 M_2 + M_Q

Distributed Load Concentrated Load

M_Q = kN.m

M_1 (can be > or < 0) = kN.m

M_2 (can be > or < 0) = kN.m

Axial Compression

N = kN

Cancel OK

Vnos sile

Select Fire Exposure

Fire on Four Sides

Fire on Three Sides

Select Section Protection

No Protection

Contour Encasement

Hollow Encasement

Exit Cancel Continue

Požarna zaščita

Elefir - izhodni podatki

Results Elefir

Data

Date : 05/08/2004
Time : 13:30:06

Calculation following ENV 1993-1-2
Time function of temperature

Type of Cross-Section : IPE
Profile : IPE 300
Area of the cross-section : 53,81 cm²
Critical Temperature : 486 °C

Exposed to Fire on 3 faces
Temperature-Time Curve : ISO Curve


Type of Protection : Contour Encasement
==> Section factor A/V = 187.7063 m⁻¹
Type of material : rock/glass wool
Thickness : 10 mm
Specific Heat : 850 J/kg.°K
Thermal Conductivity : 0,04 W/m.°K
Unit Mass : 150 kg/m³

Results

Time/Temperature evolution in the steel section calculated
by ELEFIR using relation 4.22 of ENV 1993-1-2
Time [min.] ; Temperature [°C]

| |
|------------|
| 0 ; 20 |
| 5 ; 43 |
| 10 ; 77 |
| 15 ; 112 |
| 20 ; 147 |
| 25 ; 181 |
| 30 ; 215 |
| 35 ; 247 |
| 40 ; 278 |
| 45 ; 308 |
| 50 ; 337 |
| 55 ; 365 |
| 60 ; 391 |
| 65 ; 416 |
| 70 ; 441 |
| 75 ; 464 |
| 79,9 ; 486 |

Temperature Curve



Modify

Profile IPE 300
Critical time for 468 °C
Configuration exposed on 3 sides, contour encasement
Protection rock/glass wool, thickness: 10 mm

Temperature-time curve

ISO Curve Hydrocarbon Curve
 External Fire Curve ASTM Curve
 Other

The profile reaches 468 °C after 75.86 minutes
Section factor : 187.7 m⁻¹

The temperature of 486 °C is obtained after 75.86 min.

Poenostavljen FRM - Potfire

Splošen opis programske opreme:

| | | | |
|------------------|---|----------|------------|
| Ime | Potfire | | |
| Verzija | 1.11 | Leto | 2001 |
| Država | Francija | Jezik | angleščina |
| Sistem | Windows | Velikost | 15 MB |
| Avtorji | G. Fouquet, G. Tabet, B. Zhao, J. Kruppa | | |
| Organizacija | CTICM, CIDECT, TNO | | |
| Področje uporabe | Model požarne odpornosti (poenostavljen) | | |
| Dostopnost | Prost dostop – www.cidect.org | | |
| Kontakt | CIDECT - www.cidect.org | | |
| Formulacija | Temelji na ENV 1994-1-2 Annex G | | |
| Kratek opis | Požarna odpornost votlih zapolnjenih prečnih prerezov stebrov. | | |

PotFire

Potfire

Section

Type of section: Circular

Dimensions of steel section

Diameter: 323.9 mm

Wall thickness: 6 mm

Material characteristics

Yield strength of steel section: 355 N/mm²

Yield strength of re-bars: 500 N/mm²

Compressive strength of concrete (cylinder at 28 days): 30 N/mm²

Reinforcement bars

By nr of bars By %

Re-bars : # 8 12 mrr

Concrete covering from rebar axis: 20 mrr

Equal to: 1184191 %

Buckling length

Buckling length: 3.0 m

Eccentricity of the load

Eccentricity | to buckling axis: 0 mm

Calculation of

Ultimate load Fire resistance duration

Fire duration: 60 min

Result

Non-dimensional slenderness: 4140.0000

Ultimate load: 1582 kN

1°

2°

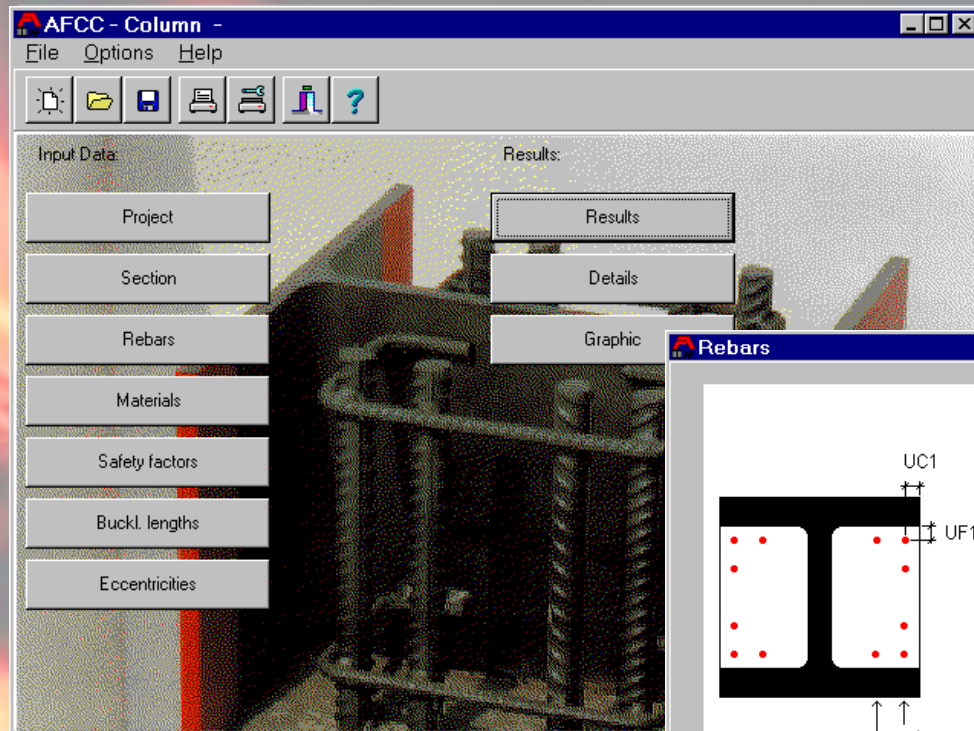
3°

4°

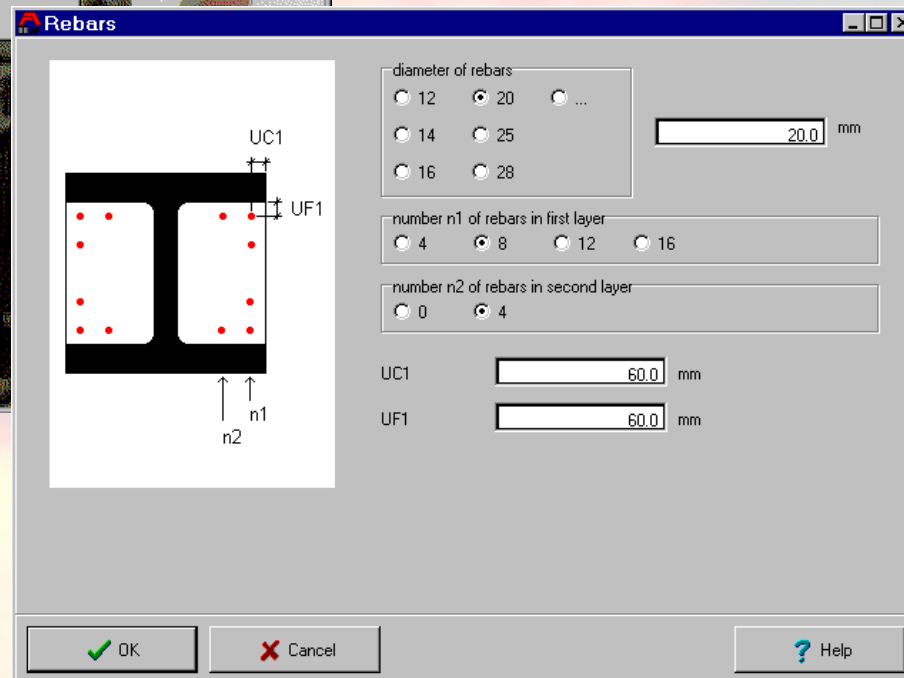
Poenostavljen FRM - AFCC

| Splošen opis programske opreme: | | | |
|---------------------------------|---|----------|------------|
| Ime | AFCC | | |
| Verzija | 3.06 | Leto | 2004 |
| Država | Luxembourg | Jezik | angleščina |
| Sistem | Windows | Velikost | 2.5 MB |
| Avtorji | H. Colbach | | |
| Organizacija | Arcelor LCS Research Centre | | |
| Področje uporabe | Model požarne odpornosti (poenostavljen) | | |
| Dostopnost | Prosto – www.sections.arcelor.com | | |
| Kontakt | Arcelor ASC: asc.tecom@arcelor.com | | |
| Formulacija | Temelji na ENV 1994-1-2 | | |
| Kratek opis | Požarna odpornost sovprežnih stebrov | | |

Vhodni podatki



Panel control.



Reinforced steel

Izhodni podatki

Results

Write report

Results

Ultimate loads [kN]

| | axial | axial | eccentrically | eccentrically | eccentrically |
|--------------|-----------|-------------|---------------|---------------|---------------|
| | weak axis | strong axis | weak axis | strong axis | biaxial |
| eccent. [mm] | | | 0.00 | 0.00 | |
| Service | 6403 | 7256 | 6403 | 7256 | 6403 |
| R 30 | 5352 | 5708 | 5352 | 5708 | 5352 |
| R 60 | 4005 | 4311 | 4005 | 4311 | 4005 |
| R 90 | 3019 | 3277 | 3019 | 3277 | 3019 |
| R 120 | 1872 | 2059 | 1872 | 2059 | 1872 |

Warnings

Number or diameter of the re-bars too high for design at room temperature. Percentage of the reinforcement = 4.16 %
0.3 % < allowed percentage < 4 % (ENV 1994-1-1, 4.8.3.1 and 4.8.2.5)
4 % assumed for the calculation at room temperature
Reduced diameter of re-bars for calculation at room-temperature = 19.62 mm

OK Help

Drawing detail

Details

Project

Project-Name: DIFISEK
Project-Number: Example
Position-Name: AFCC - Example
Position-Number: 001
User: DIFISEK
Comment: Example of use
created: 5/8/04
modified last: 5/8/04

Warnings

Number or diameter of the re-bars too high for design at room temperature. Percentage of the reinforcement = 4.16 %
0.3 % < allowed percentage < 4 % (ENV 1994-1-1, 4.8.3.1 and 4.8.2.5)
4 % assumed for the calculation at room temperature
Reduced diameter of re-bars for calculation at room-temperature = 19.62 mm

Input values:

Steel-Profile: HE 360 A
h: 350 mm

OK Help

Graphic

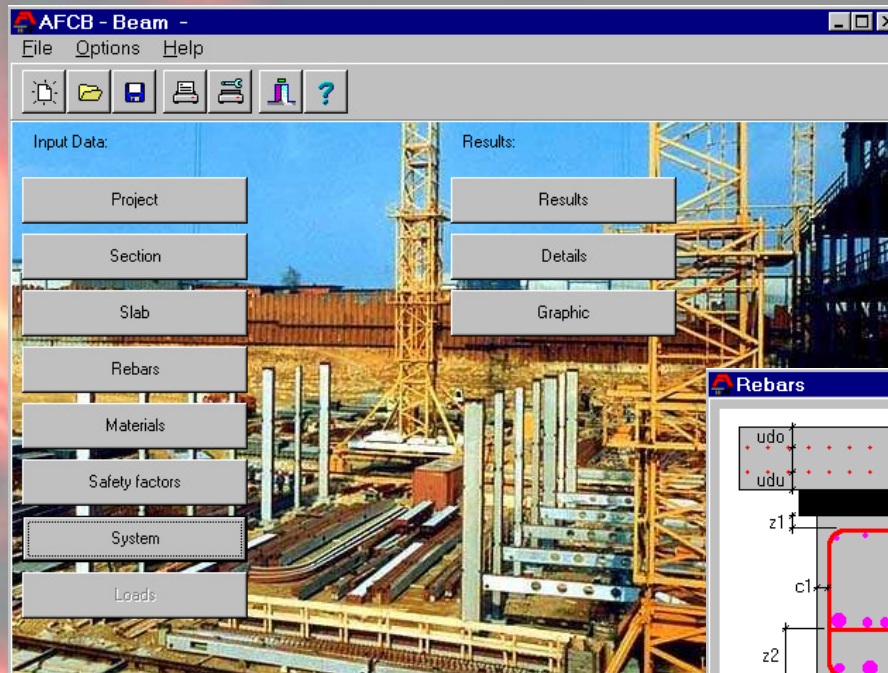
Steel-Profile: HE 360 A
Rebars: 12 x d = 20 mm

OK ?

Simplified FRM - AFCB

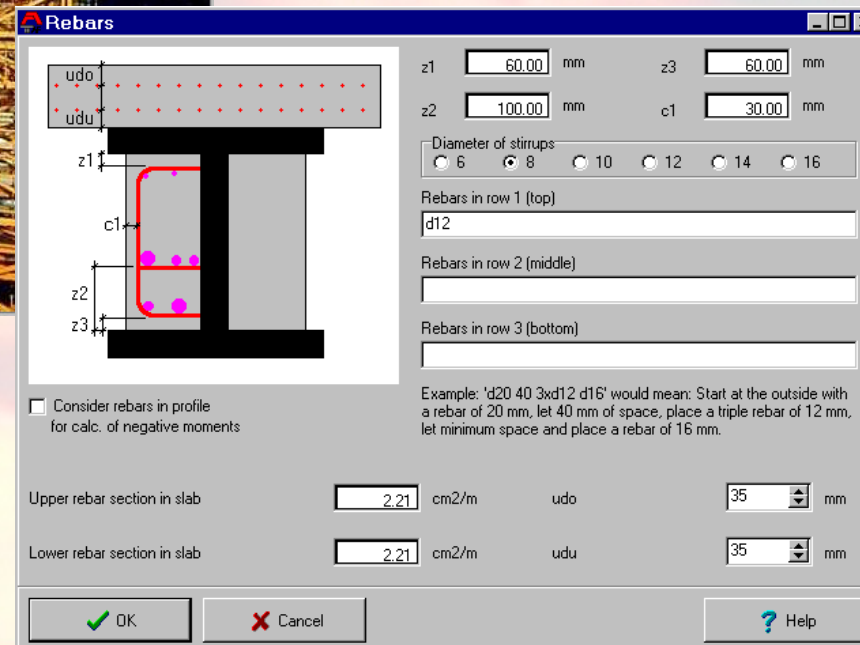
| Splošen opis programske opreme: | | | |
|---------------------------------|---|----------|------------|
| Ime | AFCB | | |
| Verzija | 3.07 | Leto | 2004 |
| Država | Luxembourg | Jezik | angleščina |
| Sistem | Windows | Velikost | 3 MB |
| Avtorji | H. Colbach | | |
| Organizacija | Arcelor LCS Research Centre | | |
| Področje uporabe | Model požarne odpornosti (poenostavljen) | | |
| Dostopnost | Free – www.sections.arcelor.com | | |
| Kontakt | Arcelor ASC: asc.tecom@arcelor.com | | |
| Formulacija | Temelji na ENV 1994-1-2 | | |
| Kratek opis | Požarna odpornost sovprežnih nosilcev | | |

AFCB – vhodni podatki



Panel control.

Reinforced steel



AFCB – izhodni podatki

Results

Write report

Results

Ultimate plastic moments and shear forces

| | Ultimate positive | Ultimate negative | Ultimate Shear |
|------|-------------------|-------------------|-------------------|
| | Moments M+ [kNm] | Moments M- [kNm] | Forces T.ult [kN] |
| cold | 1748.31 | 858.47 | 1221.19 |
| R60 | 1376.58 | 518.56 | 1211.41 |

Calculation of fire resistance class under given load
Calculation type: Calculation of section resistance

Warnings

OK Help

Details

Project

Project-Name: DIFISEK
Project-Number: Example
Position-Name: 001
Position-Number: 001
User: DIFISEK
Comment: Example of use
created: 5/8/04
modified last: 5/8/04

Input values:

Steel-Profile: IPE 600

h: 600 mm
b: 220 mm
t.w: 12 mm
t.f: 19 mm
r: 24 mm
b*: 220 mm

Concrete slab : Cast in place slab
Orientation of joints or ribs : perpendicular to beam-axis

OK Help

Graphic

Steel-Profile: IPE 600
Cast in place slab
Orientation of joints or ribs : perpendicular to beam-axis

OK Section Hogging-cold Sagging-cold
Moments Hogging-fire Sagging-fire Help

Drawing detail

Napredne metode izračuna

Napredne metode izračuna vsebujejo 3 faze:

Predprocesiranje

Definicija modela konstrukcije (končni elementi)

Definicija materialov (linearni, nelinearni)

Definicija mehanskih in termičnih vplivov ter robnih pogojev..



Procesiranje – faza izračunov



Postprocesiranje – izhodni podatki

Napredni FRM - Safir

| Splošen opis programske opreme: | | | |
|---------------------------------|--|----------|------------|
| Ime | Safir | | |
| Verzija | 9.8 | Leto | 2007 |
| Država | Belgium | Jezik | angleščina |
| Sistem | Fortran/Visual Basic | Velikost | ---- |
| Avtorji | J. M. Franssen | | |
| Organizacija | University of Liege | | |
| Področje uporabe | Model požarne odpornosti (napreden) | | |
| Dostopnost | Komerzialni paket | | |
| Kontakt | JM.Franssen@ulg.ac.be | | |
| Formulacija | Metoda končnih elementov | | |
| Kratek opis | Odziv konstrukcij med požarom. | | |

Napredni FRM - Ansys

| Splošen opis programske opreme: | | | |
|---------------------------------|--|----------|------------|
| Ime | Ansys | | |
| Verzija | 10 | Leto | 2008 |
| Država | U.S.A | Jezik | angleščina |
| Sistem | ----- | Velikost | ---- |
| Avtorji | ----- | | |
| Organizacija | ANSYS Inc. | | |
| Področje uporabe | Model požarne odpornosti (napreden) | | |
| Dostopnost | Komerzialni paket | | |
| Kontakt | Ansys – www.ansys.com | | |
| Formulacija | Metoda končnih elementov | | |
| Kratek opis | Splošna uporaba | | |

Napredni FRM - Abaqus

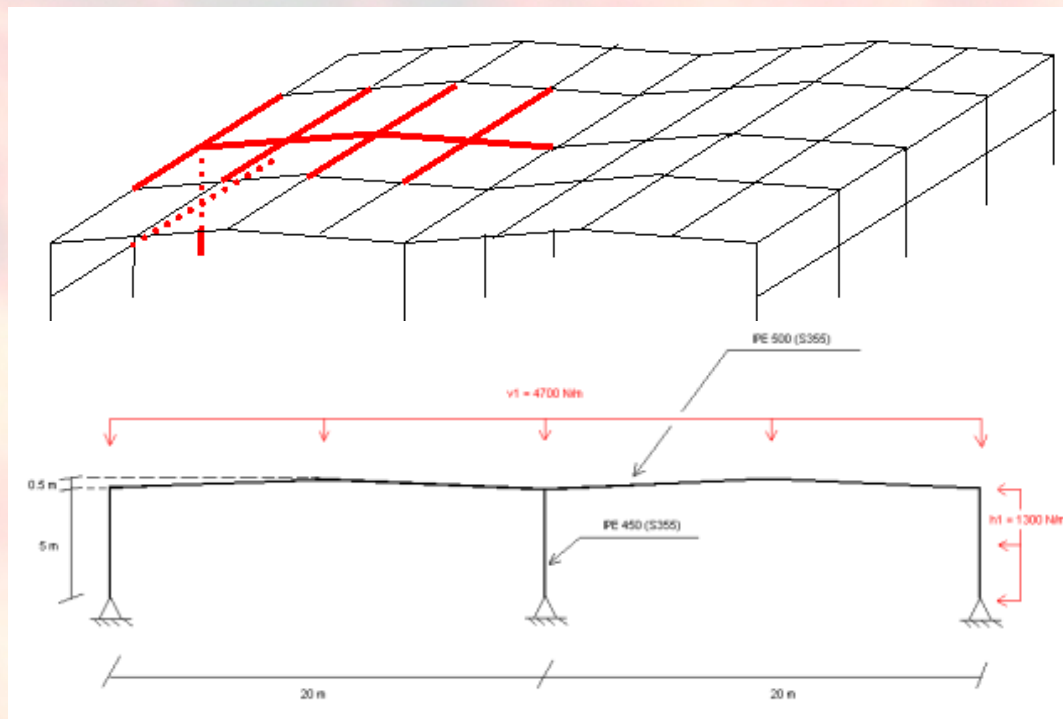
| Splošen opis programske opreme: | | | |
|---------------------------------|---|----------|------------|
| Ime | Abaqus | | |
| Verzija | 6.7 | Leto | 2008 |
| Država | U.S.A | Jezik | angleščina |
| Sistem | MS-DOS | Velikost | ---- |
| Avtorji | Hibbitt, Krlsson and Sorensen | | |
| Organizacija | ABAQUS Inc. | | |
| Področje uporabe | Model požarne odpornosti (napreden) | | |
| Dostopnost | Komerzialni paket | | |
| Kontakt | Abaqus – www.abaqus.com | | |
| Formulacija | Metoda končnih elementov | | |
| Kratek opis | Splošna uporaba | | |

SAFIR/ANSYS/ABAQUS - Primer

Scenarij požara: požar v industrijski hali

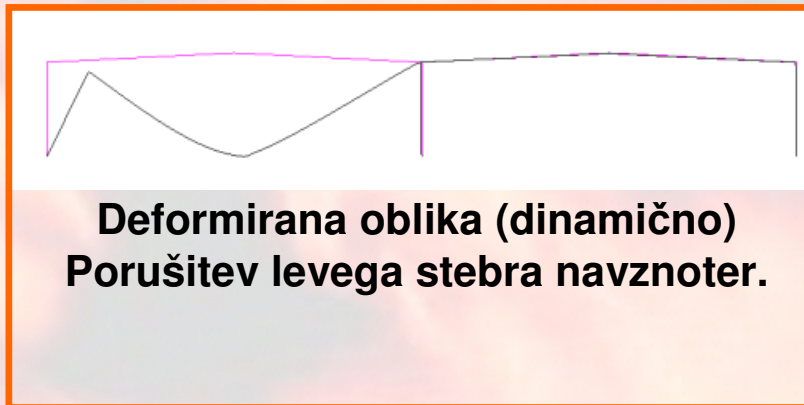
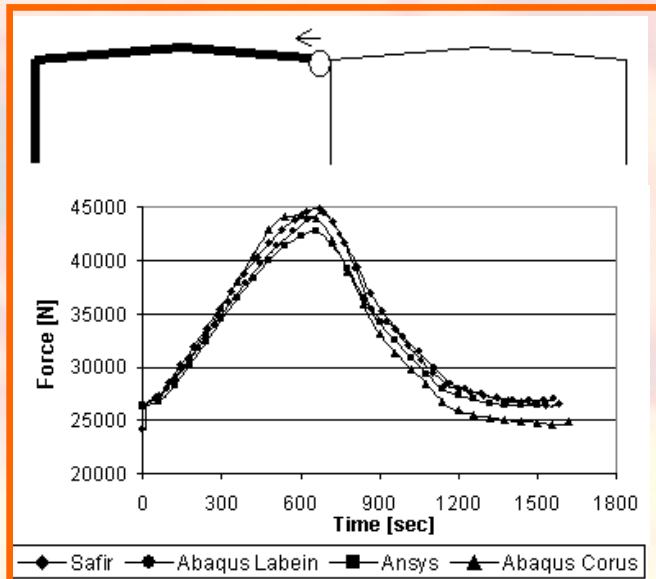
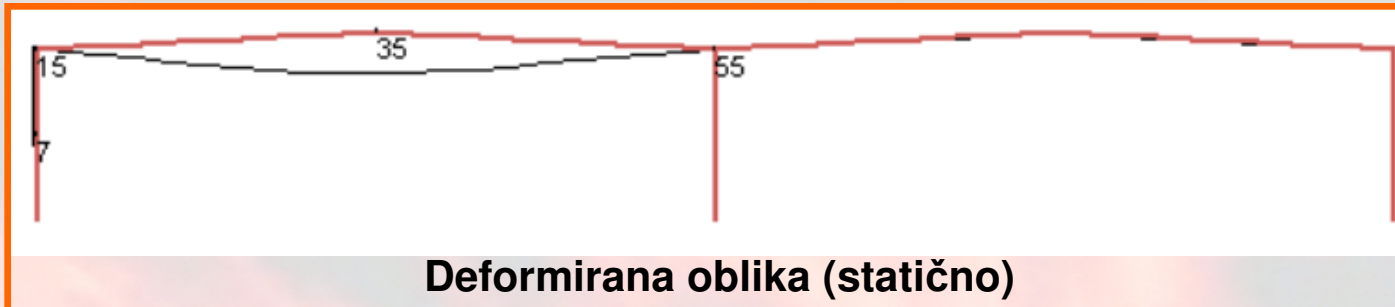
Projektni požar: ISO krivulja

Namen: Določitev požarne odpornosti celotne konstrukcije in vpliv prizadetega dela na celotno konstrukcijo.



SAFIR/ANSYS/ABAQUS - Primer

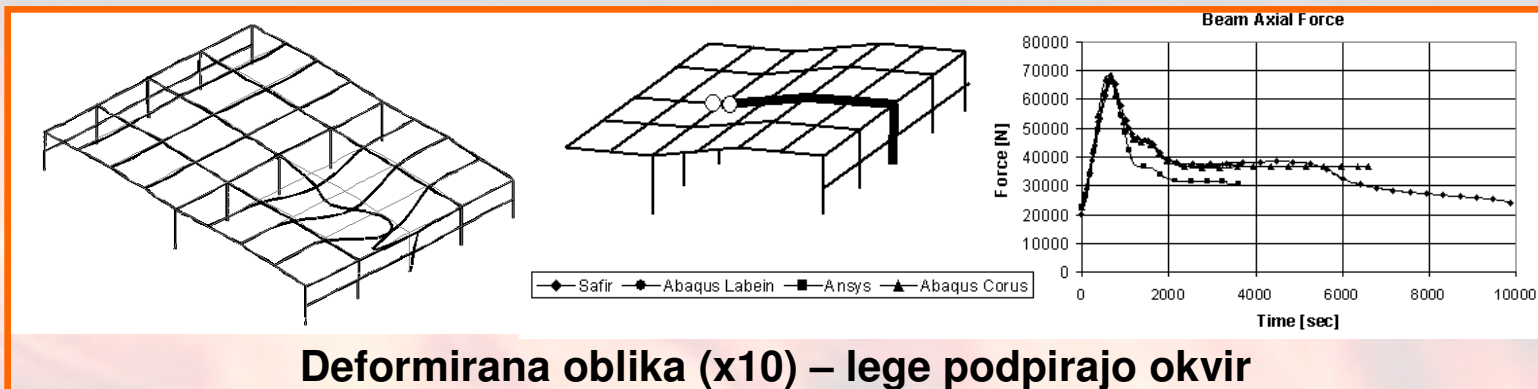
2D



Osna sila – Vpliv ni večji kot vpliv
vetra v mejnem stanju uporabnosti

SAFIR/ANSYS/ABAQUS - Primer

3D – z več kot enim okvirom, brez vročih leg

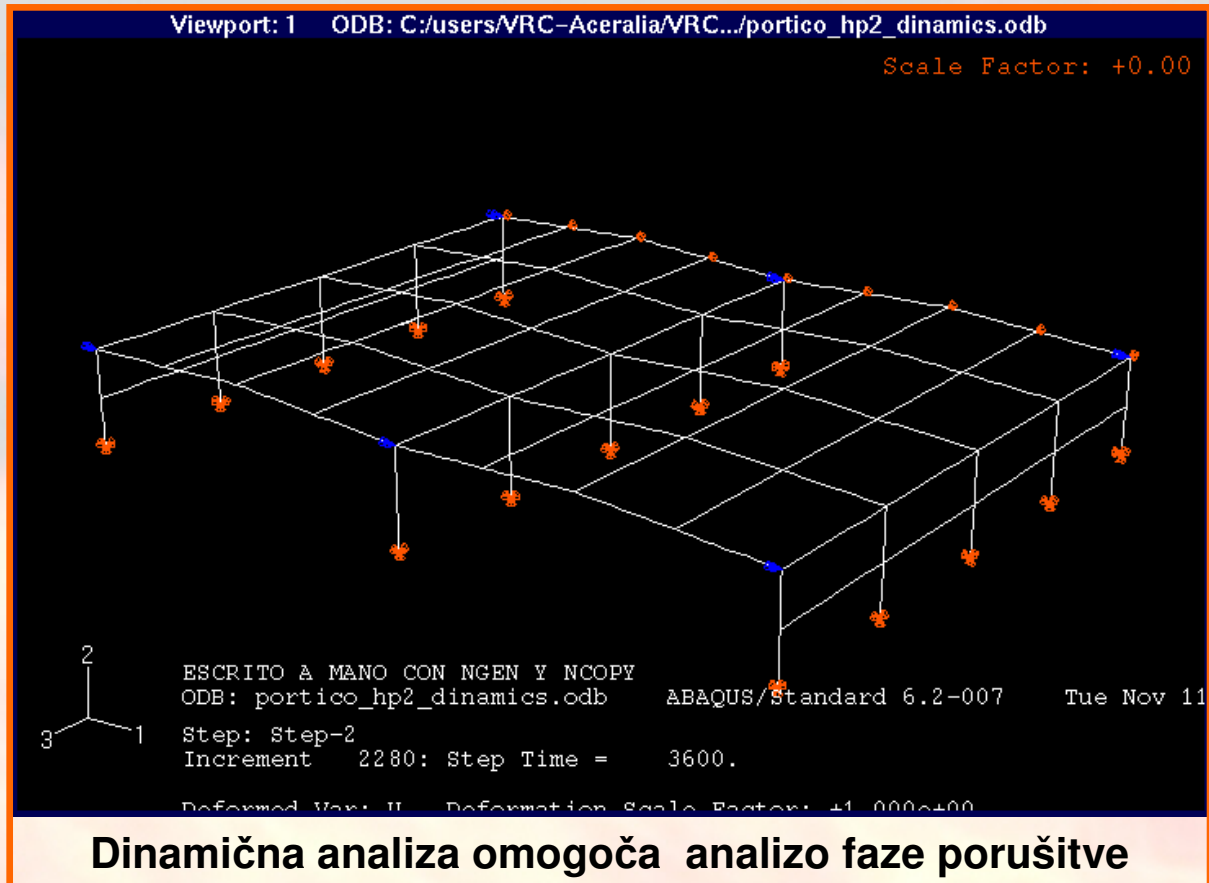


3D – z več kot enim okvirom in z vročimi legami



SAFIR/ANSYS/ABAQUS - Primer

3D - z več kot enim okvirom in z vročimi legami (dinamično)



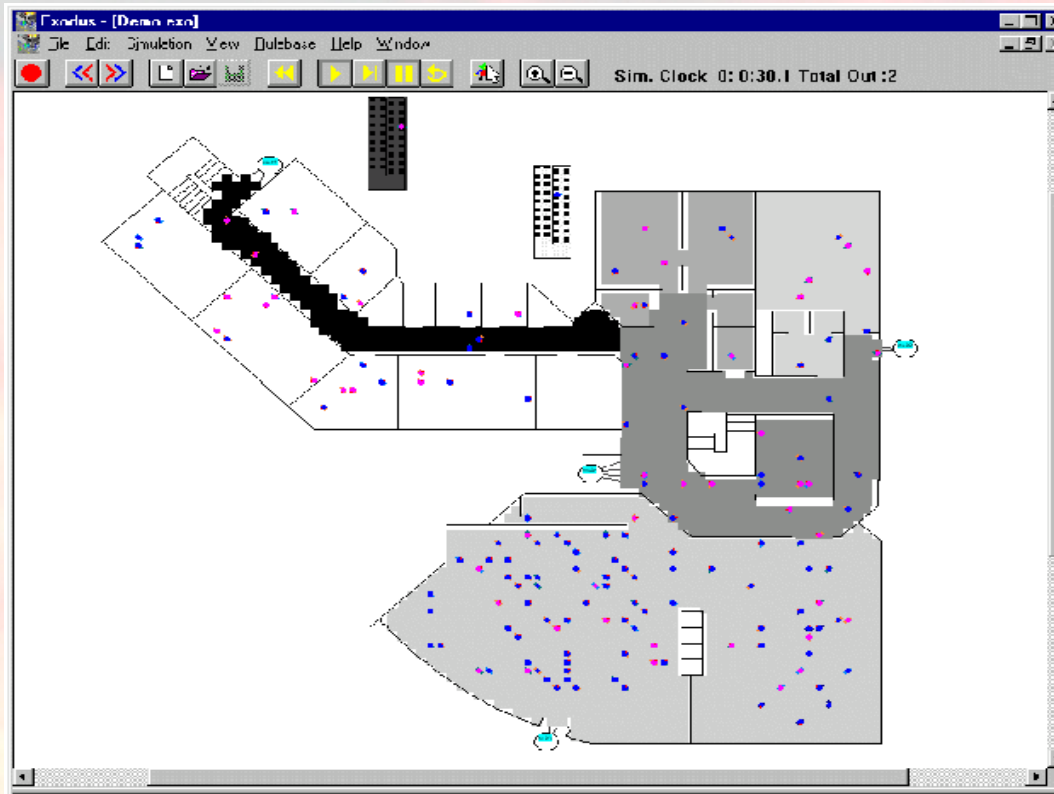
Modeli evakuacije in odziva detektorjev

Model evakuacije - Exodus

| Splošen opis programske opreme: | | | |
|---------------------------------|--|----------|------------|
| Ime | Exodus | | |
| Verzija | 4.0 | Leto | 2004 |
| Država | England | Jezik | angleščina |
| Sistem | Windows | Velikost | ----- |
| Avtorji | E. Galea, St. Gwyne, S. Blake, L. Filippidis | | |
| Organizacija | University of Greenwich | | |
| Področje uporabe | Model evakuacije | | |
| Dostopnost | Komerčni paket – www.fseg.gre.ac.uk | | |
| Kontakt | E.R.Galea@greenwich.ac.uk | | |
| Formulacija | ----- | | |
| Kratek opis | Model evakuacije, ki temelji na obnašanju ljudi | | |

Model evakuacije - EXODUS

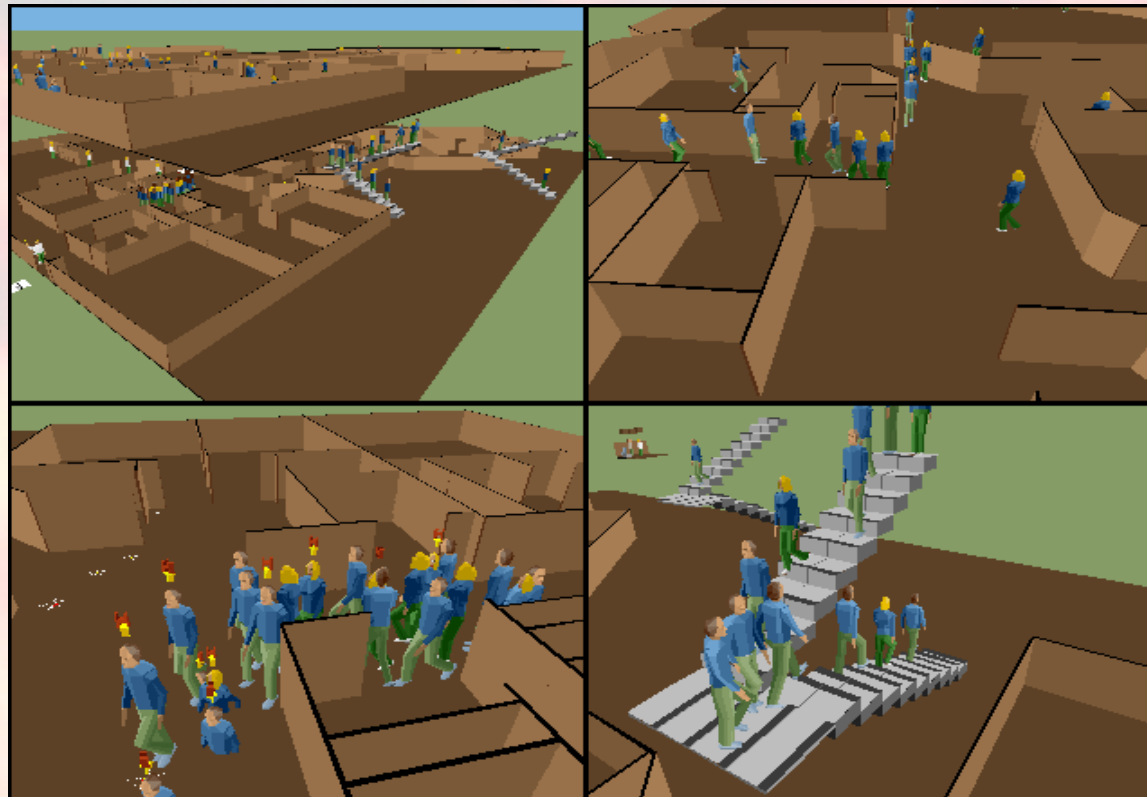
Simulacija uporabniku omogoča oceno nivoja varnosti med evakuacijo.



Model evakuacije - EXODUS

Rezultati:

Simulacijo je mogoče predstaviti z orodjem za grafični prikaz VR-EXODUS.



Model odziva detektorjev - Jet

| Splošen opis programske opreme: | | | |
|---------------------------------|---|----------|------------|
| Ime | Jet | | |
| Verzija | 1.0 | Leto | 1999 |
| Država | U.S.A | Jezik | angleščina |
| Sistem | Windows | Velikost | 4 MB |
| Avtorji | W. D. Davids | | |
| Organizacija | NIST (National Institute of Standards and Technology) | | |
| Področje uporabe | Model odziva detektorjev | | |
| Dostopnost | Free – www.fire.nist.gov | | |
| Kontakt | NIST - www.fire.nist.gov | | |
| Formulacija | Conski model, ki temelji na kodi LAVENT. Algoritem za središčno temperturno. Algoritem za sprinkler system v odvisnosti od globine plasti dima. | | |
| Kratek opis | Odziv sistema sprinklerjev – čas do aktivacije. | | |

Jet – glavni meni

jet

vents fire links

Open File Unit Convert Save File Run Jet End

JET

Sprinkler Links

Room Geometry (m)

| | |
|--------------------|-------|
| Room Length (m) | 11,52 |
| Room Width (m) | 9,35 |
| Ceiling Height (m) | 5,12 |
| Curtain Length (m) | 1,50 |
| Curtain Height (m) | 2,00 |

Ceiling Properties

| | |
|-----------------------|----------|
| INSULATED METAL DECK | |
| Th. Cond. (W/(m °C)) | 1,50E-01 |
| Ht. Cap. (J/kg °C) | 1,16E+03 |
| Density (kg/cu m) | 1,05E+03 |
| Ceiling Thickness (m) | 0,10 |

Link # Rad. Dist. (m) RTI sqrt(m s) Fuse Temp (°C) Below Ceiling C-factor sqrt(m/s)

| | | | | | |
|---|------|--------|-------|------|------|
| 1 | 1,75 | 350,00 | 79,00 | 0,62 | 1,00 |
| 2 | 1,75 | 350,00 | 79,00 | 0,62 | 1,00 |
| 3 | 3,20 | 350,00 | 79,00 | 0,62 | 1,00 |
| 4 | 3,0 | 350,00 | 79,00 | 0,62 | 1,00 |

Vent Properties

| | | |
|--------|------------------|--------|
| Vent # | Vent Area (sq m) | Link # |
| | | |
| | | |

Forced Ventillation

| | | |
|-----------------|---------|--------|
| Air Flow (m3/s) | Temp °C | Time s |
| 0,00 | 20,00 | 20,00 |

Program Times (s)

| | |
|-------------|--------|
| Output Time | 25,00 |
| End Time | 300,00 |

Solver Inputs

| | |
|----------------------|----------|
| CS Under Relax | 0,65 |
| DDRIVE Tol | 1,00E-06 |
| SOLVER Type | 1 |
| Flux Update Int. (s) | 2,00 |
| Smallest Value | 1,00E-06 |
| # Ceiling Seg. | 6 |

Fire Properties

| | |
|-------------------|--------|
| Ambient Temp (°C) | 20,00 |
| Fire Height (m) | 1,00 |
| Fire Diameter (m) | 255,00 |

Fire Input

| | | | |
|--------|----------|----------|-------------------|
| Seg. # | Time (s) | HRR (kW) | Rad. Frac. (<1.0) |
| 1 | 0,00 | 0,00 | 0,33 |
| 2 | 30,00 | 100,00 | 0,33 |
| 3 | 60,00 | 400,00 | 0,33 |
| 4 | 120,00 | 640,00 | 0,33 |
| 5 | 180,00 | 1.440,00 | 0,33 |
| 6 | 300,00 | 4.000,00 | 0,33 |

HRR/Area for selected fuels

Sektor

Lastnosti sprinkler sistema

Prezračevalni jaški

Projektni požar

Parametri