

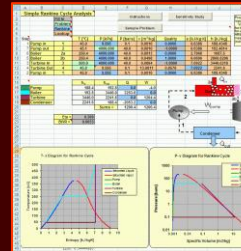
Strukovni inženjer mašinstva

Specijalista strukovni inženjer mašinstva

Modul:

Termotehnika

**Kako do posla!**



[http://www.faculty.virginia.edu/ribando/modules/xls/The rmodynamics/index\\_files/image008.gif](http://www.faculty.virginia.edu/ribando/modules/xls/The%20rmodynamics/index_files/image008.gif)

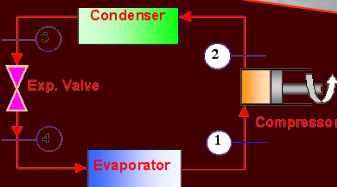


[http://img.archiexpo.com/images\\_ae/photo-g/gas-boiler-floor-mounted-condensing-829-3961707.jpg](http://img.archiexpo.com/images_ae/photo-g/gas-boiler-floor-mounted-condensing-829-3961707.jpg)

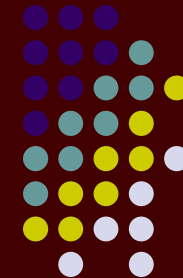


[http://www.bosch-industrial.com/images/2012/05/101124481\\_Komponenten\\_Teaser.jpg](http://www.bosch-industrial.com/images/2012/05/101124481_Komponenten_Teaser.jpg)

Mr Milovan Milivojević dipl. inž.



<http://mv-sirius.fh-offenburg.de/m+v/thermo/testcenter/Test/problems/chapter10/RevRankine.gif>

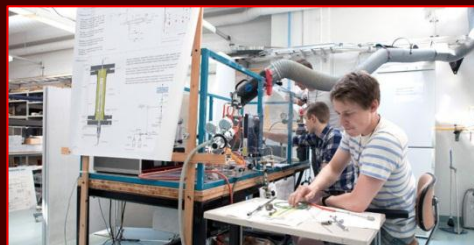


## Šta smo učili !

### elemente:

- matematike
- fizike
- socioloških nauka
- stranih jezika u domenu mašinske struke
- organizacije proizvodnje
- tehničkog crtanja i nacrtne geometrije
- poznavanja klasičnih i novih mašinskih materijala
- mehanike i otpornosti materijala
- elektrotehnike
- informatike, aplikativnih software-a, matematičkog modeliranja i optimizacije
- CAD-a (2D i 3D)
- mašinskih elemenata i konstruisanja
- termodinamike i toplotnih aparata
- pumpi, kompresora i ventilatora
- termoenergetskih postrojenja
- grejanja i klimatizacije
- energetske efikasnosti
- gasnih instalacija
- računarskog upravljanja i znanja o PLC jedinicama,
- upravljanja kvalitetom proizvoda
- zaštite na radu
- programiranja i Internet tehnologija
- projektovanja proizvodnih informacionih sistema (CASE alata) i relacionih baza podataka
- upravljanja projektima
- metoda istraživačkog rada podržanog informacionim tehnologijama
- obnovljivih izvora energije
- dinamike energetske postrojenja
- sušara
- sistema, grejanja, hlađenja i ventilacije ...

## Šta i koliko znamo ?



[http://energytech.aalto.fi/en/midcom-serveattachmentuid-1e31c629db7e7dc1c6211e383a62bbdf531ece9ece9/the\\_rmodynamics\\_700x350.jpg](http://energytech.aalto.fi/en/midcom-serveattachmentuid-1e31c629db7e7dc1c6211e383a62bbdf531ece9ece9/the_rmodynamics_700x350.jpg)



Ocenimo sebe i svoja znanja i veštine ... u domenu proizvodnih tehnologija ... objektivno, pošteno, realno ...

Koristimo SMART indikatore !

## Čemu treba da težimo !!!



stalnom usavršavanju sopstvenih stručnih znanja i veština iz domena proizvodnog mašinstva



tehničkoj efektivnosti



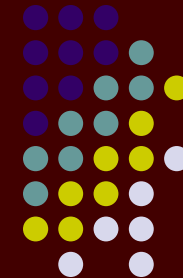
timskom radu



plasmanu znanja i umeća u oblasti proizvodnog mašinstva kroz realni rad i posao u industriji



postizanju poslovne izvrsnosti



Gde može raditi strukovni inženjer termotehnike sa VPTŠ Užice?

Gde može raditi specijalista strukovni inženjer termotehnike sa VPTŠ Užice?

- ❖ Toplanama i JKP za obezbeđenje i distribuciju toplotne energije
- ❖ Firmama, ustanovama i biroima za projektovanje grejanja, klimatizacije i ventilacije
- ❖ Firmama i sektorima koji se bave parnim kotlovima, pumpama i kompresorima
- ❖ Firmama koje se bave projektovanjem energetskih postrojenja
- ❖ Firmama koje se bave projektovanjem sušara i hladnjača
- ❖ Firmama koje se bave održavanjem sušara i hladnjača i drugih termoenergetskih postrojenja
- ❖ Firmama koje se bave izmenjivačima toplote
- ❖ Biroima koji se bave energetskom efikasnošću, zelenom energijom, i obnovljivim izvorima energije
- ❖ ....

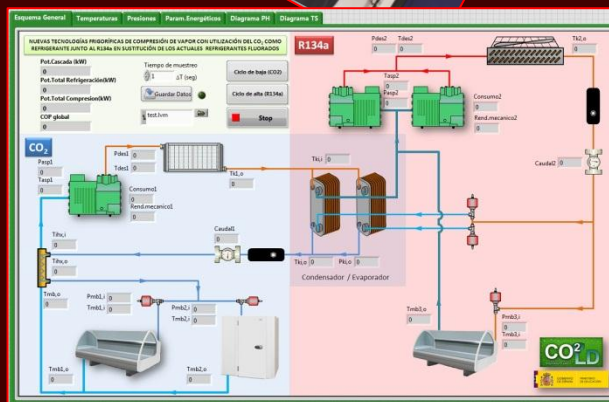


[http://irms-nis.co.rs/assets/7/equipment-for-thermotechnics-and-thermoenergetics1.jpg\\_large.jpg](http://irms-nis.co.rs/assets/7/equipment-for-thermotechnics-and-thermoenergetics1.jpg_large.jpg)

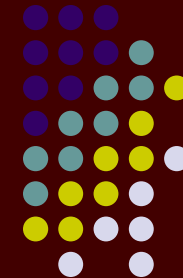
[http://skheatingandcooling.co.uk/admin/templates/sk/images/SK\\_Engineer.jpg](http://skheatingandcooling.co.uk/admin/templates/sk/images/SK_Engineer.jpg)

**Kakav je posao?**  
(pod uslovom da ga znate, da se trudite, da ga volite, da mu se predajete...)

- prestižan
- dostojanstven
- tehnički superioran
- cenjen
- povlašćen
- dobro plaćen
- zahtevan
- lizazovan
- ...



<http://www.iotse.org/index.php/otse/article/viewFile/82/102/546>



Deo opreme sa kojom možete raditi, koju možete projektovati...  
 .....  
 kojom možete upravljati ...



<http://www.graduzice.org/userfiles/images/toplana.jpg>



[http://img.archiexpo.com/images\\_ae/photo-g/gas-boiler-floor-mounted-condensing-829-3961695.jpg](http://img.archiexpo.com/images_ae/photo-g/gas-boiler-floor-mounted-condensing-829-3961695.jpg)



<http://www.edibon.com/products/img/systems/en/9/9AD3.jpg>



<http://www.bosch-presse.de/presseforum/pressdownload/image/1-TT-19891.jpg?file=1-TT-19891.jpg&id=9035.7>

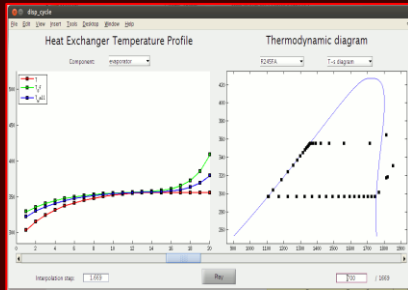
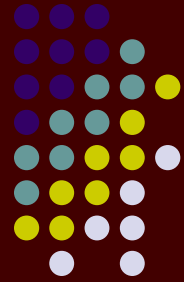


[http://img.directindustry.com/images\\_dj/photo-m2/centrifugal-pump-self-priming-magnetic-drive-single-stage-24684-6674655.jpg](http://img.directindustry.com/images_dj/photo-m2/centrifugal-pump-self-priming-magnetic-drive-single-stage-24684-6674655.jpg)

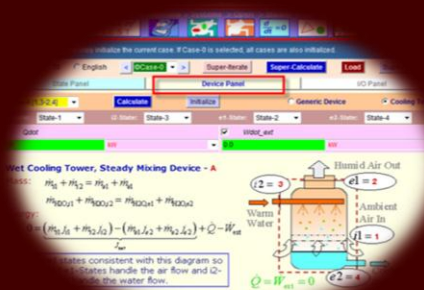




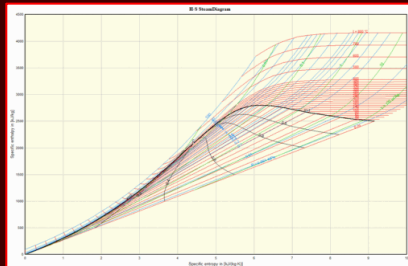
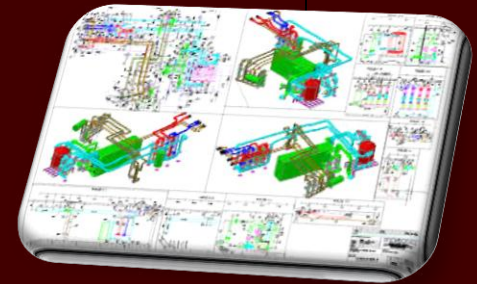
Šta možete projektovati, proračunavati, testirati ... !  
 .....  
 Čime možete upravljati ... ?



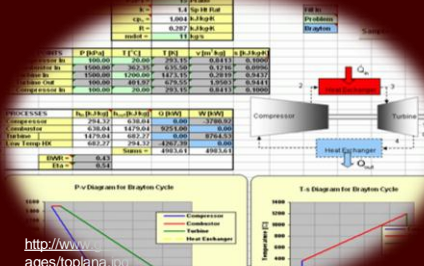
[http://thermicycle.net/wp-content/uploads/2013/07/matlab\\_display.gif](http://thermicycle.net/wp-content/uploads/2013/07/matlab_display.gif)



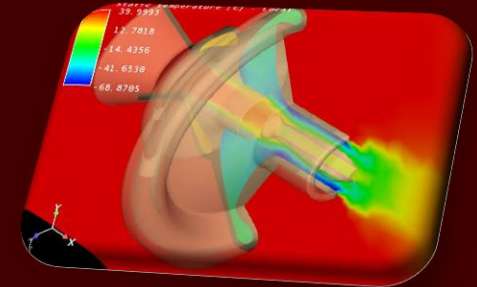
<http://entropy.sdsu.edu/testhome/Tests/intro/introimages/daemonrias/hvacdaemon.png>



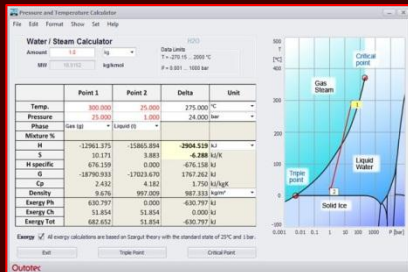
<http://www.megaawatsoft.com/images/h-s%20diagram.png>



<http://www.ages.to.plana.pl>

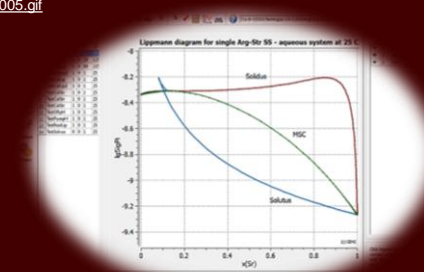


<http://peswiki.com/images/6/64/Image-Image-PlaneCuts7.jpg>

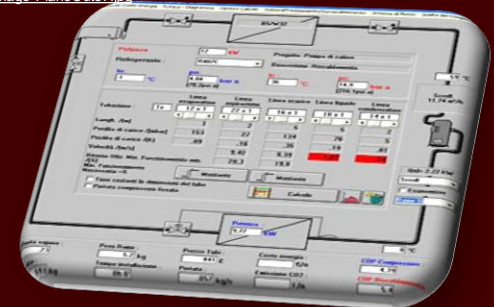


[http://www.hsc-chemistry.net/images/Water\\_1.jpg](http://www.hsc-chemistry.net/images/Water_1.jpg)

[http://www.faculty.virginia.edu/ribando/modules/xis/Thermodynamics/index\\_files/image005.gif](http://www.faculty.virginia.edu/ribando/modules/xis/Thermodynamics/index_files/image005.gif)

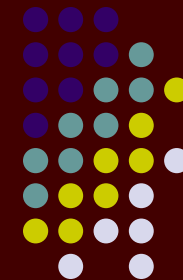


<http://gems.web.psi.ch/images/GEMS3-MDI-screenshot-1.png>

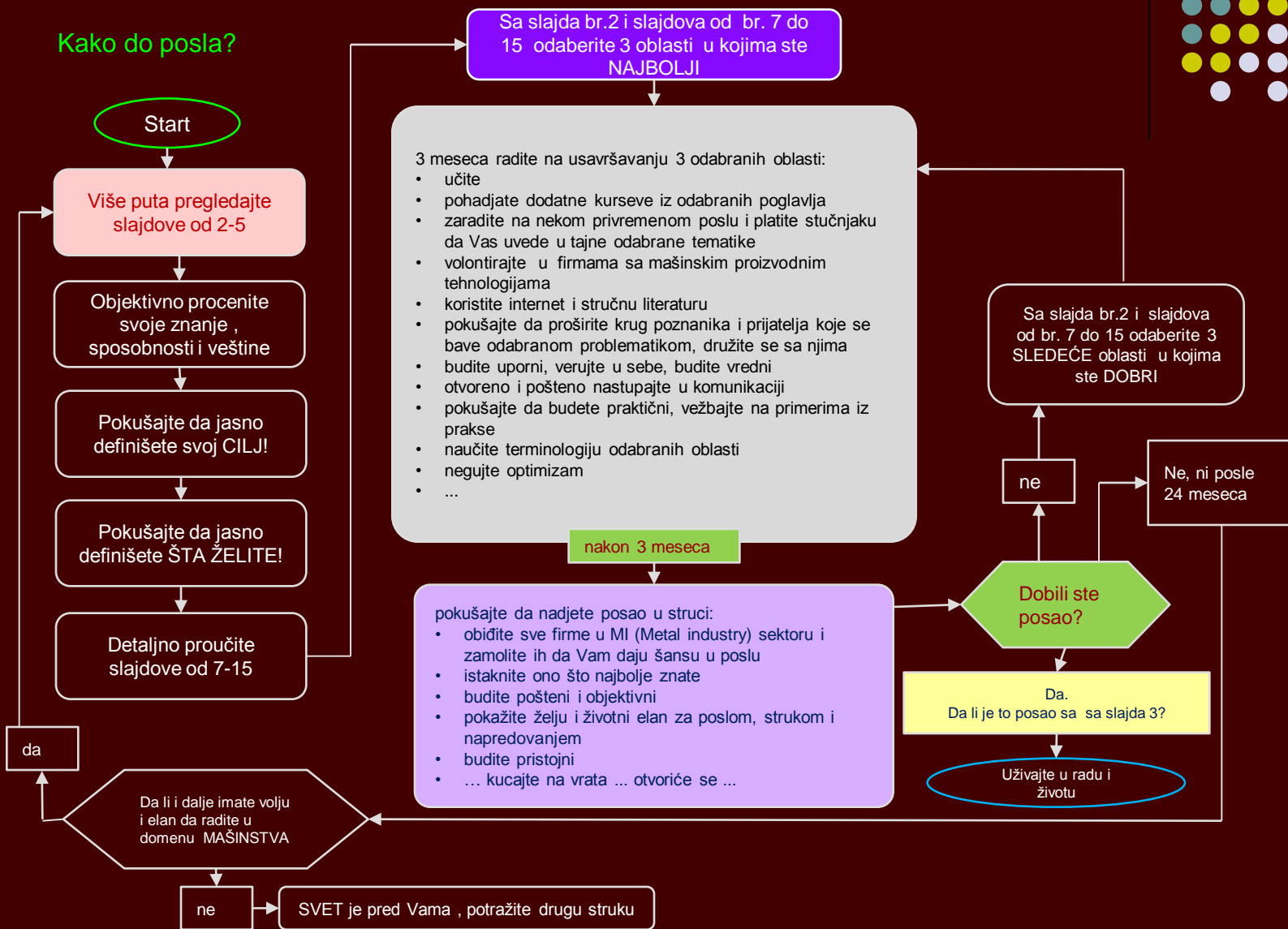


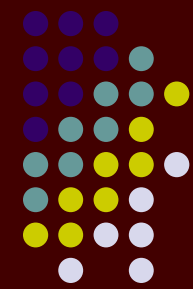
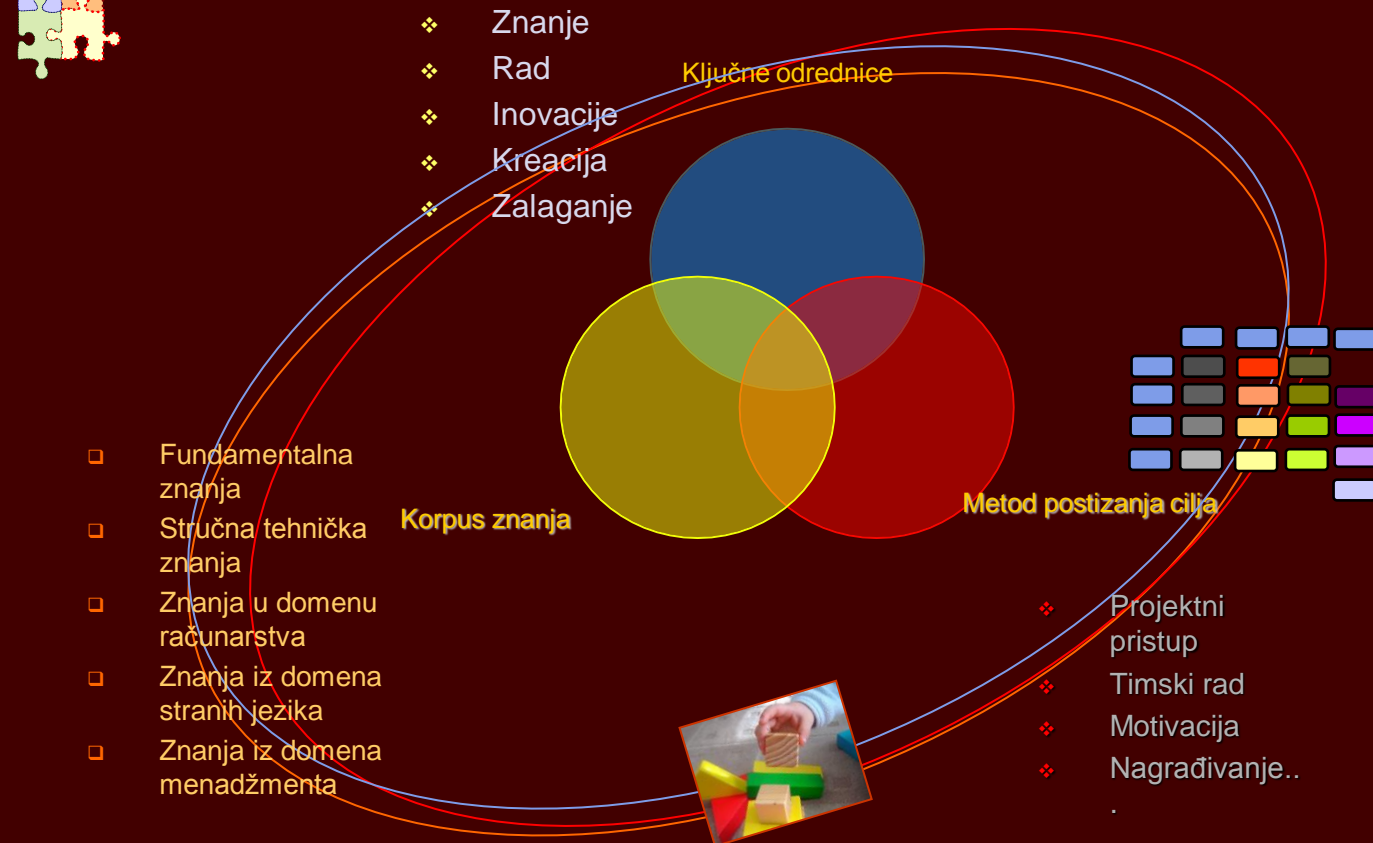
<http://www.edilio.it/media/edilio/prodotti/img/secos/POMPEDICALO RE2.jpg>

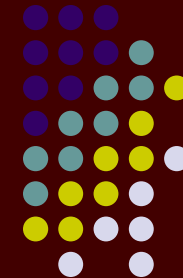




Kako do posla?



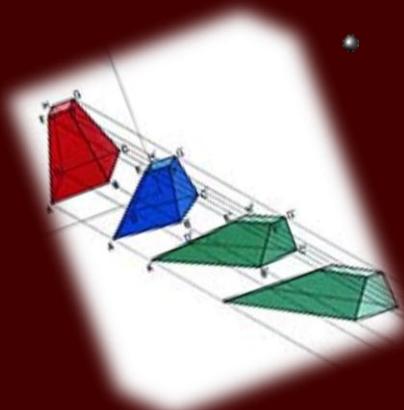




## Fundamentalna znanja

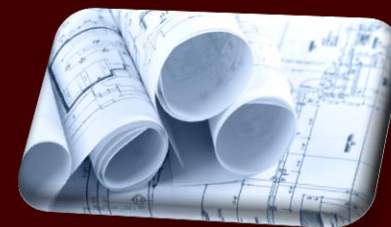
### Nacrtna geometrija

- Tačke, Ravni, Prave
- Prodori prave kroz ravan
- Obaranje Ravni
- Aksonometrijski prikazi
- Prikaz osnovnih geometrijskih tela
- Kosa projekcija
- Mreže tela...



### Tehničko crtanje

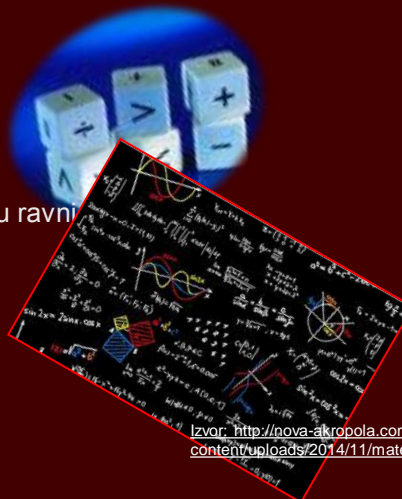
- Projekcije
- Pogledi
- Standardi
- Materijali
- Preseci
- Kotiranje
- Rekonstrukcija
- Projektna dokumentacija
- Čitanje projektne dokumentacije
- Solid Works 2D, 3D
- AutoCAD 2D, 3D
- ...



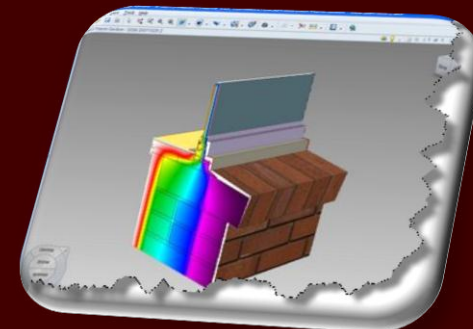
Izvor:  
<http://www.thermo-floor.co.uk/images/underfloor-heating-design.png>

### Matematika

- Geometrija
- Matrice
- Analitička geometrija u ravni i prostoru
- Funkcije
- Integrali
- Trigonometrija
- Numeričke metode
- ...
- ...

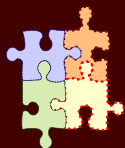
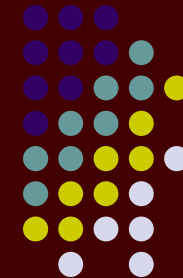


Izvor: <http://nova-akropola.com/wp-content/uploads/2014/11/matematika.jpg>



Izvor:  
[http://rcd.typepad.com/rcd/ACA\\_2BVHT.png](http://rcd.typepad.com/rcd/ACA_2BVHT.png)





Proširite znanja iz sledećih tehničkih stručnih oblasti

• Termodinamika i toplotni aparati



<http://www.ktt.uns.ac.rs/wp-content/uploads/2014/10/Heat-exchangers-in-Pocenia-263x263.jpg>

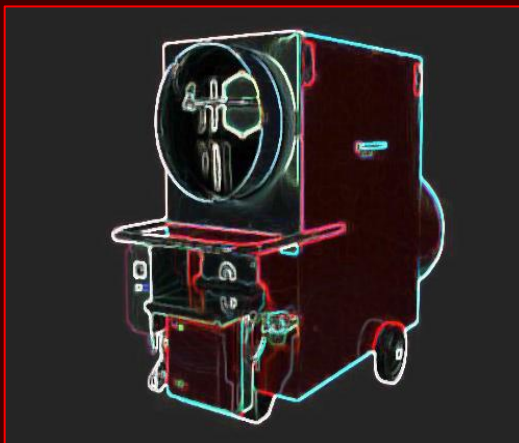
• Pumpe, kompresori, ventilatori



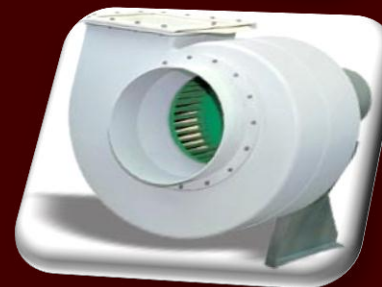
[http://www.ksb.com/linkableblob/ksb-en/14980-1904/lightboxLs/KSB-Pumpe\\_RDLO-lightboxLs.jpg](http://www.ksb.com/linkableblob/ksb-en/14980-1904/lightboxLs/KSB-Pumpe_RDLO-lightboxLs.jpg)



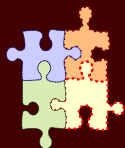
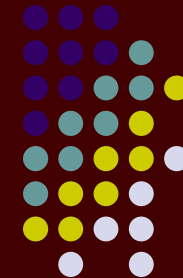
[http://galeb.com/wp-content/uploads/2011/04/AB\\_100\\_248.jpg](http://galeb.com/wp-content/uploads/2011/04/AB_100_248.jpg)



<http://poljoprivredni.org.lasi.rs/images/oglas/201409/860855/1.jpg>



<http://vazdusnatehnika.avit.rs/images/catalog/grp68/VSB42.jpg>



Proširite znanja iz sledećih tehničkih stručnih oblasti

• Termoenergetska postojenja

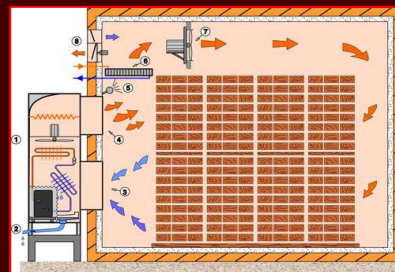


<http://www.b92.net/news/pics/2013/10/21/17242226685264f5b5bed3d151573097640x427.jpg>

• Sušare



<http://www.euclid.hr/slike/Susara-TS-250-1.jpg>



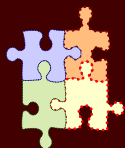
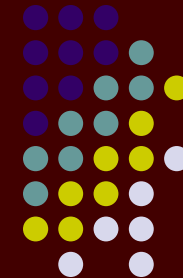
<http://www.niqos.rs/slike/presekond2.jpg>



[http://static.juznasrbija.info/files/toplana\\_jug\\_2.jpg](http://static.juznasrbija.info/files/toplana_jug_2.jpg)



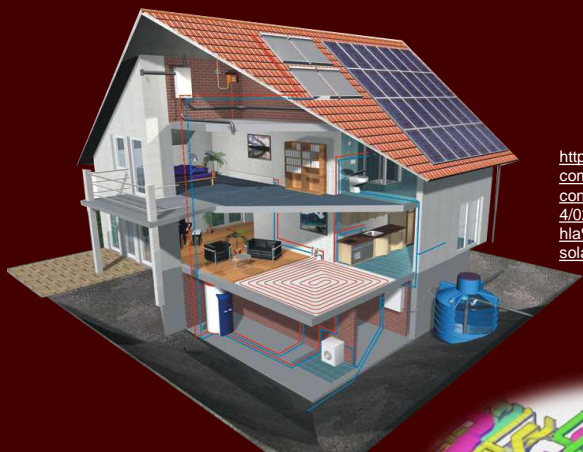
<http://www.termoplin.rs/slike/Galery/>



Proširite znanja iz sledećih tehničkih stručnih oblasti

● **Grejanje i klimatizacija**

● **Gasne instalacije**



<http://www.lotexdoo.com/trebinje/wp-content/uploads/2014/02/grijanje-i-hla%C4%91enje-solarni-paneli.png>



[http://www.blic.rs/data/images/2015-02-09/571132\\_gas08foto-reuters\\_f.jpg?ver=1424686209](http://www.blic.rs/data/images/2015-02-09/571132_gas08foto-reuters_f.jpg?ver=1424686209)



[http://www.meba.rs/wp-content/uploads/iStock\\_00002985220Small2.jpg](http://www.meba.rs/wp-content/uploads/iStock_00002985220Small2.jpg)



<http://coloseumenterijeri.com/wp-content/uploads/2012/12/back7.jpg>

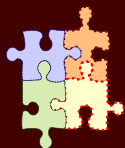
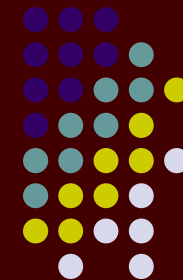


<http://www.portal-srbija.com/media/fe/21537/mont-invest-1.jpg>



<http://termotim.eu/images/gorionik.jpg>





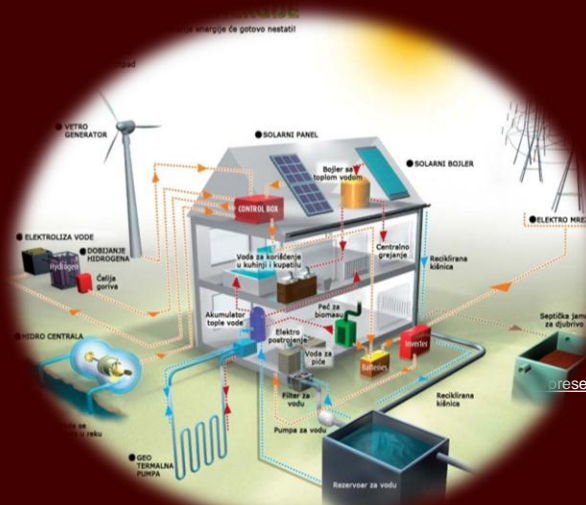
Proširite znanja iz sledećih tehničkih stručnih oblasti

• Energetska efikasnost

• Obnovljivi izvori energije



<http://www.ozon.rs/ozon/wp-content/uploads/2014/03/energetska-efikasnost-skala-1.jpg>



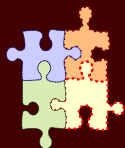
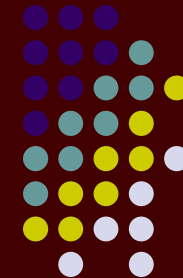
<http://www.ekovat.rs/blog/wp-content/uploads/2011/05/obnovljivi-izvori.jpg>



<http://www.zemis.co.rs/images/slika4.jpg>

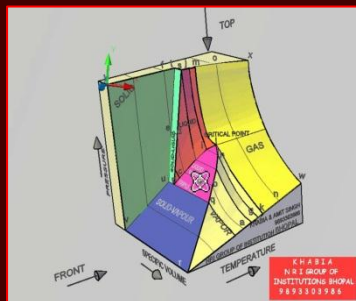


<http://www.hazud.hr/portal/wp-content/uploads/2015/02/obnovljivi-izvori-energie1.jpg>



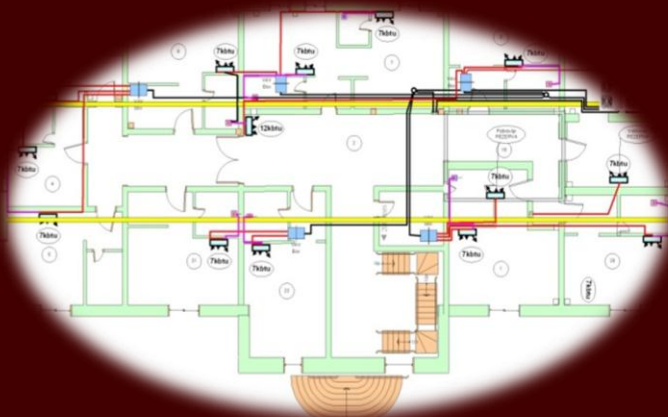
Раџунарска знанја

- Hardware
- Software
- Услужни програми
- Windows .....
- Мрежни рад – LAN
- ...

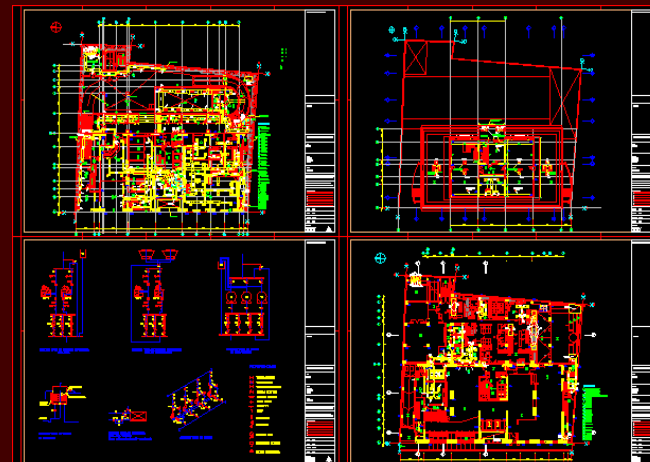


<http://i.ytimg.com/vi/URkqpUngnPYP/maxresdefault.jpg>

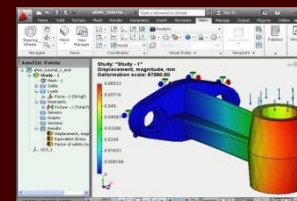
- Word 2013
- Excel 2013 – napredni nivo
- Internet (tehnička primena, dobavljači, karakteristike mašina, alata, komponenti...)
- AutoCAD, 2D - 3D – napredni nivo
- Solid Works



<http://www.dado-servis.com/primer/projekat-klimatizacije-dado-servis-subotica-zobnatica-skica-sprat.jpg>

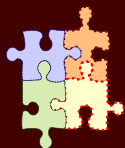
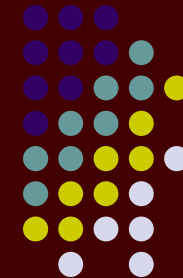


[http://img02.bibliocad.com/library/image/00010000/9000/thermodynamicinstallation\\_19072.gif](http://img02.bibliocad.com/library/image/00010000/9000/thermodynamicinstallation_19072.gif)



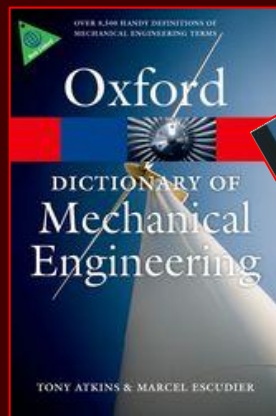
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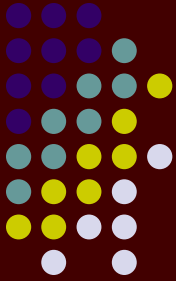


## Znanja stranih jezika

- Engleski A1,A2, B1, B2 nivo po CEF-u (obavezno)
- English for mechanical Engineers (obavezno)
- ...
- Nemački A1, A2 nivo po CEF-u (obavezno)
- ...

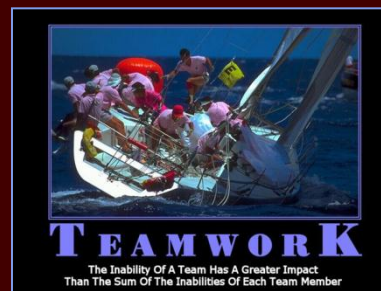


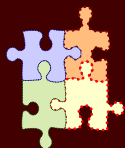
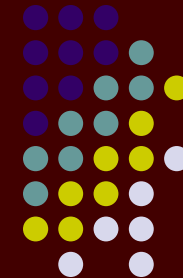
- Ruski jezik nivo A1, A2, B1



Da bi ste dobili kvalitetan posao, **pored znanja u struci**, potrebno je da negujete i sledeće vrednosti:

- Viziju i težnju ka izvrsnosti
- Znanje
- Integritet
- Pravedost
- Predanost klijentima
- Timski rad
- Učenje tokom čitavog života (LLL)
- ... kao i
- Porodicu kao temelj svakog uspeha





Poštovane kolegice i kolege,  
inženjeri i specijalisti termotehnike

ENERGIJA JE PITANJE BUDUĆNOSTI!!!

.... U propulzivnoj ste oblasti !!!

POSLA IMA !!!

.... Potrudite se da vam principi termodinamike budu izazov i  
inspiracija a TERMOTEHNIKA životni poziv.

Verujte u RAD i rezultate

Težite vrhunskom KVALITETU

Trudite se da opravdate POVERENJE

Živite DANAS punom snagom

Verujte u SUTRA !!! ...

Hvala na pažnji !!!

Mr Milovan Milivojević dipl. inž.

