Think Functional Safety	**SIL4S™, SIL for Safety**
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SIL4S™ (SIL *for* Safety)

SIL4S™ was founded in 2004 and 100% owned by CONTRORG Kft. to give technical assistance, service consultancy in the Process Industry, Factory Automation Industry and Automotive Industry in the field of Functional Safety detailed below. Our activities are based on IEC 61508:2010 and IEC 61511:2016 standards, Machinery Directives and Standards, SEVESO Directives, ATEX 100 and ATEX 137 Directives.

Company data:

Official Name	:	SIL4S™ Kft
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Our goals, focusing onto the Process, Machinery and Automotive industry, are:

- Educating the people to increase their competence in the field of Functional Safety:
  - worker level;
  - operator level;
  - management level.
- Educating the people why Functional Safety Management is necessary and important for
  - workers,
  - operators,
  - management.
- Changing the people's mind to make them thinking more Safely;
- Positioning the Safety as number one goal in our region and in Europe, Increasing the level of Safety Culture in our region.
- Saving human's life in Factories;
- Saving human's life of Public;
- Saving environment of Public;
- Saving the Business against losses;

To reach our goals we supply the following services for our Partners:

- Functional Safety Management System;
- HAZOP Study of dangerous process both in Process and Machinery Industry;
- HAZOP Study of big machines & equipments (compressors, turbines, burners etc.);
- LOPA analysis;
- "What if" analysis;
- Fault Tree analysis;
- Failure Modes and Effects Analysis (FMEA);
- Markov analysis;
- Hazard Analysis & Critical Control Points (HACCP);

- Fire&Gas application and Monitoring system;
- Preparing study and Certificates according EN 50495;
- Preparing studies related to SEVESO III Directives;
- Explosion Protection Documentation (ATEX 137).

In the last 12 years we developed our TOOL4S™ hazard and risk analysis SW with the following features. We are using this SW in our everyday work and one can license from SIL4S also:

1. HAZOP study, according **IEC EN 61511, lifecycle 1**
2. Independent protection layer allocation and SIL determination using Risk matrix or LOPA, according **IEC EN 61511, lifecycle 2**
3. Safety requirement documentation, according **IEC EN 61511, lifecycle 3**
4. Detailed engineering of the SIFs, according **IEC EN 61511, lifecycle 4**
5. Pre validation in detailed engineering phase, Validation, according **IEC EN 61511, lifecycle 5**

In more details:

1. HAZOP
   - Process hazard analysis
   - Freely programmable unmitigated frequency matrix
   - Freely programmable Quantitative Tolerable Risk Matrix for human, business and environment
   - Session tracking
   - P&ID, and equipment tracking
   - Participant of the HAZOP session report
   - HAZOP report
2. SIL determination
   - Allocation of safety function
   - Cumulative LOPA
   - Risk graph
   - LOPA report
3. SRS
   - Safety Requirement Specification according IEC EN 61511
   - Unlimited voting hierarchy
   - Tag database
   - Cause & Effect matrix
   - SRS report
4. Detailed engineering of SIFs and pre-validation
   - Global components
   - User supplied components
   - Unlimited tag and component configuration
   - Extreme fast Markov model
   - Auto recalculations, manual review not needed
5. SIF SRS validation
   - Global components
   - User supplied components
   - Unlimited tag and component configuration
   - Extreme fast Markov model
   - Auto recalculations, manual review not needed
   - Validation report

HAZOP, SIL determination, SRS and SIF SRS validation integrated in one studies with cross reference and live links. Multiuser application is standard.

Also this TOOL4S™ would be used for **Machinery risk assessment** with the following specification, taking into consideration the following standards:

- ISO 13849-1
- ISO 13849-2
- ISO 12100:2010
- IEC EN 62061

Detailed information about the machinery version:

- Risk assessment
  - Binary documents/pictures handling
  - Custom or built-in life cycle phases, protective measures and hazards.
  - Life cycle phase combinations
  - Unlimited hierarchical, auto numbered location filter with linking support
- PLr determination
  - Risk graph
- Safety function verification
  - PFH, PL calculation
  - Component library support
  - SISTEMA 1.x, 2.x compatibility
  - Import project and library files from SISTEMA
  - Export your work to SISTEMA project or library

Risk assessment, Plr and Safety function verification integrated in one studies with cross reference and live links.

If you or any of your college is interested in the SW, you can test and evaluate our SW visiting **https://toolforsafety.com and register for DEMO.**

If you have any question regarding the SW please contact my colleges:

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Dr. János Madár, e-mail: janos.madar@sil4s.com, M: +36 20 433 2006.

Services, related to Safety Standards (IEC EN 61510:2010 and IEC EN 61511:2016) see our description about our TOOL4S™ SW.

Services related to Ex Standards:

- Explosion protection documentation based on ATEX 137,
- Ex Area Determination of explosive Plant (zone classification) according ATEX 100 for gases and dusts,
- Application of EN 50495 standards and certification.

Education and Training:

- TÜV Certified Functional Safety Professional course in our region, Accredited by TÜV Süd

- Trainings Accredited by Hungarian Chamber of Engineers
  - Training about IEC 61508:2010
  - Training about IEC 61511:2016
  - ATEX training
  - HAZOP Training
  - IPL allocation training
  - SIL determination training
  - SIS Design training
  - SIS Maintenance training
  - SIS Validation training
- Taylor made training in the field of Functional Safety;
  - Functional Safety of Oil Terminals,
  - Functional Safety of Furnace and Fire heater,
- Education and post graduate education of Ex and safety systems based on ATEX, IEC 61508:2010 and IEC 61511:2016 standards for Plant operators, Instruments and mechanical maintenances people and Plant Management,
- Functional Safety training in the Automotive Industry based on ISO 26262

Functional Safety in General

- Company Safety Manual;
- Functional Safety Management system manuals;
- Functional Safety Quality Manuals;
- **Workflow** and **Verification** plan for all SLC;
- Validation plan for installed SIS;
- Assessment plan of running Safety Instrumented Systems;
- Audit plan for HAZOP study and all SLC phase.

Co-operation

- Risknowlogy
- MDINA-GROUP

Manpower and their education

SIL4S have 6 employees, three of them process engineer, one of them Control Technique specialist and two of them industrial informatics development engineer. Two of them have PhD degree (for personal certificates see our web site).

4 persons have the TÜV Functional Safety Professional qualification, 2 persons have qualification as technical specialist of operation and maintenance of the apparatus intended to use for potentially explosive atmosphere.

All the technical personnel have plus 70 years of experience on the process safety applications.

References for Safety PLC applications with HIMA safety PLC (www.hima.de)

- MOL Rt., Danube Refinery, GOK-3 Plant, 2000 IOs system, 11 pcs 800*800*2100 Cabinets
- MOL Rt., Danube Refinery, Hydrogen I. Plant, 450 IOs system, 4 pcs 800*800*2100 Cabinets
- MOL Rt., Danube Refinery, Hydrogen II. Plant, 450 IOs system, 4 pcs 800*800*2100 Cabinets
- MOL Rt., Danube Refinery, FCC Plant, , 170 IOs system, 1 pcs 800*800*2100 Cabinets
- MOL Rt., Tisza Refinery, Combine Plant, 270 IOs system, 2 pcs 800*800*2100 Cabinets, PLANAR system
- Tiszai Vegyi Kombinát (TVK Rt.), Tiszaújváros, Ethylene I Plant in two step, 2300 IOs system, 13 pcs 800*800*2100 Cabinets
- Tiszai Vegyi Kombinát (TVK Rt.), Tiszaújváros, Ethylene II Plant, 2100 IOs system, 15 pcs 800*800*2100 Cabinets
- HUNTSMAN Rt., Pétfürdő, 270 IOs Systems (2 pcs), 2 pcs 800*800*2100 Cabinets
- Messer Hungária Rt., Pétfürdő, HUNTSMAN Rt., Hydrogen Plant, 135 IOs system, 1 pcs 800*800*2100 Cabinets
- MESSER Hungária Rt., Tiszaújváros, TVK Rt., Gas Plant, 176 IOs System, 1 pcs 800*800*2100 Cabinet
- LINDE Hungária Rt., Kazincbarcika, BORSODCHEM (BC Rt.), Gas Plant, 230 IOs System, 2 pcs 800*800*2100 Cabinets
- Kelenföld Power Station Rt., Burner Management System, Budapest 250 IOs System, 1 pc 800*800*2100 Cabinet
- Csepel Power Station Rt., Burner Management System, Budapest 230 IOs System, 2 pcs 800*800*2100 Cabinets
- Debrecen Power Station Rt., Debrecen 210 IOs System, 1 pcs 800*800*2100 Cabinet

References in Ex area with application of ATEX 137

These works includes the preparing of explosion protection documentation to protect the workers working in ex classified area.

ATEX 137 Explosion Protection Documentations:

- MOL Refineries and Oil terminals
  - ✓ 5 Oil terminals with 140 vessel, loading station
  - ✓ 10 Refinery Plants
- Bridgestone _ Környe (Explosive Dust)
  - ✓ Mixing rubber additives
- SUZUKI _ Esztergom (Explosive gases and vapours)
  - ✓ Flammable liquid storage
  - ✓ Gas storage
  - ✓ Painting plants
  - ✓ Battery charging rooms

- Procter and Gamble _ Csömör, Gyöngyös (Explosive Dust and vapours)
  - ✓ Raw material processing (cotton, cellulose)

- ✓ Dust filter systems
- ✓ Flammable liquid storage

- HENKEL _ Környe (Explosive solvent vapours)
  - ✓ Paint production
- Nestle _ Bük (Explosive Dust)
  - ✓ Dry plant
  - ✓ Wet plant
  - ✓ NH_3 storage
- Bakonyerdő (Explosive Dust and vapours)
  - ✓ Cleaning solvent
- EGIS _ Körmend
  - ✓ Experimental medicine production
- Penta Industries Kft. _ Százhalombatta
  - ✓ Experimental biogas plant (MOL Danube Refinery)
- Vishay Kft. _ Budapest (Explosive solvent vapours)
  - ✓ Semiconductor manufacturing
- BorsodChem _ Kazincbarcika (Explosive gases and vapours)
  - ✓ Rail tank unloading (Ammónia, Toluol)
- MVM Zrt. _ Ajka, Lőrinci (Explosive gas)
  - ✓ Gas turbine power plant
- ProCoPlan Kft. _ Érd
  - ✓ Classification of hazardous areas (FCC plant MOL Danube Refinery)
  - ✓ Classification of hazardous areas (Road tank unloading)
- Farmol Kft. _ Nyírbátor (Explosive gases and vapours)
  - ✓ Flammable liquid storage
  - ✓ Gas storage
  - ✓ Aerosol production
- Huntsman Zrt. _ Pétfürdő (Explosive gases)
  - ✓ Distillation plant
  - ✓ Catalytic hydrogenation plant
- NEMAK Kft. _ Győr (Explosive gases and vapours)
  - ✓ Flammable liquid storage
  - ✓ Gas receiving station
  - ✓ Battery charging rooms
- Dunacell, Dunaújváros (Explosive Dust)
  - ✓ Cellulose production

References in area of SEVESO Directives

- E.ON Natural Gas Storage Zrt., Zsana, Safety Report
- E.ON Natural Gas Storage Zrt., Kardoskút, Safety Report
- E.ON Natural Gas Storage Zrt., Pusztaederics, Safety Report
- ISD POWER Kft., Dunaújváros, Validation of Safety Report
- Szekszárdi Növény Zrt., Szekszárd (intermedier and fertilizer storage), Safety Report
- Plataco Kft., Hidas. (Intermedier storage), Safety Report
- Henkel, Környe, Solvent Based Additives, Safety Report
- Federal Mogul Hungary Kft., Solvent storage, Safety Report

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References for HAZOP study and target SIL determination, SIL verification and validation:

Our work is based on application of Process Safety Standards (IEC 61508:2010, IEC 61511:2016), for HAZOP study, SIL determination and validation using our Tool4S™ SW (for DEMO please visit our www.sil4s.com website) and EXIDA SW.

HUNGRANA Rt., Szabadegyháza in 2005

- Three gas/oil boilers HAZOP study and SIL Determination

Budapest Power Stations in 2006

- 10 natural gas boilers, HAZOP Study and SIL determination

MOL NyRt. in 2006 - 2008

- MOL Logistic, 1500 km Pipe network HAZOP Study and SIL determination
- MOL, Danube Refinery, 39 Refinery Plant, HAZOP Study, SIL determination and SIL verification
- MOL, Tisza Refinery, 4 Refinery Plant, HAZOP Study, SIL determination and SIL verification
- MOL, Zala Refinery, 3 Refinery Plant, HAZOP Study, SIL determination and SIL verification

MOL NyRt. - Slovnaft in 2006 – 2007

- Slovnaft (Bratislava) Refinery, 38 Refinery Plant, HAZOP Study, SIL determination and SIL verification
- Slovnaft (Bratislava) Powerplant, 5 Turbine-Generator system and 5 boilers, HAZOP Study, SIL determination and SIL verification

TVK Rt. (now MOL Petrochemical ZRt.) in 2006 - 2007

- TVK Tiszaújváros, Ethylene plant boiler, HAZOP Study, SIL determination and SIL verification

FŐTÁV Rt., Budapest in 2007

- Five natural gas boiler HAZOP study and SIL Determination

BatchControl Kft. in 2007

- Batch chemiflex system, HAZOP study and SIL Determination

Hungarian Government in 2008

- Szöreg, Underground natural gas storage, HAZOP study and SIL determination

HUNTSMAN Corporation Hungary ZRt. in 2008

- 5 chemical plant, HAZOP study and SIL

Kraftszer Budapest Kft. and Cameron in 2009

- Gas station and boiler, HAZOP study and SIL

TVK Rt. (now MOL Petrochemical ZRt.) in 2009

- TVK Tiszaújváros, PP4 plant, HAZOP Study, SIL determination and SIL verification

HUNGRANA RT, Szabadegyháza, Hungary in 2010

- Maize, starch drier and dextrose plants, HAZOP Study and SIL determination

MOL Nyrt., HAZOP Audit Activity in 2010-2012

- Danube Refinery, HAZOP-SIL Audit of 25 plants

MOL Nyrt. 2010 - 2012

- MOL Upstream 40+ plants (gas/oil gathering stations, exploration units) in Hungary, HAZOP Study and SIL determination
- Algyő KTD, Gas processing plant, HAZOP Study and SIL determination
- Algyő KTD, Gas compressors, HAZOP Study and SIL determination
- Algyő LOG, LPG storage area, HAZOP Study and SIL determination
- Tiszaújváros LOG, Storage tank terminal, HAZOP Study and SIL determination
- Tiszaújváros LOG, Railway loading stations, HAZOP Study and SIL determination
- Hajdúszoboszló LOG, Railway loading stations, HAZOP Study and SIL determination
- Tiszaújváros Refinery, Waste gas processing, HAZOP Study and SIL determination
- Tiszaújváros Refinery, Storage area, HAZOP Study and SIL determination

MOL LUB Kft. in 2012

- 3 additive plants, HAZOP Study and SIL determination

TECHNIP (Holland) 2010

- Foktő, Hungary: Vegetable Oil Plant, HAZOP study

ÖMV in 2011

- Exploration plant in Yemen: HAZOP study and SIL Determination

Vattenfall (Germany) 2011

- CO2 pipeline, HAZOP study and SIL determination

TVK Rt. (now MOL Petrochemical ZRt.) in 2011

- TVK Tiszaújváros, Compressor and EP storage, HAZOP Study, SIL determination and SIL verification

Honeywell Hungary Kft. in 2011

- TVK Tiszaújváros, PP4 interlock system upgrade, SIL verification

Dunastyr Rt. in 2012

- Százhalombatta, Polystyroil plants, HAZOP Study and SIL determination

HENKEL Hungary Kft. and ACIS Complex in 2012

- Környe, Henkel Organic Solvent Plant, HAZOP and SIL study

PPG Trilak Kft. in 2012

- Budapest, 5 paint production plants, HAZOP Study and SIL determination

Olajterv Zrt. in 2012 - 2013

- INA Sisak Refinery, DCU unit upgrade, HAZOP Study and SIL determination

- Caspmunaigas, Kazakhstan, New gas exploration plant, HAZOP study
- MOL Danube Refinery, 3 flare systems upgrade, HAZOP Study and SIL determination
- TVK Tiszaújváros, new BD and C4 storage area, HAZOP Study, SIL determination and SIL verification

TMK Automatika Kft. in 2013

- TVK Tiszaújváros, EP storage, SIS Design and verification

KIS Kft. and Ferrum Cetrifuge Technology in 2013

- Vertical scrapper centrifuge system (batch), HAZOP and risk analysis study, Machinery PL determination and verification

INA d.d. in 2013

- INA Rijeka Refinery, 2 plants, HAZOP Study and SIL determination

MOL LUB Kft. in 2014

- 2 additive plants, HAZOP Study and SIL determination

Pannon Növényolajgyártó Kft in 2014

- Foktő, Vegetable oil plant, HAZOP Study and SIL determination

OT Industries Zrt. and JSR/MOL in 2014

- Synthetic Styrene-Butadiene Rubber plant, FEED HAZOP Study and SIL determination

Nitroterv Kft. and Hunstman Corportation Hungary in 2014

- Hydrogenation plant, FEED HAZOP Study and SIL determination

MOL Petrochemical Zrt. (former TVK) in 2015 -2016

- Tiszaújváros TVK, 4 petrochemical plants (including several steam turbines), HAZOP Study and SIL determination

BEMEA Danube Region in 2015

- Martfű, Bunge Sunpro 46 plant

Pannon Mérnöki Iroda Kft. and MFGT in 2015

- Pusztaederics, Natural Gas Storage compressors, HAZOP Study and SIL determination

GTC Technology in 2015

- Aromatic plant revamp in Danube Refinery, FEED HAZOP study

Losonczi és Tsa Kft. in 2015

- Üllés, Gas Compressor, HAZOP Study and SIL determination

MOL Nyrt., HAZOP Audit Activity in 2015-2017

- Danube Refinery, HAZOP-SIL Audit of 22 plants

AERZEN hungária Kft.

- Two compressors, HAZOP Study and SIL determination

NIS/YOKOGAWA Serbia, 2015

- 14 plant SRS upgrade

CASALE and YARA in 2015 - 2017

- Sweden, Nitric Acid plant, HAZOP study, SIL determination and SIL verification

MOL NyRt. in 2015

- MOL Upstream, 3 gas Processing/gathering units, HAZOP study and SIL determination
- MOL Upstream, 1 plant HAZOP/LOPA audit
- MOL Logistic, 3 sites with loading/unloading stations, HAZOP study and SIL determination

MOL LUB Kft. in 2015

- 2 additive plants, HAZOP Study and SIL determination

INA d.d. in 2016

- INA Rijeka Refinery, 3 plants, HAZOP Study and SIL determination

Nitrogénművek Zrt. in 2016

- Pétfürdő, Acid storage, HAZOP Study and SIL determination

GTC Technology in 2016

- Designed Styrene plant in Tiszaújváros, FEED HAZOP study and SIL determination

P&G Hyginett Kft in 2016

- FAM-2 unit SIL verification

OT Indsutries Zrt. and Nitrogénművek Zrt. in 2017

- Pétfürdő, AN Neutralization plant, HAZOP Study and SIL determination

EMERSON hungary Kft. in 2017

- Tiszaújváros MTBE plant, HAZOP-SIL audit and SIL verification

OT Indsutries Zrt. in 2017

- Százhalombatta, Coprocessing plant, HAZOP Study and SIL determination
- Százhalombatta, LPG amine absorber system, HAZOP Study and SIL determination
- Algyő, Powerplant heat recovery system, HAZOP Study and SIL determination

MOL Petrochemical Zrt. (former TVK) 2017

- Tiszaújváros, Powerplant (steam turbine-generator systems, boilers, gasturbine) , HAZOP Study and SIL determination
- Tiszaújváros, Waste gas plant, HAZOP Study and SIL determination
- Tiszaújváros, Railway loading/unloading unit, HAZOP Study and SIL determination

MOL NyRt. in 2017

- MOL Logistic, Algyő, LPG loading/unloading unit, HAZOP study and SIL determination
- MOL Logistic, Tiszaújváros, Storage area, HAZOP study and SIL determination
- MOL Upstream, Szank, Gas facility, HAZOP study and SIL determination

TISZA-TK in 2017

- Tiszapüspök, HPNE plant (corn ethanol plant), HAZOP Study and SIL determination

GE Hungary Kft. in 2017

- Compressor platform interlock system, SIL verification

Hunstman Corportation Hungary in 2017

- EVD distillation plant, SIL verification

Losonczi és Tsa Kft. in 2017

- Szeged, Gas gathering station revamp, HAZOP and SIL study

Vermilion Hungary Battonya-dél Koncessziós Kft in 2018

- Tótkomlos, Gas gathering station revamp, HAZOP and SIL study

LCNG Fuel Kft in 2018

- Csombárd, LCNG unit, HAZOP and SIL study

SCAN Projekt and INA in 2018

- Ivanič Grad, Etan plant, HAZOP and SIL study
- Ivanič Grad, IVA-1/2 plants, HAZOP and SIL study

Hunstman Corportation Hungary in 2018

- Hydrogenation LOOP – Process Hazard Analysis (PHA) study
- Propoxylation reactor – Procedural PHA study

Unilever Hungary in 2018

- Nyírbátor Storage Area – HAZOP and risk assessment study

GE Hungary Kft. in 2018

- National Grid UK - Turbine platform interlock system, SIL verification

Aerzen Hungária Kft. in 2018

- YARA – compressor interlock system, SIL verification

Yokogawa Hungary Kft. in 2018

- VIRESOL Visonta project – SRS study

Szolterv Kft. in 2018

- Lakocsa gathering station - HAZOP and SIL study
- MOL Nyrt. Danube Refinery – New paraffin and oil truck loading station – HAZOP and SIL study

- MOL Nyrt. Gomba gathering station revamp - HAZOP and SIL study
- MOL Nyrt. Nagyakáta 3/B oil well revamp - HAZOP and SIL study

MPK Zrt. in 2018

- Tiszaújváros PE2 plant – HAZOP and SIL study
- Ethylene-compressor new dry-gas seal system - HAZOP and SIL study

OT Indsutries Zrt. in 2018

- MOL Nyrt. DGDES plant new Amine system– HAZOP and SIL study
- MOL Nyrt. TIFO wastewater storage – HAZOP and SIL study

Losonczi és Tsa Kft. in 2017

- MOL Nyrt. Csombárd – new LCNG loading system - HAZOP and SIL study

MPK Zrt. in 2019

- Ethylene-1 plant – POS and MOS study
- Ethylene-1 plant Flare system upgrade – HAZOP and Sil study
- Ethylene-1 plant –Management of Change for HAZOP study

OT Indsutries Zrt. in 2019

- Slovnaft new Ethylene Storage Tank – HAZOP consultant
- Ethylene-compressor new dry-gas seal system (new design) - HAZOP and SIL study

Hunstman Corportation Hungary in 2018

- New Falcon plant – Process Hazard Analysis (PHA) study
- Truck and railway loading and storages –PHA study and SRS study

MOL Nyrt. in 2019

- Algyő NF, C2, MC2-CC2 compressor plants - HAZOP and SIL study
- Endrőd-III gathering station – HAZOP-SIL audit
- Hosszúpályi gathering station – HAZOP-SIL audit

Szolterv Kft. in 2018

- MOL Nyrt. new sulphur truck and railway loading and storage system – HAZOP and SIL study

ISD Dunaferr in 2019

- New flare system – HAZOP and SIL study

Tisoterv Kft. in 2019

- Guardian Orosháza Kft. Glass plant gas systems revamp – HAZOP and SIL study

Detailed references in MOL NyRt., Hungary

- Activities: Audit, Revamp, New plant
- Type of factory: Refineries
- Hazard and Risk analysis
- Hazard and Risk assessment
- Independent Protection Layer allocation
- Evaluating the Hazard and Risk with cumulative LOPA, based on Quantitative Tolerable Risk matrix
- Determination of SIL and RRF value of SIFs
- Pre-validation of the SIL value of the SIFs
- Safety Requirement Documentation
- SIL Validation of the realised plants

Abbreviation	Name of the Plants
DAV1	Atmospheric and vacuum distillation 1
DAV2	Atmospheric and vacuum distillation 2
DPEM	Aromatics feed re-distillation
DKGU	Central gas processing unit
DKOT	Crude oil storage
DFOT	Fuel oil storage
DPBT	PB blending and storage
DAV3	Atmospheric and vacuum distillation 3
DBFR	Naphtha re-distillation unit
DGFR	Gas fractionating unit
DPBK	PB desulphurization unit
DKBI	Light naphtha isomerisation
DGK1	Gasoil Hydro treating 1
DBK2	Naphtha Hydro treating 2
DBK3	Naphtha Hydro treating 3
DRF3	Naphtha Reforming 3
DBK4	Naphtha Hydro treating 4
DRF4	CCR Reforming 4
DRFH	Reformat Hydro treating
DFHU	Central flare unit
DPHU	Kerozene hydrotreating unit
DHGY	Hydrogen Production 1
DHG2	Hydrogen Production 2
DAR1	Aromatics extraction 1
DAR2	Aromatics extraction 2
DARO	Ortho-xylene unit
DXIL	Xylene isomerization/ortho-xylene 2
DASB	Special naphtha feed redistillation
DGF1	Steam/BFW 1
DGF2	Steam/BFW 2
DGF3	Steam/BFW 3
DMSA	Maleic acid anhydride unit
DFCC	FCC - Fluid catalytic cracking
DBK5	Naphtha hydro treating 5 and etherification
DMTB	ETBE unit

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Abbreviation	Name of the Plants
DHFA	HF alkylation unit
DBTK	Gasoline blending and storage
DHDS	HDS-MIC (FCC pretreater)
DCL4	Sulphur recovery 4
DCL6	Sulphur recovery 6
DRC2	Cooling water 2 and makeup water
DRC4	Cooling water 4
DGK3	Gas oil hydro treating 3
DFGK	Gas oil blending and storage
DPAM	Propane deasphalting
DOKF	Lube oil refining
DBAV	Cooling water 3
DRC1	Cooling water 1
DMK1	Solvent dewaxing 1
DMK2	Solvent dewaxing 2
DMKO	Microcrystalline wax deoiling
DPMH	Solvent dewaxing
DKOH	Lube oil hydro finishing
DGPR	Slack wax/petrolate redistillation
DMIH	Micro paraffin hydrogenation unit
DMPH	Macro paraffin hydrogenation unit
DKOF	Micro paraffin contact unit
DKOK	Lube oil blending
DPGY	Paraffin manufacturing unit
DCL3	Sulphur recovery 3
DCL5	Sulphur recovery 5
DDCU	Delayed cooker unit
DBIT	Bitumen blending / loading unit
DBIF	Bitumen blowing unit
TGKM	TR Gas oil Hydrotreater
TMTB	TR MTBE
TCLA	TR Sulphur Recovery
TBEK	TR Storage and Gasoline Blending
ZRBF	ZR Bitumen units
ZRT	ZR Storage

Detailed references in MOL Nyrt. Slovnaft, Slovakia

- Type of factory: Refineries
- Hazard and Risk analysis
- Hazard and Risk assessment
- Independent Protection Layer allocation
- Evaluating the Hazard and Risk with cumulative LOPA, based on Quantitative Tolerable Risk matrix
- Determination of SIL and RRF value of SIFs
- Pre-validation of the SIL value of the SIFs
- Safety Requirement Documentation
- SIL Validation of the realised plants

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Abbreviation	Plant name
AD 5	Crude Oil Distillation No.5
Asfalty	Asphalts production and expedition
RHC	Residual Hydrocracker - LC Finer
VGH	VGO Hydrotreater (FCC Feed Pretre.)
HPP	Hydrogen Unit No.2
VV KHK	Hydrogen Unit of VGO Hydrocracker
VD KHK	Vaccuum Distillation of VGO HC
ŠJ KHK	Cracking unit of VGO Hydrocracker
FCC	FCC Unit - Fluid catalytic cracking
SHU	Selective Hydrotreating Unit of C4 fr.
MTBE	MTBE Unit
ALK	Alkylation
SRU 100	Sulphur Recovery Unit No.1
SRU 200	Sulphur Recovery Unit No.2
AAR	DEA regeneration Unit
SWS	Sour water stripping Unit
SAR	Sulphuric acid regeneration Unit
OP1	Gas Desulphurisation Unit No.1
OP2	Gas Desulphurisation Unit No.2
DBP1	Gas recovery Unit No.1
DBP2	Gas recovery Unit No.2
OKP	Liquid gases desulphurization
CCR 5	CCR -Naphta Reformer No.5
HRR 4	Naphta Hydrotreater for CCR
Izo ľbi	C5/C6 Isomerization (PENEX)
EA	Aromatics Extraction Unit
Exp.Aromátov	Aromatics Expedition Unit
Red.Ref.	Reformate Splitter
HRP7	Middle distillates HDS No.7
HRP2	BTX Distillates HDS No.2
HRP6	Middle DistillatesHDS No.6
TEPL	Power Plant
ÚKV	Air Supply
MCHBČOV	Mech. Chem.Biologic. WWTU
Čistička bl.50	Waste Water Treatment Unit bl.50
EO	Ethylene Oxide
KF	Cumene Phenol
KU	Cumene
SKP1	Liquified Gases Storage 1
SKP2	Liquified Gases Storage 2
SPCHV	Storage of Petrochemicals Products
SEE	Ethylene downloading unit
Poľné horáky	Flares
Rekompresná stanica	Recompression station

Detailed references in MOL Petrochemical (TVK) Tiszaújváros

- Type of factory: Petrochemical plants
- Hazard and Risk analysis
- Hazard and Risk assessment
- Independent Protection Layer allocation
- Evaluating the Hazard and Risk with cumulative LOPA, based on Quantitative Tolerable Risk matrix
- Determination of SIL and RRF value of SIFs
- Pre-validation of the SIL value of the SIFs
- Safety Requirement Documentation

Abbreviation	Plant name
BDE	Butadiene
HDPE-1	High Density Polyethylene 1
LDPE-2	Low Density Polyethylene 2
PE2/HDPE2	Polyethylene 2 / High Density Polyethylene 2
Olefin-1	Ethylene 1
Olefin-2	Ethylene 2
PP3	Polypropylene 3
PP4	Polypropylene 4
Powerplant	Power station
Styrene	Styrene plant (design)
Storage	Tank farm
Waste gas	Waste gas incinerator

Detailed references in INA Rijeka

- Type of factory: Petrochemical plants
- Hazard and Risk analysis
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- Safety Requirement Documentation

Abbreviation	Plant name
FCC	Fluid catalytic cracking Unit
HDS1	Hydrodesulphurisation Unit 1
HDS2	Hydrodesulphurisation Unit 2
VDU	Vacuum Distillation Unit
VIS	Visbreaking Uni

References for FSE courses

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