

# Alexander Rudolf

Riyadh, Saudi Arabia  
arudolf.de@gmail.com • +966-504158399  
linkedin.com/in/alexander-rudolf/



## Personal Details:

03/14/1968 • • Hof / Saale • German  
Male • Married

---

## Tunnel Ventilation & Aerodynamics Expert

*Proven track record of accomplishments in the world's most prominent infrastructure projects related to vehicle and tunnel aerodynamics, outstanding scientific contributions, practical innovations, and coaching of fellow engineers, helping staff to unleash potential for the benefit of their projects and companies within time and budget*

---

Seasoned, result-driven entrepreneur, manager, senior engineer and researcher with successful background in fluid dynamics, thermal systems, energy technology in all phases of large infrastructure projects. Detailed knowledge and world expert level in tunnel ventilation and train aerodynamics (appointed as public assessor). Broad experience in engineering disciplines related to vehicle and tunnel aerodynamics, management strategies, acquisition and accounting on a team level.

Successful background in the development of optimised vehicle and tunnel aerodynamic design concepts; mediation of solutions with involved discipline leads and preparation of vivid design documents for project owners and regulatory authorities.

Experienced project manager; instrumental in identifying the root cause of issues and implementing innovative cost-optimized solutions to complete complex projects within committed budget, quality, and timeframe. Possess excellent communication, presentation, and leadership skills with innate ability to act in and direct cross-functional teams that drive successful project execution and completion.

### Core Competencies:

- Recognized International Expert
- Professional in dealing with technical and commercial matters
- Exceptional Academic Certificates, project references and industrial experience
- Publicly appointed assessor for Tunnel Ventilation and Train Aerodynamics
- Team Building, Leadership, & Coaching
- Full Life Cycle Project Management
- Assessment and optimisation of Design Concepts, Detailed Design & Verification
- Systems Implementation & Launch
- Problem Resolution / Troubleshooting
- Research & Development, Presence on International Conferences
- Technical Report Writing

## Professional Experience

---

RMTC / Systra, Riyadh, Saudi Arabia

### **Tunnel Ventilation Specialist**, 2017 – Present

Lead all planning and construction activities of the contractor; act as technical lead ventilation for the prominent lines 1 and 2 with 3 tunnels and 24 stations; deliver technical guidance and leadership in tunnel ventilation while ensuring fire life safety with leverage for other lines.

### **Riyadh Metro Project (RMP)**

- Identified, named, and eliminated technical challenges and gaps in the planning level between the tunnel ventilation (TVS) and the other disciplines to recover the lost time on a fast track.
- Developed required project adaptations in the second phase with a provision to meet the contractual and the normative requirements.
- Started the third phase through the modified construction documents and to supervise their implementation.

*Continued...*

# Alexander Rudolf

---

Page Two

- Introduced a cost-effective solution to increase the extraction capacity in the stations significantly without changing the previous size of the active components of the ventilation system.
- Ensured the solution preserved the platforms smoke free during self-evacuation as well as for the intervention of rescue forces and firefighters, significantly enhancing the safety of the RMP.
- Highlighted and minimised changes in TVS entail coordination with other disciplines through successful planning and project management; avoided political challenges as project modifications involved millions of dollars for documentation and addressed by the suitable bodies in the right time.

## *Key Achievements:*

- Ensured swift identification and resolution of all open TVS issues.
- Leveraged extensive leadership experience in overriding and correcting the previous direction the TVS project.

Gruner AG, Basel, Switzerland

## **Head of the Department for Tunnel Ventilation and Aerodynamics, 2015 – 2016**

Planned all engineering aspects during all phases as well as leveraged expert services in tunnel ventilation and aerodynamics, fluid mechanics / CFD, thermodynamics, energy, and climate technology. Delivered exceptional engineering and project management abilities in completing multiple projects.

## *Key Achievements:*

- Conducted technical improvements to the General Project for the 2<sup>nd</sup> tube of the Gotthard Road Tunnel (longest directional road tunnel in Europe), yielding an increase of the availability and simultaneously a simplification of the ventilation system and cost reduction for civil and mechanical works of some \$50M.
- Cleaned-up a backlog of 100+ projects for a new perspective of the ventilation team on 2 sites.

Dr. A. Rudolf – Engineering Services, Konstanz, Germany and Kreuzlingen, Switzerland

## **Independent Expert Services in Tunnel Ventilation and Aerodynamics, 2007 – Present**

Acknowledged for contributions as the Department Head for Tunnel Ventilation at the ILF Switzerland as well as in the Lotschberg Tunnel project. Partnered with the ILF Group of Companies world-wide and for other clients as an independent engineer with offices in Konstanz, Germany and Kreuzlingen, Switzerland.

## *Key Achievements:*

- Established 2 engineering offices in Germany and Switzerland (still fully operational), deftly steering and completing key projects as well as training young engineers as interns or employees.
- Directed conceptual design, detailed design, and implementation for some of the most prominent railway and road tunnel projects in Europe and the USA from 2007 to 2013, including the Wienerwaldtunnel (rail, 13.6 km), the Bosrucktunnel (road, 5.5 km), the Tunnel Leifers (road, 3 km), the 710 gap closure in Los Angeles (road, twin deck, 6 km), contributions to the Brenner Base Tunnel (rail, 55 km) and the Gubrist tunnel (road, 3.3 km).
- Developed the country guideline for road tunnels of the Slovak republic as the sole author with several novel ideas to enhance the safety and the planning process of road tunnels
- Pioneered the development of NUMSTA® from a scientific to an industrial tool that enabled to deal with tunnel ventilation and train aerodynamics in general and as a basis to use in the planning process.
- Acted as the first sworn assessor for tunnel ventilation and train aerodynamics in Germany (IHK Konstanz) in 2013, renewal in 2018.

ILF Consulting Engineers Ltd, Zurich, Switzerland

## **Head of the Department for Tunnel Ventilation and Aerodynamics, 2003 – 2007**

Administered all engineering activities (tunnel ventilation and aerodynamics) in the execution project for the Lotschberg Base Tunnel as the deputy project manager. Created the scientific basis for high speed underground railways, for the cooling of large tunnel networks and the ventilation of road tunnels as well as representation of the ILF at numerous scientific conferences. Commenced the department in Switzerland in terms of calculation tools, reference projects and human resources. Cultivated close links to other colleagues in Austria, Germany, and the USA.

*Continued...*

# Alexander Rudolf

---

Page Two

## Key Achievements:

- Appointed as deputy project manager for Lotschberg tunnel, final ventilation system; project manager for Lotschberg tunnel, temporary ventilation system during installation.
- Minimised costs (> \$10M) and realized substantial alleviations for the logistics by introducing an adiabatic tunnel cooling system with high pressure nozzles for the installation phase of the Lotschberg base tunnel with a cooling effect of 15 MW; overriding the initial plans to use conventional chillers; contributed to overcome strong reservations of stake holders for this novel solution with scientific evidence.
- Delivered strategic guidance and leadership in deter damage claims of \$100k by a client in Germany by assessing ILFs involvement and other project participants in this project (first assessment project).
- Developed scientific models, computational tools, basic techniques, as well as trained fellow engineers.
- Contributed efforts in revision of the Austrian road tunnel guideline to account for density changes during fire events for the design and operation of emergency ventilation systems.

-----

*Prior experience as **Ventilation Engineer** for Mott MacDonald Ltd, London, United Kingdom / **Practice Lead - Computational Fluid Dynamics (CFD)** for CargoLifter Development GmbH Berlin, Germany / **Department Head** for ADtranz, Hennigsdorf, Germany / **Consultant** for SAP, Walldorf, Germany*

## Technical Proficiencies

---

<b>Own Simulation Tools</b>	NUMSTA®   various elaborated Excel tools for the dimensioning of ventilation systems for tunnels
<b>Non-Web Programming Languages:</b>	Fortran, Basic
<b>Open Source Simulation Tools</b>	FDS, SMV, Evac
<b>Commercial Simulation Tools</b>	StarCD, ICEM CFD
<b>Operating System, Network, &amp; Hardware:</b>	Profound knowledge of DOS, Windows, Office and Linux since 1981

## Education and Credentials

---

### **Doctorate (PhD) in Technical Sciences (Dr. ès sciences techniques)**

Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland

Development of the tunnel ventilation and train aerodynamics software NUMSTA® covering both low speed and high speed rail aerodynamics under atmospheric conditions and in a partial vacuum

### **Dipl.-Ing. in Mechanical Engineering (Equivalent to Masters)**

Karlsruhe Institute of Technology (KIT), Baden-Wuerttemberg, Germany

Theses titles: "Bionics – from an idea to a scientific discipline", "Central solar heating plant with seasonal storage"

### **Dipl. d'études de 3ieme cycle in Fluid Mechanics (Equivalent to Masters)**

Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland

Thesis title: "The Turbo SwissMetro"

### **DEA studies in Fluid Mechanics**

Ecole Centrale de Lyon, Lyon, France

### **Publicly Appointed and Sworn Assessor for Tunnel Ventilation and Train Aerodynamics (since 2013)**

IHK Hochrhein, Bodensee, Konstanz, Germany

### **Scholarshipholder during diploma and PhD studies (1989-1994)**

Friedrich-Naumann Foundation for liberal politics, Germany

### **Member of the scientific exchange group (ATG)**

DaimlerChrysler AG