

Mgr. Jiří Libra,
Kolibrik.net CEO:
'We Strive to Provide
a Cost-Effective
Customizable
Modular Solution
Suitable for
Application
Development
in Both Small
Startups and
Large Companies,
Providing an Option
of Redesign for Mass
Production in Future'

"Our flagship products are potentiostats, zero-voltage loads, and stack impedance spectroscopy analyzers developed for research and testing of automotive-grade high-power fuel cells and stacks."



Mgr. Jiří Libra
CEO

The utilization and subsequent modernization of portable electronic devices have seen a tremendous increase in the last decade. With this ever-increasing functionality, in terms of various applications software, as well as, assembled hardware, has automatically led to the necessity of advancing the charging and power back up systems for these devices. The conventional and current battery technology has been found lagging in increasing the operating times of these advanced devices, thus leading to

frequent charging requirements. This is a serious drawback towards modernizing portable electronic devices, especially for devices used in military operations and other emergency services where frequent charging is not feasible. Therefore, in order to meet the high demand for present and next-generation portable devices, the development of alternative energy harnessing systems as replacements for batteries is crucial. In this respect, fuel cells in general and hydrogen fuel cells, in particular, have evolved as promising candidates.

In light of the foregoing, we're thrilled to present **Kolibrik.net** — Committed to providing solutions and products mainly for H2FC technologies and electrochemistry. Kolibrik's electronics and software can cover many tasks ranging from basic and applied research, high-power cell and stack testing, stack control system prototyping to target application solutions.

The company was incorporated in 2009 and is headquartered in Žďár and Sázavou, Czech Republic.

Mgr. Jiří Libra, Kolibrik.net CEO, spoke exclusively to The Silicon Review. Below is an excerpt.

Explain your services in brief.

We provide a range of electronic products for laboratory research and testing as well as for the industrial environment, complex solutions for hydrogen fuel cell research and stack testing and control, and software for spectroscopy data acquisition and processing. Our services

cover complete development and engineering process — hardware design and manufacturing, embedded and application software development, project consulting, and system integration.

Can you tell us in brief about your modular control system?

Our modular system is designed to provide compact customizable controllers mainly for hydrogen fuel cells or electrolyzers applications. All modules are of credit-card size and can be stacked to build up a customized system of many types of modules. There is a module as the main controller with basic inputs and outputs, a micro SD card for setup and logs, safety sensors, etc. As a controller, also Raspberry Pi or similar industrial-level embedded-Linux boards can be used, and the system is mechanically compatible with them. There are other modules used for power management, for a variety of sensors and actuators, DC/DC power converters, etc. An important part of the system is cell voltage monitor modules; useful for fuel cells health monitoring. We have two variants of cell voltage monitors; one is low-cost and the second is high precision with additional CAN bus and automotive specifications.

The main goal of our compact modular system is to provide an easily customized controller for the development of prototypes or small series products. All functions can be built from selected modules without extensive hardware development. So, our solution helps with a cost-effective development and fast launch of new fuel cell products and solutions. After stabilization of the overall application design, we provide a service of custom single-board design, which can further

lower the price for higher volume production.

What are the different use cases for your low and high power testing equipment?

Our low power potentiostats are used in the first stages of research. PicoPotentiostat can handle currents from 100 mA down to a resolution of 100 fA (10-13 A) and is used for standard electrochemistry measurements, in materials research, which is important for further fuel cell development. Our basic fuel cell potentiostat is made with the 20 A range, which can be considered a low power device compared to the rest of our portfolio. This type is mainly used for the research of small area fuel cells.

Our flagship products are potentiostats, zero-voltage loads, and stack impedance spectroscopy analyzers developed for research and testing of automotive-grade high-power fuel cells and stacks. Those cells can deliver more than 1000 A and our products can perform all standard electrochemical measurements including impedance spectroscopy on those high-power cells and even on stacks.

Our newest R&D project is focused on a multi-channel impedance analyzer for high-power fuel cell stacks with more than 500 cells, where impedance spectroscopy will be acquired simultaneously on all cells. This system can provide e.g. rapid end-of-line testing in mass fuel cell stack production.

What are the critical issues addressed by your solutions and products?

Regarding our testing equipment, the most challenging is to develop a

device that must handle more than 1000 A, with small-signal frequency analysis modulation over 100 kHz, while still maintaining precision voltage measurements much below 1 mV. Those specifications fight completely against each other.

We developed our products on requests of scientists who were not able to find any suitable existing products that would fit their requirements. We are happy to announce that our development was successful, and the first prototypes of those high-power products are already working.

There are other major players in this segment. How do distinguish your services, standout from the rest?

There are well-established companies that provide potentiostats for a myriad of electrochemical research tasks. Most of them are low-current. We focus on hydrogen fuel cell stacks and electrolyzers, but our products are used also in other fields, like redox-flow batteries. We further

focus on high-current testing, with modifications needed in fuel cell research.

The second part of our portfolio is focused to fuel cell applications. We strive to provide a cost-effective customizable modular solution suitable for application development in both small startups and large companies, providing an option of the redesign for mass production in the future.

How do you deal with the 'never-ending change' in digital transformation?

Changes in electronics hardware and microcontrollers are not as fast as in higher-level IT technologies. However, they are there. So, we try to use well-established solutions, techniques, and components that should be alive in the long run. From the point of view of modern clouds, AI, etc., this approach may seem conservative. However, hardware development takes years and our products must last for years. In the meantime, many 'modern' technologies may emerge and disappear within this time frame.

Do you have any new services ready to be launched?

We are working on our new e-shop which should be launched next month.

What are your trajectories for the next five years?

The market for fuel cells is expected to grow well during the coming years. We are already seeing a steady increase in R&D activities. We are constantly working on the widening of our portfolio and increase the volume of our sales. We focus especially on research institutions and firms involved in hydrogen technology research and application development in this field. E-mobility is a big trend, so we would also like to reach out to automotive companies and their partners as hydrogen drives slowly become a reality.

Of course, the COVID-19 crisis also affected this field. We hope that the activities have been mostly just suspended and are now starting to resume and continue.

“We developed our products on requests of scientists who were not able to find any suitable existing products that would fit their requirements. We are happy to announce that our development was successful, and the first prototypes of those high-power products are already working.”