

 <p style="text-align: center;">CanMor</p>	<p style="text-align: center;">Morphological Institute Canada</p> <p style="text-align: center;">Breakthrough Innovations 1</p>	<p style="text-align: center;">Serving Toronto to London. Kitchener Waterloo preferred.*</p> <p style="text-align: center;">emilzahner@cswebmail.com</p>
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*The Morphological Institute Canada coaches companies, organizations and individuals on matters requiring an innovative approach, like identifying and solving problems and checking out integral solutions for possible errors.. A large benefit once, or a smaller benefit repetitively, innovation is a must to survive. Many prejudices disable innovation progress. These and other deadlocks can be overcome. Business leaders convinced about the need of an integral progress should call the Morphological Institute Canada to discuss their objectives in view of increasing **innovation and operation efficiency**. The Institute is absolutely independent and is able to coordinate parallel innovation coaching projects in North America and Europe.*

What are breakthrough innovations?

The examples we present here! The Morphological Institute Canada does not claim having been involved in the cases mentioned on this page. Nevertheless, it is important for everyone to *take encouragement* from what people achieve once they set their mind to become innovative.

Case A: A Suburban Train designed by Stadler in Switzerland and sold worldwide by Deutsche Waggonbau and AEG Schienenfahrzeuge. Partners involved are mentioned upon your request.

Stadler builds locomotives for setting up trains, rail snowmovers, and other specialties running on rails. During WW2 the company started in a garage modifying cars to run on batteries. Stadler later added an Engineering Consultancy, and 1961 started manufacturing electric and diesel locomotives. 1987 Peter Spuhler joined Stadler only one year after finishing his studies at the School of Economics in St. Gallen. 1989 Spuhler bought Stadler, a company employing 25 people. 1995 the company with now 65 people had its break through. They designed and built a new, **modular suburban train with 65 % less weight and 50% less cost** compared to currently operating trains. Though extremely innovative, sound engineering principles guided design and construction. By eliminating prejudices and grown patterns of doing things, the approach reduced the trains's weight from 130 to 45 tons, reduced work, and eliminated many

expensive parts. Licenses are sold to build the trains, as quantities of 250 trains (a tender during 1995) are outside of the manufacturing capacity of Stadler's.

Case B: In manufacturing trains, these heavyweights pose special problems. Whether the factory is moved around the trains or the trains are moved within the factory is a considerable logistic problem. A German company places locomotives on an air cushion type of moving carpet. Sitting on this «hovercraft», **a heavy locomotive can be moved and rotated by a fork lift**. There are no rails in this railway vehicles factory.

Case C: The new Airbus 320 shall be fitted with a rudder that is expected to **reduce fuel consumption of the entire aircraft by about 15%**. The surface of this vertical wing will be perforated with microscopic holes of only 0.07 mm diameter. Channels on the inner side are kept at lower pressure than the oncoming air. Turbulence waves are reduced and resistance to air flow drops heavily. Daimler Benz Aerospace GmbH hopes the technical breakthrough will be adopted to all new Airbus aircraft.

Case D: A new Parallel Computer is being built in Switzerland. Its weight being **only 50 kg**, it works at the speed of **1.6 Gigafllops per second**. It **cost** about **one percent** of comparable machines and it consumes only **1/1000 of competitor's power**. In Switzerland operate super computers built by Cray (2), NEC (1), and the new unit at ETHZ. The newest model being developed is called MUSIC and with **3.8 GFlops** processing performance is up to **6 times faster than a traditional super computer**. It is a massive parallel computer ranking with the fastest, most compact and most economical ones of the world. MUSIC (Multiprocessor System with Intelligent Communication) uses several processors connected via a custom built communication controller. The system is barely larger than a PC and its modular construction permits easy system integration. Simulating Big Bang isn't far.