Electromobility

IAV – Your Partner for Electric Motoring
Engineering for the Entire Vehicle
IAV is one of the leading engineering providers to the automotive industry and employs over 4,000 members of staff worldwide. Our long-standing clients include virtually all automobile manufacturers and their system suppliers. Hand in hand with them, we work on advanced solutions for powertrains, electronics and vehicle development.

Our attention at all times focuses on the entire vehicle – and not just on individual components. Guided by this approach, IAV provides vehicle manufacturers and suppliers with independent support in development activities to the point of mass production.

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Electric car: tomorrow’s means of transport?
Mobility Undergoing Change

With a changing world climate and the growing awareness that resources are becoming ever scarcer, the demand for electric vehicles has reached a new dimension. Politicians and consumers are also demanding the development of electrically propelled cars against the backdrop of rising oil prices.

What is needed in future is a vehicle that is uncompromising in terms of ecology, traveling range, price, safety, quality, ride comfort and driving fun. To satisfy these demands, an electric vehicle must take into account all of the specific properties that come with this drive concept. It will only be possible to harness all the benefits of an electric powertrain effectively by redefining the vehicle concept on a broad front.

New technologies are also demanding new suppliers. These must be integrated in the automotive industry’s newly structured value-adding chain and provided with the skills required to meet this exacting task.

On top of this, electromobility will necessitate entirely new business models in relation to the familiar infrastructure. Whereas a combustion engine can quickly refuel just about anywhere, charging stations are still few and far between.

Electric cars are not simply vehicles with a different power unit. Their widespread introduction on the market will lead to a dramatic change in mobility management. Coping with this complex change will demand strong and competent partners. IAV can draw on decades of experience in developing electric vehicles.

How can we help you?
All Powered Up for 20 Years

Our involvement in developing electric vehicles for mass production goes back as far as 1990. During the years that have passed since then, we have realized many other projects for study, concept and production vehicles with electric or hybrid drives.

We can also provide our clients with many years of expertise in developing hybrid vehicles for mass production. In the light of recent developments, we are working on more and more projects for electric vehicles.

Are you interested in our references? Approach us – we will be pleased to show you IAV's reference projects and tell you just how competent our staff are.

Electric power: basis for future mobility
IAV was involved in developing the Golf City Stromer (Golf III) as far back as 1994.

What will tomorrow's car look like?
Performance

The aim is to maximize the potential of electric powertrains.
Given their high level of efficiency and torque, electric motors provide the ideal basis for a strong and efficient powertrain. But to get this power onto the road effectively, it takes a powertrain that is prepared for the job in the best way possible. In addition to transmission and power electronics, this is an area where the battery plays a key part, as it determines the performance and traveling range of an electric vehicle.

To exploit the advantages of an electric drive concept to the full, an electric vehicle must be developed completely from scratch. The vehicle concept will only be a success if it is geared to the conditions and limitations of the electric powertrain.

This also involves meticulous planning for all secondary power users. Energy is a scarce resource in the electric vehicle. Each additional power user reduces traveling range and power output. This calls for intelligent concepts that are careful in their use of the energy stored in the battery. For them to be so, the concept for the electric vehicle must be all-embracing as early as the design study phase. All of the disciplines involved should coordinate and optimize this design study.

Do you need specialists with expertise in the entire vehicle, specialists who are passionate about developing electric vehicles? We can assist you from the concept and approved prototype phase right through to the start of production. Beyond this, we are also your partner for quality assurance and support in the field.

Have you met our specialists yet?
Power from renewable energy sources is the basis for carbon-neutral electric vehicles
The battery is an elementary part of the electric drive. Its storage capacity goes a long way to defining the traveling range and performance of the electric vehicle. The ability of modern and future batteries to store energy is far poorer than that of conventional fuels. This has direct repercussions, also for traveling range which is significantly shorter for electric vehicles than vehicles running on combustion engines.

Utilizing the battery with all of its potential demands a deep understanding of the chemical and physical processes taking place inside the battery cells. Extensive simulation and testing facilities are necessary for optimizing battery systems with regard to their specific applications. Cell-related monitoring of battery charge determines the battery’s range and life. This requires highly developed monitoring electronics.

Battery temperature conditioning is another important aspect. The temperature window that batteries work in efficiently is limited. They need to be charged on a regular basis. Whether by charging station or range extender, the motorist expects an optimum supply of power. This is where ecological aspects play a crucial part.

A key factor in determining an electric vehicle’s carbon footprint is the way in which power is produced. An electric car can only reap its full potential savings if power is derived from renewable energies. But if power comes from coal-fired power stations or from the classic power mix of the type predominating, say, in Germany, the electric vehicle has a carbon footprint that is no better than that of a combustion engine.

Developing batteries in this complex field of tension is a job for specialists who have not lost sight of the overall vehicle.

Have you met our battery developers yet?

Electric vehicles require a change in the power mix
Developing electric vehicles harbors many challenges. The high levels of voltage and current automatically occurring in an electric vehicle will not only demand new technologies – the methodology underlying vehicle development will also have to change. For instance, electric vehicles require a complex high-voltage electrical system in addition to their electronic and 12-V system.

The increasing scope of functionalities provided by electrical / electronic means and the sheer extent to which components are interconnected mean that the E/E architecture must be planned in meticulous detail. The technology itself behind the high-voltage electrical system must be adapted on a broad scale to the requirements of the automotive industry.

High voltages and currents inevitably produce electromagnetic fields. The electromagnetic compatibility of all electrical components must be taken into consideration as early as the planning and concept definition phase as changes later on can be very costly. At the same time, high voltages and currents also harbor huge potential danger. Comprehensive safety precautions must be taken to prevent a hazard, whether in normal vehicle use or in the event of a malfunction. The functional safety of electric vehicles must be an integral part of the development process as early as the initial concept phase to avoid corrective action.

And last but not least, everything must be brought together to produce a well-functioning whole. Overall integration is the touchstone for the work done by the developers. This shows whether development processes have been intermeshed and efficiently coordinated from the very outset.

Time to get the concept on the road? One step on the way to reaching the start of production is the prototype. IAV has extensive experience, the human resources and facilities for constructing prototypes with high-voltage components.

Complexity is the order of the day for our development engineers. Have you met them yet?
Electronics – indispensable in optimizing electric vehicles
Fleet testing is the touchstone for the work performed by the developers.
An electric vehicle should be fun to drive. Knowing what a gasoline or diesel-engine vehicle is like to drive, the motorist has high expectations of electric vehicles. This goes for driving dynamics and traveling range just as it does for ride comfort. Yet at the same time, old habits die hard. Although motorists want to drive on electric power, they do not want any compromises in relation to drivability. For the time being, an electric vehicle will come with limitations to traveling range.

Motorists will have to learn to live with short distances-to-empty. They will expect vehicles to save as much energy as possible. The vehicle must be able to draw on a wide range of external information, such as route profiles, in order to optimize fuel efficiency. This makes communication between driver and vehicle indispensable. The HMI required for this is the interface between driver and vehicle. A short distance-to-empty must not compromise driving comfort.

Bringing new concepts to the market will make it essential to obtain early and adequate feedback from the motorist. We can provide you with the means for fleet testing with automatic data acquisition and evaluation for results that say the most, yet cost the least.

The demands on electric vehicles are manifold. Our engineers have their eyes set on the entire vehicle.

Do you want to see electric vehicles through the eyes of our engineers?