Theses

1 The individual factors of the development and manufacturing of buses; communication between the engineer and the designer

1.1 *1832-1935*: The production and manufacturing of coaches involved two types of expertise. More hidden elements like the expensive appliances of the chassis, the spring and the wheels were created only once, to be used for manufacturing bus parts by several generations to come.
Demands for individuality mainly concerned the body as the attention of the customer was focussed on its elaborateness and appeal. Thus, the development of the body required a person with an individual approach while the production of the chassis needed a practical mind.

1.2 *1936-44:* During these years the development of buses in Hungary undoubtedly meant adapting licences.
Because of the sparse number of orders, the manufacturers set high demands concerning quality. They were very much aware of the fact that a nice design is one of the most important elements of quality. The shape and excellence of luxury cars served as the standard set for everyone.
All of the first Hungarian designers of bodies had qualifications in engineering, therefore they were able to cooperate with those doing traditional engineering jobs easily.
To my knowledge, because of licences, bodies of commercial vehicles were implemented, except the Harcsa model of the MÁVAG factory. Independent designs were mostly made for the unique models.

1.3 *1945-89:* The development of buses in Hungary after 1945 was two-faced and so were the related political intentions. On the one hand, sufficient quantities needed to be provided, on the other, the design of the buses had to demonstrate the modernity of the socialist system. Manufacturers were quick to realise that in this new world they had no competitors so competitiveness was no longer a requirement. Monopoly also meant marketability. They did not need to take any risks any more. Because of 'oversupply in engineers' the technical content was overemphasized. Attempts to describe success produced expressions like *'very modern', 'a lot of', 'very strong'* or *'enormous'*. The state, being the sponsor kept an eye on the form it considered attractive and made decisions accordingly. It

insisted on these decisions and ensured that they were complied with. Therefore, Ikarus, the only Hungarian bus manufacturer always had to present designs with an aesthetic value to state organs. Thus a strange thing happened, namely that the official ideology, which otherwise advocated general poverty, insisted on aristocratic, art deco design for a long time.

Undoubtedly, the numerous engineers did not like this practice at all because they had to adapt to accepted and approved designs. In the eyes of the engineers the designer working independently was very often just a nuisance, some kind of an oddity that could not easily be accounted for. They would have preferred the designer to make a design based on technical instructions and then disappear. Quite understandably, the dialogue between the engineer and the artist/ designer worked only for short periods of time.

1.4 *From 1989 onward:* Hungarian bus industry, which had no previous experience of the free market now faced the real rules of the game, i.e. that there are no rules. The factory was half-owned by the state and the management, now also having new members, decided on development that would support an offensive strategy. They realised that a product needs to be competitive and not just marketable. Competitiveness was to be reached by developing the technical content, which they wished to reinforce with design. Technical development, however, proved to be unsuccessful.

When the factory became a private company development went on in two directions. The task of the team of engineers was to make series based on the already existing developments. The other teams, under the direction of designers were given a free hand in making innovations, based on the useable part of the technical development. Thus, the designer was now present all the time and was able to prevent technical or technological changes affecting the design. This, however, only lasted until the prototype was created. So the dialogue between the engineer and the artist/ designer still existed only for a short period of time.

In order to establish competitiveness, design and its protection must be considered as an integrating factor. The designer must be present during the whole process of production and must be able to prevent any unjustified technical or technological changes that would affect the design.

In developed industrial countries an approved design and all its parameters are of the same significance and are strictly protected, just as all the technical parameters.

The designer is the 'catalyst' of the whole planning and production process but to achieve this, the legal and structural framework of guaranteeing mutual quality assurance must be established.

2 Community transport as a problem

2.1 *1832-1935:* Local social transportation by bus, which catered primarily for the needs of the less well-off, was called to existence by big cities. In cities in Europe and in Hungary the problems of crowdedness, public safety and disorder had to be solved first, with the help of city planning.
As a second step, traffic was regulated by rules enforced by authorities.
The third step was to define the standards for designing the means of transport more and more accurately.
Still, there was one more expectation set by the magistracies and the public. Houses were built and clothes were made in a fashionable style so they expected the other objects in the cities, e.g. the omnibus to have an attractive appearance.

2.2 *1936-44:* Because of the size and structure of the towns, public transport in Hungary was underdeveloped. The capital had a centralised road structure and the backbone of its transport was constituted by trams, rail-buses and suburban trains. Buses played only a supplementary part. City buses were hardly to be seen outside Budapest.
Because of the expensive fares, buses were mainly used for transporting officials but, due to being noisy, smelly and reeky, they were not very popular. They acquired a significant role only when providing communications to factories and elegant residential areas.

2.3 *1945-89:* The development of public transport during this period can be divided into three phases.
At the time when life was started again after the war, the first step was to provide the transport of goods and then of passengers. The government announced the doctrine of public/ mass transport.
In the second phase, the government launched a programme with the definite aim of integrating the capital and the big towns and the areas surrounding them (all of these areas had grown significantly in the previous years) with the help of mass transport. The main part of public transport was constituted by buses that were

flexible, needed only minimal infrastructure and provided transport for those going to or coming from work.

In the third phase, the construction and standardisation of the whole public transport capacity was set as an aim. That was when the track-based and the other transport systems were *integrated*. In country towns, networks of bus services running in the centres and connecting to these central lines were set up. Bus services accounted for 50% of the national passenger transport capacity.

2.4 *1989-*: After the systemic change in the early 1990s cheap mass transport was replaced by expensive community transport.

The situation was made more difficult for the companies operating the bus services because it was difficult to forecast the size of commuters' transport in the future. Companies were closed down one after the other and it was not clear what would replace them. This meant that even the government was unable to predict the capacity to be built and the vehicle mix to be needed. When grants from the state and the capital ceased, transport companies faced a crisis, which they tried to overcome by changing their legal status.

The structure of transport in the capital was unchanged. The rapid underground railway is very efficient in covering large distances, but its integration into city traffic is still an unsolved problem. New and low-floor trams were only introduced on the line No. 4-6 (the main inner-city tram service). Innovation in transport first appeared in the form of semi low-floor buses that were able to service the main lines and the ones connecting to them. They were followed by low-floor buses. Semi low-floor and low-floor buses were able to ensure that people are not excluded from travelling because of their age or physical condition.

Developers and manufacturers of buses as well as operators of bus services must understand the role of community transport. Buses are made for their users, so it is their interests that must be considered. Bus drivers must get the experience of driving, passengers that of travelling and passers-by the aesthetic experience from the sight of the bus, the same aesthetic experience they normally get from the personal belongings they purchase.

Sizes and arrangements must be designed in such a way that nobody will be excluded from travelling because of their age or physical condition. Buses must integrate into the needs and conditions of city life. Because of environmental considerations, passenger flow must be reasonable so that it imposes a balanced load on all of the areas of both the vehicle and the environment.

3 The principle of product series – the manufacturers' strategy

3.1 *1832-1935:* The principle of product series already existed in the time of omnibuses, since the size of the chassis and of the wheels and the load capacity were all defined by the type of wood available in a certain place. Parts that were prone to frequent damage and their templates were stored. The parts of the frame could not be stockpiled because of their individual character.

3.2 *1936-44:* In 1932, the central organs issued unified guidelines concerning requirements and thus the basis of standardisation in the Hungarian automotive industry, including the manufacturing of bodywork was laid down. The numerous small businesses involved in manufacturing bodywork set up a common design office in 1936 in order to ensure unified standards.

When purchasing licences for chassis with engines, they mainly considered their versatile application. The unified machinery was put in expansible chassis so they would be able to carry the widest range of commercial vehicles. Building bus bodies on them was just one of the numerous solutions (and not even the most important one).

3.3 *1945-89:* The versatility of the early bus series was a result of the manufacture-type technology used in building bus bodies. The similarity of bent and embossed elements depended on the extent to which templates were used for making them.

In the mid-1960s, they wanted to replace the practice of having different chassis for city and long-distance buses with building both types on the same platform, which they called the series principle. According to this doctrine, the various models must be designed at the same time, using the same machinery and body elements, with interchangeable variable parts. The technological principle that is based on moulded and rolled and bent profiles represents the large-scale industry approach. The series principle they decided on was in fact a *'construction set principle'*, which was inflexible, therefore it could not be developed. The uniformity of the Ikarus model No. 200 was suitable for the conditions of a closed market but did not work in a competitive environment.

3.4 *1990-*: In the first phase, part of the management of the Ikarus factory, who wanted to preserve the organisational system and the capacity, had the presupposition that the earlier market still existed and everything would be set back to normal after a while. The technical management was more cautious,

saying that the older No. 200 model should be offered but the 300 and 400 series should also be manufactured and the aim should be to get orders of small numbers instead of several thousand.

Accident played the main role in realising this idea. The equipment for the manufacturing of the above mentioned, modern models was minimal so it was supplemented to a reasonable extent. The number of plastic parts was increased. Thus the manufacturing costs of the models were reduced and their variability grew. The first real series of buses were created. The technical management also started the factory's own mechanics development.

Because of the failure of this development, a more modest programme was realised in the next phase. To this end, they considered the three items of the real series principle as a basis: various types of mechanics, an own standardised frame and "all the other parts" that would ensure flexibility. Development was based on the new design.

Development of buses should be based on the three-item formula of the real series principle: the various types of mechanics, an own standardised frame and the flexible "all the other parts". Development should be based on approved and protected design. The freedom of design comes from the extent of the elasticity of the three components.