

## UNUSUAL STATISTICS ABOUT ROLLOVER ACCIDENT OF BUSES – III.

(Presented by Hungary)

### 1. Remarks to the statistical data:

This is the continuation of the work, the results of which were presented in GRSG on its 78<sup>th</sup> and 80<sup>th</sup> meeting as informal documents No.6. and No.5. Those rollover bus accidents were collected which have been reported by the Hungarian press (Radio, TV, newspapers) The data (see Table I.) are not officially checked, neither technical nor medical examinations, investigations have been made. The information about the last 8 rollover accidents were given by the Holland and Norwegian delegates in GRSG.

### 2. The summary of the statistics.

2.1. The same structure is used when summarising the data as it was used earlier to be able to compare the data and summing them up. Some explanation are given below to Table 2, (the referring numbers are used in Table 2. as well.)

- (1) the countries may be “involved” as manufacturer, approval authority, operator or the scene of the accident
- (2) similar or close to the standard rollover test: rollover into a ditch, down on a slope (not more than one complete rotation)
- (3) more than one rotation, more than 8m level difference
- (4) frontal collision and rollover, rollover and fire, falling into water, etc.
- (5) e.g. collapse, when the survival space was obviously damaged
- (6) the survival space very likely did not damage.

2.2. Table II. shows that the relative frequency of Category III. is around 50% in the total rollover accidents. The number of high decker (HD) coaches among this category:

HD coaches	11
Traditional coaches	14
Presumably traditional coaches	5
No information (could be HD, or DD too)	<u>18</u>
total:	48

That means: min. 23% of the tourist coaches rolling over were HD coaches. Considering the double decker (DD) coaches also in this category, this presentage is min. 30%. These figures call the attention to the problem that the higher vehicles (HD and DD) are over represented in the rollover statistics, related to their proportion in the bus fleet. In other words their lateral stability practically is not satisfactory.

2.3. The injury risk is shown below in those rollover accidents which are not too severe (categories: “turned on side” and “rollover from the road”) The total number of this kind of rollover accident is 54 (56%)

fatalities	259 (26%)
serious injuries	186 (61%)

light injuries	287 (69%)
injuries without classification	198 (39%)
statement “more fatalities and injuries”	5 times

#### 2.4. The site of the rollover accidents:

Hungary	29 (30%)
Europe (excluding Hungary)	33 (34%)
Other than Europe	35 (36%)

Hungary is over represented, but that is natural because this statistics is based on the Hungarian press reports. From outside Europe mainly the very serious accidents were reported. (In 15 cases, out of Hungary, only the number of fatalities have been given) Table 3. gives the numbers and the percentages of the rollover accident groups in the three geographical region.

Table 3.

	Turned on side	Rollover from the road	Combined rollover	Serious rollover	Total
Hungary	6 (21%)	20 (69%)	3 (10%)	-	29 (100%)
Europe (excl Hung.)	4 (12%)	13 (40%)	8 (24%)	8 (24%)	33 (100%)
Other than Europe	1 (3%)	10 (28%)	14 (40%)	10 (29%)	35 (100%)

Table 4. gives some feeling about the yearly frequency of the rollover accidents.

Table 4.

	1990-1998	1999	2000	2001	2002	Total
Hungary	4	2	4	13	6	29
Europe (excl. H)	8	8	7	5	5	33
Other than Europe	2	7	6	12	8	35
Total	14	17	17	30	19	97

The year 1999 was not a detailed, fully observed period and 2002 relates only the first seven month. As a yearly average, Hungary (having a bus fleet in the order of 20.000 units) was producing 6-7 rollover accident per year in the last four years.

Table 2.

Summary of rollover statistics	Statistics I. 1990-1999	Statistics II 01.01.2000- 01.03.2001	Statistics III 01.03.2001- 31.07.2002	Sum of I. II. III
The number of accidents	23	23	51	97
The number of countries involved <sup>(1)</sup>	min.15	min. 15	min 26	min 37
The total number of				
• fatalities	238	254	519	1011
• serious injuries	103	107	94	304
• light injuries	122	123	170	415
• injuries without classification	197	122	189	508
• reported “many injuries”	2 times	1 time	6 times	9 times
Type of rollover accident (severity)				
• turned on side	4	2	5	11
• rollover from the road <sup>(2)</sup>	13	12	18	43
• serious rollover <sup>(3)</sup>	3	6	9	18
• combined accident with rollover <sup>(4)</sup>	3	3	19	25
Category of the bus rolled over				
• Category I. (city, suburban)	2	2	2	6
• Category II (intercity, local)	-	2	4	6
• Category III (tourist, long-distance)	18	10	20	48
• Small bus (Reg.52)	-	2	9	11
• Double decker (Reg.107)	2	2	1	5
• School bus	-	1	2	3
• Other (worker, pilgrim, etc.)	-	1	4	5
• unknown	1	3	9	13
Deformation of the superstructure				
• serious deformation <sup>(5)</sup>	4	5	6	15
• slight deformation <sup>(6)</sup>	5	5	11	21
• no information	14	13	34	61

**Bus rollover accidents between 01.03.2001 – 01.08.2002**

Table I.

	Date City (district) Country	Type of the bus Category Operator	Circumstances of rollover	Fatalities and injuries	Damage of the superstructure
1	16.02.2001 Soul South Korea	Category I. Local operator	24 cm snow on the road, the bus slipped down from an elevated road. Finally it stopped on its roof	More injuries	The superstructure was strong enough, the survival space was not harmed
2	10.03.2001 270 km from Addis Abeba Etiopia		The bus had a frontal collision with a utility vehicle, the driver lost the control, the bus rolled down into a precipice.	22 fatalities 10 serious injuries	
3	20.03.2001 Budapest Hungary	Midi bus Roman operator	The bus hit a car, rolled in a ditch having a depth of $\approx 0.8$ m but the further rotation was blocked by a concrete fence (of railway station)	1 serious injury 5 light injuries	Front wall damaged on left side, the superstructure had small deformation but the survival space was not hurt.
4	25.03.2001 Santa Comba Dao Portugal	Category III. (tourist coach)	The bus slipped from the road, rolled down 30 m and stopped in a house garden. The passengers were elderly, retired persons	14 fatalities 9 serious injuries 16 light injuries	
5	21.03.2001 Bánd Hungary	IKARUS 256 Category II.11 m Volán (Hung.Operator)	Heavy truck run into a bus standing in a bus stop. The bus rolled in a ditch having 0,5-0,6 m depth, laied on its door side. Firemen took out the passengers	5 serious injuries 13 light injuries	The superstructure was slightly deformed, but the survival space was not hurt
6	02.07.2001 Kujchen China		The bus slid on the road and finally rolled down on a steep slope	28 fatalities many injuries	
7	12.08.2001 Hsin Chiang China	Regular intercity bus Chinese operator	The driver fell asleep and the bus rolled down, into a river. (41 passenger on board)	35 fatalities	

8	24.08.2001 Apc Hungary	Microbus Hung. operator	The bus was overtaking a car which also started the same manoeuvre. The bus driver made a hidden steering manoeuvre, the bus rolled into the ditch.	2 serious injuries 6 light injuries	
9	24.08.2001 Shang Si China	Local operator	The bus rolled down on a long slope (30 m) and fall into a river	32 fatalities 19 injuries	
10	27.08.2001 Close to Kano Nigeria	Local operator	The bus rolled down from a bridge into a river	49 fatalities 23 injuries	
11	22.09.2001 Jakabszállás Hungary	SETRA Category III. HD Switzer operator	Foggy whether, the bus hit a car and after that turned into a 0,5 m deep ditch, laying on the sidewall	2 injuries	Left side of the frontwall damaged, the survival space remained intact
12	03.10.2001 Chattanooga USA	Category III. HD, 3 axles	Head on collision with a car, after that the bus rolled down from the road, lied on its sidewall. 36 passengers on board.	6 fatalities	The side windows were broken out, the survival space was not damaged
13	24.10.2001 Esna City Egypt	School bus Local operator	The bus had a frontal collision with a truck, after that it rolled into a irrigation channel	14 fatalities (children)	
14	24.10.2001 Guatemala City Guatemala	Company bus Local operator	The driver was drunk, overspeeding, loosing the control, the bus rolled into a river. Workers were transported.	5 fatalities 40 injuries	
15	14.11.2001 South from Barcelona Spain		The bus was drifting from the road and rolled down to a level 0,6-1 m under the road (Elderly retired people on board)	15 fatalities more injuries	
16	17.11.2001 Close to Szeged Hungary	Minibus Local operator	Fogy whether, slippery road, the bus slipped and after that rolled over	More injuries	
17	15.11.2001 170 km from Lima, Peru		Because of technical fault, the driver lost the control felled down into 20 m deep precipice	24 fatalities 17 injuries	

18	19.11.2001 Budapest Hungary	Ambulance minibus First aid Service	The minibus was hit by a van, after that it turned to its side	3 injuries	No considerable deformation on the superstructure
19	01.12.2001 Pér Hungary	IKARUS 350 Category III 12m HD, Hungarian operator	Foggy day slippery road, the bus slipped and rolled into a 0,6 m deep ditch. The bus lied on its side, the passengers left it trough the escape hatches	1 injury	Only slight deformation on the superstructure, the survival space remained untouched
20	01.12.2001 Close to Győr Hungary	11 m “worker” bus, local operator	Hitting a car the bus turned into a small ditch, laid on its side	No injury	The survival space did not damage. Only slight deformations.
21	2.12.2001 Meehring Germany	Category III. German operator	Icy road, in a sharp curve the bus slipped, whirled and turned into a ditch. 50 passengers on board.	13 serious injuries 17 light injuries	
22	10.12.2001 Cairo Egypt	Category I. (city bus) Local operator	In the city the bus broke the guide rail of the overbridge going to the airport and fell down, 6-8 m level difference	“Many fatalities and injuries” were reported	The roof collapsed
23	14.12.2001 Akaba Jordanian	Pilgrim bus	The driver lost the control, hit a heavy truck, rolled over and burned out.	52 fatalities (everybody was killed)	
24	26.12.2001 Bak Hungary	Category II Zala Volán	On icy road the bus slipped, turned on its side and slipped into a small ditch. 20 passengers on board.	4 light injuries	
25	02.01.2002 Baracska Hungary	IKARUS 256 Category II 11m Hung. operator	Snow on the road, the bus slipped and turned into a ditch	4 light injuries	
26	15.01.2002 Nagykölked Hungary	Volkswagen Small bus Hung. operator	Company car, transporting workers, slipped on the icy road, turned into a ditch, hit a pole, finally landed in a brook.	7 fatalities 6 serious injuries 12 light injuries	
27	17.02.2002 Chungde China		The bus left the road and rolled into a 300 m (?) deep precipice 60 passengers on board	25 fatalities 12 injuries	

28	20.01.2002 Hamburg Germany	Mercedes Ambulance minibus Local operator	The bus was hit by a van, the minibus turned on its side	5 injuries	The superstructure deformed, plastic hinges formed, but the survival space was not hurt
29	16.02.2002  China		The bus rolled into a 100 m deep precipice.	12 fatalities 8 injuries	
30	20.02.2002 South from Katmandu Nepal		The driver lost the control, the bus slipped and rolled down into a 100 m deep precipice.	34 fatalities 7 serious injuries	
31	13.03.2002  Peru		Wet road, the bus slipped and rolled into a gas station. Big fire, all the passengers were killed	35 fatalities	
32	18.03.2002 Close to Metz France	Category III, HD, 3 axles Dutch operator	The bus had a frontal collision with a heavy truck, the bus rolled down from the road ( $\approx 1,5$ m level difference) and laid on its side	7 fatalities 3 serious injuries 30 light injuries	The roof had considerable deformation, the survival space was damaged in the first part of the bus
33	20.04.2002-08-14 Close to Salalah Oman	Ashok Leyland 12 m "worker bus" local operator	Company bus transported workers, hilly road, sudden steering, the bus rolled down into 6-8 m deep depression	46 fatalities 8 serious injuries	The roof collapsed, there was no survival space
34	06.05.2002 200 km from Mexico City Mexico	Tourist coach	On a hilly district the bus left the road and rolled down into a 20 m deep precipice	17 fatalities many injuries	
35	31.05.2002-08-15 Budapest Hungary	Mercedes Ambulance minibus First Aid Service	After a collision with a car the minibus turned on its side	2 serious injuries 1 light injury	Small deformations, the survival space remained untouched
36	07.06.2002 Jalalabad Afghanistan	Tourist coach	The bus, transporting refugees rolled down from the road, into the river Kabul	45 fatalities no survivor	

37	15.06.2002 250 km from Soul South Korea	Category III, 12m	The bus had a frontal collision with a tanker and after that rolled over.	13 fatalities	
38	20.06.2002 Miskolc Hungary	Minibus (ambulance) Hung. operator	The bus was hit by a car, the minibus turned on its side and slipped away.	2 light injuries	The superstructure got only slight deformation
39	01.07.2002 Balatonkersztúr Hungary	DAF-Berkhof Category III, 12m, HD Polish operator	The bus run into a roundabout, where a 10 cm high kerbstone tilted it turning on its side. Slipped $\approx$ 40 m and rolled trough a 1,5 m deep ditch and stopped on its roof.	20 fatalities 17 serious injuries 14 light injuries	The roof completely collapsed, many seats were broken away. No residual space remained.
40	04.07.2002 25 km from Linz Austria	SCANIA Category III. 12m, HD Polish operator	The bus run into a car, after that broke the belt rail, run down on a standard slope (6 m) and turned on it side	3 fatalities 2 serious injuries 25 light injuries	The windows were broken, the pillars deformed (plastic hinges) the survival space partially damaged
41	05.07.2002 Highway M1 Győr Hungary	microbus Holland operator	The bus left the road and turned into a small ditch.	2 serious injuries 4 light injuries	
42	14.07.2002 Near to Nagyszeben Romania	Category III. Slovak operator	The driver fell asleep, the bus broke through the safety rail and rolled into the river Olt, 10 m down.	no injuries	
43	26.07.2002 Kula Kosovo	Category III.	The bus left the road and rolled down into a precipice	10 fatalities 31 injuries	
44	October, 1996 Antalya Turkey	Tourist coach	Rolled down into a ditch	8 fatalities	
45	March, 1997 Mexico	Tourist coach	The bus turned on its side. 41 passengers on board	4 injuries	



46	1998 Paris France	Tourist coach Dutch operator	The bus turned on its side	6 serious injuries 13 light injuries	
47	January, 1999 Zillertal Austria	Tourist coach	Rolled down into a ditch	2 fatalities 15 injuries	
48	March, 1999 Wiesbaden Germany	Tourist coach, DD, 3 axles	The bus rolled into 30 m deep precipice	2 fatalities 9 injuries	
49	August, 1999  Bolivia	Tourist coach	The bus rolled over and burned out. The passengers could evacuate the bus	2 fatalities	
50	22.10.1999  Norway	VOLVO B10, Vest Karossassi School bus, 12 m	The front right wheel hit a big stone, the bus turned on the other side of the road, rolled down on a 10-12 m long slope and stopped on its side in a river. 12 children on board	3 fatalities 4 light injuries	
51	December, 1999  Bolivia	Tourist coach	The bus rolled down into 300 m deep precipice	10 fatalities	