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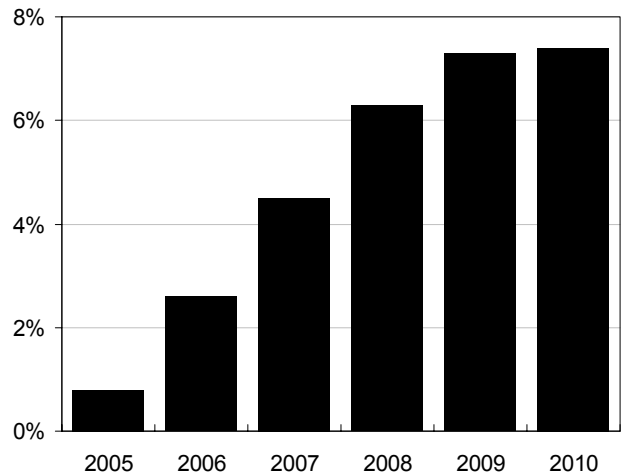
## Global Powertrain Outlook

### Europe's shifting transmission scene

Considering the global light vehicle transmission market, the European Union is poised to undergo the most significant change to the end of the decade, owing to a move towards dual clutch transmissions (DCTs). Companies such as Getrag, ZF and Graziano have all invested heavily in this technology for European application.

However, despite the current hype surrounding DCTs, much speculation remains regarding the extent to which DCTs will penetrate the market. There are competing solutions that threaten to truncate potential DCT penetration. The most significant of which is the continuously variable transmission (CVT), with some OEMs betting heavily one way or the other.

**Dual Clutch Transmission (DCT) Penetration**  
European Union (2005-2010)



Source: AUTOFACTS Global Light Vehicle Outlook 2006 Q1 Release

- Dual clutch automated manual transmissions (DCTs) are forecast to outpace growth of other automatic transmissions such as CVTs and torque-converter automatics within the EU, to 2010.
- DCTs are essentially manual transmissions with pre-selected gears that allow for rapid gear changes with minimal torque interruption, without the need for a torque converter.
- However, current PwC Automotive Institute analysis indicates that the penetration rate of DCTs will be noticeably lower than the optimistic forecasts of some suppliers (e.g. 15-18% share by 2010).
- Most of the major European OEMs are expected to have DCT technology available by 2010. Renault, however, will likely favour CVTs due to its affiliation with transmission supplier Jatco.
- Further, DCT strategies will vary across the individual light vehicle manufacturers: For example, GM and Fiat are likely to use DCTs in niche applications, while other OEMs have adopted a more volume-based approach.
- Market penetration of dual clutch transmissions will also depend on how OEMs factor the price of the transmission technology into the vehicle. For example, VW is pricing its DCT more as a torque converter automatic transmission than a technologically enhanced manual. Consequently, the much-lauded 11% DCT penetration on the Golf falls short of the “quantum leap” expectations of many protagonists in the market.
- Although DCTs can be applied across a wide variety of vehicle segments, they are most likely to remain confined to either a specific niche within the high-end sports car application or at the heart of the European diesel engine market.
- Major automatic transmission suppliers are also not likely to accept a substantial loss of market share to DCTs; this applies particularly to Japanese suppliers such as Aisin AW and Jatco. Also, Bosch VDT is preparing to introduce CVT belts with a 450Nm handling capacity, thereby significantly expanding the potential application of CVTs going forward.

Engine Displacement Range	2005	2006	2007	2008	2009	2010	Growth Analytics (2005-2010)		
							Unit Diff.	% Chg.	CTG %
<=1.0L	5,274,004	5,312,354	5,278,483	5,471,157	5,453,900	5,385,060	111,056	2.1%	1.4%
1.0-1.6L	17,879,982	18,647,462	19,704,518	20,840,314	21,397,739	21,645,869	3,765,887	21.1%	48.2%
1.6-2.0L	13,521,428	13,428,300	13,912,096	14,045,829	13,785,960	13,925,916	404,488	3.0%	5.2%
2.0-3.0L	12,046,199	12,574,753	13,073,831	13,411,385	13,621,400	13,868,325	1,822,126	15.1%	23.3%
3.0-4.0L	6,801,943	7,136,743	7,670,663	8,142,698	8,166,595	8,202,297	1,400,354	20.6%	17.9%
>4.0L	6,267,868	6,408,931	6,464,260	6,417,637	6,556,400	6,576,730	308,862	4.9%	4.0%
Electric	1,804	779	1353	2,709	2,832	2,962	1158	64.2%	0.0%
Global Total Consumption	61,793,228	63,509,322	66,105,204	68,331,729	68,984,826	69,607,159	7,813,931	12.6%	100.0%

Cylinder Configuration (Top 5)	2005	2006	2007	2008	2009	2010	Unit Diff.	% Chg.	CTG %
I4	39,863,391	40,948,177	42,905,652	44,604,563	44,677,199	45,026,237	5,162,846	13.0%	66.1%
V6	9,362,931	9,819,111	10,219,186	10,609,670	10,822,884	11,004,317	1,641,386	17.5%	21.0%
V8	5,177,674	5,370,421	5,649,421	5,611,796	5,676,456	5,686,983	509,309	9.8%	6.5%
I3	4,036,302	4,160,850	4,243,641	4,302,340	4,478,340	4,569,316	533,014	13.2%	6.8%
I6	1,627,192	1,399,505	1,196,193	1,231,863	1,298,364	1,322,897	-304,295	-18.7%	-3.9%
Other	1,725,738	1,811,258	1,891,111	1,971,497	2,031,583	1,997,409	271,671	15.7%	3.5%

Engine Type/Fuel Type	2005	2006	2007	2008	2009	2010	Unit Diff.	% Chg.	CTG %
Combustion/Gasoline	48,619,777	49,756,981	51,504,562	52,907,103	53,009,863	53,378,088	4,758,311	9.8%	60.9%
Combustion/Diesel	12,816,367	13,325,003	13,995,351	14,584,474	14,979,817	15,103,353	2,286,986	17.8%	29.3%
Hybrid/Gasoline	352,988	424,528	602,470	810,569	968,986	1,097,702	744,714	211.0%	9.5%
Hybrid/Diesel	2,292	2,031	1,468	26,874	23,328	25,054	22,762	993.1%	0.3%
Electric	1,804	779	1,353	2,709	2,832	2,962	1,158	0.642	0

Engine Family [Designer] (Top 10)	2005	2006	2007	2008	2009	2010	Unit Diff.	% Chg.	CTG %
EA086/153/188 [Volkswagen]	2,056,955	2,041,534	2,036,957	2,063,670	2,248,823	2,320,978	264,023	12.8%	3.4%
GEN3/GEN4 [General Motors]	1,604,648	1,660,390	1,839,771	1,829,286	1,760,197	1,748,352	143,704	9.0%	1.8%
I [Adam Opel]	1,567,493	1,287,977	1,276,804	1,277,298	1,286,125	1,344,981	-222,512	-14.2%	-2.8%
EA827/113 [Volkswagen]	1,550,495	1,639,993	1,676,130	1,586,735	1,632,270	1,605,097	54,602	3.5%	0.7%
DV [PSA]	1,429,675	1,526,172	1,595,914	1,771,706	1,940,277	1,851,092	421,417	29.5%	5.4%
K [Renault]	1,336,883	1,501,707	1,648,530	1,778,557	1,672,215	1,530,659	193,776	14.5%	2.5%
ZZ [Toyota]	1,311,103	1,159,593	1,275,061	1,365,847	1,283,003	1,325,208	14,105	1.1%	0.2%
MOD I V8 [Ford]	1,308,727	1,389,559	1,380,116	1,337,736	1,333,170	1,296,071	-12,656	-1.0%	-0.2%
EA111 [Volkswagen]	1,221,061	1,223,770	1,238,790	1,398,457	1,482,506	1,556,062	335,001	27.4%	4.3%
AZ [Toyota]	1,207,475	1,339,448	1,448,344	1,526,951	1,463,191	1,510,586	303,111	25.1%	3.9%
Top 10 Engine Family	14,594,515	14,770,143	15,416,417	15,936,243	16,101,777	16,089,086	1,494,571	10.2%	19.1%
Top 10 (% of Global Total)	23.6%	23.3%	23.3%	23.3%	23.3%	23.1%	19.1%		

Transmission Type Summary	2005	2006	2007	2008	2009	2010	Unit Diff.	% Chg.	CTG %
Manual	31,205,262	31,925,034	32,843,010	33,485,927	33,597,536	33,887,336	2,682,074	8.6%	34.3%
Automatic	27,764,221	27,772,852	28,382,424	29,288,248	29,542,856	29,794,306	2,030,085	7.3%	26.0%
Continuously Variable (CVT)	2,230,800	2,772,434	3,227,715	3,471,518	3,542,448	3,587,815	1,357,015	60.8%	17.4%
Automated Manual	591,155	1,029,332	1,621,596	2,054,746	2,270,318	2,305,164	1,714,009	289.9%	21.9%
Electric	1,790	774	1,343	2,699	2,817	2,947	1,157	64.6%	0.0%
Infinitely Variable	0	8,896	29,116	28,591	28,851	29,591	29,591	0.0%	0.4%

Note: Top engine families are based on 2005 total consumption volume.

Source: AUTOFACTS Global Light Vehicle Outlook 2006 Q1 Release (Updated January 1, 2006)

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