An Integration Proposal for University / Research Center - Automotive Industry Case Mercedes-Benz do Brasil

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Abstract

The Brazilian automobile industry has a history of more than 40 years installed at the country. For its success great efforts of technology transfer and labor training were done, particularly close to Brazilian universities. Those efforts goes from the admission of professionals that are graduated by universities until the use of their research resources to solve the problems and the challenges that have been showing, notedly in the last years. Due to the offered possibilities and to the existent needs for the new automotive engineering professional that have been configuring in the last times, it is proposed a model of integration between industry-university that does not consider just the graduate engineering professional use as final resource for the industry, but several other relationships that aid both sides intending to reach their goals. The model proposes interactions about research, training and practicing of graduation students, master degree and doctor students relationships (generally for research), works with expert research groups, cooperative research and so on. As example it is introduced the case of Mercedes-Benz do Brasil which manufactures trucks and buses at the country since 1956 and intensified its contact with the universities and research institutes through several forms as already mentioned. The results have been allowing an interesting group of works and proposals which correct the original model, aiming new postures and new directions in the interaction for both sides.

Introduction to the issue

Founded in 1956, Mercedes-Benz do Brasil (MBB) became the first commercial vehicle industry to be installed in Latin America and it has produced a large variety of trucks and buses with its brand, besides engines for OEM and chassis for the bus body assembly industry.

In the early 60's, almost the entire technical staff was formed by European engineers and technicians. At that time, all the products and parts designs, manufacturing processes, machine and tool specifications were determined by Daimler-Benz (DBAG) in Germany.

Due to the raise of the production levels demanded by the growing commercial vehicle market in the sequent decades, MBB has experienced a great expansion not only concerning production areas like new engine, axles and vehicles assembly lines, but also concerning development activities. in the field of both products and manufacturing processes.

The great technology breakthrough observed in the past 20 years and the appearance of new strong competitors increased the need for specialized human resources, alternative materials, more pruductive and less costly

manufacturing processes and so on. These factors added with a scenery of downsizing enterprises made MBB look for different sources of knowledge, such as universities, research centers, high-tech supliers, etc.
Several types of relationship among MBB and these instituitions and the particularities of each type constitute the theme of this explanation.

Our object of study

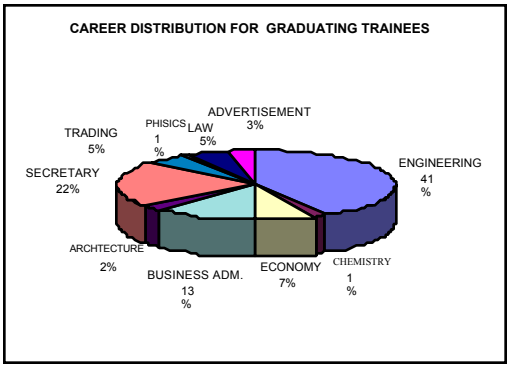
Passing through the information age and going to the knowledge age, society has suffered several changes and all its instituitions have been adapted for the new trends. Industries and more particularly automotive industries are not out of this context.
The automotive engineer of the future must be seen under the scope of the trilogy: man, technique and process.
The man-technique interaction in the modern age is affected mainly by aspects like the new paradigm of global and agile manufacturing processes, communications breakthrough, current engineering, re-engineering, different types of partnerships among car assemblers, supliers, universities, etc.
The items below can be considered as desirable qualities for the modern age automotive engineers:
- being creative and fexible to absorb new ideas;
- being curious and have a constant action behaviour;
- computers and foreign language domain;
- being able and conscious about team work;
- knowing how to lead and to be led.

The automotive industry breakthrough has pulled several types of specific techniques which will bring different important knowledge for the engineer, like:
- electronics (analog, digital, control, communications, etc);
- CAPR that envolves CAE/CAD/DFMA/CAPP/CAM/CAQ, providing development costs and time reduction;
- simulation advanced techniques like virtual reality;
- new materials (steel, aluminum, plastics, adhesives, composites, etc);
- new energetic alternatives.

Not only for automotive industries, the success of any enterprise in the current very competitive global market depends on some factors that can make the difference among it and its competitors, since the geographical location and climate up to its culture, passing for local infra-structure, labor qualification, market particularities and so on.
In the point of view of enterprises, universities are centers of knowledge about different areas like human, biological and exact sciences, besides specialized professionals providers.
The needs of modern enterprises which find correlation in the aspects that the universities can provide are essentially highly specialized human resources, costs and risks reduction in new developments, access to advanced knowledge, identification of students for further hirings, technical problems solutions, etc.
On the other hand, universities are looking for additional financial and material resources, social function realization, prestige for researchers, university image divulgation, interactivity with enterprises reality, incorporation of new information to research and teaching processes.
In the case of MBB, this relationship occurs in six different manners: graduating trainees, graduated trainees, UNI (a kind of post-graduating scholarship) projects, specific projects, PDTI (government incentive plan for industrial development) projects and post-graduating students working at MBB.

The trainee program

For trainees, the MBB human resources area works as an interface between the academic universe and the several internal areas which receive them. The distribution of careers changes year a year, but engineering is predominant with around 40 per cent. Other careers are business administration (around 15%), secretary (around 20%), economics, law, trade and advertisement (around 5% each one) and physics, chemical, architecture in the remaining 10% . The picture 1 shows the distribution for the year 1996.
Currently around 18% of the MBB management staff are composed by ex-graduating trainees: 7 directors, 24 managers and 44 supervisors.
Another kind of trainee program is called “estágio visita”. During an “estágio visita” a last year universitary or technician student can spend up to 3 months taking part of some enterprise activities like: seminars, visits to the factory or universities, Kaizen courses, lectures at MBB or universities, graduation tasks and so on.



Picture 1 *- Career distribution for graduating trainees (year 1996)*

The graduated trainee program aims at the formation of multifunction professionals with a systemic vision. This kind of trainee is an employee who participates of a series of lectures and seminars, language courses, specific courses, meetings and receive information and advices about career. Each year some of those trainees take part of a six month interchange program in DBAG, developing projects and improving their German language skills.

The distribution of graduated trainees in the different MBB areas can be seen in the picture 2.

TRAINEES DISTRIBUTION AT MBB

CONDITION	TECHINICAL	PRESIDENCY/ SYSTEMS	FINANCES	HUMAN RESOURCES	SALES	DEVELOPMENT
EMPLOYEES	39,5%	16,3%	9,3%	2,3%	24,4%	8,1%
IN TRAINING	23,8%	4,8%	19,0%	4,8%	23,8%	23,8%

PROGRAM STARTED IN 1987

Picture 2 *- Distribution of trainees at MBB in the several areas*

The DBAG interchange

The interchange among DBAG units is part of a policy for reinforcing the DBAG competitive position as an employer. Besides that, market research, enterprise image campaigns, participation of DBAG employees in universities recruiting fairs, seminars and workshops are very important to consolidate that position.

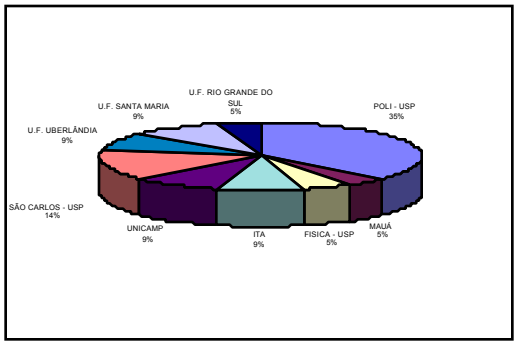
The International Workshop on Production and Controlling

The International Workshop on Production and Controlling is an event sponsored by DBAG which joins students of 4 of the best engineering and busines administration schools of European universities and one international. Each delegation is formed by 4 students led by one teacher and takes part of a 3 day workshop along DBAG executives.
During the last workshop some case studies have been discussed:
- economic study about a new passenger car for the Asian market;
- "make or buy" strategy;
- parts management;
- nationalization of the product E-Class for the Indian market;
- start price of a truck for Great Britain.

The International Workshop has the participation of schools and universities like St.Gallen (Switzerland), Groupe HEC (France), ICAI (Spain), IST (Portugal), MIT (USA), SDA Bocconi (Italy), Ecole Central de Paris (France), Erasmus Univ. Rotterdam (Netherlands), Universidade de Deustos (Portugal), Escola Politécnica da USP (Brazil).

The UNI project

Initialized in 1987, the UNI project, through the sponsorship of master and PhD thesis, specific studies and practical works, aims at mainly 3 goals: recruiting human resources, personnel qualification and research development. Some of works already developed are:
- thermal confort within vehicles (master thesis);
- data communication network (master thesis);
- artificial vision (master thesis);
- measurement of turbulence in heads (master thesis);
- confort classification (document);
- abnormal grain growth (master thesis).



Picture 3 *- UNI project developed works among Brazilian universities (until 1997)*

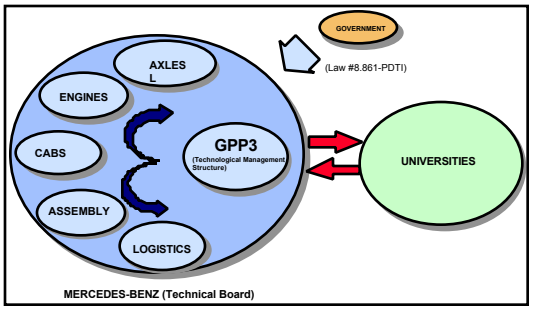
Specific projects are coordinated directly by MBB areas and are important for the solution of its specific problems. It also can be executed by cooperation activities of MBB employees and the universities.

The POEMA project

The "Projeto Pará" or POEMA (Project for the Poorness and Environment) is a social-ecologic concept for the protection of the rain forest and reforestment of the Amazonian region. POEMA is based in communitary structures, health services, agronomic concepts, forest economy and industrialization of natural materials.
POEMA is a partnership among MBB which makes products reseach and development, "Universidade Federal do Pará" which coordinates the biological, social and industrial bases and is responsable for the characterization of the natural materials, UNICEF which sponsors the project and makes sociological researches and DBAG which sponsors, makes technological researches an adds its know-how.

The PDTI plan

Through PDTI, a Brazilian government plan for industrial development, MBB has gotten some incentives for innovating projects concerning both products and manufacturing processes development. The main goal of PDTI is stimulating enterprises investments in research and technological development in order to increase its competitiveness and promote the creation of a permanent technological management structure.



Picture 4 - *PDTI project management*

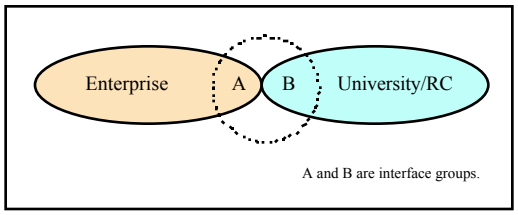
Some PDTI projects currently in development:

- Flow-Drill process development;
- development of computer simulation of the resin flow and path during an injection procedure of the TRV process;
- development of FEA (Finit Element Analysis) applied to TRV moulds;
- enhancement of honing technology for engine blocs;
- development of microwave curing for TRV plastics parts;
- virtual prototyping;
- cold gear forming;
- intelligent deburring process for machined parts;
- cold metal sheet joint;
- termoset parts recycling;
- composite aluminum-ceramics brake discs development;
- cold washing process development;
- reference fixing concept devolopment for machined parts.

MBB estimates up to the year 1999, to spend around US$ 49.6 mi in PDTI projects.

The interface groups concept

Segatto [1] stated that interface groups into both enterprise and university seems to be the better way to overcome the natural differences concerning these two instituitions. Some aspects like: academic vs. profit aimed culture, different response times, different time disposals, etc, can be minimized if the two groups are well trained and have enough good communication to act as facilitators of the relationship process.



Picture 5 *- Interface groups concept*

At MBB technical board, the group which is responsible for this interface and also is the permanent technological management structure is called GPP3 and is subordinated to GPP, the pre-planning department. Its staff is: 1 supervisor (master in engineering), 9 engineers and 1 computer systems analyst.

The continuous education

Many efforts have been done to make the relationship between MBB and Brazilian universities closer and more efective, due to MBB believes that academic community can offer the most important item to achieve competitive advantage: its employees formation.
This capacitation begins before the person become a MBB employee, e.g. during the student graduation which must go on due to the enterprise could reach satisfatory results during the introduction of new technologies.
Within the new needs of a highly globalized and competitive market, where the speed of the technological innovations demands a learning speed equaly high, it is necessary to adequate the information transfer models between enterprises and universities.

Future proposals

Some adequation proposals for the graduation courses:
- theorical learning periods with practical lab classes and practical learning into industries;
- higher speed in the changes of the curriculum program to match industries needs;
- stimulate the industry professional to take part in seminars, workshops and lectures for graduation students into the university;
- stimulate teachers to take part in industry projects as consultants;
- use of lab machines for the production of parts for industries, in order to reproduce factory conditions into the university.

Conclusion

Facing the modern age challenges, MBB has structured itself and made many effortrs to increase

the number and improve the results of relationships with universities and research centers, because it believes that as human knowledge generators and providers, these instituitions certainly are part of the success key for the next century.

Bibliography

[1] Segatto, Andréa Paula, Aplicação da Teoria de Agência na Análise das Relações entre os Participantes dos Processos de Colaborção Tecnológica Universidade-Empresa, 1997.