

# Efficient Management Methods of Project Transfers

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**Abstract** – The present paper describes the transfer of products, product series and the associated production resources across plants and locations, as well as the reorganization of plants. Due to the complexity and scope of production transfers, these are planned with the aid of project management. In the case of production transfers, planning of manufacturing locations creates an appropriate project organization depending on the tasks involved. The composition of the core team and expanded team will vary according to the scope of transfer projects. The project team is generally composed of employees from the same departments in the delivering and receiving plant and is supported by central functions. The general product coordinator selects the team and defines the sub-projects which are not relevant based on organizational aspects and with regard to content. Transfers in the sense of production transfers are carried out by means of project management in accordance with the gateway principle. Transfers extending over a longer period can be divided into several transfer stages. In the case of transfers, an audit is to be planned at the delivering plant prior to moving machinery and at the receiving plant once the move is complete.

**Keywords** – Machine, Manufacturing, Product, Project, Transfer.

## I. INTRODUCTION

In the past decades, competition has intensified and customers are more demanding than ever before [1]. The automotive industry is notoriously exposed to the risk of low capacity utilization, and a variety of measures have been taken to improve flexibility [1], [2]. The recent change in Renault's manufacturing strategy demonstrates the new paradigm, away from inflexible one-plant/one-vehicle policies towards highly flexible machines and manufacturing platforms that are capable of producing multiple products [1], [3].

Companies feel ever-increasing pressure to get new products to market faster. As new products are developed, successful new product transfer from research and development to manufacturing is a common problem for companies of all sizes. The best internal transfer process integrates all departments at the same time into the process yielding a gap-free transfer, builds on solid tools and techniques that streamline execution and produce effective results, and is developed and implemented such that the whole company embraces the transfer process [4].

The basis for economic success in the world today is knowledge. The challenge for any nation seeking economic success can therefore be thought of as twofold: first, to facilitate the acquisition of knowledge from within (or without) its borders and second, to facilitate the conversion of that knowledge into benefits for its citizens by the most efficient means available. This is the essence of technology transfer [5]. Technology transfer as a

separate field did not appear until the 1970s. It emerged as a result of accelerating awareness of the key role of technology in economic development and its study has essentially been driven by the need to better understand the process, its determinants, its effects on transferor and transferee and factors affecting its control [6]. Companies follow different technology transfer strategies. Several factors determine technology-transfer strategies in the presence of potential imitation, including variable-cost-saving potential, fixed transfer and imitation costs, market potential, and product differentiation [7].

A product is designed to meet certain functional requirements, and to satisfy the customer's needs. New technology and new materials currently available will also be explored during the product design stage. A product consists of assemblies, sub-assemblies and component parts [8]. Product transfer is a key activity in the complex process of new product development. Purposeful management of the product transfer process leads to more effective transfers in terms of timeliness, cost, functional performance, and competence building. Better management of product transfer gives firms access to a greater variety of new technology options, improves a firm's ability to offer significantly differentiated products, deepens the firm's competitive competencies, and positively influences sustained product development success [9].

Companies often incorporate new product technologies in their product designs to help achieve distinctive new products. Companies rarely rely solely on internal research and development for the initial development of all the new product technologies they will employ in a new product system [9], [10]. Accordingly, careful integration of product technologies from external organizations, called the "product technology transfer process" here, is an essential competence for new product development organizations. Companies skilled in the product technology transfer process have access to a vastly greater array of technological options and can ration their scarce research and development resources better [9], [11], [12]. This process often is fraught with unanticipated problems and excessive risk, leading to product development efforts that are unsuccessful due to time delays in market introduction, cost overruns, and technical functionality problems. It is acknowledged that product technology transfer is conducted regularly in an ad-hoc manner [9], [13].

Production flow system is mostly associated with products which flow naturally. Using the flow principle is one of the most important achievements in manufacturing technology. Even today, project transfer remains the most effective solution for continuous production method [14].

The automobile industry has a keen interest in the concept of transfer machines to accommodate the changes occurring there. The first is the greater variety found in automobiles now. A builder of in-line transfer machines and lines, Manfred Maier, president of Heller Machine Tools (Troy, Mich), says: "The number of sold cars may still be the same, but the variation in these cars is increasing" [15]. Project transfer among multinational organizations, whether they are large or small, has been the subject of much research. The conclusion of these researches has led to that organizations engage in the project transfer of technology in order to profit directly from the transfer and profit indirectly from the dissemination of the product or process. Project transfer from multinational companies to host countries is the primary mechanism by which developing countries receive technology. Also, the project transfer process involves the acquisition, assimilation, diffusion, and development of technology [16].

## II. TRANSFER TYPES

A production transfer is defined as a change or localization in the production location for existing products, where all necessary production resources are transferred or sourced as new (e.g. machinery, plant facilities, assembly and measurement equipment etc.).

A product transfer is a change of the production location or a change from in-house to external production (purchase) or vice versa, if only the tooling, devices and documents for production of the affected products are transferred. In a product transfer, machinery is not transferred and no training will be performed (Fig. 1 described the main steps of transfer).

A machine transfer is part of a production transfer or is a local transfer of machines within a plant. The transfer of machines within a plant is carried out by the plant itself and not ruled by central procedures.

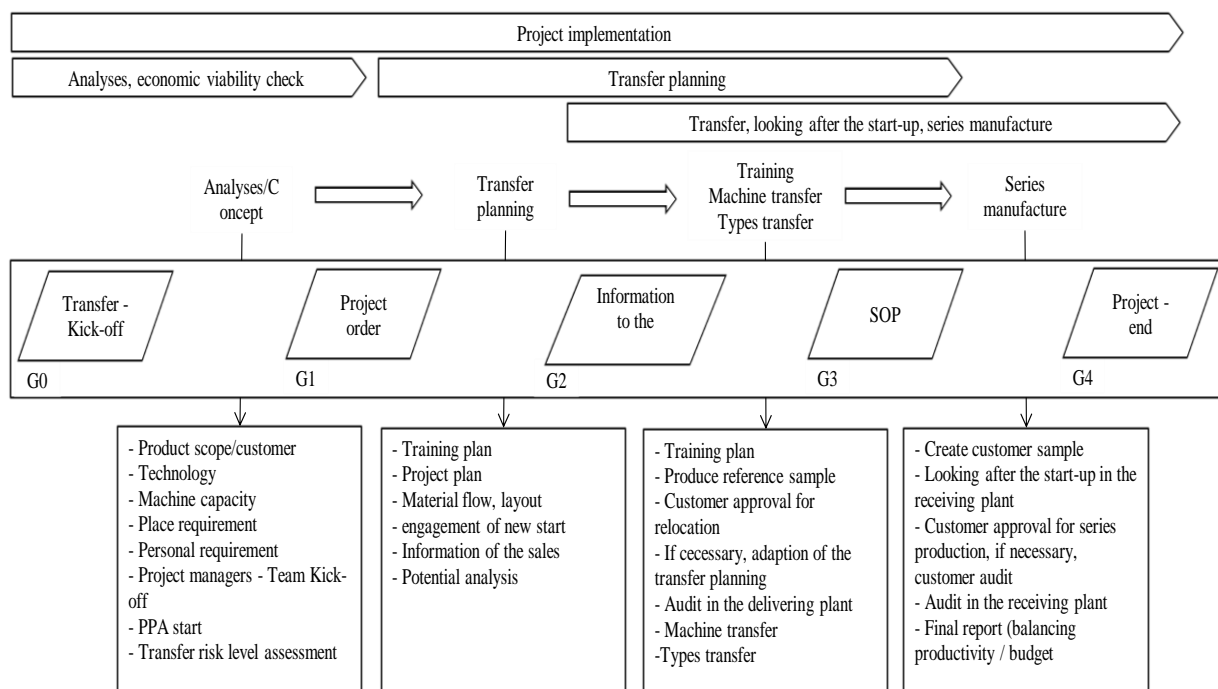


Fig.1. Transfer steps

## III. PROJECT TRANSFERS

### A. Project order and basic conditions

The project coordinator in planning of manufacturing locations documents the fact that the transfer has been approved. This is carried out in writing by means of an approved project order. The project order must always be signed by a member of executive management board. For transfer projects which are included in the approved transfer budget list, the project order is also valid if it bears the signature of a member of the relevant business unit.

### B. Project manager kick-off

The project manager kick-off represents the official start

of a transfer. Possible participants: general project coordinator, project manager at delivering plant, head of planning of manufacturing locations, plant managers, project manager at receiving plant, other participants are possible.

### C. Project team kick-off

The project team kick-off takes place after or together with the project manager kick-off and constitutes the start point for the sub-projects. The core team is defined during this stage, at the latest. Main subjects/targets of the meeting: presentation of the project targets (e.g. start-up curve, production figures, key data etc.) and basic conditions, presentation of rough project timetable, presentation of project roles, presentation of tasks and sub-

project targets for defined sub-project managers, information about the project, clarify course of action for project work (e.g. status meetings, information channels, project plan, checklist), disclosure of critical project points.

#### D. Project organization

The project organization is composed of the following:

- 1) Steering committee – is composed of executive management board, product line management, plant management, the business unit and the head of planning of manufacturing locations, and supports the transfer projects.
- 2) General project coordinator – coordinates the activities of the project manager's project management at delivering plant (PL-A) and project management at receiving plant (PL-E) and the team members with each other. He coordinates the documents which are relevant to the project (e.g. project plan, checklists) and the sub-projects or work packages with regard to arranging deadlines. He actively and continually monitors the timing targets and reports on their status to the steering committee by means of intermediate reports/status reports. The general project coordinator supports the project team with reporting and documentation. He reports to and receives his instructions from the steering committee. He is the contact person for the steering committee, the supporting central departments and for the project managers. The general project coordinator can call on the support team to assist with monitoring deadlines and costs and documenting the project.
- 3) Support from central departments (support team) – this support is composed of cross-plant central departments (quality management, process/production development, product development, business management, controlling, personnel management, legal department). Support from central departments can be requested as required by any individual team member.
- 4) Project managers (PL-A and PL-E) – tasks of the project managers refers to: responsibility for the overall project, suggest project team members, prepare and maintain the detailed project plan (based on the basic project plan), reporting and target monitoring for the sub-projects, ensure internal communication (identical information for all team members), disclose problems and critical activities to the general project coordinator, responsible for the achievement of the project targets, processing checklist points of the project manager, responsible for the processing and quality of the checklists, granting approval of deviations / conditions on gateway releases.
- 5) Core team – is composed of PK, PL-A, PL-E and the sub-project managers that are essential for a transfer project and have responsibility for the most important and most extensive sub-projects. The composition of the core team can be freely selected and is formed at the project start-up meeting (project manager kick-off or project team kick-off) by PK, PL-A and PL-E.
- 6) Expanded team – is composed of sub-project managers who are necessary for achieving the project target but not

for the regular status meetings. These are smaller work packages covering a limited period of time. The composition of the expanded team is formed at the project start-up meeting (project manager kick-off or project team kick-off) by PK, PL-A and PL-E.

- 7) Sub-project manager – the general project coordinator selects the team and defines the sub-projects which are relevant based on organizational aspects and with regard to content. For the specific transfer projects, the scope of the sub-projects is defined by PK, PL-A and PL-E.

## IV. PROJECT PLANNING AND DOCUMENTATION

Transfers in the sense of production transfers are carried out by means of project management in accordance with the gateway principle. Transfers extending over a longer period can be divided into several transfer stages. Gates 2 to 4 may be passed several times in this case (refer with Fig. 2). Gate 4, which is planned as the last in the sequence, constitutes the end of the transfer. If gates 2 to 4 are passed several times, it is the responsibility of the general project coordinator to decide which checklist points should be processed. In the case of transfers, an audit is to be planned at the delivering plant prior to moving machinery and at the receiving plant once the move is complete.

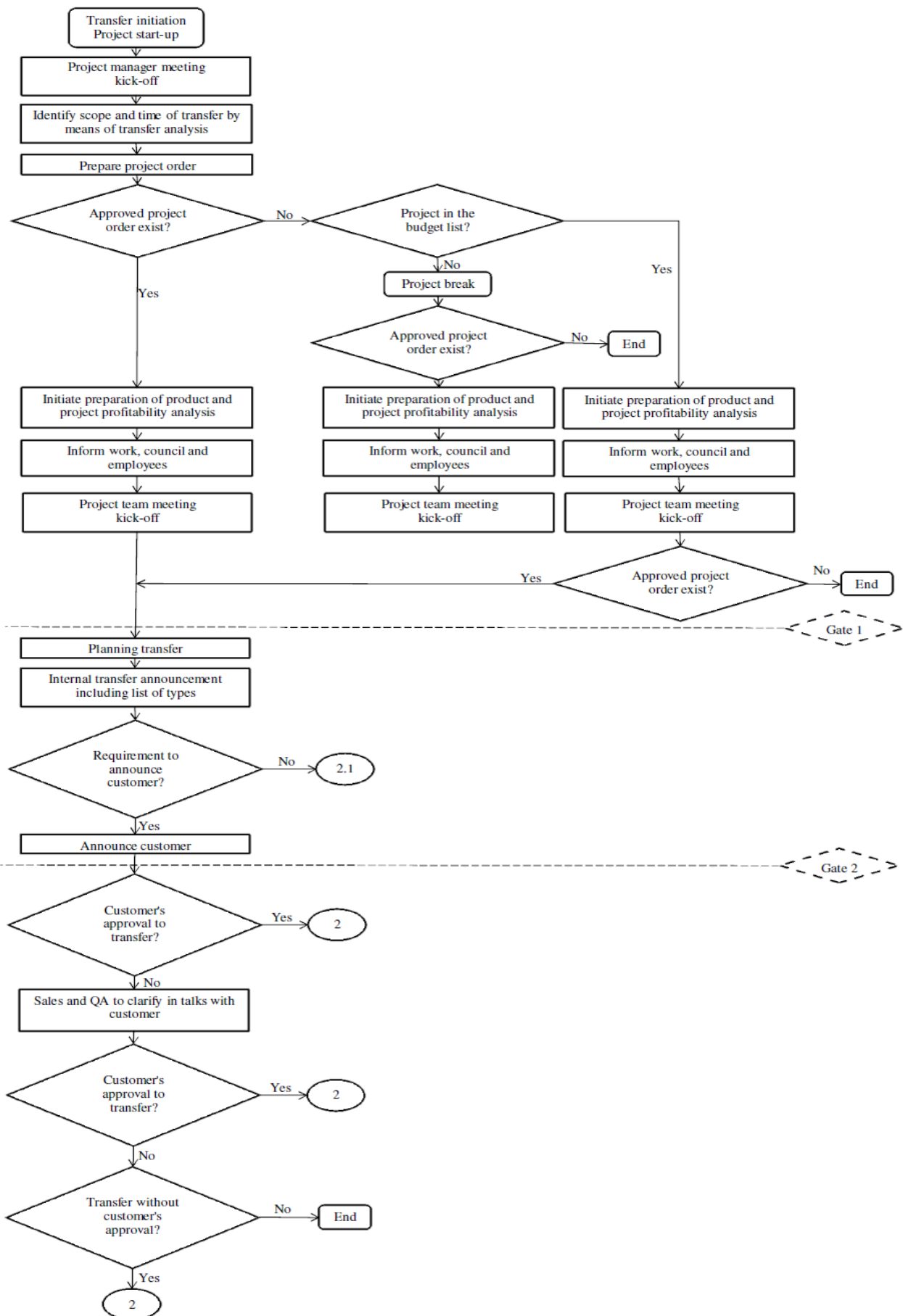
### A. Internal transfer announcement

The internal transfer announcement stating all products to be transferred is passed to sales at an early stage and by no later than gate 2. Sales are responsible for notifying customers and obtaining the customer's consent for approval of volume deliveries. The transfer timetable and the required product lead stock must be agreed with the customer as necessary. If this is rejected by the customer, sales have the task of obtaining approval for volume delivery by further measures. Sales must inform the general project coordinator of the current status of approval so that he can introduce the implementation steps.

Components of the internal transfer announcement: reason for transfer and background information, name of general project coordinator, project manager at delivering plant and project manager at receiving plant, planned transfer date, possible sample delivery date, product list, brief description of the receiving plant, customer letter, and checklist from legal department.

### B. Project plan

The project manager with main responsibility (generally PL-A) prepares a project plan with support from the general project coordinator and the project manager at the receiving plant. This project plan contains the most important milestones and transfer steps, the summarized sub-projects, the degree of completion, the persons responsible and the start and end dates. The sub-project managers of the delivering and receiving plant create sub-project plans/activity plans by request of the general project coordinator. The software tool used to prepare the sub-project plans and activity plans can be freely selected on the basis of availability and capability.



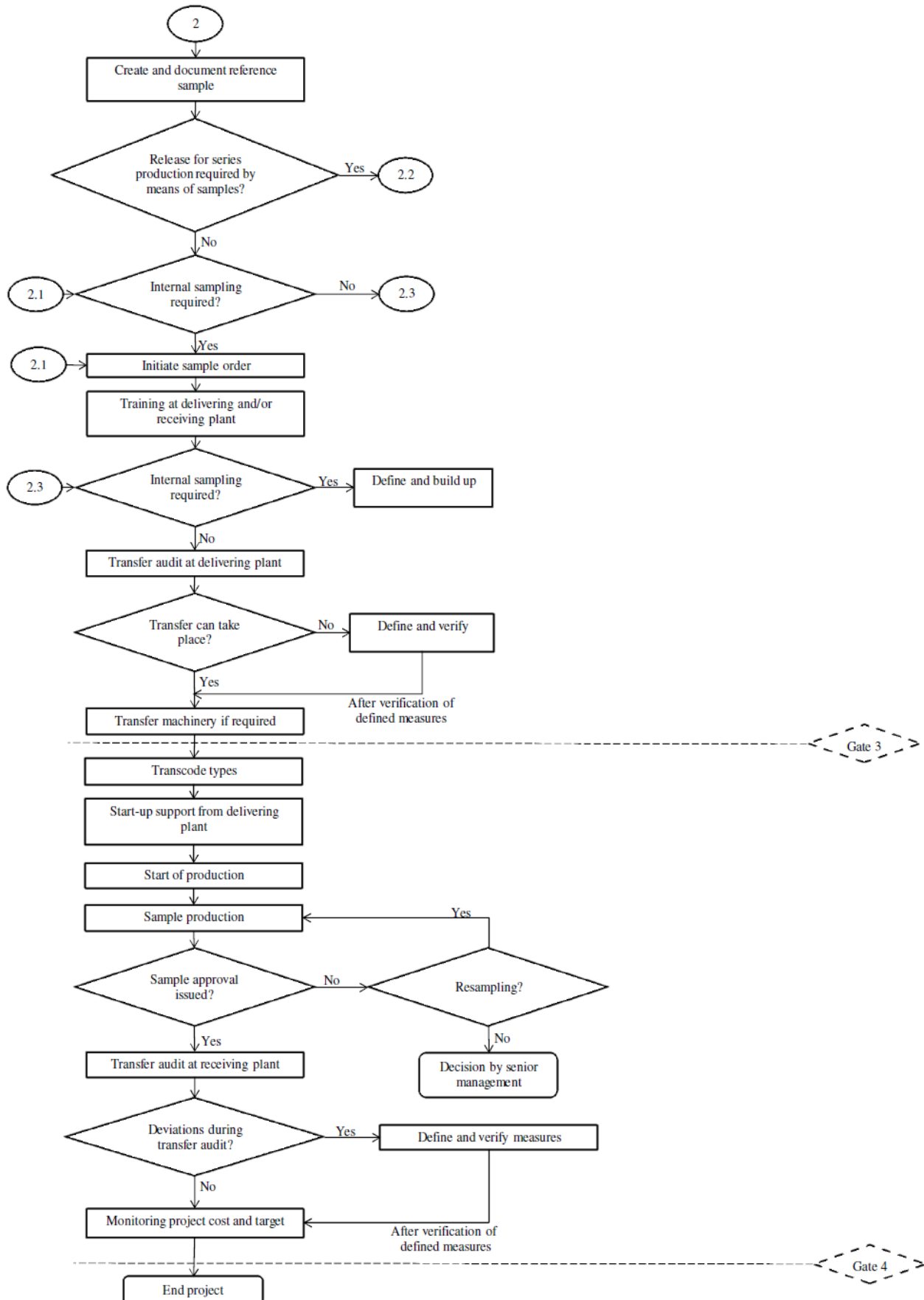


Fig.2. Project transfer

Continuous monitoring of activities should help to improve the consistent realization of planning. Changes and deviations of the planned activities must be included in the project plan in a timely manner in order so that an overview of the large number of individual stages and details can be obtained at any time. It is advisable to enter an appropriate note in the project plan when changes occur. Continuous monitoring of activities should help to improve the consistent realization of planning.

#### C. Checklist

Checklists are specifically allocated to the sub-projects that are also assigned in timing terms to the gates. If the project is divided into several transfer stages, the checklist must be processed several times as necessary indicating the associated stage in the headline. The checklist points are obligatory and prove that a project phase has been completed. Responsibility in the specific sub-project (naming of a specific person) for processing of checklists is indicated in the general checklist under the checklist overview. The status must be recorded for each checklist point.

Approval of a transfer gateway is granted by the general project coordinator following completion of the individual checklist items for this gateway. If individual items have not yet been completed or are critical, the general project coordinator can decline approval of the gate. In the event of gateway deviations, approval must be granted by the PL-A, PL-E, PK and a representative from the steering committee. The general project coordinator is responsible for monitoring the gateway date deviations. Documentation/monitoring takes place in accordance with the project plan or minutes of the status meeting.

#### D. Status meetings

The status meetings are to be held regular or demand-oriented in order to maintain a uniform level of knowledge in the project team. They are an important instrument for discussing the progress of a project progress, activities, problems and possible solutions. Invitations are issued by the general project coordinator and the participants are defined by the general project coordinator.

#### E. Training and monitoring of training

In production transfers, employees of the receiving plants are to be trained usually before machinery is moved. The training serves to communicate theoretical and practical knowledge of products, machinery and processes. The delivering plant notifies the receiving plant of the training times and the required qualifications at an early stage in the transfer planning phase so that personnel selection or the appointment strategy can be defined. The training requirements for direct and indirect areas are to be defined from the project team.

In order to define the scope of training must be prepared a training plan for each individual employee that records all knowledge and activities. The success of training is discussed in regular meetings between the trainers and their line managers in order that any further or special training can be derived from this. The trainee receives feedback on the status of his training on one or more occasions, depending on the length of the training. At the

end of his training period, the trainee receives his instruction evidence of training, including the targets achieved, by means of a copy to his line manager. In each case, instruction evidence of training, including the targets achieved, must be prepared by the trainer at the delivering plant and by the trainee. If he has not completed all of the training content, a decision is made on whether to extend the training measure or carry out further training at the receiving plant.

#### F. Intermediate reports for the steering committee

If the project status is critical, an intermediate report must be prepared for the steering committee. The intermediate report is a brief overview of the transfer project and informs the steering committee of the project status. The intermediate report content: current project status, highlight deviations from the plan, indicate countermeasures and reasons, reference to potential risks.

#### G. End of the project

As soon as all of the relevant transfer activities in the project plan/activity plan are completed and the audit measures have been implemented, the general project coordinator must prepare a final report. The final report content: status of activities, checklist points and targets, planning (nominal), transfer process, project results (actual), other activities, including responsibilities, conclusion/ empirical values, findings for other projects.

## V. CASE STUDY

The case study presented in this paper, was conducted in an automotive company “Y”. The study followed the steps needed for a project transfer of an automatic polishing machine who produces four different parts for auto industry. The production machine is transferred from the home company “X” at a company “Y”, part of the same automotive company group.

The automatic polishing machine offer an easy programming (defining trajectory based on part geometry) and the possibility to process 3D complex geometries in 5 axes (3 vertical axes and 2 horizontal axes), the automatic compensation of polishing brush depreciation to maintain the surface quality of parts, ergonomics operating mode, the automatically selection of working parameters and programs, and minimum adjustment time. This is possible following the development of the processing machine.

For study and analysis, was followed the cost of project transfer, and of benefits and the profit from the project transfer. By investment and development the machine production process, leads to lower costs of materials consumption, and reducing time of processing parts. All costs of project transfer are described in Table 1.

From table 1 we it can be observe that, by project transfer between the companies of an automotive group, is obtained a total saving cost per year of 1.391.758 €. For this result, was analyzed the labor cost per minute, the cycle time of production machine and the material consumption of the automatic polishing machine that produced four different components of parts.

Table I: Costs of Project Transfer

| Project Transfer                   |             |         |             |                                    |             |         |             |
|------------------------------------|-------------|---------|-------------|------------------------------------|-------------|---------|-------------|
| Cost of labor                      |             |         |             |                                    |             |         |             |
| Situation before project transfer  |             |         |             | Situation after project transfer   |             |         |             |
|                                    | 2013        | 2014    | 2015        |                                    | 2013        | 2014    | 2015        |
| Annual volume                      | 30600       | 24250   | 11000       | Kapacitate                         | 30600       | 24250   | 11000       |
| Time of processing [min/pcs]       | 0.285       | 0.285   | 0.285       | Time of processing [min/pcs]       | 0.188       | 0.188   | 0.188       |
| Total time of production           | 8721        | 6911    | 3135        | Total time of production           | 5753        | 4559    | 2068        |
| Time of adjustment / shift [min]   | 30          | 30      | 30          | Time of adjustment / shift [min]   | 25          | 25      | 25          |
| MPH (labor cost per min)           | 0.06        | 0.06    | 0.06        | MPH (labor cost per min)           | 0.06        | 0.06    | 0.06        |
| Total MPH saving                   | 523         | 415     | 188         | Total MPH saving                   | 345         | 274     | 124         |
| Total until end of project         | 1,126.04 €  |         |             | Total until end of project         | 742.79 €    |         |             |
| Cost of material                   |             |         |             |                                    |             |         |             |
|                                    | 2013        | 2014    | 2015        |                                    | 2013        | 2014    | 2015        |
| Annual volume                      | 30600       | 24250   | 11000       | Annual volume                      | 30600       | 24250   | 11000       |
| Material consumption (brushes/buc) | 3           | 3       | 3           | Material consumption (brushes/buc) | 2           | 2       | 2           |
| Total material                     | 91800       | 72750   | 33000       | Total material                     | 61200       | 48500   | 22000       |
| Brushes cost [Euro/buc]            | 12.9        | 12.9    | 12.9        | Brushes cost [Euro/buc]            | 8.75        | 8.75    | 8.75        |
| Stain cost [Euro/buc]              | 1184220     | 938475  | 425700      | Stain cost [Euro/buc]              | 535500      | 424375  | 192500      |
| Total until end of project         | 2,548,395 € |         |             | Total until end of project         | 1,152,375 € |         |             |
|                                    | 2013        | 2014    | 2015        |                                    | 2013        | 2014    | 2015        |
| Annual volume                      | 30600       | 24250   | 11000       | Annual volume                      | 30600       | 24250   | 11000       |
| Material consumption (paste/kg)    | 12          | 12      | 12          | Material consumption (paste/kg)    | 10          | 10      | 10          |
| Total material                     | 367200      | 291000  | 132000      | Total material                     | 306000      | 242500  | 110000      |
| Paste cost [Euro/kg]               | 8.1         | 8.1     | 8.1         | Paste cost [Euro/kg]               | 5.5         | 5.5     | 5.5         |
| Stain cost [Euro/kg]               | 2974320     | 2357100 | 1069200     | Stain cost [Euro/kg]               | 1683000     | 1333750 | 605000      |
| Total until end of project         | 6,400,620 € |         |             | Total until end of project         | 3,621,750 € |         |             |
| Total costs MPH                    |             |         | 1,126 €     | Total costs MPH                    |             |         | 743 €       |
| Total costs for material           |             |         | 8,949,015 € | Total costs for material           |             |         | 4,774,125 € |
| Total saving costs / year          |             |         |             | 1,391,758 €                        |             |         |             |
| Total saving costs in 3 years      |             |         |             | 4,175,273 €                        |             |         |             |

For define the production flow of parts was calculate the takt time and the rhythm of produced parts on the automatic polishing machine, which are detailed described in Table 2.

Table II: Takt time and Rhythm calculation

| Calculation |                  |                          |                      |                        |                          | Verification  |             |                      |                        |
|-------------|------------------|--------------------------|----------------------|------------------------|--------------------------|---------------|-------------|----------------------|------------------------|
| Parts       | Cycle time [min] | Work time/ 1 shift [min] | Parts/ 1 shift [buc] | Takt/shift [min/parts] | Rhythm/shift [min/parts] | Minutes/ week | Parts/ week | Takt/week [min/part] | Rhythm/week [min/part] |
| A           | 0.56             | 460                      | 821                  | 0.56                   | 1.79                     | 2300          | 4107        | 0.56                 | 1.79                   |
|             |                  | 920                      | 1643                 |                        |                          | 4600          | 8214        |                      |                        |
|             |                  | 1360                     | 2429                 |                        |                          | 6800          | 12143       |                      |                        |
| B           | 0.58             | 460                      | 793                  | 0.58                   | 1.72                     | 2300          | 3966        | 0.58                 | 1.72                   |
|             |                  | 920                      | 1586                 |                        |                          | 4600          | 7931        |                      |                        |
|             |                  | 1360                     | 2345                 |                        |                          | 6800          | 11724       |                      |                        |
| C           | 0.64             | 460                      | 719                  | 0.64                   | 1.56                     | 2300          | 3594        | 0.64                 | 1.56                   |
|             |                  | 920                      | 1438                 |                        |                          | 4600          | 7188        |                      |                        |
|             |                  | 1360                     | 2125                 |                        |                          | 6800          | 10625       |                      |                        |
| D           | 0.56             | 460                      | 821                  | 0.56                   | 1.79                     | 2300          | 4107        | 0.56                 | 1.79                   |
|             |                  | 920                      | 1643                 |                        |                          | 4600          | 8214        |                      |                        |
|             |                  | 1360                     | 2429                 |                        |                          | 6800          | 12143       |                      |                        |

In Fig.3 it can see the layout who describes the position of the automatic polishing machine transferred and the production flow of the parts.

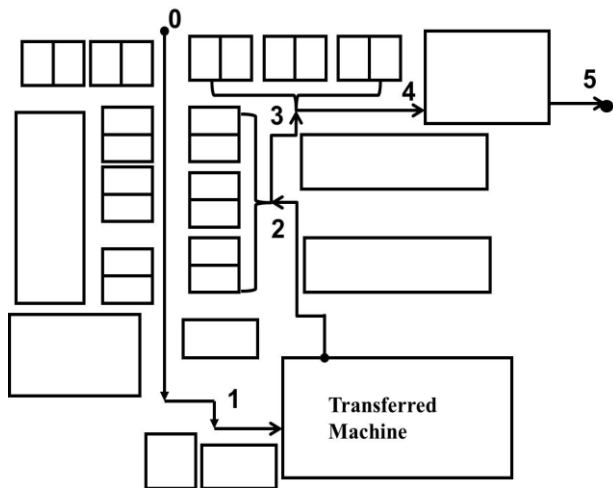


Fig.3. Production flow of parts on the automatic polishing machine transferred

As a short conclusion of the case study, the project transfer of an automatic polishing machine has conducted to increase the company profits by reducing the costs of materials consumption, lower processing time of parts, and by creating a continuous production flow of the four different parts needed for an automotive company.

## VI. CONCLUSION

Production transfers include the following conditions: change in the production location for existing products, technology in the receiving plant not available, training is required, and machinery/facilities are being transferred. Restriction of production transfers: if the risk level assessment for the production transfer indicates a significantly reduced training requirement in conjunction with the movement of machinery for identical or strongly related processes, the particular case can be processed in low-risk cases as a product transfer. This applies under the following conditions: all four assessment categories in the risk level assessment are classified as green, commercial risk and/or application risk classified as yellow. The decision on a possible product transfer is made in consultation with the product line and planning of manufacturing locations and documented. Even if the conditions for a production transfer are not fulfilled, the particular case can be processed with project Management and planning of manufacturing locations. The decision is made in consultation with the product line and location planning and has to be documented.

The responsible project managers at the delivering plant and receiving plant are equally responsible for the success of a project. The overall responsibility for the transfer and start up production of the transferred products lies with the project manager at the delivering plant, except for when the receiving plant is technologically more advanced than the delivering plant. Responsibility for updating the project plan lies with the project manager at the delivering plant with main responsibility, whereas responsibility for updating the sub-projects lies with the sub-project

managers. The general project coordinator must be informed of any serious status changes.

The activities for the project plan / activity plan are derived from the checklists. They represent a minimum requirement for a transfer project and contain the most important transfer items. Deviations from the checklists are documented in the gateway release with activities and dates. If a sub-project is not opened, the general project coordinator must check the checklists for these sub-projects and derive any activities, appoint the persons responsible and document these as necessary. If a checklist item is not valid for the transfer, this must be recorded in the field "comments". Furthermore, reference must be made to documents and paperwork in the "comments" field. If a checklist item cannot be processed by the submission date, the person with responsibility must define an appropriate activity and obtain a deviation approval.

In the event of deviations from targets, checklist points, audits and outstanding long-term activities, these are divided up into critical and non-critical deviations by planning of manufacturing locations and the project managers. In the event of critical deviations, the project is not closed out and a new project final date is defined between planning of manufacturing locations and the project managers. In the event of non-critical deviations, an action plan is prepared with the responsible persons. Reference is made to this action plan in the final report and a copy is then attached to the final report. After presentation of this project final report, the general project coordinator must dissolve the project team. The general project coordinator closes the project number and archives and deletes the project drive.

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