Efficient Management Methods of Production and Product Projects Transfer

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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 project management 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, production, 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 involves 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].

II. TYPES OF TRANSFERS

A. Production and product transfer

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.

The production and product transfer is shown in Fig. 1.

B. Machine transfers

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.

III. PRODUCTION 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. Invitations are issued by the general project coordinator and the participants are defined by the general project coordinator.

Possible participants are: 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.

Main subjects or targets of the meeting are: presentation, discussion and definition of project targets (e.g. start-up curve, production figures, key data etc.) and basic conditions, formation of the project organization, definition of the core team, structuring and delimitation of the project, overall planning of the project, definition of support from central departments, preparation of the transfer risk level assessment (RLA), information about the project, disclosure of critical project points.

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. The project team kick-off is initiated by the general project. A joint meeting of all members is not essential.

Main subjects/targets of the meeting may be: 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: steering committee, general project coordination (PK), support from central functions (support team), project management at delivering plant (PL-A), project management at receiving plant (PL-E), core team with sub-projects, expanded team with sub-projects.

E. Steering committee

The 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.

Tasks of the steering committee are: provide the necessary resources and capacity, provide expertise with regard to implementing the relevant project targets, set priorities in the event of an overlap with other tasks and projects, make decisions that cannot be made by the project team, where necessary, arbitrate on problems between all functions involved in the project, carry through overriding corporate interests, inform the general project coordinator at an early stage of any changes to targets/basic conditions.

Authority of the steering committee suppose: access right to information on all cases, definition and modification of project targets and basic conditions, option of making adjustments in the appointment of project managers.

Additional tasks of the steering committee are: make sufficient resources available to the general project coordinator, supporting all project managers, granting approval of deviations/conditions on gateway releases.

F. General project coordinator

The 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.

Tasks of the general project coordinator are: raise a project number, creating a project folder and granting access rights, organize the kick-off meetings and status meetings for the overall project, structure the overall project in sub-projects (definition of the project structure), definition of project team building, preparation of the basic project plan, project cost planning and controlling, plan, structure and carry through the overall project, chair project discussions, project documentation for the overall project (intermediate reports, status reports), ensure internal communication (identical information for all team members), introduce necessary measures / develop proposed solutions, process the general project coordinator’s checklist points, approval of gateways, monitoring of deadlines for gateway deviations, prepare project final report, terminate project and dissolve project team.

Authority of the general project coordinator suppose: authority to issue directives to project managers and project team within the project, access right to information on all matters which are relevant to the project, definition and agreement of work packages, access to all costs which are relevant to the project, right of escalation to steering committee, release of necessary capacities by line manager, option of making adjustments to team composition.

G. 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.

Tasks of the support team are: agreement of activities with the general project coordinator as necessary, process work packages at an early stage and at the correct cost, assist with technological, qualitative, business management, personnel or legal issues.

Authority of the support team: right of escalation to relevant originator.

H. 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.
Authority of the project managers suppose: authority to issue directives to sub-project managers within the project, access right to information on all matters which are relevant to the project, definition and agreement of work packages, right of escalation to general project coordinator, release of necessary capacities by line manager, option of making adjustments to team composition.

I. Core team

The 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.

Tasks of the core team are: agreement and optimization of individual activities, bundling of information and results, development of solutions to problems and alternatives for achieving targets.

J. Expanded team

The 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.

K. 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.

Tasks of the sub-project manager are: plan and carry through sub-projects, if necessary, form and lead a sub-project team, ensure availability of resources, reporting and target monitoring for the sub-project (costs, time, functionality and quality), disclose problems and critical activities to the core team at an early stage, develop proposals for solutions and initiate measures, documentation of results, processing checklist points of the sub-project manager.

Authority of the sub-project manager suppose: access right to information on all matters which are relevant to the project, right of escalation to project manager, release of necessary capacities by line manager, veto on nomination as sub-project manager.
Create and document reference sample

Release for series production required by means of samples?

Yes → 2.2

No → 2.1

Internal sampling required?

No → 2.3

Yes → 2.1

Initiate sample order

Training at delivering and/or receiving plant

2.3

Internal sampling required?

Yes → Define and build up

No → Transfer audit at delivering plant

Transfer can take place?

No → Define and verify

Yes → Transfer machinery if required

After verification of defined measures

Gate 3

Transcode types

Start-up support from delivering plant

Start of production

Sample production

Sample approval issued?

No → Resampling?

Yes → Transfer audit at receiving plant

Deviation during transfer audit?

No → Decision by senior management

Yes → Define and verify measures

After verification of defined measures

Gate 4

Monitoring project cost and target

End project

Fig. 2 Project transfer
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.

Authority of the sub-project manager suppose: access right to information on all matters which are relevant to the project, right of escalation to project manager, release of necessary capacities by line manager, veto on nomination as sub-project manager.

V. 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 (tandem concept). 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.

REFERENCES