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BOSCH POWER TOOLS: THE DELTA SANDER PROJECT (A)

This case was prepared by Professor Francis Bidault, as a basis for class discussion rather than to illustrate either effective or ineffective handling of a business situation.

"We seem to be running late on the Delta Sander project! I now seriously wonder whether we should still consider it for the 1993 Cologne fair. Is this still feasible or should we postpone the market introduction to a later date instead? What do you think?"

Mr. Klaus Huttelmaier, the General Manager of the Marketing Department at Bosch Power Tools, boldly expressed what an increasing number of people had been thinking quietly. Somehow, the team engaged in the development of the Delta Sander had to face this question.

It was already November 16, 1992 and the new sander did not seem to be ready for production. From experience, it was known that in order to launch at the Cologne fair in March, the production ramp-up had to be achieved by December of the previous year. It was uncertain whether or not the Delta Sander could match this benchmark.

"We need to make a decision today!" continued Mr. Huttelmaier "I need your input. Do you think we should go ahead or not? and how?"

The meeting involved most of the key actors in this new product development process: the project leader, people from R&D, the product manager, a quality control engineer, a manufacturing engineer and two engineers from the R&D Department.

The question was of particular importance to Mr. Huttelmaier, as the Delta Sander was the first concrete result of his newly developed "new product policy"--whose goal was to increase the number of innovative products rather than new versions of existing ones.

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The Market for Power Tools

The name "power tools" designated all tools operated with an electric motor that were used manually by an operator.[1] They included a large number of devices that were used indoors and outdoors alike: drills, hammers, grinders, sanders, saws, screwdrivers, hedgetrimmers, spray guns... The market was traditionally divided into two product families, according to the status of the customer: professional and "Do-It-Yourself" (DIY). The first product family intended to address the needs of professionals, mostly from the various trades in the construction industry, but also in a variety of industries like shipbuilding, woodworking or foundries... The second family catered to individuals who needed tools to perform certain household tasks.

The market for power tools amounted to almost DM 10 billion in 1992 (down 4% from 1991). Some 96 million units had been sold (down 1% from 1991). Most of the sales were concentrated in the triad: North America (DM 2.25 billion), Europe (DM 4.9 billion) and Asia (DM 2 billion), with all three regions affected by the downward trend to the same extent. Only the Latin American and African markets were growing--however, from a small base.

Competition in the power tool industry was quite open. Competitors could be clustered around two main categories: large multinationals and local players. Only a few belonged to the first category: Black & Decker, Bosch, Makita, and Skil. These companies were typically present in both the professional and the DIY segments, with the exception of Makita. There were a large number of local players: they tended to be smaller companies compared to the first group, and usually specialized either in the professional or the DIY segment. Some had also international activities--like Hilti (based in Liechtenstein), but most were active in their own domestic market (Kango in the UK, Peugeot in France, Fein in Germany...). In addition, there was a significant amount of OEM supply agreement among manufacturers or with distributors.

The distribution of power tools was performed through a variety of channels, chosen to fit with the segment. Professional tools were almost exclusively sold through specialized distributors, either hardware retailers or wholesalers. DIY tools could be purchased in specialized hardware stores and home centers, but also hypermarkets or mail order distributors. The choice of distribution by a given brand was made consistent with its positioning (low-priced or differentiated). For some tools whose design had become fairly standard (like drills or chainsaws...), distributors sometimes used their own brand name to sell products made by an OEM supplier--often new players from South East Asia taking advantage of the low barriers to entry on traditional products. Thus, price competition tended to put pressure on manufacturers for the more classical tools.

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[1] *Robert C. Howard, William A. Fischer and Per V. Jenster: "Iskra Power Tools", IMD case GM 473, 1991.*

Bosch Power Tools: a Differentiation Strategy

Bosch Elektrowerkzeuge was a division of Robert Bosch GmbH, the large German diversified company active in automobile components, telecommunications, household appliances and industrial equipment, with a total turnover of DM 33.6 billion and workforce of 181,000 people in 1991.

Sales for the Bosch Elektrowerkzeuge division were expected to reach DM 2.3 billion in 1992. Bosch had a 23.5% share of the world market, close to the market leader, Black & Decker. But, while the latter was pursuing a low-cost strategy, Bosch Power Tools followed a differentiation strategy, emphasizing reliability and safety, allowing its products to command a premium prices over the going market rate.

The strategic position of Bosch Power Tools stemmed to a large extent from the division's history. Bosch started to manufacture power tools for professionals and industrial applications in the late 1920s. When the "Do-It-Yourself" concept emerged in the 1950s, Bosch did not embark in this segment as the company considered its tools to be over-engineered for this particular market, and too expensive compared to those made by competitors.

However, Bosch realized that DIY customers were getting more demanding in terms of quality, which meant that there was room for more reliable and durable products.[2] Therefore, in 1966, Bosch entered the DIY market in Europe. Since then, Bosch had kept two product families: the professional family (also called "the blue line" because of the color of tools' casings) and the "Do-It-Yourself" family (called "the green line"). While some companies in the industry were positioned either in the professional market (e.g. Hilti from Liechtenstein or Fein from Germany), or in the DIY market (Ryobi from Japan), Bosch remained in both. Its reputation in the professional segment gave the company an obvious advantage when attempting to support a differentiation-based positioning in the DIY segment. In addition, Bosch's overall philosophy was based on the "QIK" concept (*Qualität, Innovation und Kundenorientierung*, i.e. Quality, Innovation, Customer Orientation), which was consistent with its strategic positioning as a differentiated competitor.

The DIY family involved as many as 28 different lines of products, ranging from drills, hammers, jigsaws, grinders, cleaners, glue guns, gardening tools, and a new line of micro-tools... The professional family was comprised of 35 different lines of products, the majority of which were a "professional" version of the DIY tools, but it also included tools not available to DIY consumers--like heavy-duty rotary hammers or sheet metal shears. In both families, Bosch's policy was to offer a broad range of tools that were considered "mainstream" in the sense that they would be manufactured in large volume (several hundred thousands per year). Very specialized tools would not be part of Bosch's portfolio.

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[2] *Dieter Büschelberger, Alfred Odendahl: "Bosch-Elektrowerkzeuge: Innovation bringt Spass und Ertrag" in Armin Töpfer und Tom Sommerlatte (Hrsg.), Technologie Marketing: Die Integration von Technologie und Marketing als strategischer Erfolgsfaktor, Arthur D. Little*

Bosch power tools were sold via a network of retailers and distributors with which Bosch had direct contact through its own national sales organizations. In the DIY segment, Bosch used mostly hardware stores and some high-end retail chains, but not the discount stores and hypermarkets. The professional tool line was marketed through specialist distributors. Sales were supported by substantial promotions, which included point-of-sales material (brochures, leaflets, videos...), advertisements in specialized magazines and, sometimes, even TV spots. The division had developed an important customer service system where clients, particularly professionals and distributors, could be trained.

In the early 1990s, the strategic objective for Bosch Power Tools was to become a global player with substantial market presence in all major world markets. While Bosch was the market leader in Europe, its market presence was much lower in North America and, quite limited, in Asia. Thus, in addition to maintaining its leadership in Europe, Bosch intended to significantly increase its presence in the other two regions over the following years. Implementation of this strategy had already started. With respect to North America, Bosch was forming a joint venture with Skil, a major power tools producer based in the USA. The joint venture was intended to merge the US activities of Bosch Power Tools together with the worldwide business of Skil Corporation. Concerning the Asian region, Bosch was planning to build a plant in Malaysia, with production starting in 1994. The plant would serve the Far East market as well as supply the worldwide market for certain products.

Organization and Structure

In 1992, Bosch Elektrowerkzeuge was a multinational organization. It handled all activities--from R&D through commercialization--for a wide range of power tools in countries around the world.

The division was organized using a mix of functional and matrix structures *(refer to **Exhibit 1**)*. Below the traditional functions (R&D, Sales, Control, Production...), some departments were organized as matrices. For instance, in the Marketing Department, headed by Mr. Huttelmaier, the product managers needed assistance from specialized support units in advertising, market research, sales control, sales quality, purchasing... As well, product managers were allocated by product groups (i.e., hammers or woodworking) which covered both the "blue" line and the "green" line.

Bosch Power Tools had seven plants: Leinfelden (2,200 employees) near Stuttgart, Germany where the headquarters were located: Murrhardt (750 employees), also in Baden-Württemberg; Scintilla (1,800 employees), in the Canton of Solothurn, Switzerland; St-Niklaus (500 employees), in the Canton of Valais, Switzerland; New Bern (700 employees) in North Carolina, USA; Campinas (750 employees) in Brasil; and Sebnitz (300 employees) in Saxe (ex-East-Germany), which had been acquired after the reunification of Germany. In addition, Bosch had a large customer service center in Willershausen, Germany, devoted to service and repair.

R&D activities were present in most plants, although the larger part were concentrated in Leinfelden and Scintilla. R&D also was organized as a matrix structure, with product groups as one dimension and technology as the other *(refer to **Exhibit 2**)*. Therefore, the development of, say, a new saw would be put under the responsibility of woodworking, but would require some contribution from the various technology-oriented departments, i.e. CAD/CAM, electric motors, accessories... In addition, one of the R&D technology groups (Pre-Development) had the mission of studying and developing new technologies that would be needed in future products. Similar to the marketing organization, R&D product groups took care of a set of products which belonged to either the "blue" or the "green" line.

New Product Development

"Innovative Iden für den Markt" was the motto of Bosch Power Tools. In other words, product development was very central to the strategy of the division. Innovation was defined as "new products or sets of products to solve problems which the customer is not conscious of, but which the market will accept."[3] Thus, Bosch intended to regularly introduce new products that would satisfy its customers' needs and further enhance the brand's reputation as being highly innovative. Introduction of new products--together with quality improvement for existing products, which also required development work, were powerful ways to deal with market price pressures.

Hence, in addition to creating innovative products that would expand its product lines, Bosch also faced the need to renew the existing products regularly. The typical pattern was to "invent" a new tool, develop it first as a professional tool, then adapt it to the DIY segment once the company's competence was accepted. The life cycle of a product generation was 4-6 years. With each generation, new technologies (such as quick mounting systems, or motor speed control) needed to be introduced so as to continually improve every tool's performance. Bosch Power Tools was thus organized for continuous development work.

Bosch reckoned very early that barriers between functions (marketing, manufacturing and R&D) were a major obstacle to innovation. Consequently, teamwork became the rule for all product development projects. A team was typically comprised of the product manager, a project manager (from R&D) and an engineer (from manufacturing), plus possibly other members depending on the nature of the project, most often from purchasing and quality control. Each member "represented" his/her function and was supposed to receive that function's support before agreeing on any important decisions. If major conflicts arose within the team, members could call on their respective managers to solve it with their counterparts in the other functions. In order to make teamwork more effective, in 1988 it was decided to limit the size of each group to no more than five core members.

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[3] *Dieter Büschelberger, Alfred Odendahl, op.cit., p. 470.*

The development process was comprised of five phases *(refer to **Exhibit 3**)*: concept, design, detailed engineering, production planning and market introduction; and responsibility was assigned to the appropriate function as the project progressed.

The concept phase normally began in the Marketing Department by deciding which tools were needed. Its "target plan" would cover the next five years, giving expected sales figures for each product and citing which products should be introduced or discarded. Product introduction included both the renewal of existing products and the creation of completely new ones. When marketing decided to pursue a new product idea, it was typical to conduct market research first. Then, whichever product manager was responsible would work on the product specifications (technical features, applications, price, postitioning...), based on an assessment relative to competitors' offerings and cost estimates. The concept phase formally ended with the publication of a "specification booklet" (also called "pre-design booklet"), produced by the Marketing Department but co-signed by R&D. A request for funds ("the development order") was then presented to the division's board.

Once the development order was accepted, responsibility was passed on to the R&D Department. The next phase in the process was "design". The product R&D group manager (e.g. woodworking) would appoint the project leader from among his/her engineers on the basis of experience and availability. Typically, it would be a junior staff member who had no management duties. The project leader was responsible for delivering the product according to the established objectives regarding costs, quality and timing, with the help of the "project team". The project leader would act as the coordinator of the project team--which typically included: (1) three R&D people from the same "product group" who specialized in design, mechanics, and testing; and (2) representatives from other departments, i.e. marketing (the product manager), purchasing, quality control, manufacturing. Occasionally, project leaders could come from purchasing or manufacturing, but it rarely happened in practice.

Most team members worked only part-time on a project. However, the project leader and his R&D colleague(s) on the team typically spent up to 80% of their time on a single project. The most motivated members tended to be the product manager and the project leader. The product manager would often be involved in two or three projects simultaneously, but he/she normally felt concerned about the outcome because of being involved during the concept phase. The other team members would generally participate in a larger number of projects (up to six) at the same time. The team would meet every one or two weeks, depending on the phase and the problems encountered. Although the project leader was not really accountable for the outcome, as he/she was purely a coordinator, everyone felt that the sheer personality of the individual had an important impact on the project's progression. Although it was widely accepted that "time-to-market" was critical, there was no reflection of this priority in the project management system: i.e., there was no incentive (nor penalty) for the project leader vis-à-vis timing, although over time a good project leader would be offered promotions. "It is so difficult to evaluate who is at fault when a project is running late!" commented an R&D group manager.

The purpose of the design phase was to check the technological feasibility of the new tool. It started with the basic technical design (layout), which was later evaluated in several ways. One form of evaluation was in terms of cost. A functional cost analysis would be conducted by the Finance and Control Department *(refer to **Exhibit 1**)*, which had to assess the final production cost based on the different functions to be integrated (electric motors, gears, housings...) and their interaction (assembly). Input for this evaluation was provided by the R&D and manufacturing departments. The cost evaluation would be reviewed at each phase by the Finance and Control Department. A product and a technical review would also be conducted at the completion of the design phase, just as it was done at the end of every phase.

These reviews played an important role in the product development process. Each phase was concluded with an in-depth assessment. The first one, referred to as FMEA (Failure Mode and Effect Analysis), systematically identified and removed all the risks involved in fulfilling the specifications, the production process and product quality. The FMEA analysis was conducted by the project team. If the results were positive and the profit projections looked satisfactory, the project would be released (on the basis of a checklist called QB) and could proceed to the next phase. A formal release was supposed to be given by the executive board, but top management only intervened if the project encountered unexpected difficulties--such as higher than anticipated financing needs. The project schedule, submitted by the team, was defined in terms of the timing of these reviews, i.e. the project plan would mention the dates when each of the three reviews were due (milestones). The first FMEA and QB were performed on the basic design.

The third phase was "detailed engineering". It included the detailed design of parts and the building of a few prototypes that would be tested. Bosch Power Tools used a new prototyping technique called "stereolithography", which could produce objects from 3D pictures, layer by layer. A resin prototype produced with this technique, subcontracted to an independent laboratory, was much faster and cheaper than conventional pattern-making or soft-tooling methods. Its cost, however, remained an important item in the budget at this stage, therefore the number of prototypes built was typically only two or three. At this stage, a second competitive assessment would be performed, and the prototypes would be evaluated using the FMEA method.

After QB2, the fourth phase--called "production planning"--started. In this phase, the leadership shifted from R&D to manufacturing. An important element in this phase was "tooling", i.e. ordering the tools (i.e., molds or dies) that would be used to make the special parts (actually made by suppliers, but designed at Bosch). Once detailed drawings of the parts were available, the project team could apply for a "production release"--which entitled them to have access to the budget for ordering the tools. The "release" meant that the design was "frozen" and that designs for the parts were then formally entered into the company's technical database. The process from ordering to delivery could take up to eight months to be completed, because the best suppliers for each key part had to be found and then contracted. Once the parts were delivered, pilot production could start and the first samples tested. At the same time, the product manager would start the "commercial" development process: i.e., the packaging and advertising material (created by the Advertising Department) and a user's manual (made by Sales Quality). The production planning phase was concluded with a third FMEA,

which particularly assessed the final product against the target specifications, costs and quality.

The last phase was entitled "market introduction", which included the final preparation of the marketing launch (e.g. presentation to the national sales organizations and at exhibitions) and the ramp-up of production.[4] There were two product introduction periods every year: the main one was the famous annual Cologne fair in March, and the September period when customers traditionally reconsidered their tooling equipment. Product managers, however, all preferred to make their introductions at Cologne, because their new product would get much better visibility. Major customers, however, were normally given a preview in early February of the new introductions to be made at the Cologne fair.

Consequently, the end of the calendar year was particularly busy, as many project leaders and product managers inevitably were "rushing to the gate". In order to ensure being present at the Cologne fair, they needed to secure the support of the various departments in charge of packaging, advertising, the user's manual, etc.--an accomplishment which required a certain element of salesmanship and experience, as they had no formal authority over these departments.

The total 5-phase cycle usually lasted around two years, with some projects taking only 15 months and others up to three years, depending on the complexity and the newness of the product. The project schedule was proposed by the project team after QB1, i.e. before the beginning of "detailed engineering" phase. Thereafter, the progression would be monitored by top management against the pre-set milestones (each QB). The strategic importance of a project could be gauged by the frequency of requests from top management for information regarding the project's progress.

As the project moved through the various phases, it demanded higher and higher investments. Through QB1, the financial needs were generally lower than DM 50,000. Between QB1 and QB2, they could amount to some DM 500,000. Later, especially when the dies were ordered, the investment could reach DM 2,000,000. Therefore, it was important to manage the development as carefully as possible so as to avoid mistakes with potentially dramatic consequences.

The new product development process was not absolutely linear or sequential *(as **Exhibit 3** might seem to indicate.)* In fact, the process involved a certain amount of overlap between the various phases *(as shown in **Exhibit 4**)*. For instance, the concept phase could run in parallel with some pre-development work by R&D as they became informed about future product introduction through the target plan.

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[4]*The organization being described was the Leinfelden plant. In Scintilla, Canton of Solothurn, Switzerland, the development process showed some major differences, which can be summarized with the following characteristics: the R&D project leader stayed in charge until the end of the production planning phase; he reported directly to the plant manager who exerted a tight control on the process; and there was a monthly review of all running projects where priority between projects was discussed.*

As a way to increase the rate and regularity of innovative product introduction, the Marketing Department decided to formalize the gathering of new product ideas. An Innovation Planning procedure was set up: its goal was to introduce at least one innovative product each year. The person responsible for achieving this goal was Ms. Christiane Hagmann, a young product manager (with a bachelor's degree in Economics) who had recently been hired to handle woodworking, painting products and measuring instruments. Four times each year, Ms. Hagmann organized an Innovation Planning meeting, where marketing and R&D managers gathered to generate new product ideas. The group used a variety of information sources--market research, brainstorming, surveys of competitors... This process had always been informal, until 1991 when it became official.

The Detail Sander Opportunity

In 1986, Fein, a German professional power tools manufacturer, introduced an innovative product: a sander which was effective in applications that could not be handled with traditional (circular or longitudinal) sanders. It could literally sand in corners and had numerous applications like window or picture frames, drawers, chair structures... and many other situations--such as in furniture renovation--where hand sanding was the only solution.

This new professional tool, sometimes called the "detail sander", did not go unnoticed at Bosch Power Tools, which continuously monitored the market. The Marketing Department quickly recognized the potential need to adapt it to the DIY segment. However, no move was taken for some time, as everyone was already busily involved in existing activities. In the summer of 1991, the idea was discussed again. This time, Klaus Huttelmaier, the General Manager of the Marketing Department, decided to initiate some action as he wanted Bosch to keep offering innovative products to the market, and there was a lack of new products in the pipeline.

A market research study was conducted to gauge the market's readiness to accept this product. The idea was to invite selected users (DIY consumers) to discuss their sanding problems and give their reactions to Bosch's new "detail" sander, presented as a prototype. They were asked to consider their purchasing intentions, the price, possible applications, necessary changes, etc. The results of this investigation were favorable for the projected Bosch design. Users were very frustrated with trying to sand in certain places and situations. They also felt that Bosch's new tool fulfilled their needs well and, if it could be reasonably offered at DIY prices, they would buy it.

The decision was then made, by the Marketing Department, to start up the concept phase. Klaus Huttelmaier gave this responsibility Ms. Christiane Hagmann, the product manager in charge of painting and measuring products.

As the company's "target plan" had not designated any new product for the Cologne fair of March 1993, Klaus Huttelmaier decided to give this new product that target date. Because of the short time horizon, the project was given "priority" status, and the development order (project budget) was obtained quickly from the executive board.

The project, called "Delta Sander" (after the delta shape of the sanding pad), could then proceed. The next step in the concept phase--evaluation of the market--was conducted in October 1991. By December, the design booklet was completed. It gave the following specifications:

- Retail price DM 139 for the 100W model and DM 169 for the 120W with electronic variator, (i.e. three times less than existing products);
- Weight: 900 grams (vs. 1.4 kg for existing products);
- Electric motor 12,000 to 13,000 rpm;
- Flexible shaft (quieter than conventional gears);
- SDS-clic (quick mounting system of the pad);
- Dust extraction.

*(For a description of the Delta Sander as it was introduced, refer to **Exhibit 5**).*

On the basis of costs, price and sales projection, the Delta Sander looked very promising; its projected ROI was indeed attractive, easily passing all the thresholds used by Bosch for project selection. In addition, it was expected that the Delta Sander would stimulate the overall sanding segment.

It was thus decided to move quickly into the design phase, where leadership was normally passed on to R&D. Since the Delta Sander's applications were mostly for wooden objects, Mr. Rudolf Fuchs (R&D manager for the woodworking group) was given supervising responsibilities *(refer to **Exhibit 2**)*. Mr. Fuchs, an engineer by training, was a jovial individual, always enthusiastic about new projects. Aged 35, he had been working for Bosch in different plants and had spent a couple of years with the US operations in North Carolina. His department worked on sawing, sanding, planers and routers, with about 10 full-time staff members.

Mr. Fuchs decided to appoint one of his engineers, Mr. Steffen Wünsch, as the project leader for the Delta Sander development. Mr. Wünsch, a 50-year-old technician, had been involved in several development projects and thus was somewhat more experienced than most project leaders. He was known as being independent in his behavior, but also committed to his tasks and communicative with colleagues. Having been with Bosch a long time, he knew many people in the organization, including at the Scintilla plant in Switzerland, which had been designated to manufacture the new tool. As a project leader, he was good at motivating his team members to deliver and to stay on schedule.

In addition, the project team was comprised of five people: a second woodworking group technician, the product manager (Ms. Hagmann), a production manager, a purchasing manager, and a quality control engineer (the latter three all from the Scintilla plant).

The design phase officially started in December 1991. In reality, however, the woodworking group had been exploring various options on a part-time basis since the middle of August. The developers had imagined several new technical solutions that offered improvements on any existing product. And, although the tool produced by Fein was protected by patents, the changes being envisioned avoided the risk of patent infringement. At the same time, the styling was contracted out to an independent design company. By February 1992, the design was nearly complete. In spite of Phase 2 progressing with such impressive speed, the schedule ahead was very tight: completion was due for December 1992, a mere 10 months away! The team unanimously decided to skip the first FMEA and to hasten the first review (QB1) by doing it "informally".

The project entered the "detailed engineering" phase in February. The R&D Department took care of the detailed layout, but contracted out the technical drawing of parts and components. The prototype was made in-house (by the Manufacturing Department), then tested to check all the specifications in the booklet as well as the safety standards. As soon as these tests were completed satisfactorily, the team proposed speeding up the next phase (production planning) by starting to order some molds (for the most complex parts) before QB2 was completed. At this point, the team did not have the detailed part drawings for these large parts (the housing, for instance), but they had enough information to ask the mold maker to start working. Normally, the release of the budget for tooling (called "production release") was made only after the "product engineering" phase was finished, based on the second quality review. In the end, QB2 eventually was done, fully and formally, in May 1992.

In July 1992, the product manager, Christiane Hagmann, ordered the Advertising Department to begin preparing the packaging, using the prototype. As usual, she also asked the Control Department to make a new production cost evaluation, based on the information obtained thus far in the process.

The formal production release occurred at the same time, thereby confirming the pre-release. Smaller (and simpler) parts were given "release" in the usual way. The fourth phase (production planning) could then start. The tools were delivered in record time--by October 1992--to the Scintilla plant, where the Delta Sander was to be manufactured. The most complex parts had taken less than 6 months to complete, versus the usual 8-9. The Scintilla plant, which had extra production capacity available, quickly proceeded with a pilot production run, which meant installing and finishing the tools. In November 1992, the production manager received the first pilot lot of 35 Delta Sanders for testing.

Difficulties with the Delta Sander

During the tests, some significant technical problems surfaced. One of the unique features of the sander, the flexible shaft that replaced the traditional gears, was not solid enough. It broke several times. Also, the rubber pad proved unsatisfactory: it did not stay securely fastened on the tool and, high frequency vibrations sometimes caused it to melt. It became obvious that some development work had to be redone: 6-8 more weeks were needed! It would thus be impossible to reach

QB3 in December, the normal benchmark for products being launched at the Cologne fair.

Regarding costs, there were also some disappointing results. The latest production cost evaluation, reviewed by the Finance and Control Department, showed a 20% difference from the initial one that had been made for the design booklet. Some of the cost adjustments could be explained by identifiable causes--such as more expensive materials or new internal pricing rules, but some mistakes had also been made by the Control Department in the initial evaluation. The cost adjustments meant increasing the retail price by the same amount, from DM 139 to DM 167 for the 100W model. An additional misfortune was that Ryobi, a Japanese competitor, had unexpectedly introduced a DM 70 detail sander at the Chicago fair in August 1993.

Finally, preparing the market introduction was running behind schedule. Mistakes had been identified in the packaging size, which needed to be reworked. Also, the user's manual (developed by the Sales Quality Department) needed some editing to correspond with the changes being made in the pad attachment. It also seemed increasingly clear that the TV spot to be used for the launch would not be shot in time, as the Advertising Department was still working on other projects. As a matter of fact, there was no shortage of new products to take to Cologne: as many as 11 new products were to be introduced at the 1993 fair, partly due to projects that had fallen behind schedule. Even though most of the products were renewals of existing ones, there were a couple of genuinely innovative products, like the "tandem saw".

Go or No Go

It was against this backdrop that Klaus Huttelmaier met with the Delta Sander project team: Mr. Fuchs, the R&D manager for woodworking products and Mr. Claus Kemmner, the development manager. He wanted to get their opinions before going to the board.

"I know you won't make QB3 in December! But can you still do the ramp-up before the Cologne fair so that we have enough products to present to the trade?" asked Mr. Huttelmaier.

Mr. Fuchs, a very experienced developer himself, answered frankly: "If we follow the normal policy, it is out of the question. The Delta Sander will probably not be on the shelves for another six months! But, I am quite ready, if the team wants it, to make an exception to the rule. This project has been an oddball since the beginning anyway! We have been trying out new ways to develop new products, so it could never have gone as smoothly as a traditional project."

"But remember, we also don't want a half-baked product. We can't afford to hurt Bosch's reputation for high-quality tools. I wonder if perhaps we should wait a little longer to make sure that the Delta Sander is exactly the way we want it," Mr. Huttelmaier suggested.

"I think we have no choice except to rush to the market now!" replied Christiane Hagmann, the product manager. "For one thing, we are no longer alone in this segment. We cannot afford to let Ryobi lead this market introduction; then, we would have a really hard time catching up. Luckily for us, Ryobi did not introduce its detail sander in Europe in September, but they will probably do it in Cologne. So we *have* to be there, too! I'm ready to put in as much time as needed so that the problems with the marketing preparation are fixed within the next two months."

"Herr Fuchs," said Mr. Wünsch, "I am not concerned about our development team. We are all committed to this project as Christiane Hagmann has just shown. We clearly want the project to be a success. I don't think we need more than three months to complete *our* job, but what happens then does not depend on me."

"If the new pilot run does not require any more major modifications, we should be able to do the ramp-up at the beginning of April. But, who can make such a promise after so many bad surprises?" commented the production manager.

Mr. Kemmner's thoughts concluded the meeting. He addressed Mr. Huttelmaier, "Klaus, I would hate to leave on a pessimistic note. I think that, before looking at the problems, we should first acknowledge the performance of the team. I personally would like to congratulate them for the fast development of the Delta Sander, only 12 months from the concept phase to the production release! They did a good job. This was only possible because of a major shift into parallel development and the strong dedication of the team members. We have to figure out what lessons we have learned that could benefit our numerous development activities in the future."

Mr. Huttelmaier faced a crucial choice in the short term: what to do with the Delta Sander? Mr. Kemmner had also a challenge in front of him: how to be fast, yet precise, in product development.

Exhibit 1: Bosch Power Tools: Organization Chart

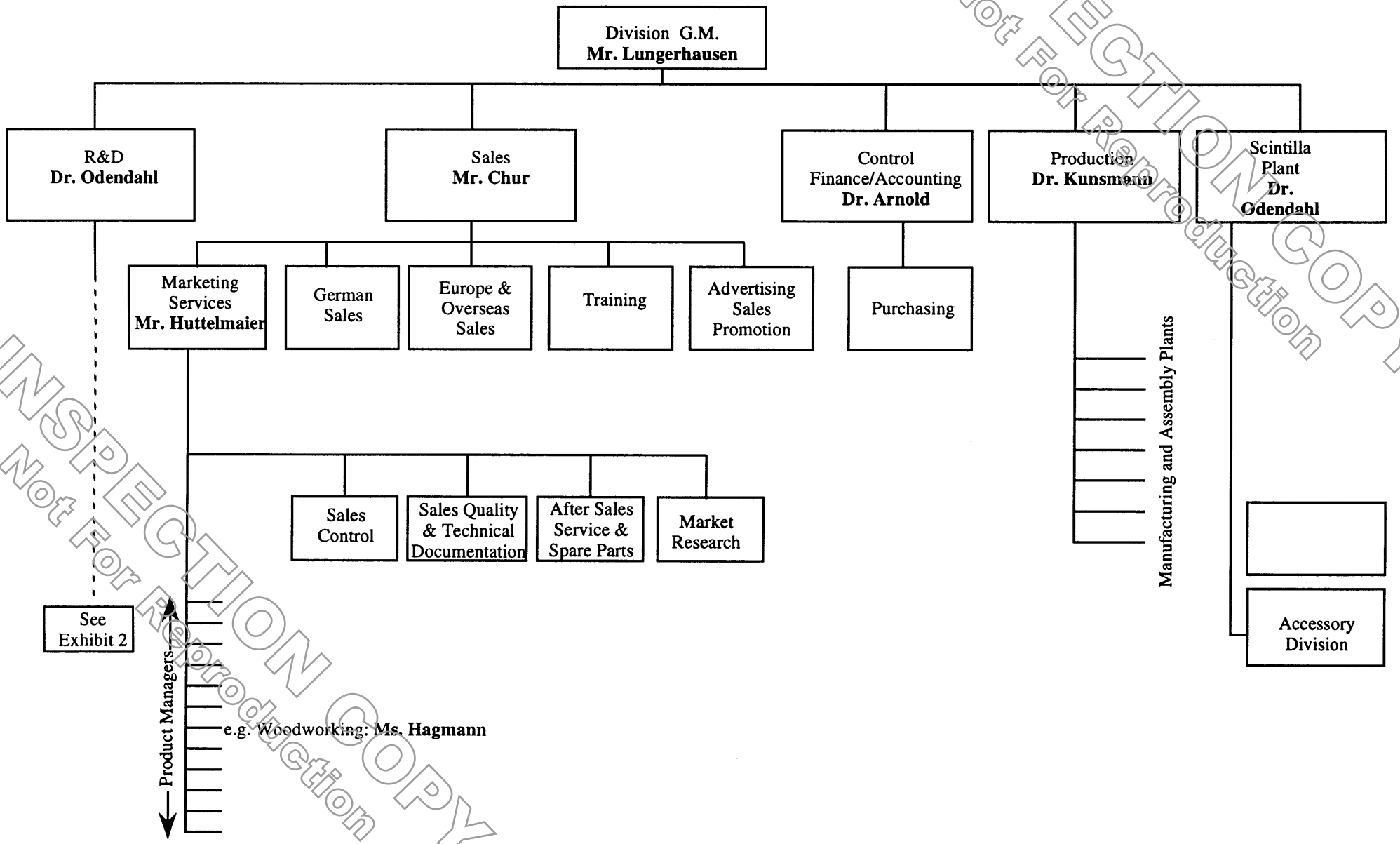


Exhibit 2: Organization of the R&D department

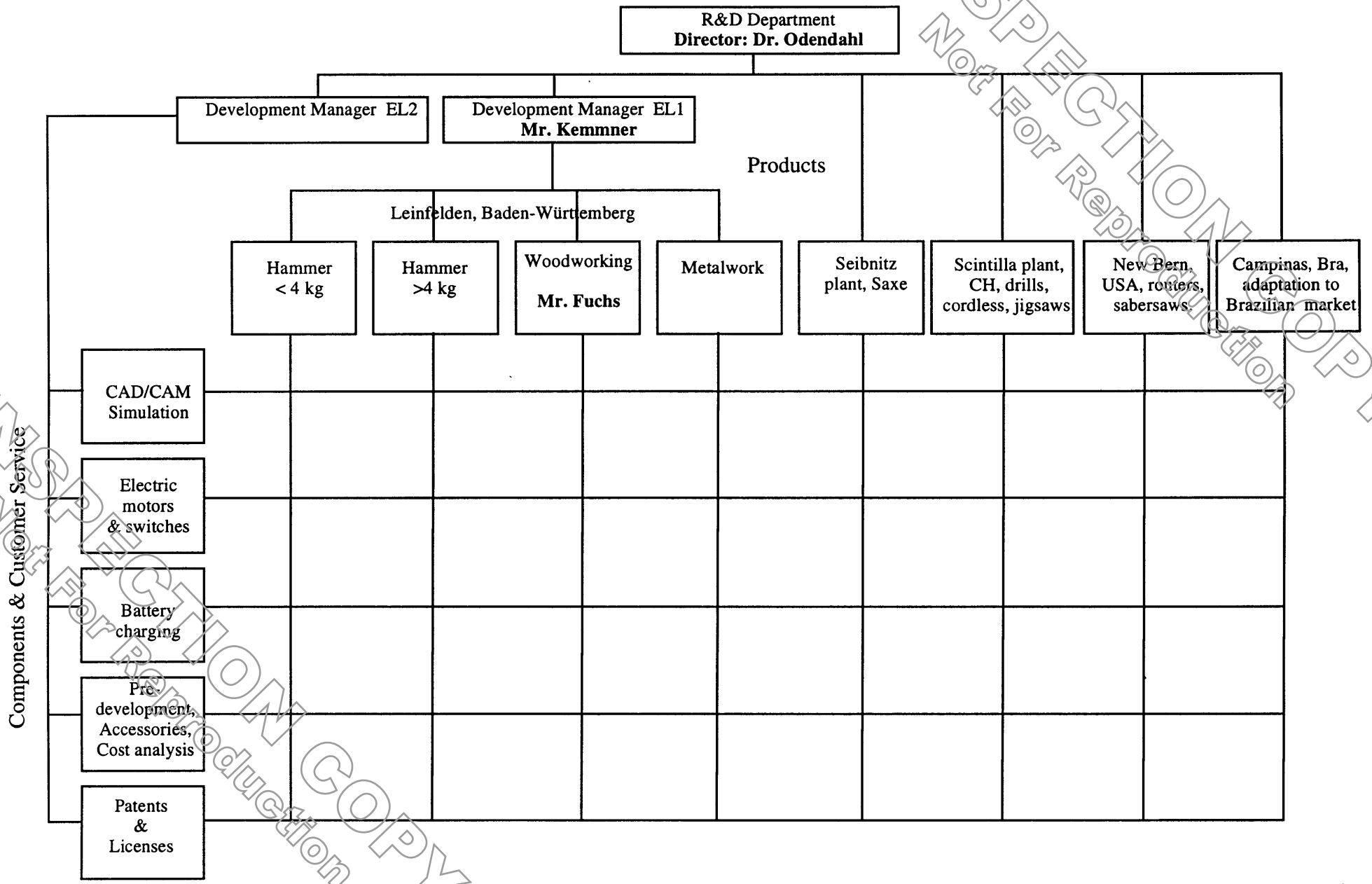
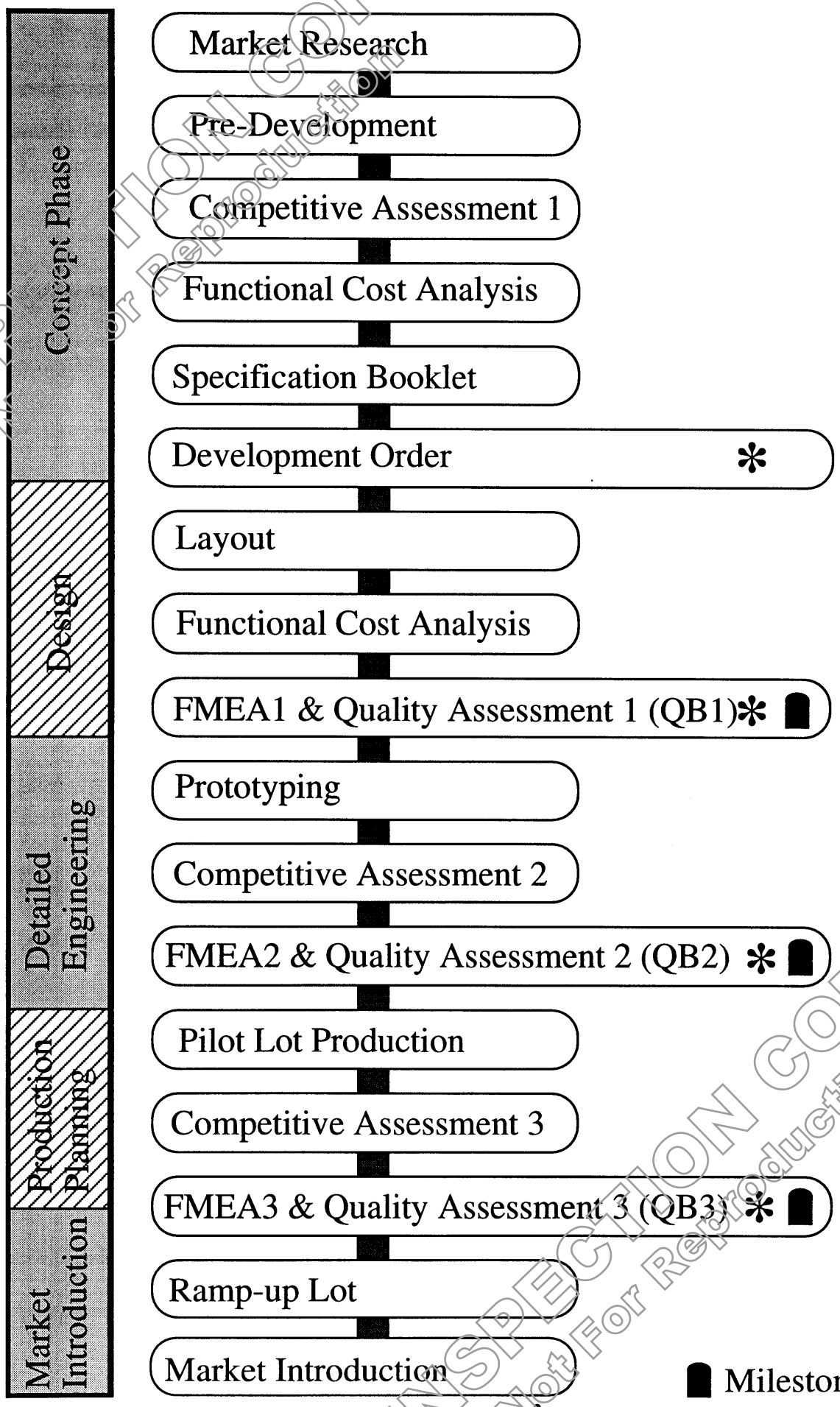
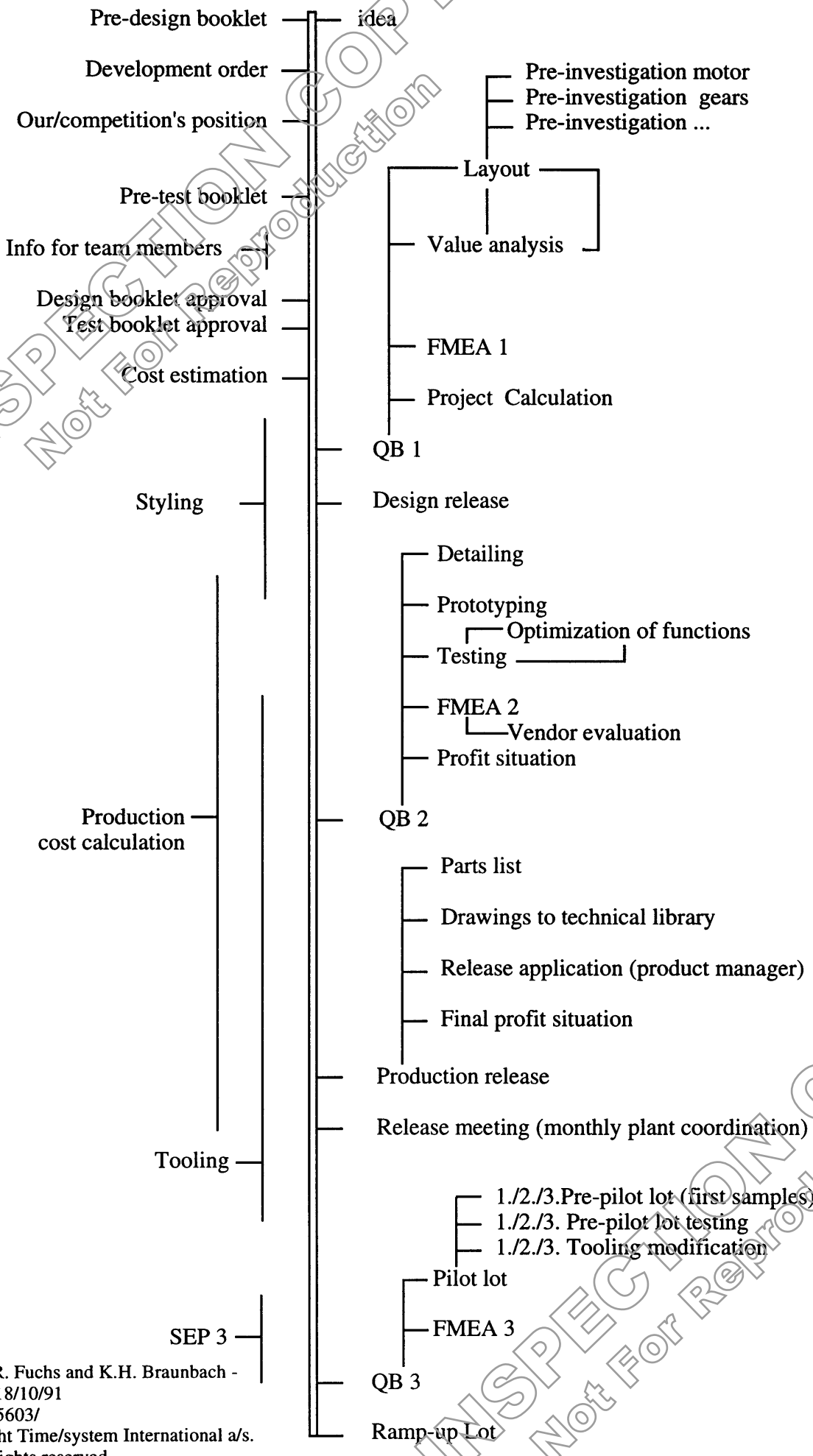


Exhibit 3: The Development Cycle at Bosch Power Tools



Source: Bosch Elektrowerkzeuge, 06/92

Exhibit 4: The Detailed Development Procedure at Bosch Power Tools



Listed by R. Fuchs and K.H. Braunbach -
Released: 18/10/91
TS-form 15603/

Exhibit 5: Bosch Delta Sander PDA 120 E

The number below matches the number on the graph on the following page:

1. SDS-clic (i.e. quick mounting system of the rubber pad on the tool),
2. Vibration absorber,
3. Flexible shaft,
4. Central on-off switch,
5. Electronic variator,
6. Single integrated circuit board for electronics and electric motor,
7. Integrated dust extraction
8. 120° changeable pad with curved boundaries.

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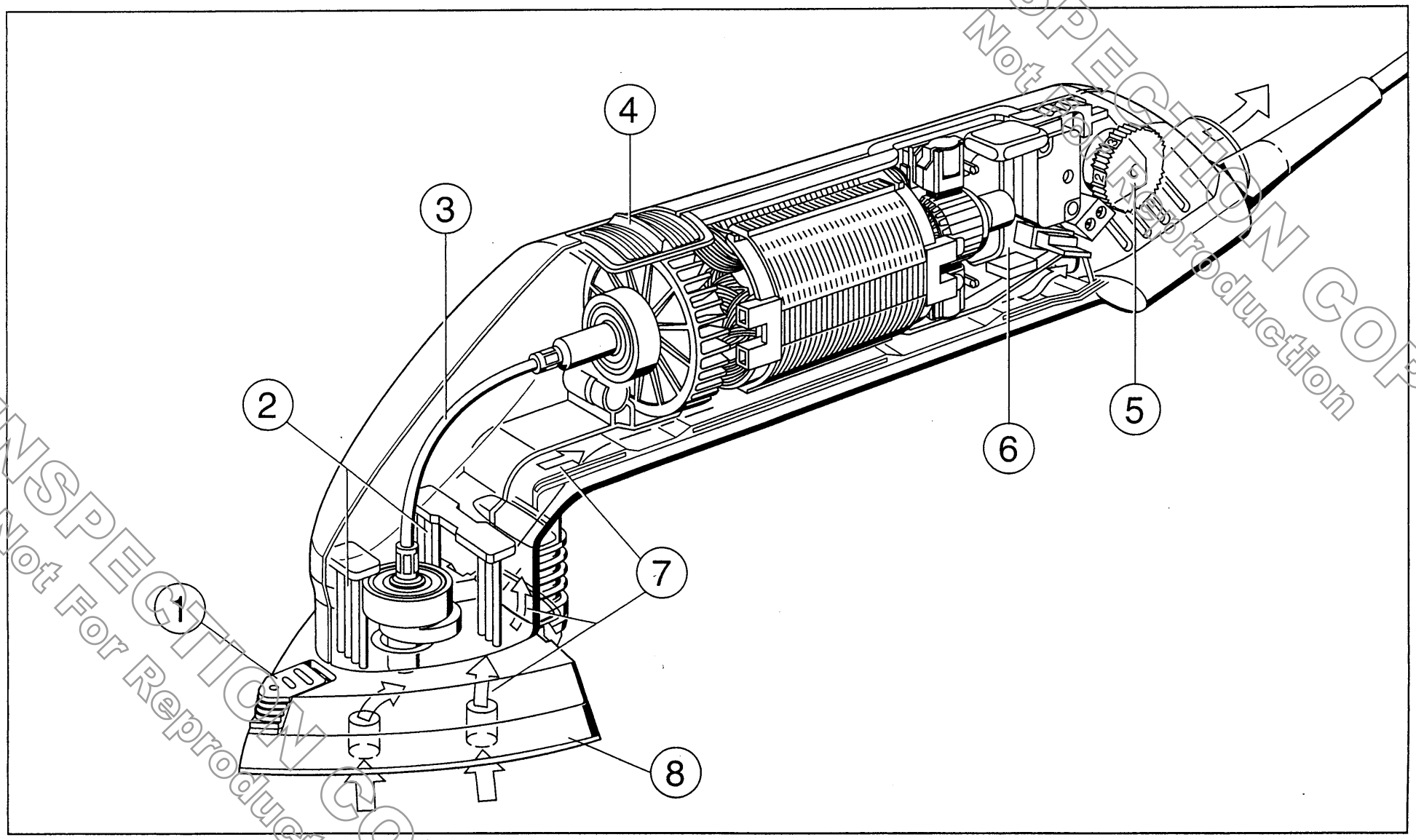
Bosch Delta-Schleifer PDA 120 E



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