Subcontracting process as a chain of transactions in the information system SAP

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Abstract: Today, subcontracting (or outsourcing) represents standard process used widely in manufacturing companies. It is based on production of several parts which are then provided to the external company creating new products from them. These products are then delivered back to the manufacturing company where they are used as subcomponents for the target product. Monitoring of the state related to the original parts as well as the delivered ones could be very demanding because there are permanently changes of their numbers in company warehouses. The effort can be decreased by the use of suitable information system enabling the description of the subcontracting process. This article shows how to implement individual steps of subcontracting in the system SAP. It presents how to create bill of materials (BOM) for delivered product, how to send and account parts to the external company and how to deliver them back as assembled subcomponents. Straightforwardness of the scheme is supported by an example from technical praxis.

Keywords: subcontracting, outsourcing, SAP, warehouse, accounting
JEL Classification: L14, L23, L24, L62

1 Introduction

Information systems (Boell & Cecez-Kecmanovic, 2015) are widely used in the world of production companies. Typical representatives are very large firms with hundred thousand employees, like Ford, Amazon, IBM, DHL or Robert Bosch (Pushmann & Alt, 2001). All of them are using the system SAP. But before going in details how SAP can be operated, let's look how the information systems can be described. Information system is composed from hardware, software and processes which are performed by employees with target to collect data, process them and used them for planning, controlling and decision making (Hasan, 2018). Those systems are nowadays very important for the organizations of different type and scope. Without them, it would not be possible to process the transactions in the banks, government could not collect the taxes, hospitals could not take care of the patients. For all these activities, it is typical that large amount of data has to be processed. Data are represented e.g. by information about services and goods, about clients and their requirements, about deadlines, etc. They are very important and therefore, they need to be stored, administer and processed. And that is the role of the information systems.

Enterprise information systems (Romero & Vernadat, 2016) are the information systems used by companies and other organizations to execute crucial activities called enterprise processes. Let's look e.g. on the processes in the production area; before the delivery of our product to the customer, many activities have to be done: First, inquiry describing the parameters of the product and other requirement from the customer has to arrive, being discussed, quoted and send back. When agreement with him is reached, material from which our product is created has to be inquired and quoted. Then, it has to be ordered. When it arrives to the company, it has to be accepted and installed into the warehouse (and, of course, accounted). Next, bill of materials has to be created to describe which components and materials will be used for our product. Machines and employees have to be allocated to ensure that product will be really produced. And when product is completed, it has to put again into the warehouse, after certain time send to the customer and accounted.

As seen above, enterprise processes can be quite long and complicated, with necessity of confirmations at different personal level. Considering that those processes repeat for every new product, their structure calls for automation by the computer to increase the effectiveness and decrease costs. And these are the main benefits of the enterprise information systems (Anaya, 2013). Moreover, when using those systems, data are stored and secured at central location with different rights of access. They can be viewed not only inside the plant but also outside the office – it is easy to get actual

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information about inventory levels, project status and financial situation. The reports can be done in real time, summary of downtime, rejected products and machine utilization can be obtained very fast. Moreover, systems include customization, i.e. they can be adjusted according to real processes occurring in the plant. On the other side, there are of course also some challenges: the first, quite significant, is required massive investment in those systems; not only financial but it is also matter of time, because to customize the system takes long time (typically months, even years). Next topic is also security of data and potential failure of the system with appropriate impacts on production (Markus, 2000).

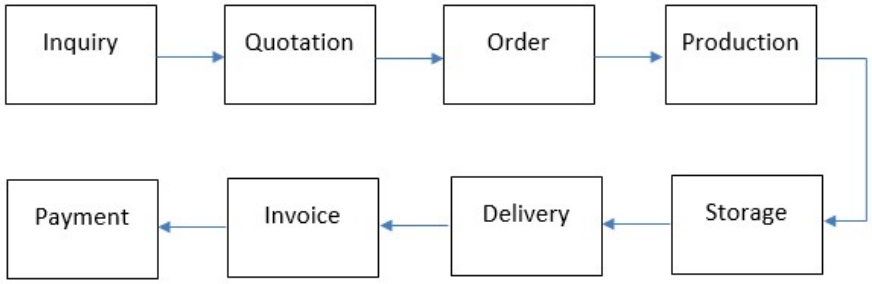
Nevertheless, even with considering some risks, information systems represent successful tool for management and reporting of company processes. In Czech and Slovak Republics, there are at least 800 installation of famous SAP system and 100 installations of Oracle systems. There is also local provider Asecco Solutions delivering system Helios. The following text is oriented on the use of SAP system because, as described earlier, it is very widespread in the world. Nowadays, there are more than 1 million of users worldwide (Overview, 2022). Moreover, on the education level, it is very good representative for students to show how individual processes can be described step by step.

2 Methods

The processes in SAP system are composed from transactions which represent the smallest piece describing one certain activity in enterprise. Transactions are usually used for creating new records, modifying, viewing, reporting, and more. Typically, an example of one transaction is an inquiry from the customer. Suppose that plant produces certain product which customer would like to buy. First, he sends the inquiry to define what he needs. Our company prepares it, sets it in SAP and generates an appropriate output sent to the customer.

Transactions can be chained into larger business activities. Considering the example from previous paragraph, there are next actions related to the inquiry. The customer reacts on our inquiry, and he requires the quotation. Receiving it with the proposed price of product, he can agree and the project starts. Then, it is necessary to prepare the order containing agreed business, i.e. required product, its amount and price per piece, date of delivery, etc. When order is prepared and manufactured, the required amount of pieces is stored in the warehouse and in the next step, it is delivered to the customer leading to the decrease of supply in our warehouse. Afterwards, invoice is prepared for customer (with limit date of payment included) and sent. The graphical representation of the chain is shown in Figure 1.

Figure 1 Example of chain of transactions



Source: Own processing

As you may see, the chain of actions can be quite long. Imagine that each action is accompanied with much information (parameters) that need to be set in the individual transactions of SAP system; to be aware of all of them, it is very exhausting. Of course, not all are required to be inserted but not to fill them, level of reporting quality becomes insufficient. Therefore, and it is common practice in business world, one employee works only on single transactions or on the small sets of transactions from his job scope. Hence, he operates in small piece of SAP system but with high degree of knowledge.

SAP system is windows-based product; it means that all activities are done in separate windows evoking when clicking on required transactions. The latter ones are stored in menu with spreading structure describing the enterprise areas where given transaction is typically used. As searching for it can take a lot of time, each transaction is equipped with transaction code. When typing this code in the command line, appropriate window appears immediately. This approach helps to user do his work faster and considering that he operates only with several windows (transactions), he can become real master in his area.

As described above, the chain of transactions can be quite long and complicated. Typical representative of that is subcontracting. What does this mean in business language? It is based on production of several parts which are then provided to the external company creating new products from them. These products are then delivered back to the manufacturing company where they are used as subcomponents for target product. Monitoring of the state related to the

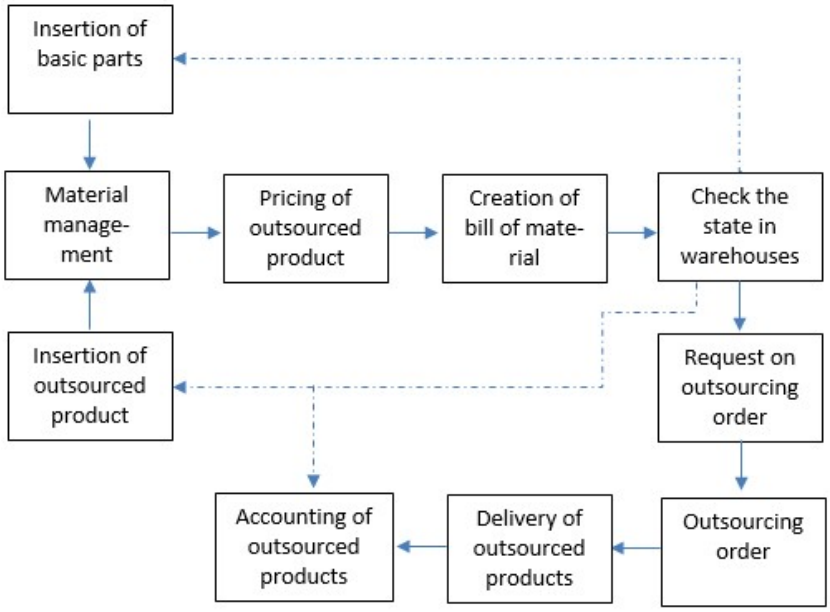
original parts as well as the delivered ones could be very demanding because there are permanently changes of their number in company warehouses.

Which transactions need to be executed to sufficiently complete subcontracting process? Suppose that our outsourced product is composed from several basic parts produced in our plant. First, all of them have to be inserted in our SAP via Material Management. Doing that, outsourced product needs to be financially assessed to reflect changes in the financial balance of company when leaving plant to the external company. When pricing procedure is finished, it is necessary to prepare bill of material (BOM) describing from which basic parts and in which amount our target product is composed. Next, fast check if the parts for outsourcing are even in warehouse of the plant needs to be done.

After preparation the basic parts and BOM, request on outsourcing process in form of order is inserted into the system. After the request, order itself is filled and then, basic parts can be delivered to the external company using appropriate SAP transaction. When the products required to be prepared outside are finished, they can be delivered back to our plant – of course, they have to be accounted to include them into plant. During all steps, check of the number of basic parts as well as outsourced product can be done via using appropriate transaction.

The chain of necessary transactions is depicted in the Figure 2. While full lines represent the flow of the transactions necessary for completion of the outsourcing process, semi-dashed lines correspond to optional transaction checking the number of products in warehouse at various state of the process.

Figure 2 Transaction scheme of subcontracting process



Source: Own processing

The implementation of the individual process steps in SAP system is described in the following section.

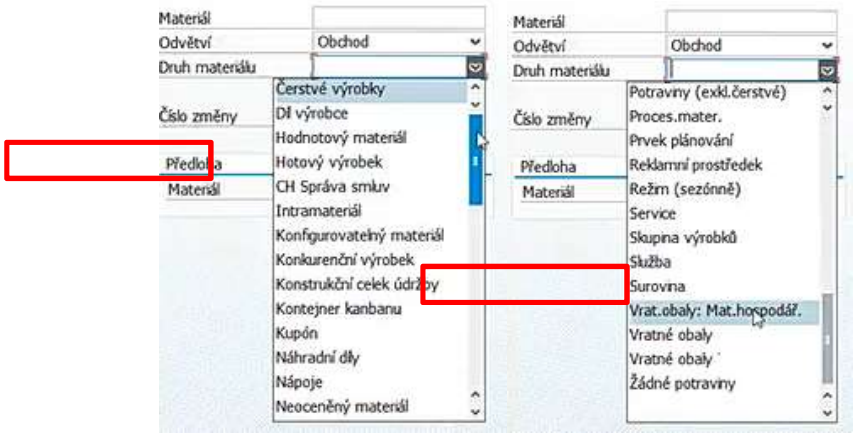
3 Research results

The described processes are implemented in SAP system via appropriate transaction windows. Let´s show only the most challenging ones to present which settings need to be done to complete the transactions successfully. Note that all windows are in Czech language – to do the method more general, translation to English is done.

3.1 Material management, BOM and status in warehouse

As described earlier, the first step is represented by insertion of basic parts and outsourced product into the Material management using transaction code MM01. To distinguish between both types of materials, it is necessary to specify the basic parts as Raw material („Surovina“) and outsourced product as „Finished product“ („Hotový výrobek“). The insertion of the material can be verified by transaction MM03 (Display material).

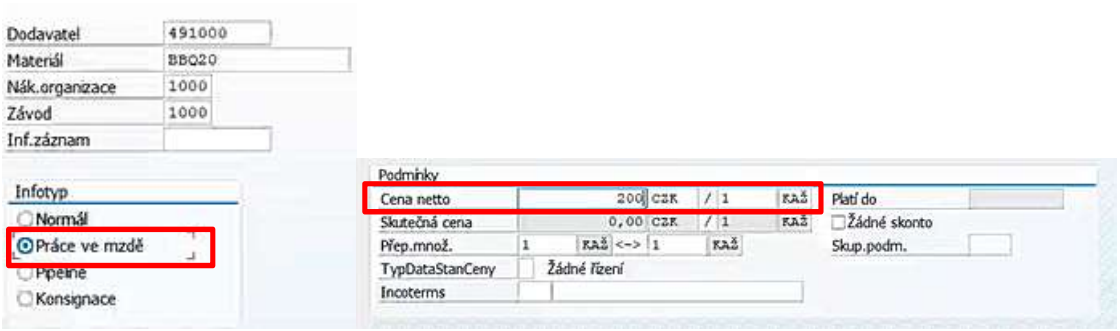
Figure 3 Material management window



Source: Own processing, generated in SAP

When all basic parts and outsourced product are inserted into SAP, a pricing procedure takes place. This transaction starts by the transaction code ME11 (Create info record) and its purpose is to add some price to the product to reflect that when the product leaves our plant, we loose some financial value. Note that in the first window, option „Subcontracting" („Práce ve mzdě") has to be chosen in Info category. In the second window, appropriate price is added in the sheet „Conditions" („Podmínky") and in the field Net price („Cena netto").

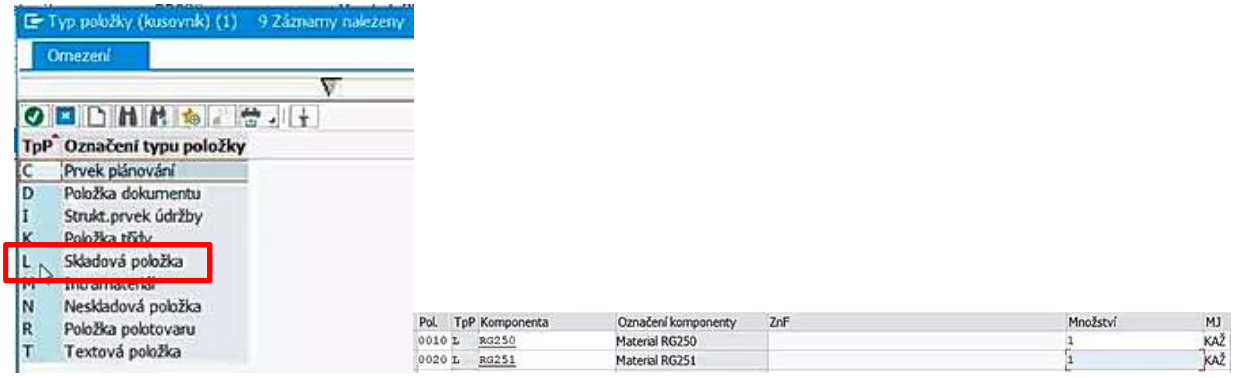
Figure 4 Pricing procedure



Source: Own processing, generated in SAP

When pricing is completed, it is time to prepare Bill of materials (BOM) to specify from which basic parts outsourced product is composed; transaction CS01 serves to do it. In evoked window, selection „Production" („Výroba") has to be chosen in the field „BOM usage" („Použ.kus."). Next window prompts us to define the bill – appropriate basic part and its amount are chosen. To specify that given part will be delivered to the outsourced company from warehouse, it is necessary to select in option „IcT" („TpP") the choice „Stock item" („Skladová položka"). The example of BOM is depicted in the Figure 5; two basic materials RG250 and RG251 are considered for completion of outsourced product.

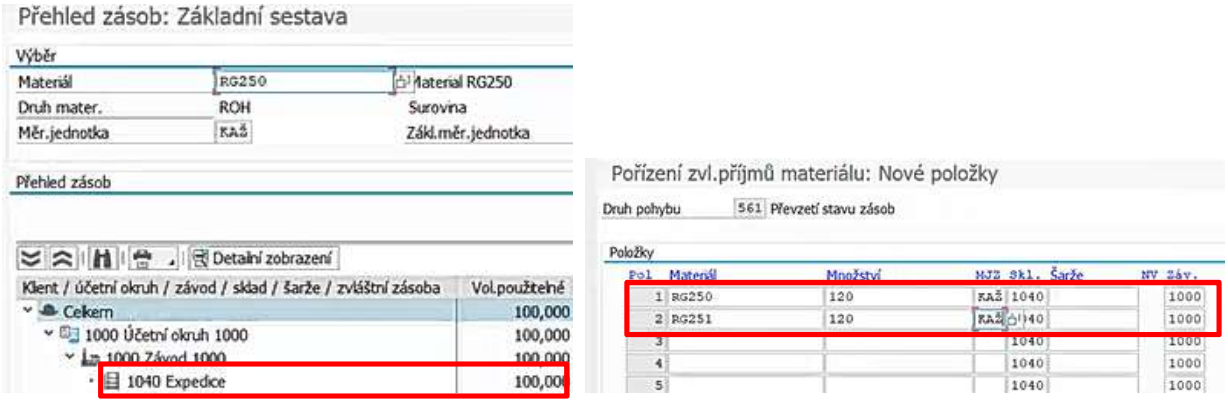
Figure 5 Preparation of bill of materials



Source: Own processing, generated in SAP

The amount of the basic parts available in the warehouse is shown using transaction MMBE. If the parts are newly inserted into system, there will be, of course, zero pieces displayed. The transaction MB1C serves to increase our supplies as shown in the Figure 6. To have parts available to our disposal, the field „Movement type“ („Druh pohybu“) should be filled via selection „561“. Then, required amount of parts (120 pieces for each basic product in our case) is inserted in the field „Quantity“ („Množství“).

Figure 6 Insertion of pieces to the warehouse



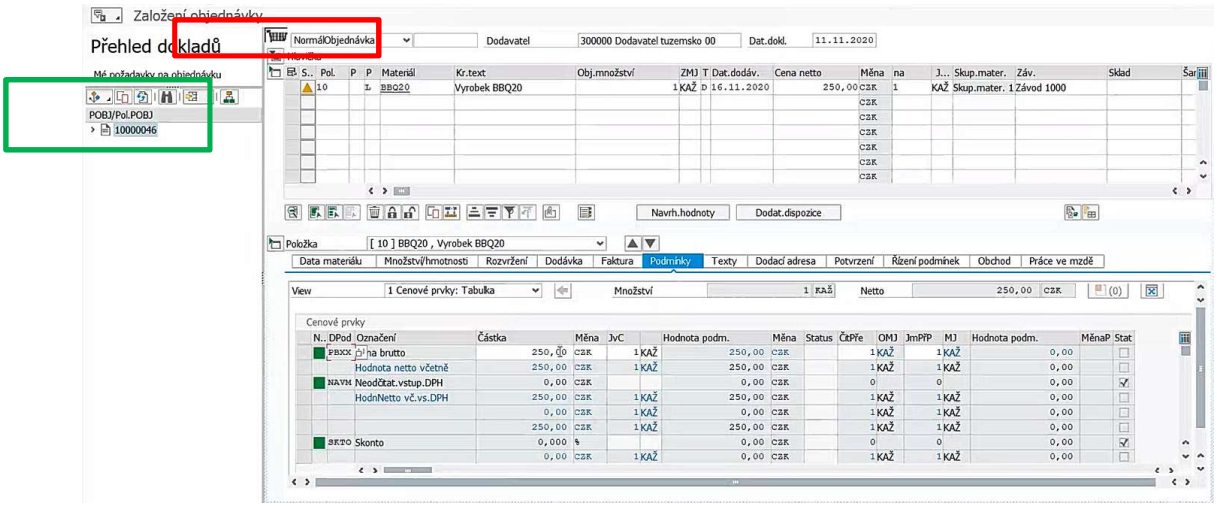
Source: Own processing, generated in SAP

The updated state of parts in the warehouse can be checked again by the transaction MMBE.

3.2 Outsourcing order and accounting

When all basic parts are available in our warehouse, the scope on next activity is oriented on outsourcing itself. To get the outsourced product from the external company, the request on the order and then the order itself are filled in SAP system. These steps are done using the transactions ME51N (request) and ME21N (order); for the former, the type of item „IcT“ („TpP“) has to be set to „Subcontracting“ („Práce ve mzdě“). For the latter, it is not necessary to write all input data again into the system but the prepared request can be found by searching window (marked by green in the Figure 7) and inserted into our order via shopping basket (marked by red in the Figure 7). Next, the external company supplying us with outsourced product needs to be chosen. In this window, data related to the product containing the list of material is also available.

Figure 7 Outsourcing order

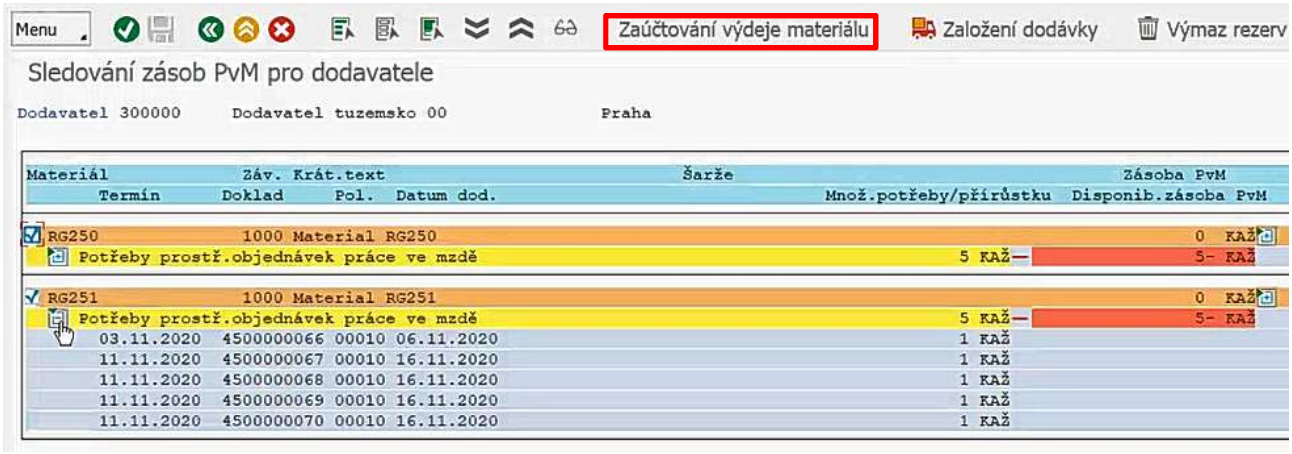


Source: Own processing, generated in SAP

Next, the parts have to be delivered to the external company. In SAP, there is the transaction ME20 that accounts for the parts leaving our plant. Starting it and filling considered parts (field „Components provided“, „Poskytnuté komponenty“), the subwindow appears showing how many basic parts are needed to manufacture required amount of outsourced product („Reqt/Receipt qty“, „Množství potřeby/přírůstku“) and how many parts were sent/should be sent to the outsourcer („Available SC stock“, „Disponib. zásoba PvM“). The upper value represents the amount of parts already available at external company and lower value corresponds to the amount which is missing (red colour) or which is extra

(green colour). When clicking on plus sign under basic parts on the left side, the list of orders related to the outsource product is shown.

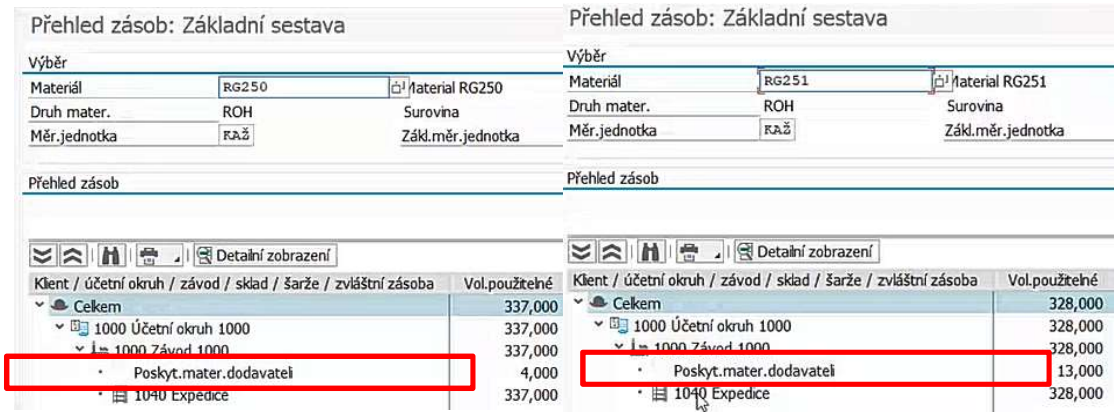
Figure 8 Accounting of basic parts going to external company



Source: Own processing, generated in SAP

Clicking on the button „Post Goods Issue“ („Zaúčtování výdeje materiálu“), the amount of parts leaving our plant is set. Completing this action, the status in the warehouse using the transaction MMBE can be checked. There, it is obvious that some pieces are, after ME2O, already in the field „Stock Provided to Vendor“ („Poskyt. mater. dodavateli“), i.e. they are waiting to be processed by the external company.

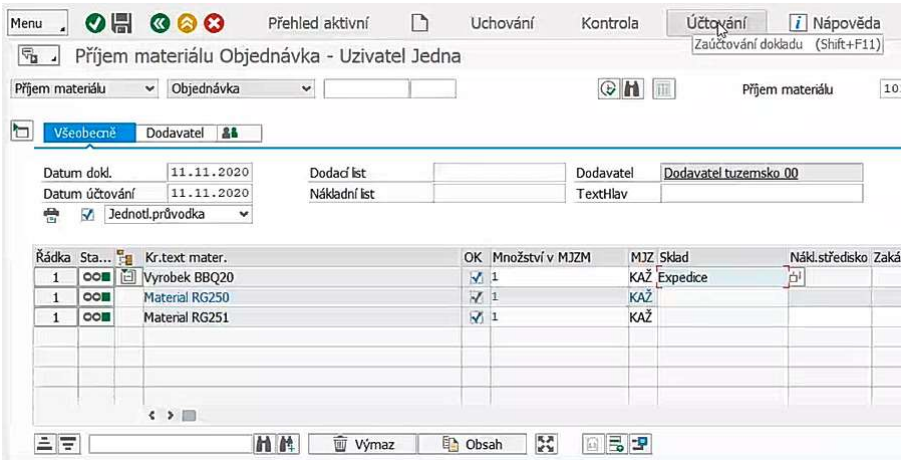
Figure 9 Changes in warehouse for basic products RG250, RG251



Source: Own processing, generated in SAP

Last transaction of the process is represented by the delivery of the product completed from basic parts to the plant. To accomplish it, transaction MIGO serves for the acceptance to the internal warehouse. The upper left part of the window has to be set to „Goods receipt“ and „Purchase order“ („Příjem materiálu“ and „Objednávka“) and an appropriate order created by ME21N is chosen from the list of orders. Confirming that products were delivered without any damages from outside and that they can be inserted into warehouse, selection „OK“ („OK“) is checked nearby individual components.

Figure 10 Delivery of outsourced product to plant



Source: Own processing, generated in SAP

Next, the transaction can be validated by the button „Check“ („Kontrola“). If all fields are filled appropriately, the light status nearby the components gets green and the process to be finished by push of the button „Post“ („Účtování“). The amount of product accepted from outside is visible via already used transaction MMBE. There, new products are situated in the warehouse where they were accepted in MIGO transaction. Hence, the process of subcontracting is completed, all necessary data are stored in the system and they can be anytime queried and reported.

4 Conclusions

The process of subcontracting in SAP system corresponds to the one of transaction scheme which covers the activities from multiple plant departments – manufacturing and logistics. While manufacturing was represented here just by the insertion of the basic parts and final product into the system, main focus of the text was oriented on the logistics covered by more detailed actions. During them, many settings were adjusted to complete the process successfully. In real plant, they can look slightly different as SAP is customized for every customer according to his requirement. But logic as well as the structure of the process and transactions keep the same consisting in the create of purchase requisition, purchase order, deliver of basic parts to the external company and import of final product back to the plant.

The presented transaction scheme could be developed further creating some challenges. One of them is represented by the generation of the documents supporting the subcontracting during delivery and receipt of the parts. Using the code VL01N for publishing of Outbound delivery is an example which can be followed by the physical delivery of the parts (VL02N) and by printing of the items in the delivery (VL71) according to the document template.

The other challenge consists in the connection to the financial department to create the invoices and other documents needed for financial processing of the subcontracting. It is clear that plant has to pay to the external company for the manufacture of the outsourced product. Using the financial module of SAP, the payments related to this process as well as other movements on plant bank account could be executed and monitored creating data useful for reporting and further analysis. This is how SAP power can be fully utilized.

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