The Benefits of Implementing an Enterprise Resource Planning System at Speed Gear:

ERP and SAP Introduction:

Speed Gear currently has IT systems in place that have been developed in an ad-hoc fashion, where different businesses areas have their own IT systems with their own databases. The nature of a business process however is that it is cross-functional meaning that it would need to be executed across functional departments. Without the implementation of an IT system that has a centralised database accessible to all business areas, Speed Gear runs the risk of facing many issues. Firstly, a department would need to log in to their own IT system and then contact another department regarding the completion of a process for the latter department to begin their process. This method of communication is inefficient. Secondly, having different IT systems in different business areas inevitably will lead to inconsistent information being passed through business processes.

To mitigate these issues, an Enterprise Resource Planning (ERP) System would need to be implemented. As defined by Monk and Wagner (2013, p.1), ERP systems are software programs that include a centralised database that is accessible to every business area. As seen in Figure 1, they provide applications that enable each business area to interact with the central database to report, document, manage, and track the progress of business processes.

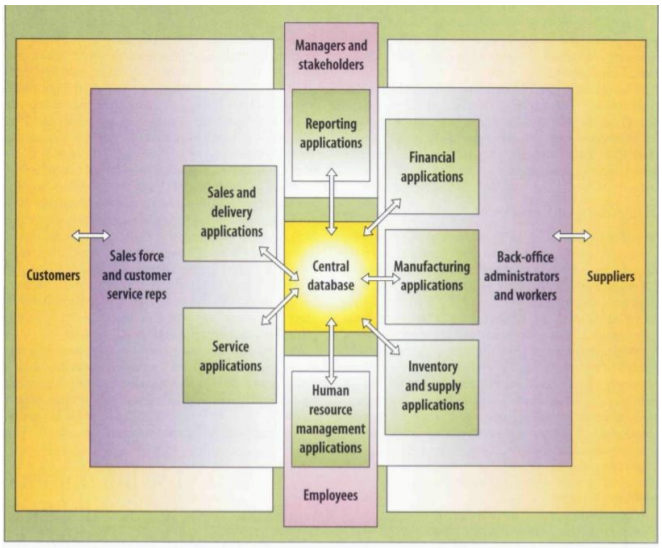


***Figure 1**: Anatomy of Enterprise System (Davenport, 1998, p.124)*

As seen in Figure 2, the client-server architecture of consists of 3 layers: the first being the front-end graphical user interface which enables employees to interact with the system; the second being the application layer which consists of application servers providing the functionality; and the third being the data layer consisting of a centralised database server containing all the data created and generated.

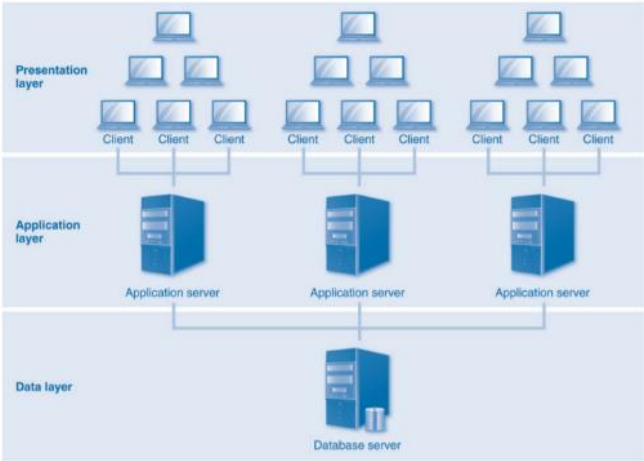
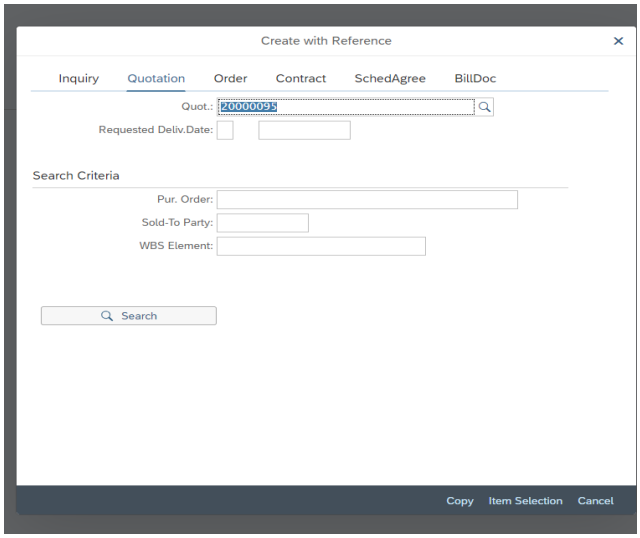


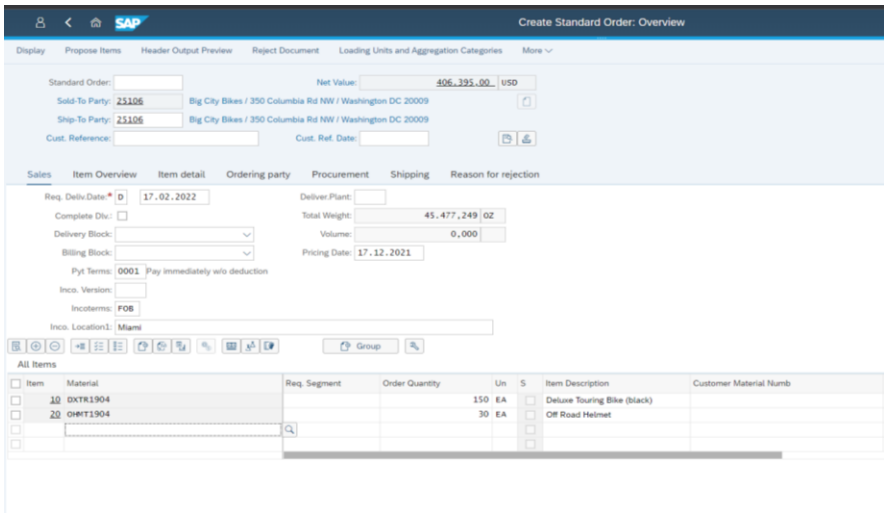
***Figure 2**: Three layers of the client-server architecture (Magal and Word, 2012, p.24)*

This architecture enables business areas to access their own data as well as data from other business areas. Therefore, a business area that is responsible for executing process 2 that requires the completion of another process 1, can track the progress of process 1 by accessing the ERP system, and then begin process 2 on completion of process 1 with little communication delay nor miscommunication between the business areas. All departments get access to real-time data, meaning changes made to data by one department is changed for all in real-time, eliminating the need for that department to directly contact other departments regarding the change, thus further decreasing the likelihood of miscommunication and increasing efficiency.

An ERP System commonly used by companies worldwide is that of German software company SAP AG, called SAP ERP. Implementing ERP SAP significantly improves the efficiency of business processes. Research by Annamalai, Ramayah (2011) found that Indian manufacturing firms had a procurement cost reduction of up to 30% and IT cost reductions of up to 35% after the implementation of SAP ERP.

In SAP, data is grouped into 3 categories: organizational data (data regarding Speed Gear's organisational structure such as different company codes, plants, storage locations); master data (long-term data such as customers, material, vendors); and transactional data (data generated from transactions, stored as transactional documents. These data categories and documents can be displayed and called by their number (identifier) when carrying out processes that require them. SAP auto-fills the relevant fields when the identifier is called, and it also includes extensive search tools when the identifier is not known, thus improving the efficiency of carrying out processes and reducing the overall time it takes to complete a process. For example, below shows the creation of a sales order using a quotation document.

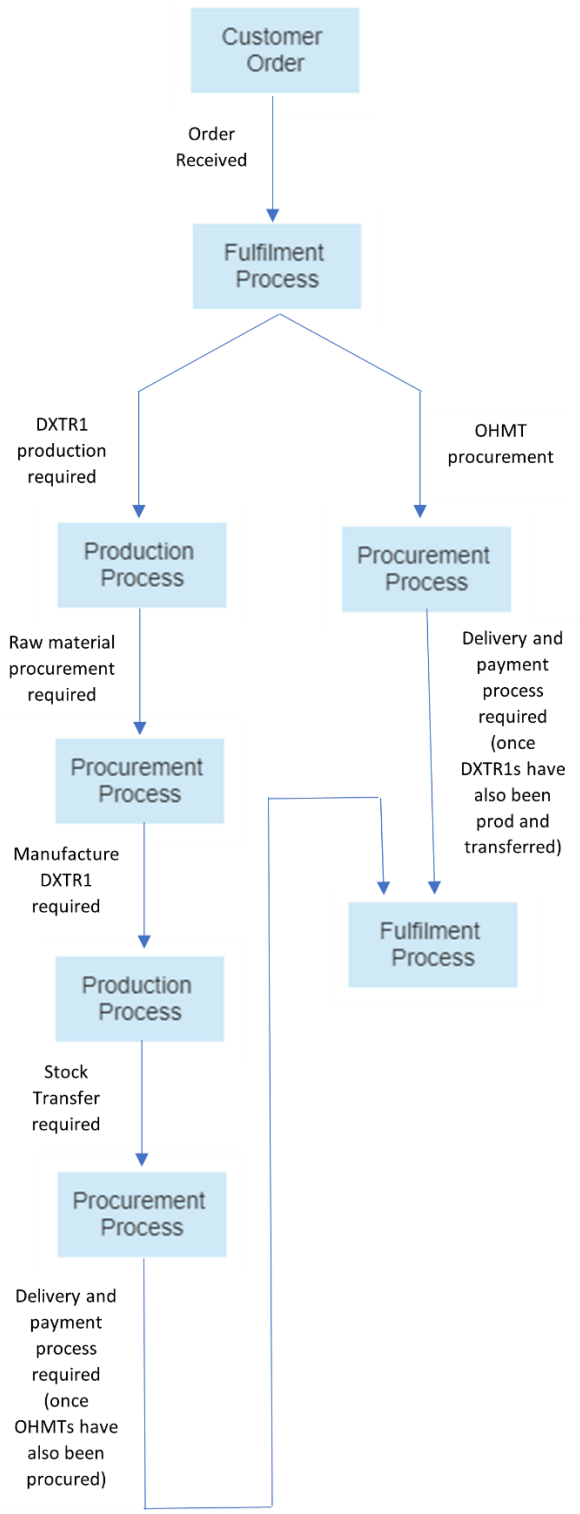




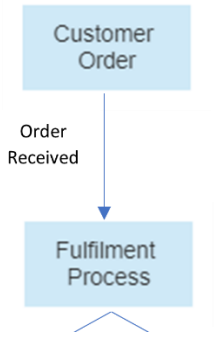
Some applications in SAP are also dynamic in that clients can glance at key information within an application without having to enter the application and search for this information. This in turn saves the client from time-consuming activities such as searching for this information within an app. An example of this is the Manage Sales Order app shown below. Here, the number of sales orders is displayed on the app tile.

SAP allows Speed Gear to pick which modules to implement into their system to meet their needs. There are 3 core processes that would be beneficial for Speed Gear to implement and integrate into their SAP system: Fulfilment, Procurement, and Production. The benefits of implementing these 3

processes in SAP will be discussed concurrently with how to integrate them. The integration scenario goes as follows: Global Bike Inc. (GBI – a company selling bicycles and bicycle-related accessories) receive a customer inquiry from Big City Bikes (BCB) about 150 black deluxe touring bikes (DXTR1s) and 30 off-road helmets (OHMTs) to be delivered at most 2 months after the enquiry date. GBI do not have enough OHMTs in stock nor DXTR1s. A diagrammatic representation of this integrated business process scenario is presented below.



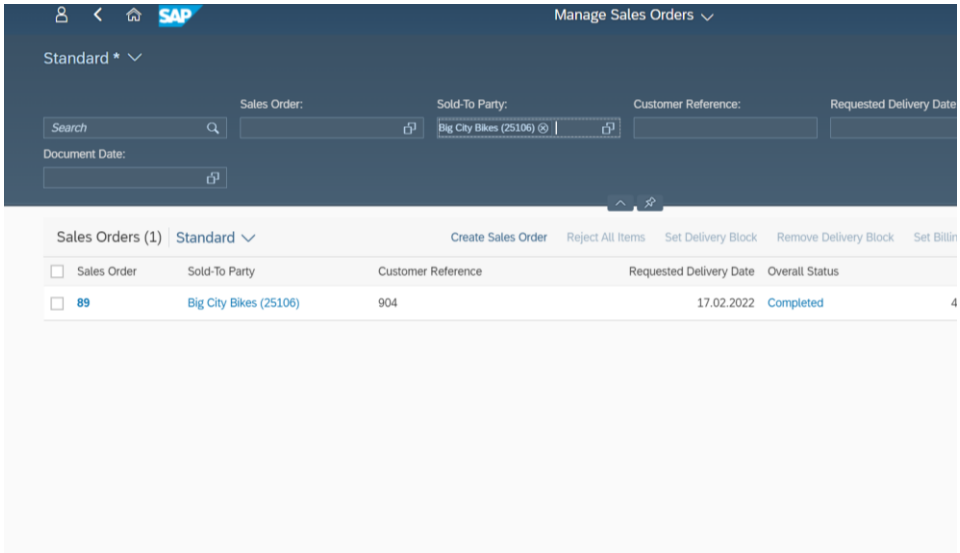
Fulfilment of the Customer Order:

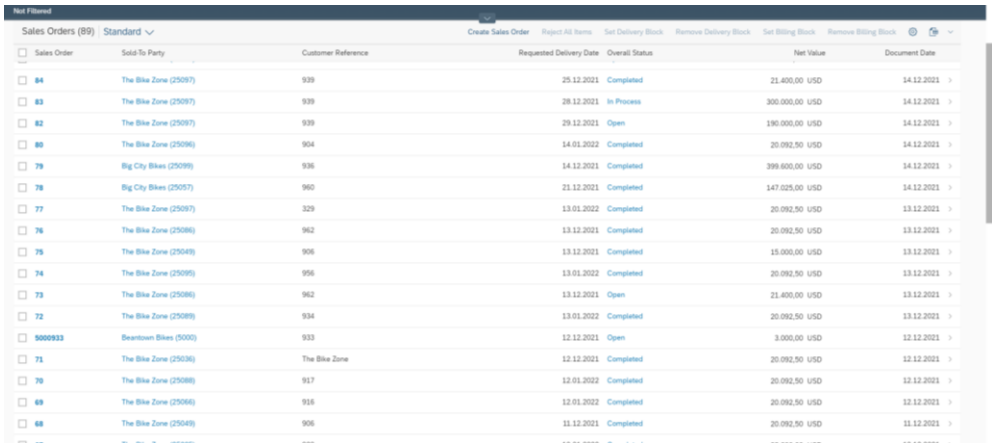


As defined by Magal and Wood, the fulfilment process refers to all the steps that are involved in selling and delivering products to customers (2012, p.6). This process begins with the sales department receiving a customer's order, then creating a quotation and sales order. The warehouse then retrieves this sales order data from the SAP system, checks the availability of the required stock. If there are enough goods in stock to fulfil the order, the fulfilment process continues, the warehouse prepares the goods for shipment and the accounting department creates and sends the invoice and processes the customer's payment. An illustration of this process is shown below in Figure 3.

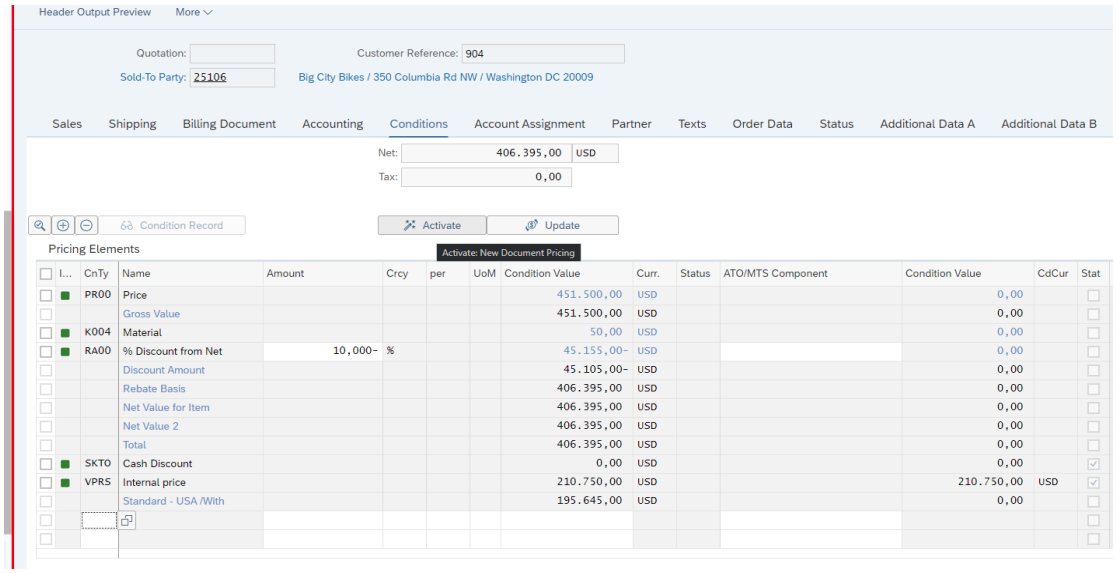
***Figure 3**: A fulfilment process (Magal and Word, 2012, p.9)*

Pre-sales activities can be carried out in SAP such as determining if a customer should be given a discount based on their purchase history. For example, below it shows that BCB has had 1 previous sales order with Global Bike Inc (GBI), and the second shows all the sales orders for GBI. GBI may then decide to give BCB a discount of 10% on their entire order, which would in-turn benefit GBI promoting customer loyalty for customers who do not have a rich history of purchases from GBI. Speed Gear could use this information for demand forecasting since they could examine the purchasing patterns of their customers.

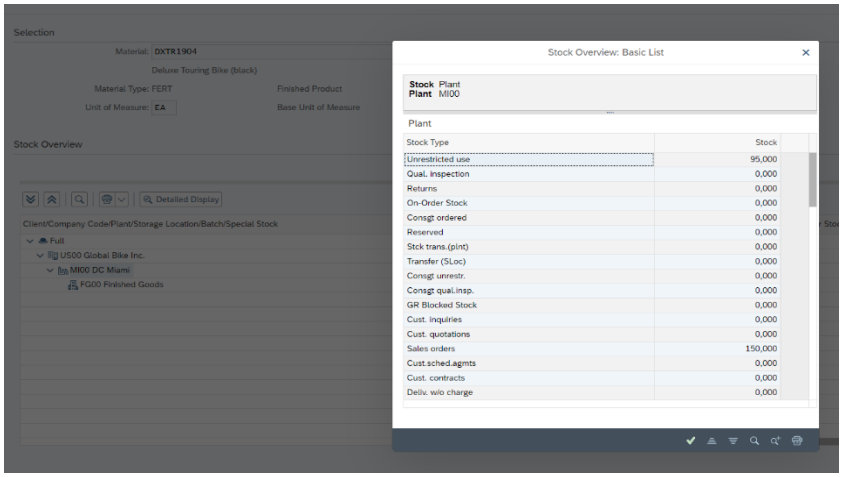


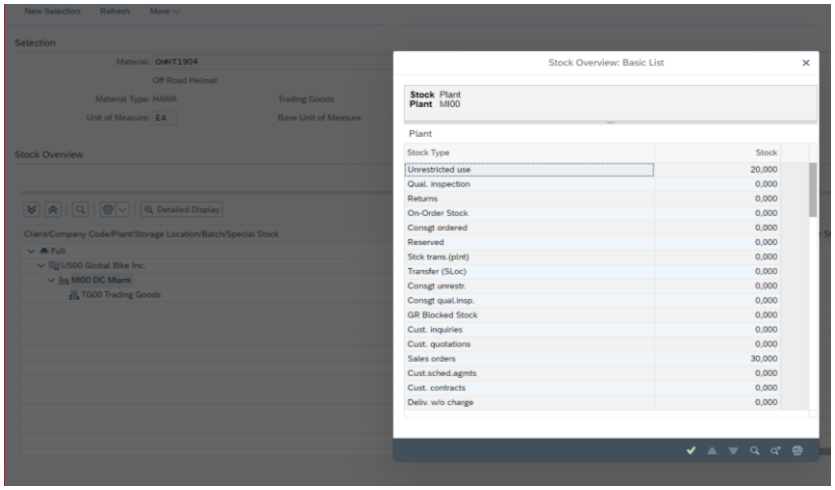


The calculations of prices and costs are also automated in SAP. When applying a discount to a quotation created, SAP automatically calculates the net price after the discount is applied. This is beneficial as it avoids the likelihood of human error and also saves time compared to manually performing calculations. Below shows a 10% discount applied to the total price of BCB's requested quotation of DXTR1s and OHTM1s (RA00, where the net value deduced automatically by $45,105 once the discount was applied, from a net value of $451,500 to $406,395).



Employees can check the stock status of goods at different moments in time throughout the entire business process, simply by referencing the item number and the plant it's at. This is beneficial as employees can track the progress of the business process in real-time. The screenshot below is taken after the sales order has been made and shows that there are 95 DXTR1's in stock at the Miami plant and 150 are needed for the sales order. The next screenshot shows that 20 off-road helmets are in stock at Miami however 30 are needed to fulfil the sales order. Once the required amount of both goods is at the plant and they are scheduled for delivery, the Schd for delivery number will change to the corresponding amount.





Since the delivery process cannot be carried out due to a shortage at the Miami plant, the fulfilment process is suspended. As OHMTs are a trading good, the fulfilment process triggers the procurement process in order to purchase them until enough are in stock. As DXTR1s are a finished good, the fulfilment process also triggers the production process in order to produce them. Instances as such demonstrate how different processes can be integrated using the SAP ERP system.

It should be noted here that due to there being enough DXTR1s at the Dallas plant, the production process can simply trigger the procurement process to perform a one-step stock transfer of DXTR1s to the Miami plant. However, in order to demonstrate full integration with the production process, this integration example assumes there are not enough DXTR1s.

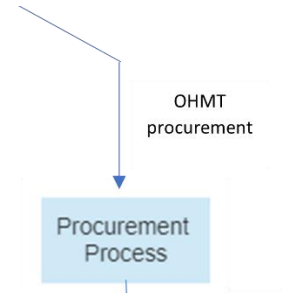
Stock Overview: Basic List

Stock Plant
Plant DL00

Plant

Stock Type	Stock
Unrestricted use	250,000
Qual. inspection	0,000
Returns	0,000
On-Order Stock	0,000
Consgt ordered	0,000
Reserved	0,000
Stck trans.(plnt)	0,000
Transfer (SLoc)	0,000
Consgt unrestr.	0,000
Consgt qual.insp.	0,000
GR Blocked Stock	0,000
Cust. inquiries	0,000
Cust. quotations	0,000
Sales orders	0,000
Cust.sched.agmts	0,000
Cust. contracts	0,000
Deliv. w/o charge	0,000

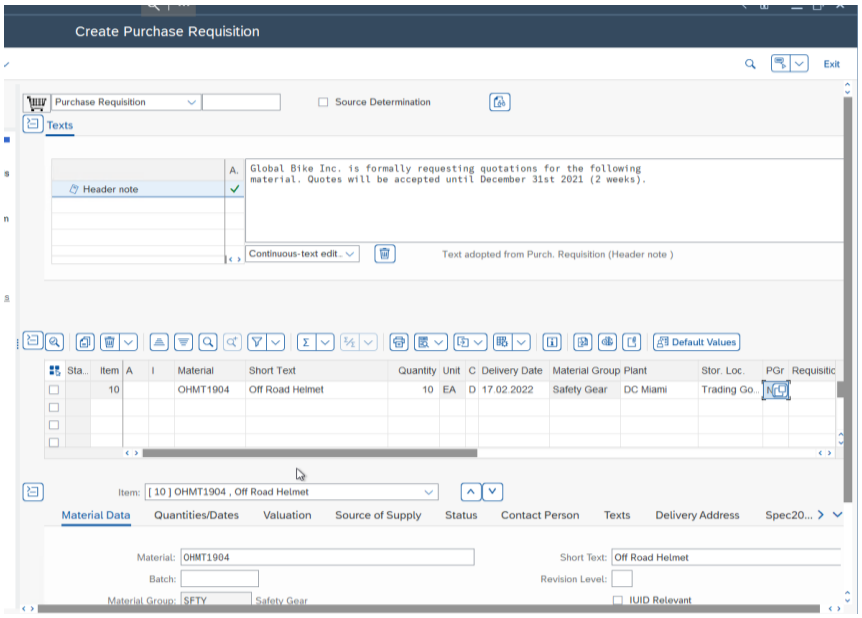
Procurement of OHMTs:



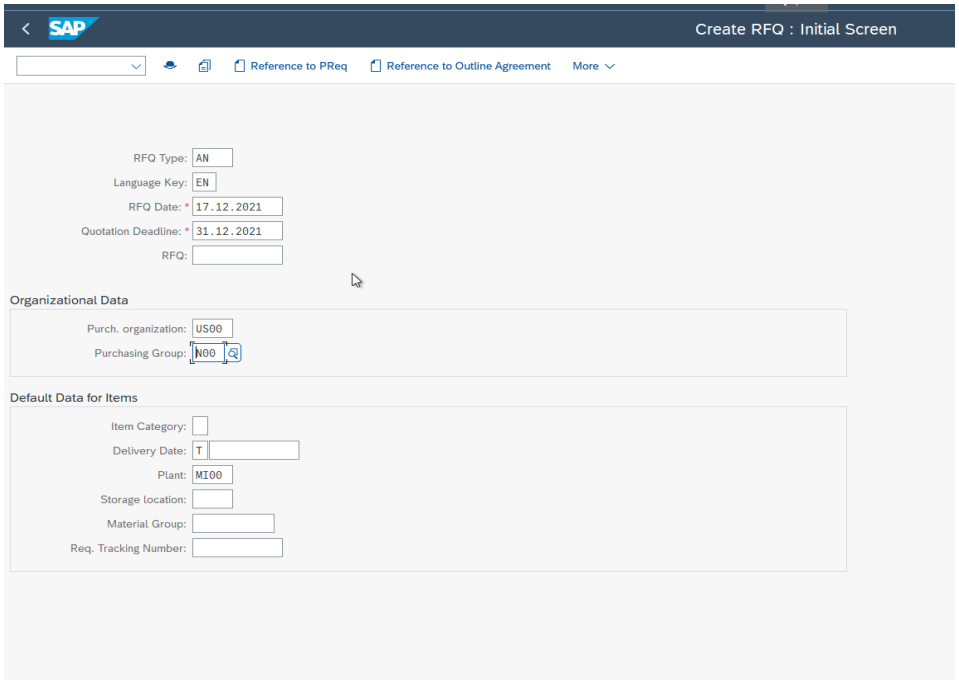
As defined by Magal and Wood, the procurement process refers to all the steps involved in buying the materials needed from vendors in order to regulate stock levels and manufacture products (2012, p.5). This process begins with the warehouse producing a purchase request document after identifying which item(s) need restocking. The purchasing department then requests a quotation from vendors. Once the vendors have responded to the request, they are compared, and the best vendor is sent a purchase order to them to fulfil the order. The warehouse department then receive the materials from the vendor; and finally, the accounting department receive an invoice from the vendor regarding the cost of the materials and then send the payment. Since OHMTs are being purchased from an external vendor, this is known as an external procurement process. An illustration of this process is shown in Figure 4.

***Figure 4**: A procurement process (Magal and Word, 2012, p.8)*

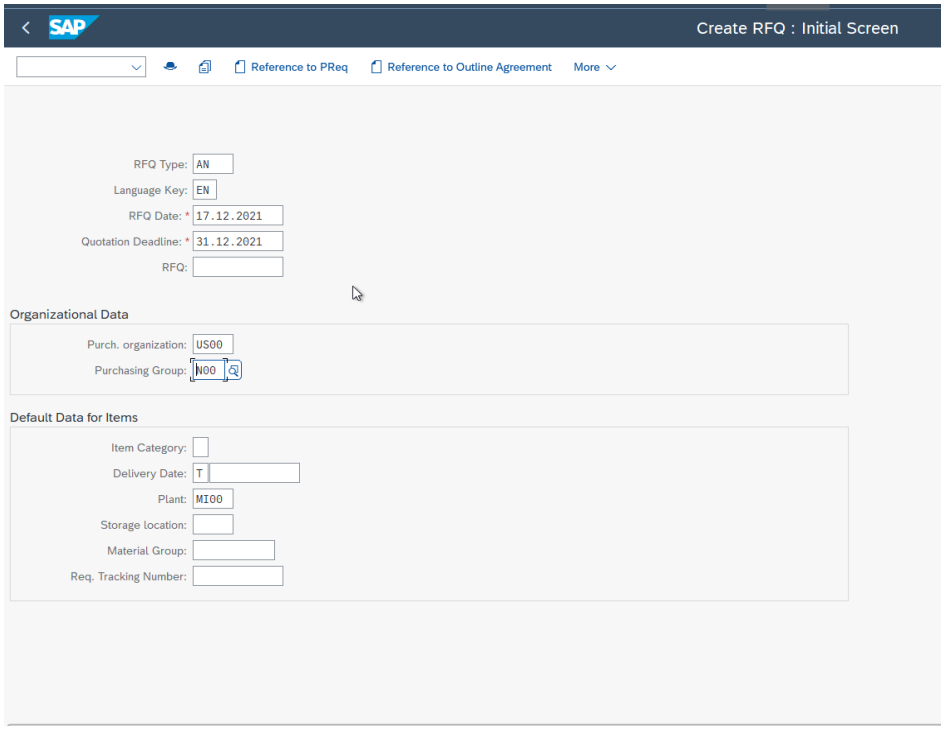
GBI would need to first purchase 10 OHMTs from a vendor, delivered to the Miami plant in order to meet the requirements for Big City Bike's sales order. The 2 vendors supplying this product are Spy Gear and Mid-West Supply. SAP's interface makes this process straightforward. It allows you to define what product you need to purchase along with the quantity, the delivery date, and a message describing the requisition. This provides clear communication to the vendors.

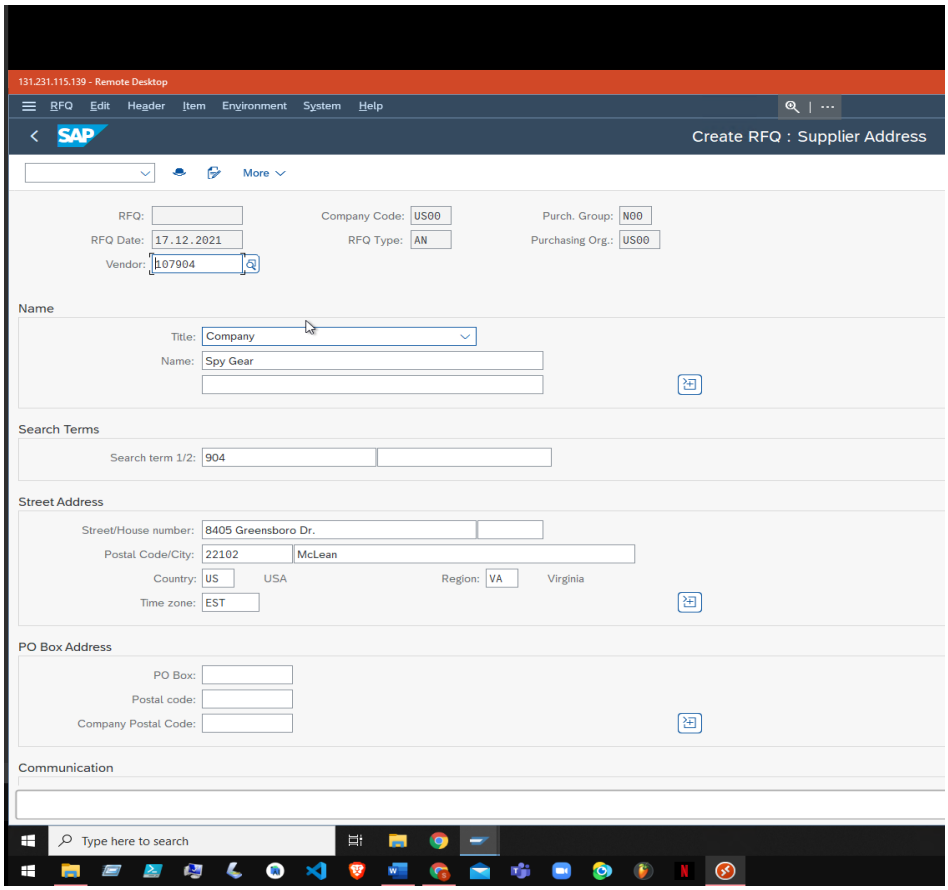


The purchase requisition document can then be referenced in the Request for Quotation (RFQ) form by its identifier. Here, a deadline for the request can also be inserted to ensure the vendors respond in time so there's little delay knocking onto the customer of the sales order. The plant that the vendors should deliver OHMTs to is also defined (Miami MI00).

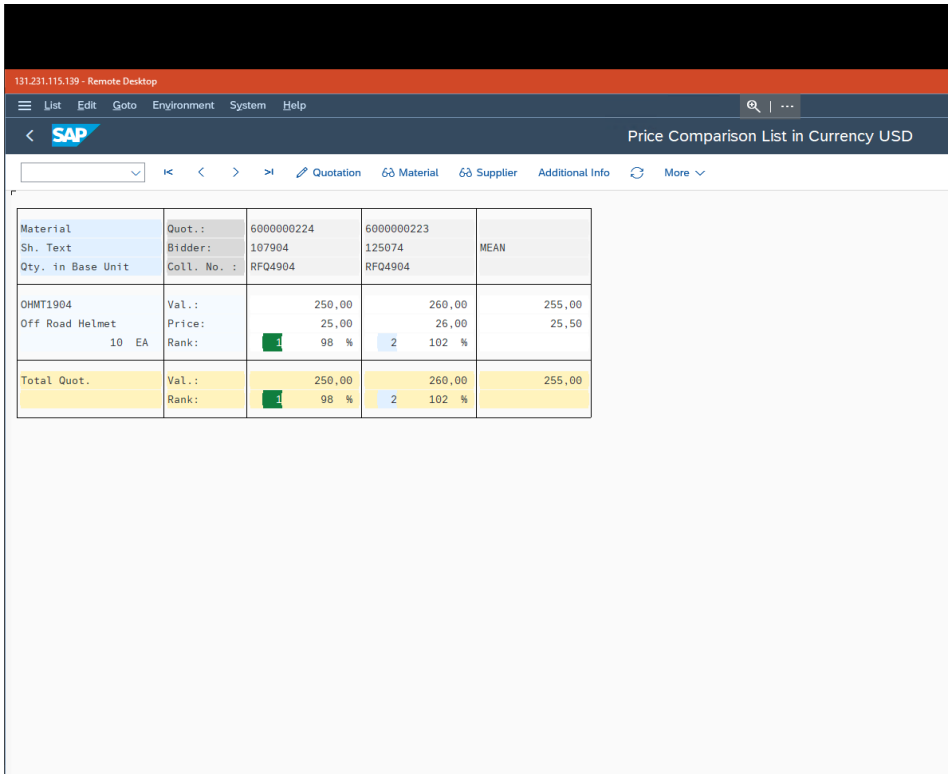


Next, the purchase requisition form is referenced by its number and the 2 vendors are referenced by their identifier in order for SAP to autofill information. The 2 vendors already exist in GBI's master data.



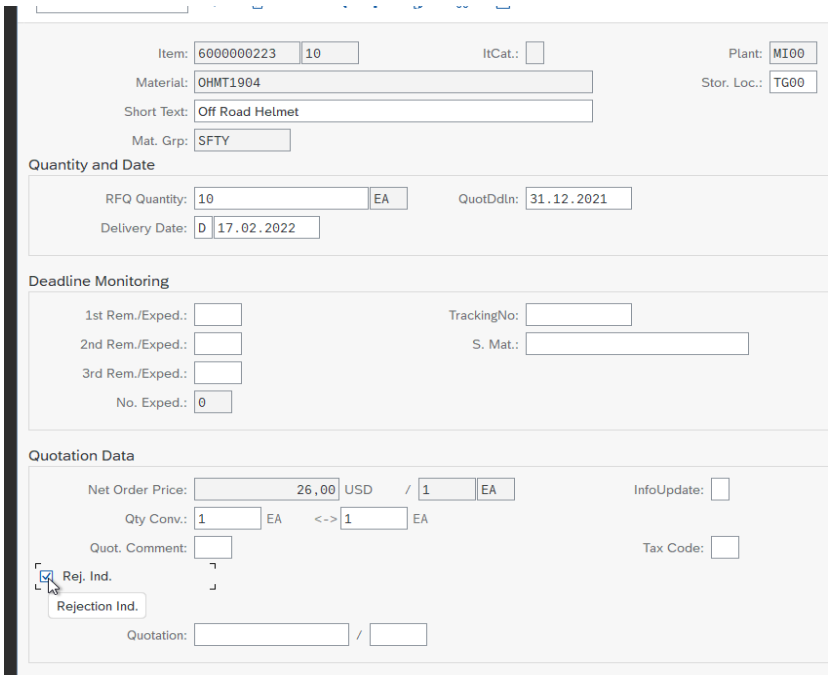


Once the vendors respond, SAP generates a document with a comparison table to compare the offers of the two vendors. For GBIs request, Spy Gear are offering OHMTs for $25 and Mid-West Supply are offering them for $26.

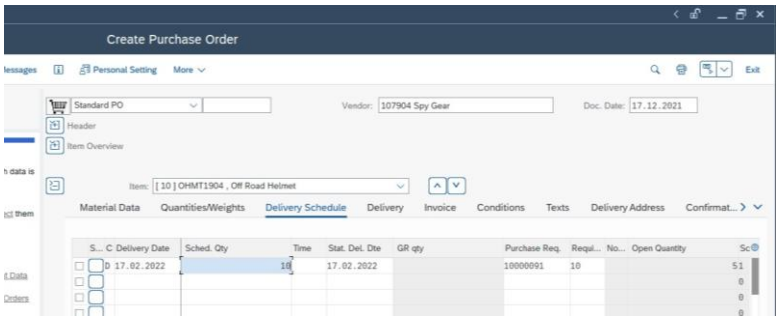


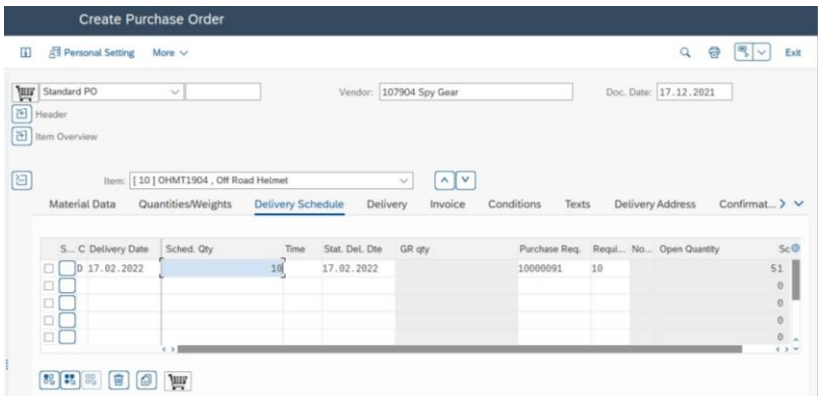
Material	Quot.:	6000000224	6000000223	
Sh. Text	Bidder:	107904	125074	MEAN
Qty. in Base Unit	Coll. No. :	RFQ4904	RFQ4904	
OHMT1904	Val.:	250,00	260,00	255,00
Off Road Helmet	Price:	25,00	26,00	25,50
10 EA	Rank:	1 98 %	2 102 %	
Total Quot.	Val.:	250,00	260,00	255,00
	Rank:	1 98 %	2 102 %	

The quotation numbers in the first row are the numbers from the RFQs created earlier, and so corresponds with each vendor; 6000000224 is Spy Gear's and 6000000223 is Mid-West Supply's. The total value offered by Spy Gear is $250, whereas the total value offered by Mid-West supply is $260. SAP is useful in such instances, as it gives a ranking to each vendor, signifying to employees which vendor has the best offer. This can be seen as a precautionary measure to ensure Speed Gear choose the best vendor, especially in instances where requests for a material are made to many numerous vendors and so it's difficult to see how the prices compare. Since Mid-West Supply has a higher ranking (2nd 102% compared to Spy Gear's 1st 98%), its quotation is then rejected by checking the rejection checkbox on their quotation as shown below.

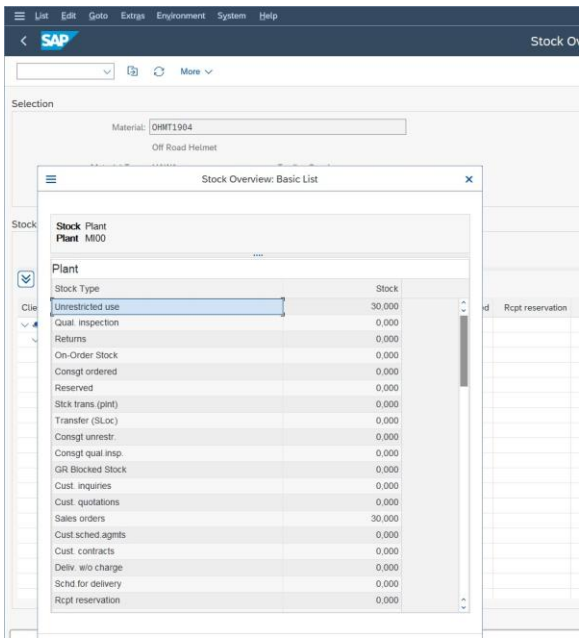


The delivery for OHMTs from Spy Gear is processed. By simply referencing Spy Gear's RFQ, the delivery can be scheduled. In instances where the quantity is high, SAP also allows deliveries to be scheduled in parts. However, since there are only 10 OHMTs that need to be ordered, there isn't a need for delivery in parts so there is only one line for the delivery schedule.

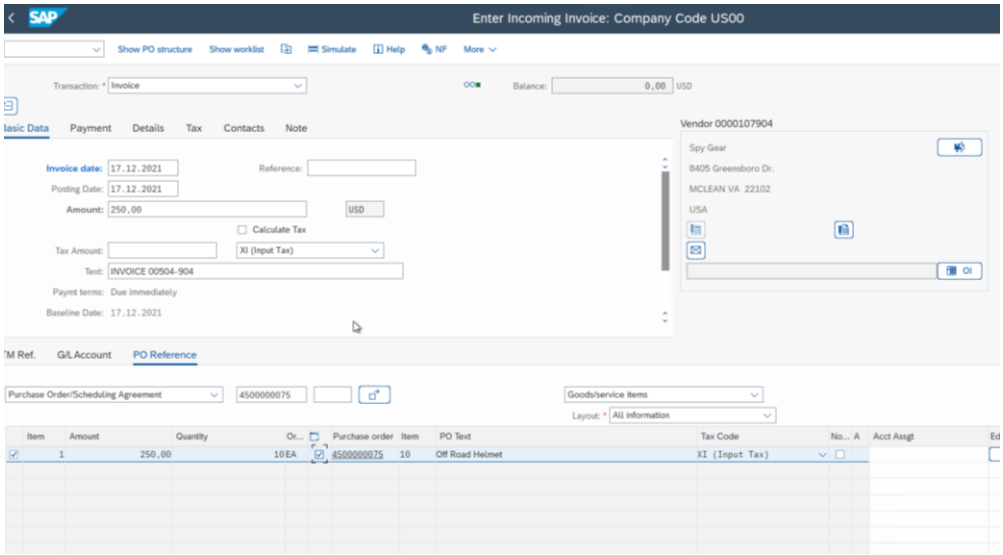


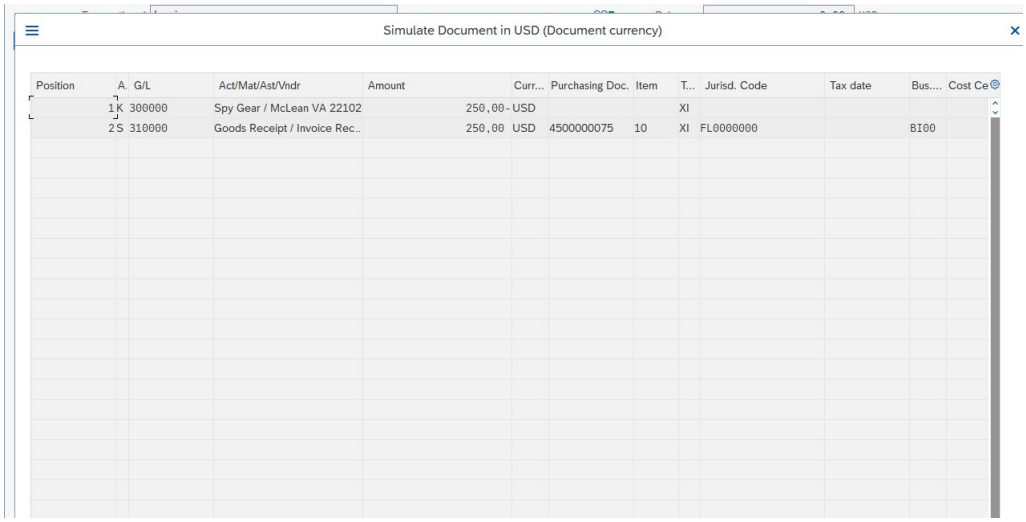


Stock levels can be displayed at any point in the entire business process, which is useful to track the arrival of deliveries. OHMT's in stock have now changed from 20 to 30, signifying a successful delivery to the plant.



The goods and invoice receipt for the purchase are processed. Payments are then posted to the vendor. Documents are generated for these receipts, saving employees the hassle of having to manually produce the records.





The accounting department can then access the invoice through its document identifier and post the payments to Spy-Gear by entering GBIs bank account information and the amount to be paid ($250).

Post Outgoing Payments: Header Data

Cancel selection | Process Open Items | More

Document Date: 17.12.2021 | Type: KZ | Company Code: US00
Posting Date: 17.12.2021 | Period: 12 | Currency/Rate: USD
Document Number: | Translation dte:
Reference: | Cross-CC Number:
Doc.Header Text: | Trading part.BA:
Clearing Text:

Bank data

Account: 100000 | Business Area:
Amount: 250
Amt.in loc.cur.:
Bank Charges: | LC Bank Charges:
Value date: 17.12.2021 | Profit Center:
Text: INVOICES 00504-904 | Assignment:

Open item selection

Account: 107904
Account Type: K | Other Accounts
Special G/L Ind: | Standard OIs
Payt Advice No.:
Distribute by Age
Automatic Search

Additional selections

None
Amount
Document Number
Posting Date
Dunning Area
Others

Account items 107904 Spy Gear

Document Nu...	D...	Document Date	P...	Busi...	Day...	USD Gross	CashDiscount	CDPer.
5105600226	RE	17.12.2021	31		0	250,00-		

Amount | Gross<>Net | Currency | Items | Items | Disc. | Disc.

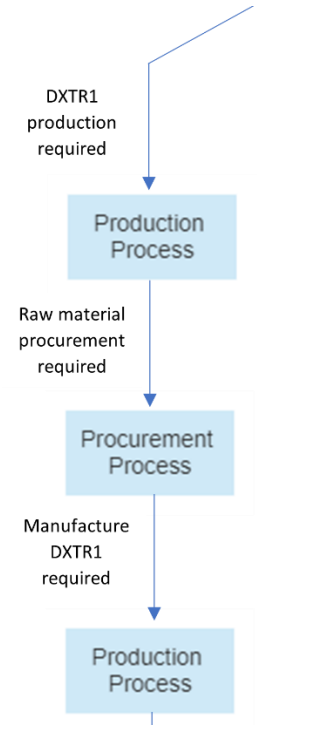
Processing Status

Number of Items: 1 | Amount Entered: 250,00-
Display from Item: 1 | Assigned: 250,00-
Reason Code: | Difference Postings:
Display in clearing currency | Not Assigned: 0,00

SAP generates a document displaying GBIs General Ledger account balance which it updates any time a payment is made. This is beneficial for management at Speed Gear to get an overview of all bank transactions that have occurred. Below it is shown in the last row that £250 were used in this scenario's transaction of buying OHMTs from Spy Gear.

		5105600225		RE	16.12.2021	31	3.200,00-	USD	3.200,00-	USD
		1500000063		KZ	17.12.2021	25	250,00	USD	250,00	USD
		5105600226		RE	17.12.2021	31	250,00-	USD	250,00-	USD
*							0,00	USD	0,00	USD
** Account 300000							6.400,00-	USD	6.400,00-	USD

Production of DXTR1s:



As defined by Magal and Wood, the production process refers to all the steps involved in manufacturing the products within Speed Gear. This process begins with the creation of a production plan for the finished goods, where factors such as the demand forecast for finished goods are calculated and the production schedule is created (MPS). The identification of raw materials that are required are then calculated (MRP). Inventory is then checked to see if there are enough materials to produce the required amount of a finished good. If there are enough raw materials, the production process continues. If there are not enough raw materials, the production process is suspended and triggers the procurement process to procure the required materials before starting the production process again. Next, production occurs at the manufacturing plant. Once the finished goods are produced, they are then transferred to the finished goods inventory at the warehouse. An illustration of this process is shown in Figure 5.

***Figure 5**: A production process (Magal and Word, 2012, p.9)*

The integration scenario hypothetically assumes that the only DXTR1s in stock are the 95 at the Miami plant in order to demonstrate the rest of the production process. The identification of raw materials needed have been calculated and are found at the manufacturing plant Dallas. In this

production process scenario. The first step taken is an MRP run to analyse the current inventory levels and generate the orders of dependent materials required for DXTR1s.

Statistics	
Materials planned	11
Materials with New Exceptions	11
Materials with Termination MRP List	

Parameters	
MRP Area	DL00
Plnt	DL00
Processing Key	NETCH
Create Purchase Requisition	2
SA Schedule Line	3
Create MRP List	1
Planning Mode	1
Scheduling	1

Database Statistics	
Planned orders changed	12
Planned orders deleted	11
Dependent requirements changed	10

Runtime Statistics

SAP then dynamically updates the stock/requirements list for the materials needed, promoting efficiency of the process. In this stock/requirements list, the planned order from the MRP run is then converted to a production order simply by selecting the corresponding line and pressing the 'Prod Order' button. This then changes the MRP element from 'PldOrd' to 'PrdOrd' as shown below.

Material: DXTR1904
Description: Deluxe Touring Bike (black)
MRP Area: DL00 DC Dallas Ex. manuf.:
Plant: DL00 MRP type: M1 Material type: FERT Unit: EA

Date | GR | ST On | On | Vendor | Cust.

A...	Date	MRP e...	MRP element data	Rescheduling...	E...	Receipt/Reqmt	Available Qty	Pro...
	17.12.2021	Stock					250	
	01.12.2021	IndReq	VSF			276-	26-	
	24.12.2021	----->	End of Planning Time I					
	01.01.2022	PldOrd	0000007737/STCK			26	0	0000
	01.01.2022	IndReq	VSF			265-	265-	

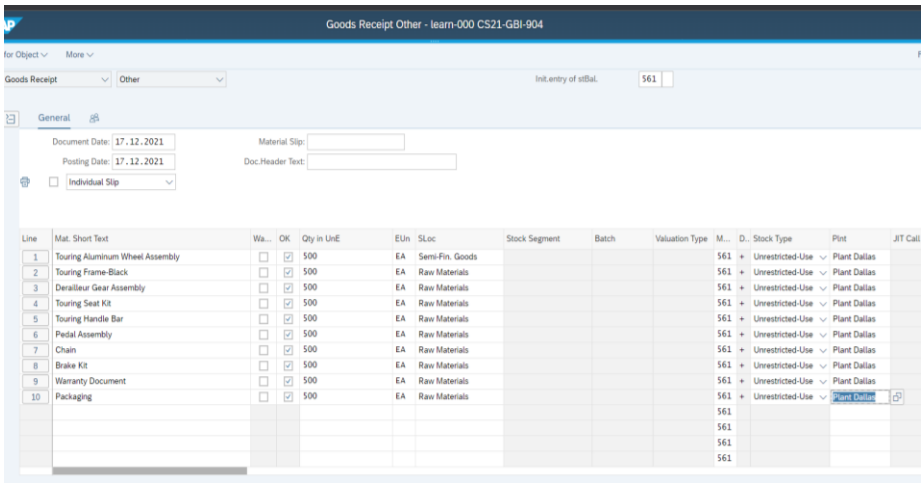
how Overview Tree | Refresh | Filter On | Send Mail to MRP Controller | More

Material: DXTR1904
Description: Deluxe Touring Bike (black)
MRP Area: DL00 DC Dallas Ex. mar
Plant: DL00 MRP type: M1 Material type: FERT Unit: EA

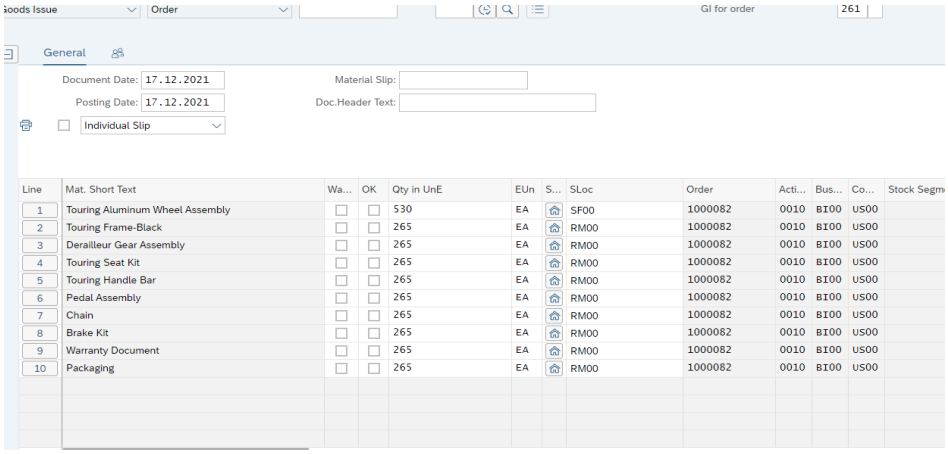
Date | GR | ST On | On | Vendor | Cust.

A...	Date	MRP e...	MRP element data	Rescheduling...	E...	Receipt/Reqmt	Available Qty
	26.12.2021	----->	End of Planning Time I				
	01.01.2022	PrdOrd	000001000084/PP01/Re			26	
	01.01.2022	IndReq	VSF			265-	

At this point, integration with the procurement department would be required in order to procure the necessary raw materials from vendors, in the same way that the OHMTs were procured above. Following this, the materials are received at the Dallas storage location and a goods receipt is produced recording each raw material and the quantity received, as shown below.



The raw materials are then issued to the production order so that the manufacturing departments can begin producing the bikes. The number of the production order produced earlier can be called to reference and autofill the lines to save time and keep the process efficient. All the OK checkboxes would be checked, the relevant quantities inserted, and then the goods posted by pressing Post. In this scenario the quantities would be 55 instead of 265 since 55 DXTR1s are needed to fulfil the sales order.



SAP is beneficial in this process in that it allows the user to examine the production order status. This is useful as it enables those involved in the business process to identify what has been done/needs to be done.

The screenshot below shows that goods issue has been posted and the costs have been updated, which is dynamically calculated by the goods issued, saving time on calculations and allowing those participating in the business process to examine the total costs of the order.

Order: 1000082

Material: DXTR1904

Status | Business processes

Syst. Status

X	Stat...	Text
☑	REL	Released
☑	MSPT	Material shortage
☑	PRC	Pre-costed
☑	GMPS	Goods movement posted
☑	SETC	Settlement rule created

Active Status

Target/Actual - Comparison

More Reports | Currency | Time Frame | Valuation View | Value Base

Order 1000082 DXTR1904
Order Type PP01 Standard production order
Plant DL00 Plant Dallas
Material DXTR1904 Deluxe Touring Bike (black)

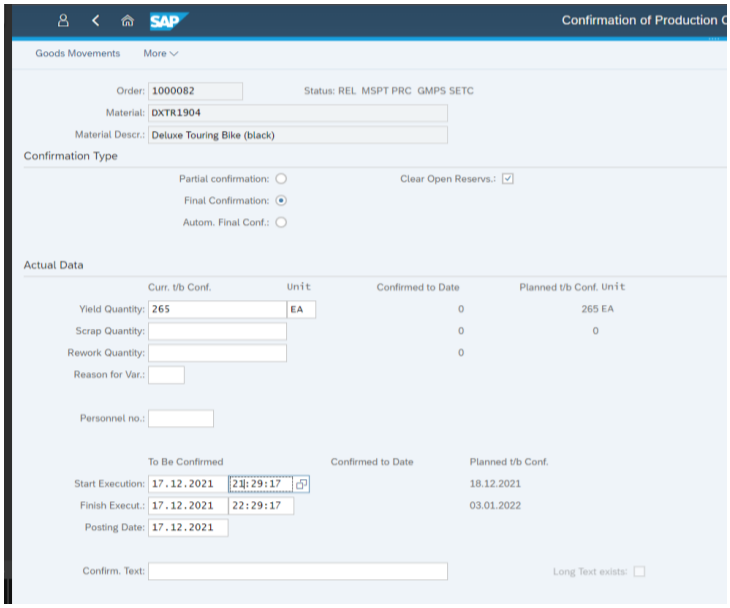
Planned Quantity 265 EA each

Target Cost Version 0

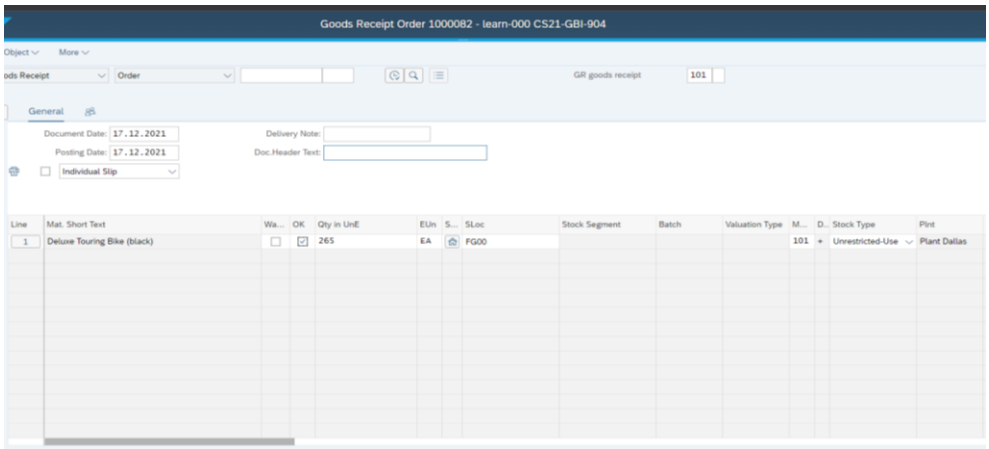
Cumulative Data
Legal Valuation
Company Code Currency/Object Currency

Cost Element	Cost Element (Text)	Origin	Total Target Costs	Total Actual Costs	Target/actual var.	T/I var(%)	Currency
720300	Semi-Finished Consumption Expense	DL00/TRWA1904	0,00	59.890,00	59.890,00		USD
			0,00	**59.890,00**	**59.890,00**		**USD**
720000	Raw Material Consumption Expense	DL00/TRFR1904	0,00	53.000,00	53.000,00		USD
720000	Raw Material Consumption Expense	DL00/DGAM1904	0,00	19.875,00	19.875,00		USD
720000	Raw Material Consumption Expense	DL00/TRSK1904	0,00	13.250,00	13.250,00		USD
720000	Raw Material Consumption Expense	DL00/TRHB1904	0,00	6.625,00	6.625,00		USD
720000	Raw Material Consumption Expense	DL00/PEDL1904	0,00	11.925,00	11.925,00		USD
720000	Raw Material Consumption Expense	DL00/CHAN1904	0,00	2.650,00	2.650,00		USD
720000	Raw Material Consumption Expense	DL00/BRKT1904	0,00	18.550,00	18.550,00		USD
720000	Raw Material Consumption Expense	DL00/WDOC1904	0,00	265,00	265,00		USD
720000	Raw Material Consumption Expense	DL00/PCKG1904	0,00	927,50	927,50		USD
Raw Materials			**0,00**	**127.067,50**	**127.067,50**		**USD**
			0,00	**186.957,50**	**186.957,50**		**USD**

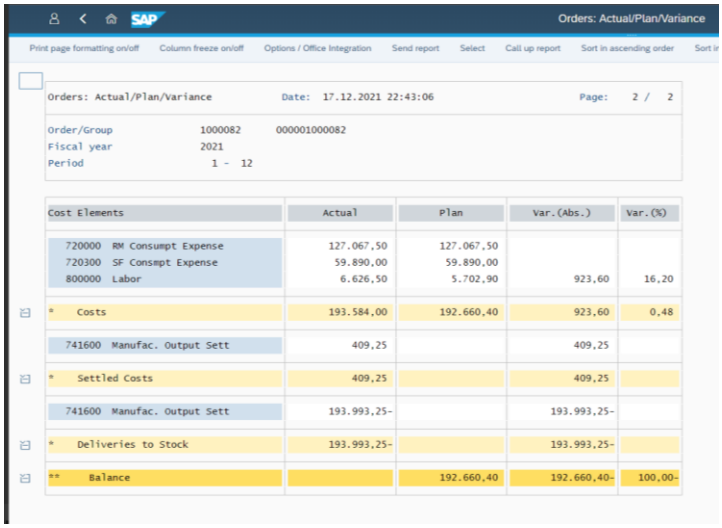
The confirmation of the completion of manufacturing the finished goods needs to be logged into SAP, as a method of communicating to other business areas that the next steps can be carried out. The time taken in executing the manufacturing process is also logged, which in beneficial to management as they can examine if the execution time is efficient or needs improvement. In this scenario, the execution time took 1 hour from start to finish.



The finished bikes are then posted into the finished goods inventory and a goods receipt document is posted for the movement taking place.



Finally, the production costs are then settled by the accounting department. With reference to the production order number, month, and year, SAP will automatically process and execute the settlement costs, and then generate a report, taking up no time doing so with little effort on the client-side. The report can then be examined by management to analyse the actual cost against the settled costs and identify any deviations that need attention.



Orders: Actual/Plan/Variance

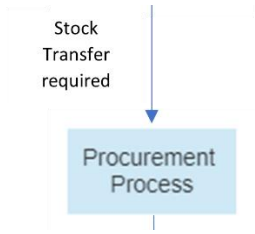
Print page formatting on/off | Column freeze on/off | Options / Office Integration | Send report | Select | Call up report | Sort in ascending order

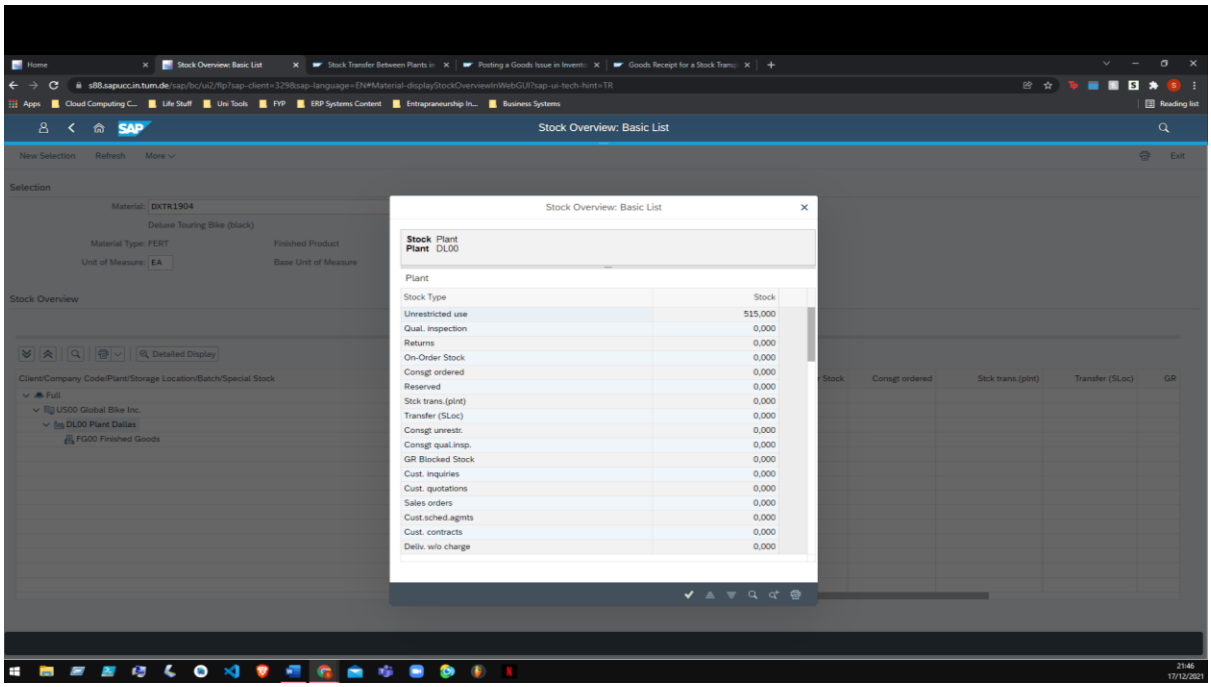
Orders: Actual/Plan/Variance Date: 17.12.2021 22:43:06 Page: 2 / 2

Order/Group 1000082 000001000082
Fiscal year 2021
Period 1 - 12

Cost Elements	Actual	Plan	Var.(Abs.)	Var.(%)
720000 RM Consumpt Expense	127.067,50	127.067,50		
720300 SF Consmpt Expense	59.890,00	59.890,00		
800000 Labor	6.626,50	5.702,90	923,60	16,20
* Costs	193.584,00	192.660,40	923,60	0,48
741600 Manufac. Output Sett	409,25		409,25	
* Settled Costs	409,25		409,25	
741600 Manufac. Output Sett	193.993,25-		193.993,25-	
* Deliveries to Stock	193.993,25-		193.993,25-	
** Balance		192.660,40	192.660,40-	100,00-

Procurement Stock Transfer:





Stock Overview: Basic List

Stock Overview: Basic List

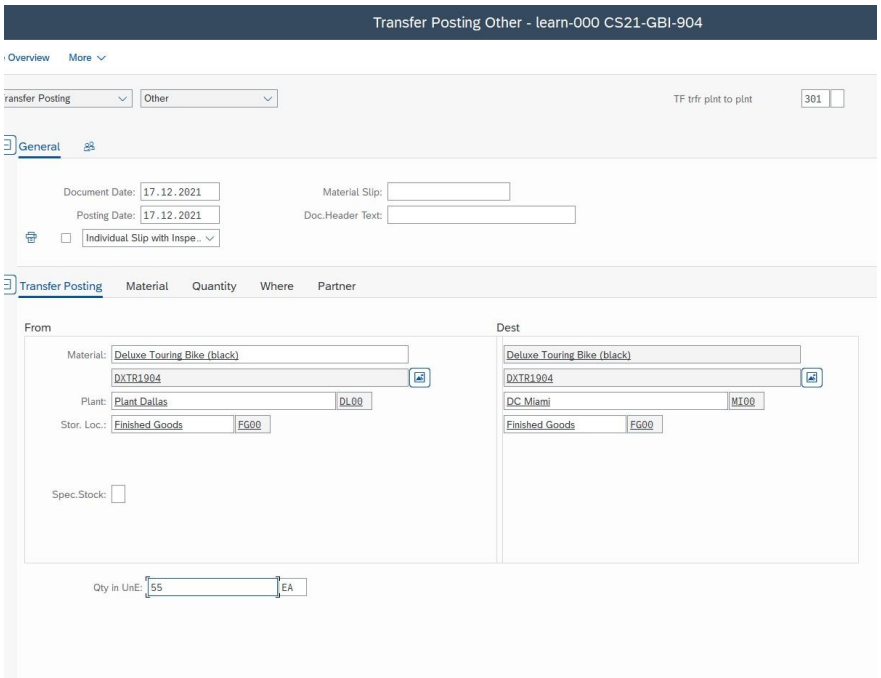
Stock Plant
Plant DL00

Plant

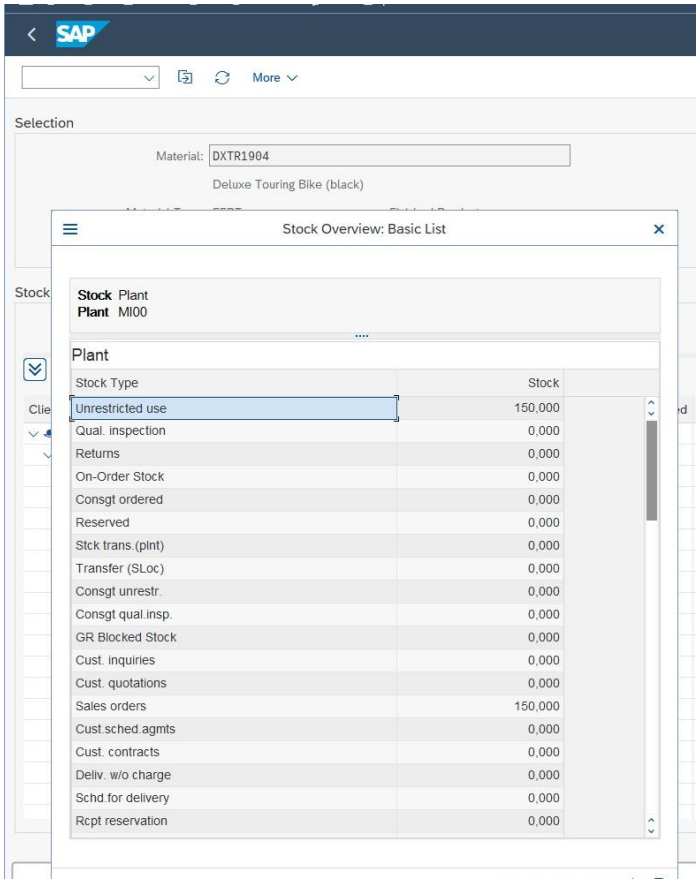
Stock Type	Stock
Unrestricted use	515,000
Qual. inspection	0,000
Returns	0,000
On-Order Stock	0,000
Consgt ordered	0,000
Reserved	0,000
Stck trans.(plnt)	0,000
Transfer (SLoc)	0,000
Consgt unrestr.	0,000
Consgt qual.insp.	0,000
GR Blocked Stock	0,000
Cust. inquiries	0,000
Cust. quotations	0,000
Sales orders	0,000
Cust.sched.agmts	0,000
Cust. contracts	0,000
Deliv. w/o charge	0,000

The stock levels of DXTR1s at Dallas have now updated after the production process. However the delivery for the sales order is planned for the Miami plant. Therefore, the procurement process is triggered by the production process to fulfil a stock transfer to the Miami plant's finished goods inventory. There are 95 DXTR1s at the Miami plant, so this process would need to transfer 55 DXTR1s. SAP's functionality eases this process, enabling a 1 step transfer using movement type 301. The Dallas plant along with its finished goods storage location are referenced as the current location of the bikes, and the Miami plant along with its finished goods storage location are referenced as the

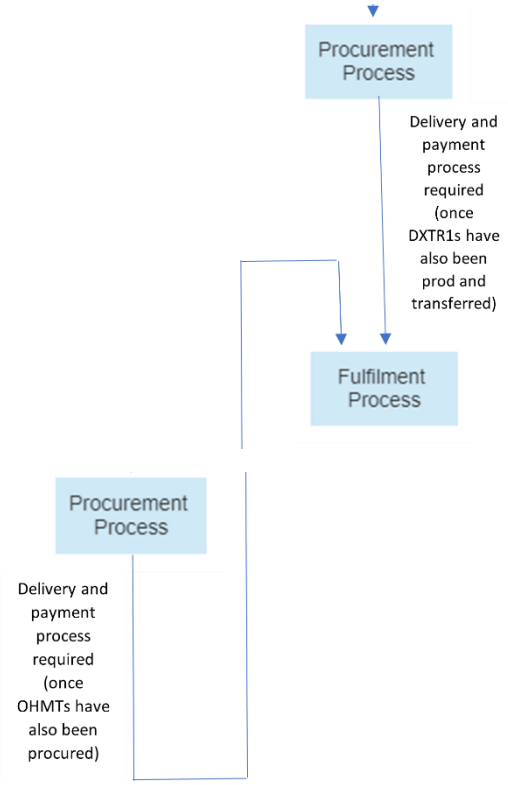
destination of the transfer. The DXTR1s are also referenced along with the quantity of DXTR1s, the date of the posting document, and the date of the occurrence of the posting.



Once delivered, the stock at the Miami plant displays 150 DXTR1s, meeting the sales order requirement of 150. The rest of the fulfilment process can then occur to fulfil the sales order.



Fulfilment Delivery and Payments Processing:

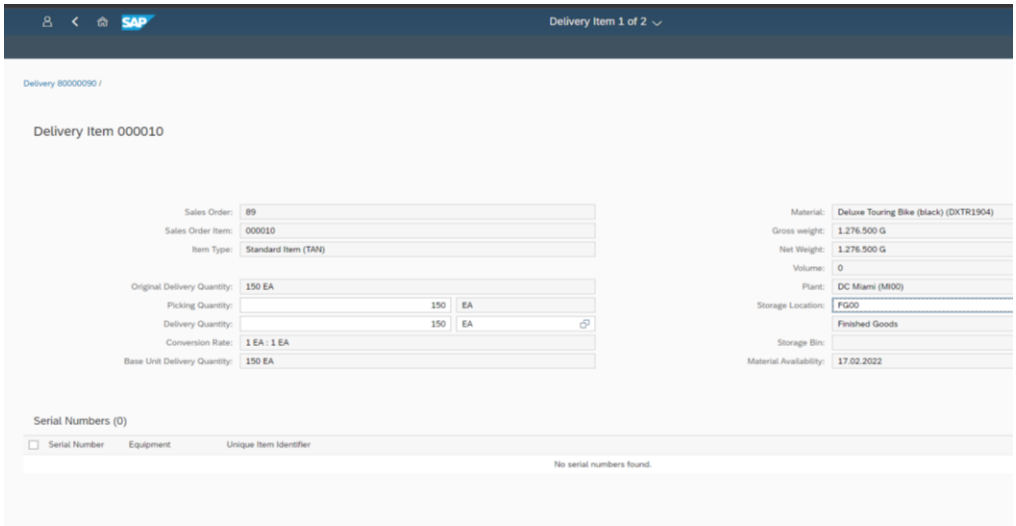


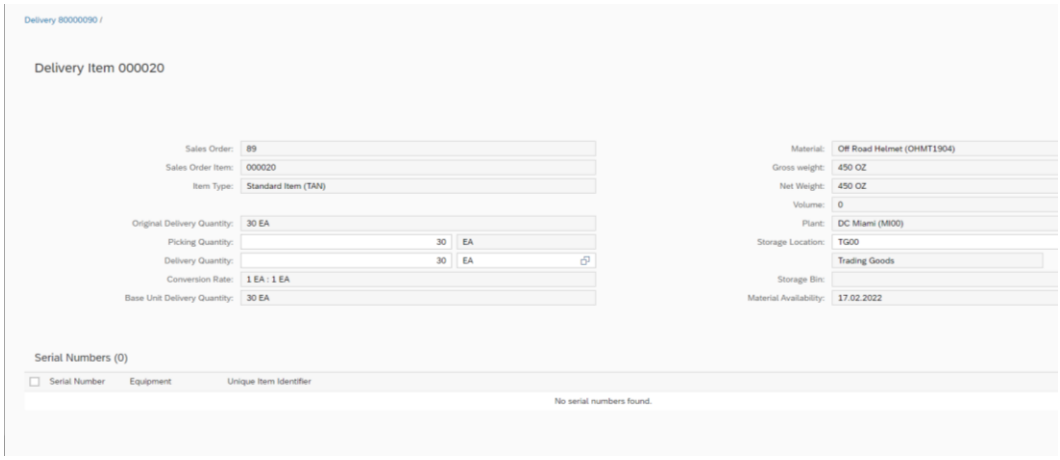
The fulfilment process is triggered to continue by the procurement process after the procurement of DXTR1s and OHMTs at the Miami plant. The continuation of this process begins with the creation of the outbound delivery for the sales order specifying the customer it is delivered to (BCB), and the date range for the delivery. SAP also allows for the priority of the delivery to be set if necessary, which is beneficial for Speed Gear in circumstances where a customer has requested a tight schedule for their sales order. Once the delivery is created, the sales document will disappear from the list of outbound deliveries that can be created.

Employees can then track the status of and manage the outbound delivery. Currently picking and the goods issued haven't been processed.

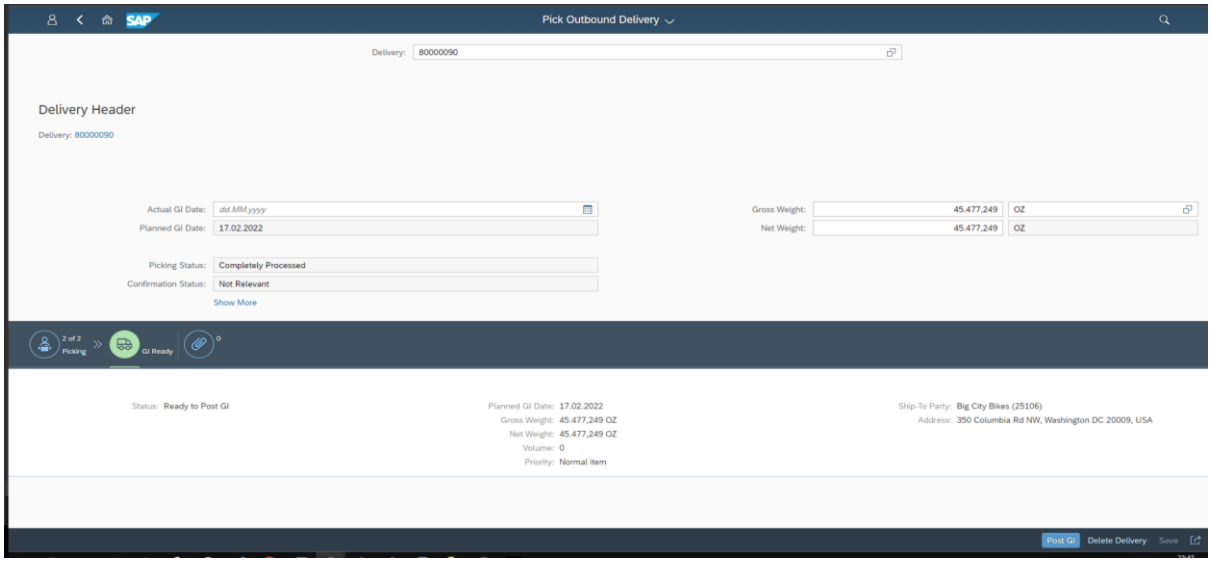
☐ 80000090	17.02.2022	Normal item (02)	Not Yet Processed (A)	Not Relevant	Not Yet Processed (A)

Picking is processed by setting the picking location and setting the quantity picked of the two goods.





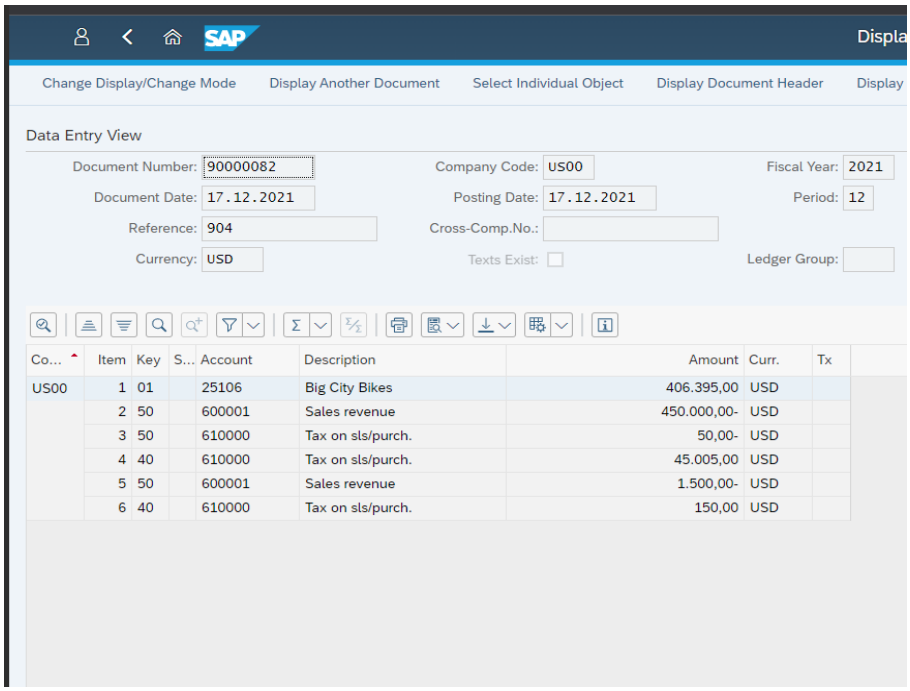
The status of the picking is then updated to completely processed and the delivery status is updated to Ready to Post GI, signifying that the goods issue is ready to post for this sales order.



Next the goods issue is posted to BCB, simply by entering the GI date and pressing the Post GI button, which will then record into the system that the goods have been delivered.

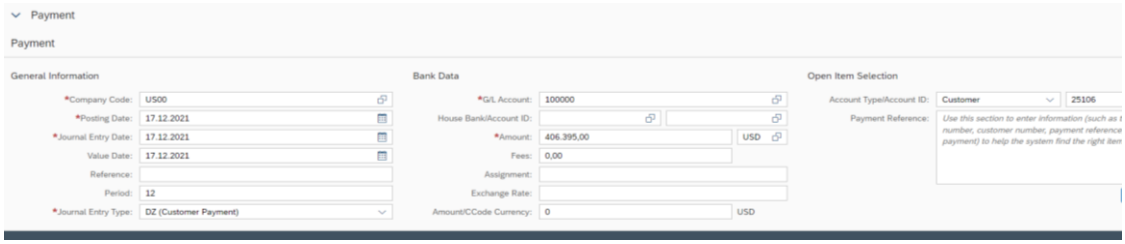
80000090	17.02.2022	Normal item (02)	Completely Processed (C)	Not Relevant	Completely Processed (C)

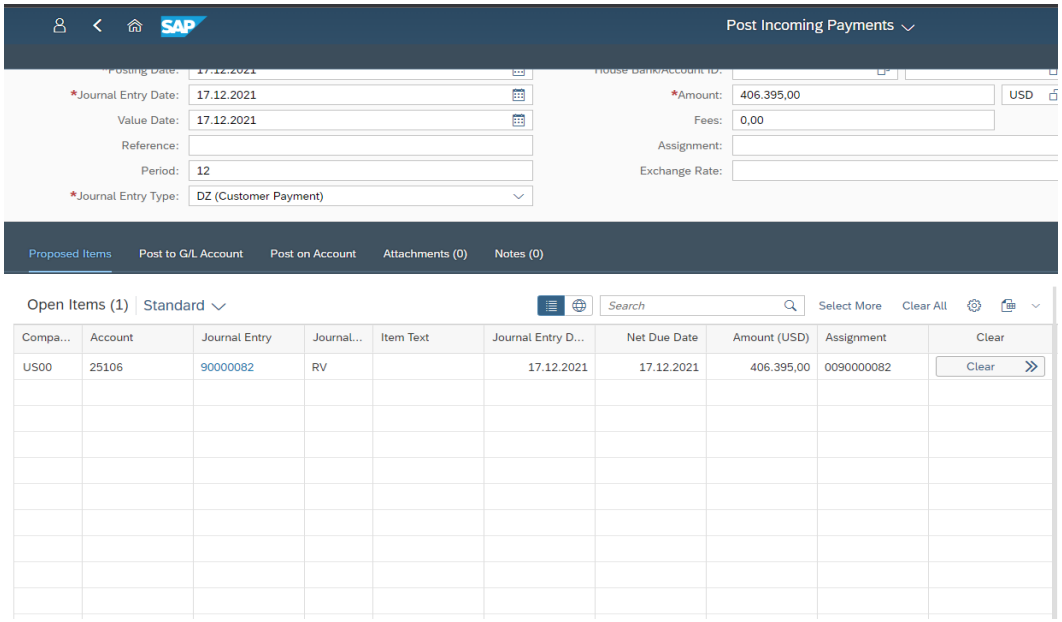
The accounting department then see that the delivery has been posted, and create an invoice for the customer. Below is the billing document and customer invoice produced for this sales order.



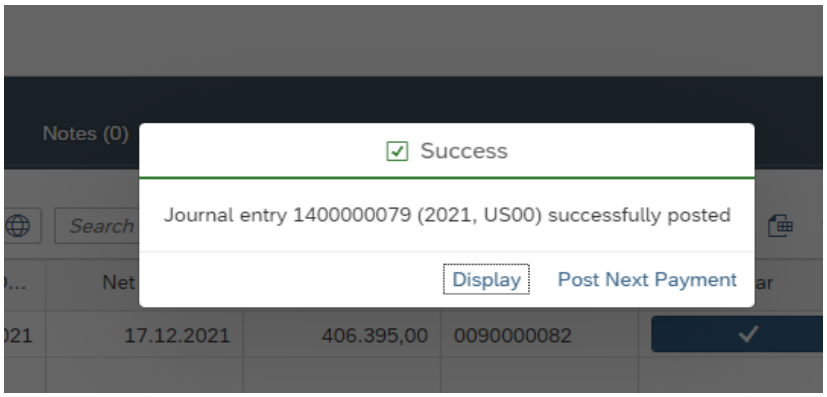
Co...	Item	Key	S...	Account	Description	Amount	Curr.	Tx
US00	1	01		25106	Big City Bikes	406.395,00	USD	
	2	50		600001	Sales revenue	450.000,00-	USD	
	3	50		610000	Tax on sls/purch.	50,00-	USD	
	4	40		610000	Tax on sls/purch.	45.005,00	USD	
	5	50		600001	Sales revenue	1.500,00-	USD	
	6	40		610000	Tax on sls/purch.	150,00	USD	

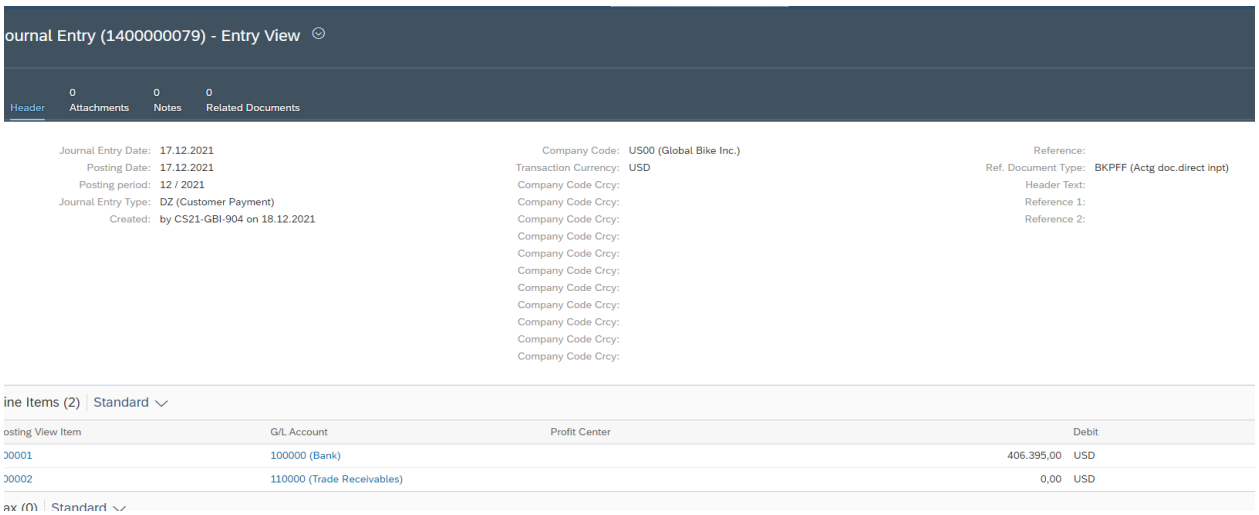
The final step of the fulfilment process is posting the customer receipt. Here the date, month, city, BCB identifier, and amount being paid are all inserted, and then the customer receipt is posted.





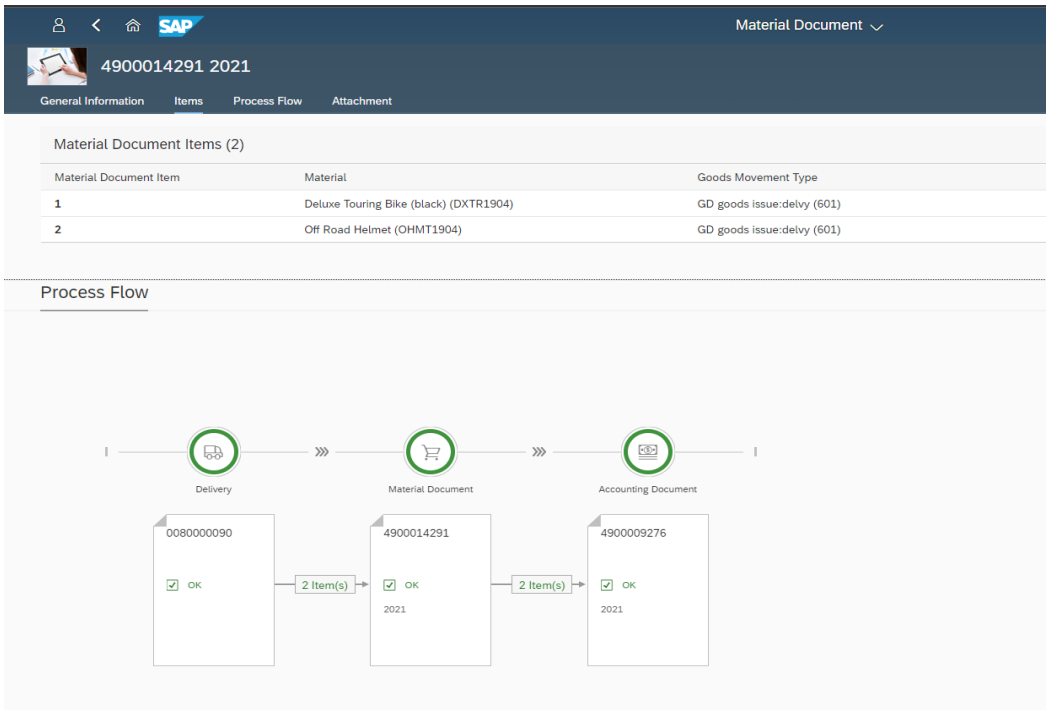
The journal entry can then be posted. This document can then be displayed by those involved in the business process and by management. Speed Gear management can use information as such to analyse the amount paid by customers and the relevant information surrounding the payment such as the date and goods bought,





On completion of the sales order, SAP generates a report displaying the entire document flow of Big City Bike's sales order where all the documents that were used are linked. The screenshot below

shows the directional links of the delivery, material and accounting documents used in the Big City Bikes sales order. This is beneficial since it can give management at Speed Gear an overview of the entire fulfilment process, enabling them to examine each document without having to spend time manually searching for each one that was involved.



Recommendations for implementing the ERP SAP System for Speed Gear:

Speed Gear currently meets customer demand through storing large volumes of raw materials and finished bikes in inventory. This manufacturing plan is very costly, since it runs into the risk of products being manufactured that may not be sold, thus leading to a loss in terms of resource consumption expenses (wasted material and labour costs). Furthermore, Speed Gear does not have any demand forecasting methods in place to avoid not meeting customer demand for specific products. This could potentially lead to delivery delays for customers. Therefore, Speed Gear would benefit from implementing Just-In-Time (JIT) manufacturing to mitigate these issues.

As defined by Kootanaee and Babu, JIT manufacturing is a “philosophy applied in manufacturing which involves having the right items of the right quality and quantity in the right place at the right time” (2013, p.8). Applying JIT implies products only being manufactured and procured in response to real-time customer demand and demand forecasting based on purchasing patterns. This is known as demand-pull production since demand drives manufacturing. ERP SAP offers MRP and MRP II when it comes to production planning, where MRP is a method for managing dependent materials in correspondence with a demand schedule, and MRP II is a function which outputs the investment costs needed to carry out MRP. Speed Gear would benefit from utilizing such tools to fulfil JIT since production planning increases the likelihood that the necessary materials to meet the demand of finished goods will be available, keeping the production process efficient. The production consumption expenses are also made transparent through running MRP II, so management can analyse costs and streamline the production process further if need be.

However, a limitation of JIT when compared to Speed Gear's initial approach is that having large volumes of inventory provides safety for times of inaccurate demand forecasts. For example, the recent COVID pandemic caused a lockdown throughout 2020 which led to a shortage of materials due to many suppliers having to close to comply with legislation. The magnitude of the pandemic could not be predicted. In this instance, applying JIT would likely lead to a shortage. Therefore, a recommendation for Speed Gear is to store a small-to-medium volume of raw materials and finished bikes as demand forecasts can never be 100% accurate.

Another recommendation for implementing JIT manufacturing is for Speed Gear to work in close liaison with vendors in its supply chain. A recent article examining the effects of COVID on supply chain management (Pisch, 2020) states that it is precisely due to the nature of an uncertain world that two firms would benefit from working closely together so that they can adapt in a coordinated way, leading to less delays when it comes to procurement and production. Therefore, a recommendation for Speed Gear would be to maintain close communication with suppliers, and to share demand forecasts so that both they themselves and their suppliers can adapt to changes in demand. Also, an ERP system in place would provide Speed Gear the ability to provide direct contact with vendors through inquiry and quotation documents, as well as payments that can be sent and received in real-time.

In a research paper investigating the key areas of success vs failures for SAP implementations (Gargeya, 2005), it was found that a lack of internal organizational readiness was the most important factor determining failure of SAP implementation in 15 companies. It is therefore recommended that Seed Gear invest a significant amount of time on preparation of ERP implementation. For medium sized companies such as Speed Gear, the estimation of total costs to implement an ERP system is $10-20 million and it would take an estimated 2 years according to Monk and Wagner (2013, p.37).

For all implementation cases, there is a roadmap that can be extracted for successful implementation strategies. Monk and Wagner (2013, p.206) define this roadmap in 5 stages. The first stage is project preparation which consists of organising a team, gathering software and hardware requirements, and identifying the project scope. The second is a business blueprint where the business process requirements would be documented in order to tailor SAP for Speed Gear specifically. In a research paper investigating the key areas of success vs failures for SAP implementations (Gargeya, 2005), it was found that internal readiness was the most important factor contributing to the success of implementation for 29 companies. It is therefore recommended that Seed Gear invest a significant amount of time on project preparation and developing a thorough blueprint.

The third stage is realisation where the project team and hired consultants work together to implement the system in correspondence with the blueprint. In a case study regarding the cause of FoxMeyer Drug's bankruptcy (1999, p. 225), a conclusion was that FoxMeyer should have ensured that knowledge was transferred from the consultants implementing the ERP system to management and employees of FoxMeyer in order to acquire in-house skills to maintain the system once consultant had left. It is therefore recommended that Speed Gear require their consultants to work in close liaison with the project team and employees so that knowledge can be transferred to them. This would avoid future costs of re-hiring specialists.

The fourth is final preparation where system testing occurs, and a helpdesk is set up for supporting employees in their training on the new system. Finally, the fifth stage is go-live and support where the system would actually begin being used for business processes by Speed Gear whilst also supporting employees with real-time helpdesk support as well as monitoring, testing, and adjusting

the system accordingly. The availability of support set up by those at the top at Speed Gear as well as the relationship they have with employees is a significant factor for determining the success of ERP implementation. For example, a case study regarding the implementation of ERP in Rolls-Royce (Yusuf, 2004) found that technical training and support for staff at Rolls-Royce was vital to the overall success of implementing ERP. It was also found that. Furthermore, it was found that managing relationships and offering support to staff from top-level management also played a vital role. For Speed Gear, it is therefore essential that costs are dedicated towards providing excellent employee training and support through hiring competent helpdesk staff.

Conclusion:

To conclude, it would be an appropriate decision for Speed Gear to implement an ERP SAP System as their business processes are cross-functional processes which can be efficiently performed in SAP. Speed Gear's use of data and their business processes are repetitive. Speed Gear have a network of trusted suppliers to buy materials from and a network of trusted business partners they regularly sell to. They can take advantage of this and set up master data for these vendors and business partners once so that their master data can be called by their corresponding identifier to automate a lot of the business processes, improving the efficiency. Implementing this strategy will save time in the long-term once training and implementation has occurred as well as benefit customer experience through a decrease in delay time. An appropriate response for to reduce inventory levels is for Speed Gear to implement JIT manufacturing in order to lower inventory levels, saving costs on storage space and wasted materials. When implementing the ERP SAP system, Speed Gear should carefully plan the implementation, acquire knowledge regarding its use, and provide support with for staff using the system.

References:

Annamalai, C. and Ramayah, T., 2011. Enterprise resource planning (ERP) benefits survey of Indian manufacturing firms. *Business Process Management Journal*, 17(3).

Davenport, T., 1998. Anatomy of an enterprise system [Diagram]. In: Davenport, T., 1998. *Putting the enterprise into the enterprise system*. Boston, MA: Harvard College.

Gargeya, V. and Brady, C., 2005. Success and failure factors of adopting SAP in ERP system implementation. *Business Process Management Journal*, 11(5).

Javadian Kootanaee, A., Babu, K. and Talari, H., 2013. Just-In-Time Manufacturing System. From: Introduction to Implement. *International Journal of Economics and Finance, 2013.*

Magal, S. and Word, J., 2012. Figure 1-4: A procurement process [Diagram]. In: Magal, S. and Word, J., 2012. *Integrated business processes with ERP systems*. Hoboken, NJ: Wiley.

Magal, S. and Word, J., 2012. Figure 1-5: A production process [Diagram]. In: Magal, S. and Word, J., 2012. *Integrated business processes with ERP systems*. Hoboken, NJ: Wiley.

Magal, S. and Word, J., 2012. Figure 1-6: A fulfilment process [Diagram]. In: Magal, S. and Word, J., 2012. *Integrated business processes with ERP systems*. Hoboken, NJ: Wiley.

Magal, S. and Word, J., 2012. Figure 2-1: Three layers of the client-server architecture [Diagram]. In: Magal, S. and Word, J., 2012. *Integrated business processes with ERP systems*. Hoboken, NJ: Wiley.

Monk, E. and Wagner, B., 2013. *Concepts in enterprise resource planning*. Mason, Ohio: Course Technology / Cengage learning.

Pisch, F., 2020. Covid-19 and the future of international supply chains. From: *CentrePiece Summer 2020*, 25(2), p.26.

Scott, J., 1999. The FoxMeyer Drugs' Bankruptcy: Was it a Failure of ERP?. *AMCIS 1999 Proceedings*,.

Yusuf, Y., 2004. Enterprise information systems project implementation:: A case study of ERP in Rolls-Royce. *International Journal of Production Economics*, 87(3), pp.251-266.