Advanced Materials Corporation

Advanced Materials Corporation is a manufacturing company based in Austin, Texas. The company employs 50 people and makes about 10,000 plastics per year. These plastics are sold to other companies who use them in their products. The company has been growing at a fast pace and now needs to track its information better. Better information will allow the company to fully understand its manufacturing process and operations in order to be more competitive. The company has struggled to correctly keep records of all of its inventory, which has resulted in lost revenue and delays in shipping their product to customers. These issues have led the company to seek a database to track its information.

The first step in the process is when a company purchases a plastic from Advanced Materials Corporation. There are many types of plastics so companies usually purchase many of these plastics. They must purchase at least one thing in order to be recorded in the database, however. Bulk ordering is common as companies usually get a discount when they purchase many items at one time. When a company purchases a plastic, the quantity purchased and the date of the order should be stored too. Each plastic can be purchased by many companies. A company has a company ID, company name, company phone number, and company address. The address is composed of the company's street, city, state, and zip code. A plastic has a plastic id, name, description of the plastic, and price (usually priced per pound as companies typically thousands of pounds).

The company also wants to keep track of its employees. It wants to track two groups of employees, although there may be other ones in the company. There are two types of employees: managers and technicians. Each manager manages one or more technician and each technician just has one manager. Each manager also may manage one or more managers, but don't have to. Some managers can also have more than one manager. Each employee has an employee id, employee name, employee phone number, employee address, and employee date of hire. The address is composed of the employee's street, city, state, and zip code. Technicians may also possess a number of certifications that the company wants to store in the database. This information may help them when promoting or making decisions about their organizational structure.

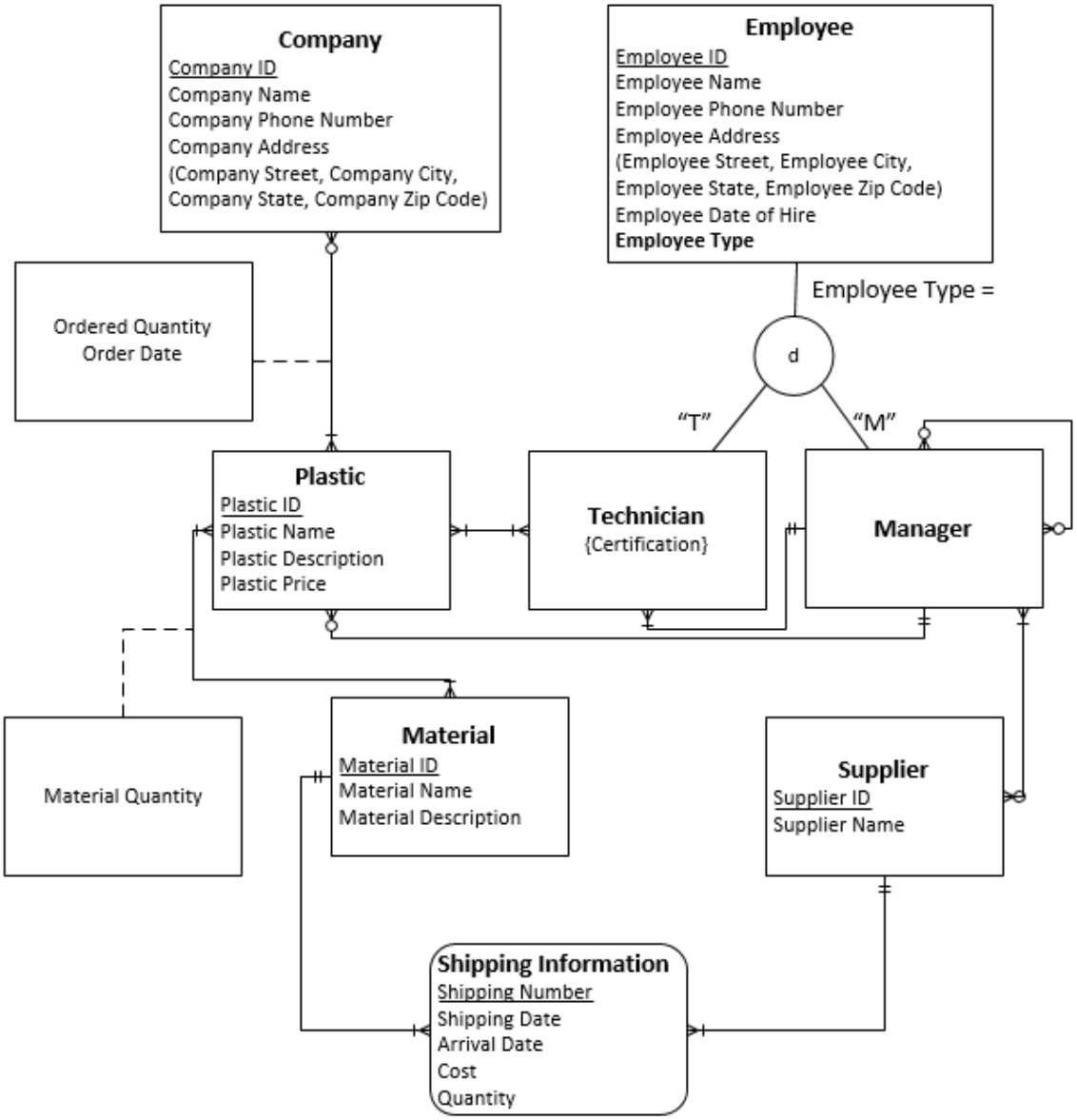
To form the final products, the company takes in raw materials from other suppliers. Each raw material has a material id, material name, and material description. Each supplier has a supplier id and supplier name. Each supplier supplies one or more materials for the company. Multiple suppliers may supply the same material because of price advantages or convenience for the company. When a material is supplied, it must be shipped. Advanced Materials Corporation wants to keep track of the shipping date and the arrival date in order to keep track of incoming raw materials. They also want to keep track of the agreed-upon cost of the shipment and quantity of each material that is shipped.

Some managers can supervise the produced plastics. Each plastic only has one manager. Managers can supervise the production of one or more plastics, although some don't supervise plastics at all. Managers may also be in charge of communicating with suppliers. Some managers do the negotiating with the suppliers in order to get the supplier to supply some of the company's plastics. Each supplier can talk with one or more managers.

Technicians then create the plastics. Technicians may be experts in different techniques so some technicians rotate between working on different plastics. This means that each technician could work on many plastics. Multiple technicians may work on the same plastic. Each plastic is made up of raw materials. Different plastics are made up of multiple raw

materials. Some raw materials are used in several plastics as the process for creating each plastic may be similar. The company also would like to record the number of raw materials used in each plastic. The company wants to make sure that this is recorded to better understand which raw materials it commonly needs. This will help the managers better negotiate with their suppliers and get a better value for the most desired raw materials.

ERD:



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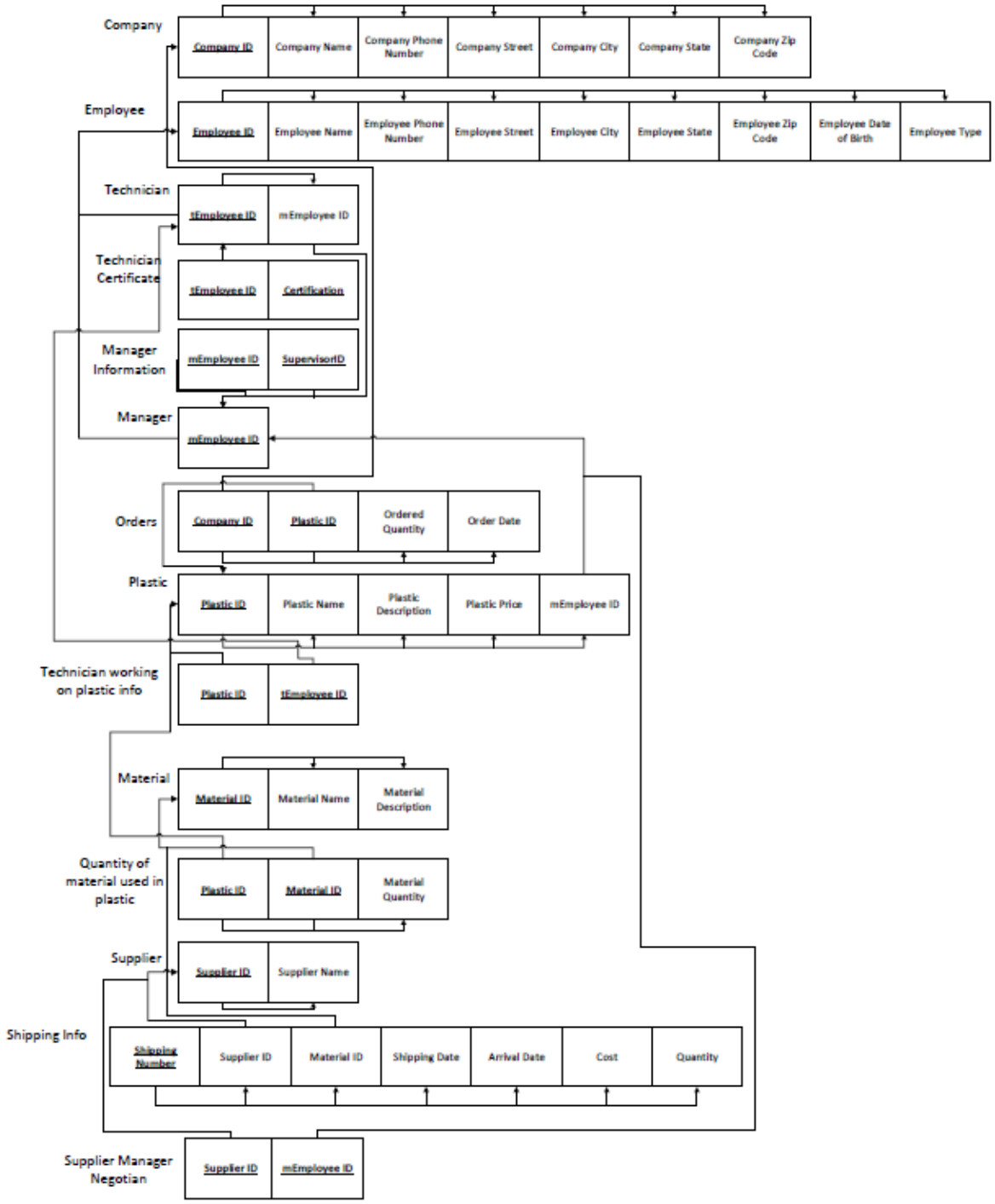
Company
Company ID
Company Name
Company Phone Number
Company Street
Company City
Company State
Company Zip Code
Employee
Employee ID
Employee Name
Employee Phone Number
Employee Street
Employee City
Employee State
Employee Zip Code
Employee Date of Birth
Employee Type
Technician
tEmployee ID
mEmployee ID
Technician Certificate
tEmployee ID
Certification
Manager Information
mEmployee ID
SupervisorID
Manager
mEmployee ID
Orders
Company ID
Plastic ID
Ordered Quantity
Order Date
Plastic
Plastic ID
Plastic Name
Plastic Description
Plastic Price
mEmployee ID
Technician working on plastic info
Plastic ID
tEmployee ID
Material
Material ID
Material Name
Material Description
Quantity of material used in plastic
Plastic ID
Material ID
Material Quantity
Supplier
Supplier ID
Supplier Name
Shipping Info
Shipping Number
Supplier ID
Material ID
Shipping Date
Arrival Date
Cost
Quantity
Supplier Manager Negotian
Supplier ID
mEmployee ID

Advanced Materials Corporation
Data Dictionary
Company

Name	Data Type	Constraints	Key	Description	Example Value
Company ID	Bigint	>0	PK	Unique identifier for a company	12345
Company Name	Varchar(50)			Name of the company	Apple
Company Phone Number	char(10)			Phone number of the company	4089658076
Company Street	Varchar(100)			Street where the company is located	7897 Oakwood St
Company City	Varchar(50)			City where the company is located	Santa Clara
Company State	Char(2)			State where the company is located	CA
Company Zip Code	Varchar(10)			Zip code where the company is located	95050

Employee

Name	Data Type	Constraints	Key	Description	Example Value
Employee ID	Bigint	>0	PK	Unique identifier for a company	12345
Employee Name	Varchar(50)			Name of the employee	Bob Maun
Employee Phone Number	Char(10)			Phone number of the employee	4089658076
Employee Street	Varchar(100)			Street where the employee lives	7897 Oakwood St
Employee City	Varchar(50)			City where the employee lives	Santa Clara
Employee State	Char(2)			State where the employee lives	CA
Employee Zip Code	Varchar(10)			Zip code where the employee lives	95050
Employee Date of Birth	Date			Day employee was born	8/19/1987
Employee Type	Char(1)			Specifies whether employee is a manager(m) or technician(t)	T

Technician

Name	Data Type	Constraints	Key	Description	Example Value
tEmployee ID	Bigint	>0	PK	Unique identifier for a technician	12345
mEmployee ID	Bigint		FK	Unique identifier for a manager	12345

Technician Certificate

Name	Data Type	Constraints	Key	Description	Example Value
tEmployee ID	bigint	>0	PK	Unique identifier for a technician	12345
Certification	Varchar(200)	>0	PK	Certification for knowledge in some subject	Thermodynamics

Manager Information

Name	Data Type	Constraints	Key	Description	Example Value
mEmployee ID	Bigint	>0	PK	Unique identifier for a manager	12345
Supervisor ID	Bigint	>0	PK	Unique identifier for a manager's manager	12345

Manager

Name	Data Type	Constraints	Key	Description	Example Value
mEmployee ID	Bigint	>0	PK	Unique identifier for a manager	12345

Orders

Name	Data Type	Constraints	Key	Description	Example Value
Company ID	Bigint		PK	Unique identifier for a company	12345
Plastic ID	Bigint		PK	Unique identifier for a plastic	12345
Ordered Quantity	Char(10)			Number of the plastic ordered by the company	10
Order Date	Date			Date the company purchased the plastic(s)	8/17/18

Plastic

Name	Data Type	Constraints	Key	Description	Example Value
Plastic ID	bigint	>0	PK	Unique identifier for a company	12345
Plastic Name	Varchar(50)			Name of the plastic	Polypropylene
Plastic Description	Varchar(100)			Description of what the plastic is	Very flexible thermoplastic polymer
Plastic Price	Numeric(20,2)			How much the plastic sells for per lb as they are usually priced in pounds	100
mEmployee ID	Bigint		FK	Unique identifier of a manager	12345

Technician Work

Name	Data Type	Constraints	Key	Description	Example Value
Plastic ID	bigint	>0	PK	Unique identifier for a plastic	12345
tEmployee ID	Bigint	>0	PK	Unique identifier for a technician	12345

Material

Name	Data Type	Constraints	Key	Description	Example Value
Material ID	Bigint	>0	PK	Unique identifier for a material	12345
Material Name	Varchar(50)			Name of the material	Ethylene
Material Description	Varchar(100)			Description of what the material is used for	Monomer used to make polyethylene

Material Quantity

Name	Data Type	Constraints	Key	Description	Example Value
Plastic ID	Bigint	>0	PK	Unique identifier for a plastic	12345
Material ID	Bigint	>0	PK	Unique identifier for a material	12345
Material Quantity	Char(10)			Number of each material in pounds used in a plastic	20

Supplier

Name	Data Type	Constraints	Key	Description	Example Value
Supplier ID	Bigint	>0	PK	Unique identifier for a supplier	12345
Supplier Name	Varchar(50)			Name of the supplier	Awesome Materials

Shipping Information

Name	Data Type	Constraints	Key	Description	Example Value
Shipping Number	bigint	>0	PK	Unique identifier for a shipping agreement	12345
Supplier ID	Bigint		FK	Unique identifier for a supplier	12345
Material ID	Bigint		FK	Unique identifier for a material	12345
Shipping Date	Date			Date when the item is shipped	7/18/2019
Arrival Date	Date			Date when the item arrives	7/21/2019
Cost	Numeric(20,2)			How much the shipment costs	50
Quantity	Char(10)			How many items are in a shipment typically measured by pounds	30

Manager Negotiation

Name	Data Type	Constraints	Key	Description	Example Value
Supplier ID	bigint	>0	PK	Unique identifier for a supplier	12345
mEmployee ID	bigint	>0	PK	Unique identifier for a manager	12345

Code to Create Each Table:

```
CREATE TABLE Company_T
             (CompanyID          bigint          NOT NULL,
              CompanyName        VARCHAR(50),
              CompanyPhoneNumber    CHAR(10),
              CompanyStreet     VARCHAR(100),
              CompanyCity       VARCHAR(50),
              CompanyState      CHAR(2),
              CompanyZipCode    VARCHAR(10),
CONSTRAINT Company_PK PRIMARY KEY (CompanyID));

CREATE TABLE Employee_T
             (EmployeeID          bigint          NOT NULL,
              EmployeeName        VARCHAR(50),
              EmployeePhoneNumber    CHAR(10),
              EmployeeStreet       VARCHAR(100),
              EmployeeCity        VARCHAR(50),
              EmployeeState       CHAR(2),
              EmployeePostalCode   VARCHAR(10),
              EmployeeDateofBirth   Date,
              EmployeeType         CHAR(1),
CONSTRAINT Employee_PK PRIMARY KEY (EmployeeID));

Create TABLE Manager_T
            (mEmployeeID         bigint          NOT NULL,
CONSTRAINT Manager_PK PRIMARY KEY (mEmployeeID),
CONSTRAINT Manager_FK1 FOREIGN KEY (mEmployeeID) REFERENCES
Employee_T(EmployeeID));

Create TABLE Technician_T
            (tEmployeeID         bigint          NOT NULL,
            mEmployeeID          bigint,
CONSTRAINT Technician_PK PRIMARY KEY (tEmployeeID),
CONSTRAINT Technician_FK1 FOREIGN KEY (tEmployeeID) REFERENCES
Employee_T(EmployeeID),
CONSTRAINT Tecnician_FK2 FOREIGN KEY (mEmployeeID) REFERENCES
Manager_T(mEmployeeID));

Create TABLE TechnicianCertificate_T
            (tEmployeeID         bigint              NOT NULL,
            Certification        VARCHAR(100)        NOT NULL,
CONSTRAINT TechnicianCertificate_PK PRIMARY KEY (tEmployeeID,Certification),
CONSTRAINT TechnicianCertificate_FK1 FOREIGN KEY (tEmployeeID) REFERENCES
Technician_T(tEmployeeID));

Create TABLE ManagerInformation_T
            (mEmployeeID         bigint          NOT NULL,
             SupervisorID        bigint          NOT NULL,
```

```
CONSTRAINT ManagerInformation_PK PRIMARY KEY (mEmployeeID,SupervisorID),
CONSTRAINT ManagerInformation_FK1 FOREIGN KEY (mEmployeeID) REFERENCES
Manager_T(mEmployeeID),
CONSTRAINT ManagerInformation_FK2 FOREIGN KEY (SupervisorID) REFERENCES
Manager_T(mEmployeeID));


CREATE TABLE Plastic_T
             (PlasticID          bigint          NOT NULL,
              PlasticName        VARCHAR(50),
              PlasticDescription VARCHAR(100),
              PlasticPrice        Numeric(20,2),
              mEmployeeID       bigint,
CONSTRAINT Plastic_PK PRIMARY KEY (PlasticID),
CONSTRAINT Plastic_FK1 FOREIGN KEY (mEmployeeID) REFERENCES
Manager_T(mEmployeeID));

CREATE TABLE Orders_T
            (CompanyID        bigint     NOT NULL,
             PlasticID        bigint     NOT NULL,
             OrderedQuantity  char(10),
             OrderDate         DATE,
CONSTRAINT Orders_PK PRIMARY KEY (CompanyID,PlasticID),
CONSTRAINT Orders_FK1 FOREIGN KEY (CompanyID) REFERENCES
Company_T(CompanyID),
CONSTRAINT Orders_FK2 FOREIGN KEY (PlasticID) REFERENCES
Plastic_T(PlasticID));



Create TABLE TechnicianWork_T
            (PlasticID         bigint           NOT NULL,
            tEmployeeID        bigint            NOT NULL,
CONSTRAINT TechnicianWork_PK PRIMARY KEY (PlasticID,tEmployeeID),
CONSTRAINT TechnicianWork_FK1 FOREIGN KEY (PlasticID) REFERENCES
Plastic_T(PlasticID),
CONSTRAINT TechnicianWork_FK2 FOREIGN KEY (tEmployeeID) REFERENCES
Technician_T(tEmployeeID));

CREATE TABLE Material_T
             (MaterialID          bigint          NOT NULL,
              MaterialName        VARCHAR(50),
              MaterialDescription   VARCHAR(100),
CONSTRAINT Material_PK PRIMARY KEY (MaterialID));

CREATE TABLE MaterialQuantity_T
             (PlasticID        bigint          NOT NULL,
              MaterialID        bigint         NOT NULL,
              MaterialQuantity      char(10),
CONSTRAINT MaterialQuantity_PK PRIMARY KEY (PlasticID, MaterialID),
```

```
CONSTRAINT MaterialQuantity_FK1 FOREIGN KEY (PlasticID) REFERENCES
Plastic_T(PlasticID),
CONSTRAINT MAterialQuantity_FK2 FOREIGN KEY (MaterialID) REFERENCES
Material_T(MaterialID));

CREATE TABLE Supplier_T
             (SupplierID          bigint          NOT NULL,
             SupplierName        VARCHAR(50),
CONSTRAINT Supplier_PK PRIMARY KEY (SupplierID));

CREATE TABLE ShippingInformation_T
             (ShippingNumber    bigint          NOT NULL,
              SupplierID        bigint,
              MaterialID      bigint,
              ShippingDate    Date,
              ArrivalDate     Date,
              Cost            Numeric(20,2),
              Quantity        char(10),
CONSTRAINT ShippingInformation_PK PRIMARY KEY (ShippingNumber),
CONSTRAINT ShippingInformation_FK1 FOREIGN KEY (SupplierID) REFERENCES
Supplier_T(SupplierID),
CONSTRAINT ShippingInformation_FK2 FOREIGN KEY (MaterialID) REFERENCES
Material_T(MaterialID));

Create TABLE ManagerNegotiation_T
                  (SupplierID           bigint           NOT NULL,
                   mEmployeeID           bigint           NOT NULL,
CONSTRAINT ManagerNegotiation_PK PRIMARY KEY (SupplierID,mEmployeeID),
CONSTRAINT ManagerNegotiation_FK1 FOREIGN KEY (SupplierID) REFERENCES
Supplier_T(SupplierID),
CONSTRAINT ManagerNegotiation_FK2 FOREIGN KEY (mEmployeeID) REFERENCES
Manager_T(mEmployeeID));
```

3 Views

View 1: Employee View

The first view was created for a confidentiality reason. The company wants to make sure its employees cannot see other employee's address information. Their phone number is ok because most employees already know each other's phone number or may need to contact an employee. They don't need to see address information, however, so the street, city, and zip code have all been removed from this view. The state information has remained, however, because the company is based in Austin, Texas and every employee that works at the company obviously lives in Texas. The code to accomplish this objective is posted below.

```
CREATE VIEW Employee_V
as
Select EmployeeID, EmployeeName,EmployeePhoneNumber,EmployeeState,EmployeeType
From Employee_T;
```

View 2: Revenue View

The reason this view has been created is because of frequent use. Many companies purchase from Advanced Materials Corporation. The corporation would like to understand which of its items are selling and how much revenue each order brings in. This will help the company understand which items are making them the most revenue and allows the company to do better cost analysis. It will also help them to understand which plastics are not as popular and, therefore, shouldn't be made as much. This view allows the company to quickly analyze the total revenue of each order for the plastic involved. The company wants this to be stored so it can be quickly run. Cost analysis is done very frequently and this information is vital to cutting costs and bringing in more money. The code that created this view is below.

```
CREATE VIEW Revenue_V
as
select Orders_T.PlasticID,PlasticName,PlasticPrice,OrderedQuantity, (PlasticPrice*OrderedQuantity) as TotalRevenue, OrderDate
from Plastic_T INNER JOIN Orders_T
ON Plastic_T.PlasticID= Orders_T.PlasticID;
```

View 3: Plastic's Manager and Technician View

This is the final view that Advanced Materials Corporation wants to have. This view was created because of frequent use. It shows both the managers and technicians of each plastic so that the company can quickly get this information when needed. The company has had problems in the past with not getting plastics completed on time and would like to know who was working on those plastics. The company would also like to know who is best qualified to give information to a manager that is in discussions with suppliers about potential raw materials. This will speed up negotiations with suppliers and better identify the types of raw materials that will be needed to create a plastic. Negotiations are always ongoing so being able to get this information quickly and often is a necessity. The code that created this view is below.

```sql
CREATE VIEW Plastic_Manager_Technician
as
select Plastic_T.PlasticID, PlasticName, mEmployeeID,tEmployeeID
from Plastic_T INNER JOIN TechnicianWork_T
ON Plastic_T.PlasticID=TechnicianWork_T.PlasticID;
```