PROJECT 1 ASSIGNMENT

Import the necessary libraries

In [1]:

```
import pandas as pd
import numpy as np
from numbers import Number
import warnings
warnings.filterwarnings('ignore')
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split

from sklearn.linear_model import LinearRegression
```

Load the dataset

The encoding parameter is used to handle any special characters that may be present in the file.

In [2]:

```
df = pd.read_csv('AviationData.csv', encoding='latin-1')
```

In [3]:

```
# Display the first few rows of the dataframe.
df.head()
```

Out[3]:

	Event.Id	Investigation.Type	Accident.Number	Event.Date	Location	Countr
0	20001218X45444	Accident	SEA87LA080	1948-10-24	MOOSE CREEK, ID	Unite State
1	20001218X45447	Accident	LAX94LA336	1962-07-19	BRIDGEPORT, CA	Unite State
2	20061025X01555	Accident	NYC07LA005	1974-08-30	Saltville, VA	Unite State
3	20001218X45448	Accident	LAX96LA321	1977-06-19	EUREKA, CA	Unite State
4	20041105X01764	Accident	CHI79FA064	1979-08-02	Canton, OH	Unite State

5 rows × 31 columns

In [4]:

```
# Display the first few rows of the dataframe.
df.describe()
```

Out[4]:

	Number.of.Engines	Total.Fatal.Injuries	Total.Serious.Injuries	Total.Minor.Injuries	Tot
count	82805.000000	77488.000000	76379.000000	76956.000000	8
mean	1.146585	0.647855	0.279881	0.357061	
std	0.446510	5.485960	1.544084	2.235625	
min	0.000000	0.000000	0.000000	0.000000	
25%	1.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	
max	8.000000	349.000000	161.000000	380.000000	

In [5]:

```
# Display the last few rows of the dataframe
df.tail()
```

Out[5]:

	Event.Id	Investigation.Type	Accident.Number	Event.Date	Location	Coun
88884	20221227106491	Accident	ERA23LA093	2022-12-26	Annapolis, MD	Unit Sta
88885	20221227106494	Accident	ERA23LA095	2022-12-26	Hampton, NH	Unit Sta
88886	20221227106497	Accident	WPR23LA075	2022-12-26	Payson, AZ	Unit Sta
88887	20221227106498	Accident	WPR23LA076	2022-12-26	Morgan, UT	Unit Sta
88888	20221230106513	Accident	ERA23LA097	2022-12-29	Athens, GA	Unit Sta

5 rows × 31 columns

In [6]:

```
df.shape
```

Out[6]:

```
(88889, 31)
```

CLEANING THE DATA

CLEANING THE DATA

In [9]:

```
print(df.isnull().sum())
```

```
Event.Id                      0
Investigation.Type            0
Accident.Number               0
Event.Date                    0
Location                     52
Country                     226
Latitude                  54507
Longitude                 54516
Airport.Code              38757
Airport.Name              36185
Injury.Severity            1000
Aircraft.damage            3194
Aircraft.Category         56602
Registration.Number        1382
Make                         63
Model                        92
Amateur.Built               102
Number.of.Engines          6084
Engine.Type                7096
FAR.Description           56866
Schedule                  76307
Purpose.of.flight          6192
Air.carrier               72241
Total.Fatal.Injuries      11401
Total.Serious.Injuries    12510
Total.Minor.Injuries      11933
Total.Uninjured            5912
Weather.Condition          4492
Broad.phase.of.flight     27165
Report.Status              6384
Publication.Date          13771
dtype: int64
```

In [10]:

```
#   - Handle missing values (e.g., drop rows, fill with mean/median/mode, or use im
df.fillna(method='ffill', inplace=True)  # Forward-fill missing values
```

In [11]:

```
df.head()
```

Out[11]:

	Event.Id	Investigation.Type	Accident.Number	Event.Date	Location	Countr
0	20001218X45444	Accident	SEA87LA080	1948-10-24	MOOSE CREEK, ID	Unite State
1	20001218X45447	Accident	LAX94LA336	1962-07-19	BRIDGEPORT, CA	Unite State
2	20061025X01555	Accident	NYC07LA005	1974-08-30	Saltville, VA	Unite State
3	20001218X45448	Accident	LAX96LA321	1977-06-19	EUREKA, CA	Unite State
4	20041105X01764	Accident	CHI79FA064	1979-08-02	Canton, OH	Unite State

5 rows × 31 columns

Convert 'Publication.Date' and 'Event.Date' columns to datetime objects.

Convert specific columns to integer type.

In [12]:

```
#   - Convert columns to appropriate data types (e.g., date, numerical)
df['Publication.Date'] = pd.to_datetime(df['Publication.Date'])
df['Total.Fatal.Injuries'] = df['Total.Fatal.Injuries'].astype(int)
df['Total.Serious.Injuries'] = df['Total.Serious.Injuries'].astype(int)
df['Total.Minor.Injuries'] = df['Total.Minor.Injuries'].astype(int)
df['Total.Uninjured'] = df['Total.Uninjured'].astype(int)
df['Event.Date'] = pd.to_datetime(df['Event.Date'])
```

In [13]:

```
# Mode imputation for 'Airport.Code'
df['Airport.Code'].fillna(df['Airport.Code'].mode()[0], inplace=True)
```

In [14]:

```
df.head()
```

Out[14]:

	Event.Id	Investigation.Type	Accident.Number	Event.Date	Location	Countr
0	20001218X45444	Accident	SEA87LA080	1948-10-24	MOOSE CREEK, ID	United State
1	20001218X45447	Accident	LAX94LA336	1962-07-19	BRIDGEPORT, CA	United State
2	20061025X01555	Accident	NYC07LA005	1974-08-30	Saltville, VA	United State
3	20001218X45448	Accident	LAX96LA321	1977-06-19	EUREKA, CA	United State
4	20041105X01764	Accident	CHI79FA064	1979-08-02	Canton, OH	United State

5 rows × 31 columns

In [15]:

```
df.head()
```

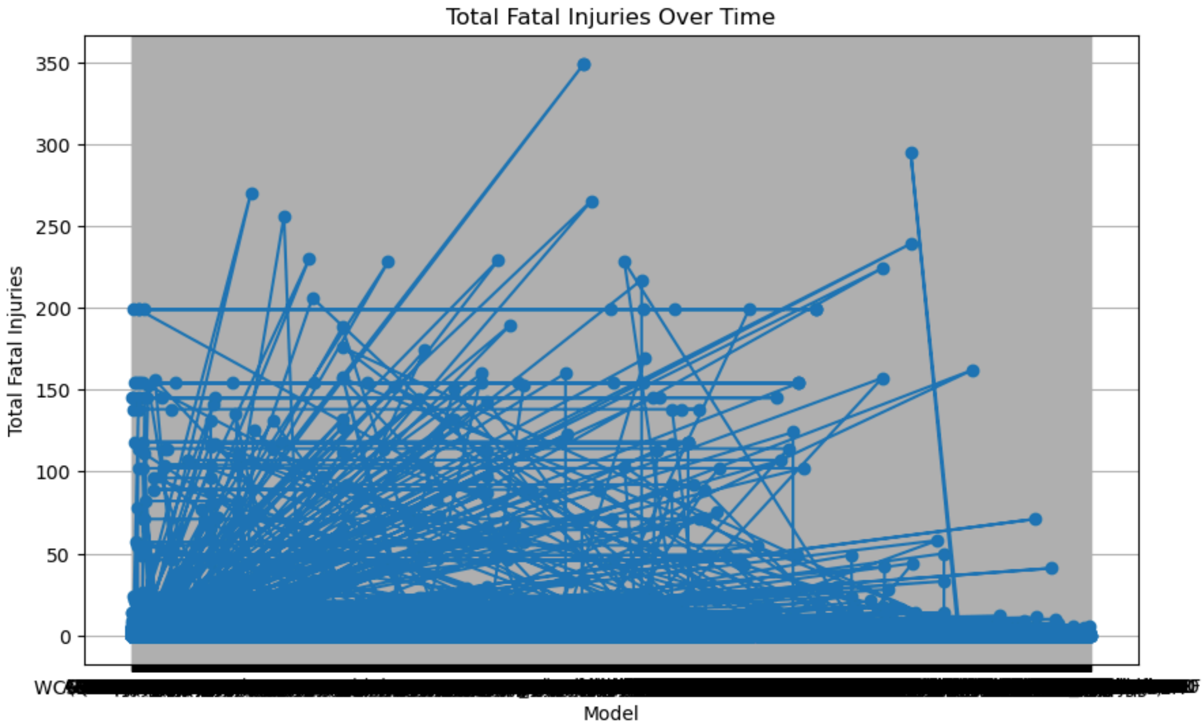
Out[15]:

	Event.Id	Investigation.Type	Accident.Number	Event.Date	Location	Countr
0	20001218X45444	Accident	SEA87LA080	1948-10-24	MOOSE CREEK, ID	United State
1	20001218X45447	Accident	LAX94LA336	1962-07-19	BRIDGEPORT, CA	United State
2	20061025X01555	Accident	NYC07LA005	1974-08-30	Saltville, VA	United State
3	20001218X45448	Accident	LAX96LA321	1977-06-19	EUREKA, CA	United State
4	20041105X01764	Accident	CHI79FA064	1979-08-02	Canton, OH	United State

5 rows × 31 columns

In [16]:

```
# Analyze accident trends over time
plt.figure(figsize=(10, 6))
plt.plot(df['Model'], df['Total.Fatal.Injuries'], marker='o')
plt.title('Total Fatal Injuries Over Time')
plt.xlabel('Model')
plt.ylabel('Total Fatal Injuries')
plt.grid(True)
plt.show()
```



In [31]:

```
# prompt: clean this data for me

# Check for and handle any remaining missing values after initial cleaning
print(df.isnull().sum())

# Further data cleaning based on specific column needs
# Example: If 'Latitude' or 'Longitude' have missing values, consider imputation or
# ... (add more specific cleaning steps as needed)


# Remove rows where 'Total.Fatal.Injuries' are greater than the total number of peo
total_injured = df['Total.Fatal.Injuries'] + df['Total.Serious.Injuries'] + df['Tot
df = df[df['Total.Fatal.Injuries'] <= total_injured]


# Ensure consistent data types across the dataframe
for col in df.columns:
    if df[col].dtype == 'object':
        try:
          df[col] = pd.to_numeric(df[col])
        except ValueError:
          pass  # Skip if conversion to numeric fails

# Example: Handling inconsistent values in a categorical column (replace with appro
#df['Make'] = df['Make'].replace({'CESSNA AIRCRAFT': 'CESSNA'})  # Replace inconsis


# Drop rows where 'Total.Fatal.Injuries' is negative (if any)
df = df[df['Total.Fatal.Injuries'] >= 0]

df.head()
```

```
Event.Id                  0
Investigation.Type        0
Accident.Number           0
Event.Date                0
Location                  0
Country                   0
Latitude                  2
Longitude                 2
Airport.Code              0
Airport.Name              7
Injury.Severity           0
Aircraft.damage           0
Aircraft.Category         5
Registration.Number       0
Make                      0
Model                     0
Amateur.Built             0
Number.of.Engines         0
Engine.Type               0
FAR.Description           5
Schedule                  5
Purpose.of.flight         0
Air.carrier               5
Total.Fatal.Injuries      0
Total.Serious.Injuries    0
Total.Minor.Injuries      0
Total.Uninjured           0
Weather.Condition         0
Broad.phase.of.flight     0
Report.Status             0
Publication.Date          1
dtype: int64
```

Out[31]:

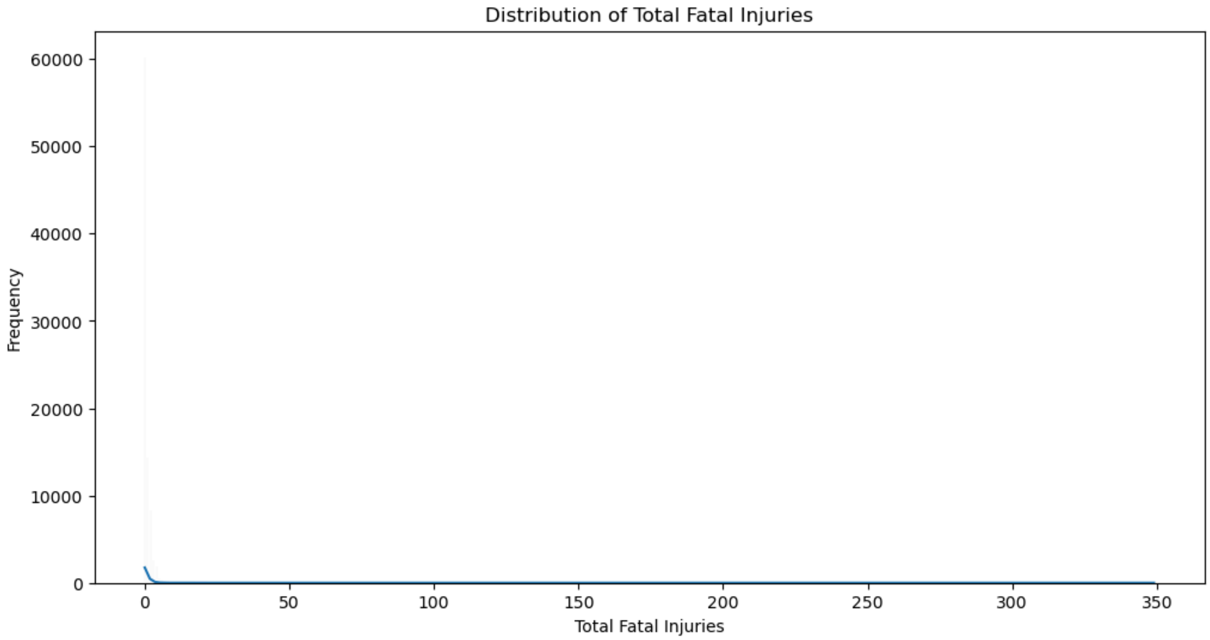
	Event.Id	Investigation.Type	Accident.Number	Event.Date	Location	Country
0	20001218X45444	Accident	SEA87LA080	1948-10-24	MOOSE CREEK, ID	United State
1	20001218X45447	Accident	LAX94LA336	1962-07-19	BRIDGEPORT, CA	United State
2	20061025X01555	Accident	NYC07LA005	1974-08-30	Saltville, VA	United State
3	20001218X45448	Accident	LAX96LA321	1977-06-19	EUREKA, CA	United State
4	20041105X01764	Accident	CHI79FA064	1979-08-02	Canton, OH	United State

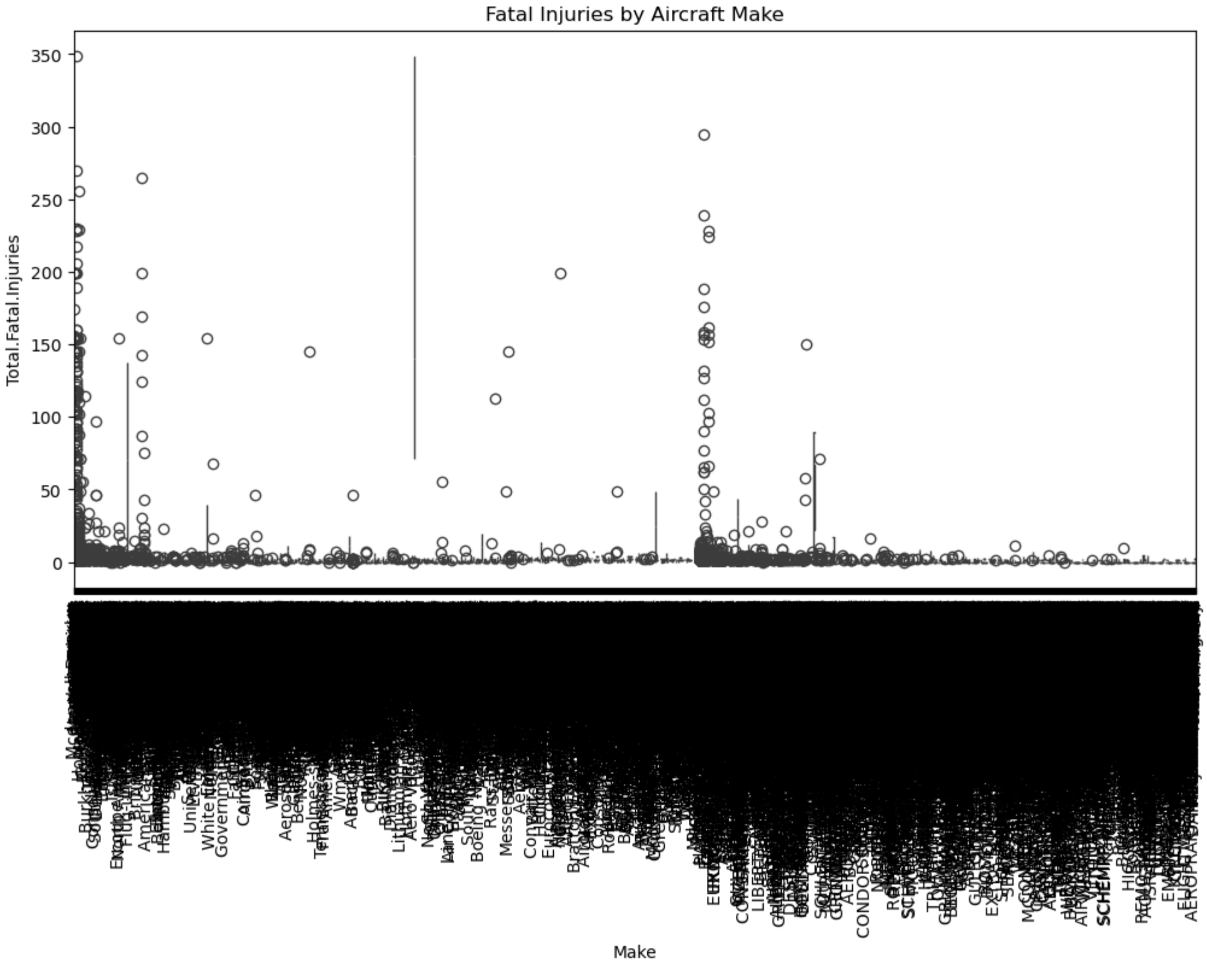
5 rows × 31 columns

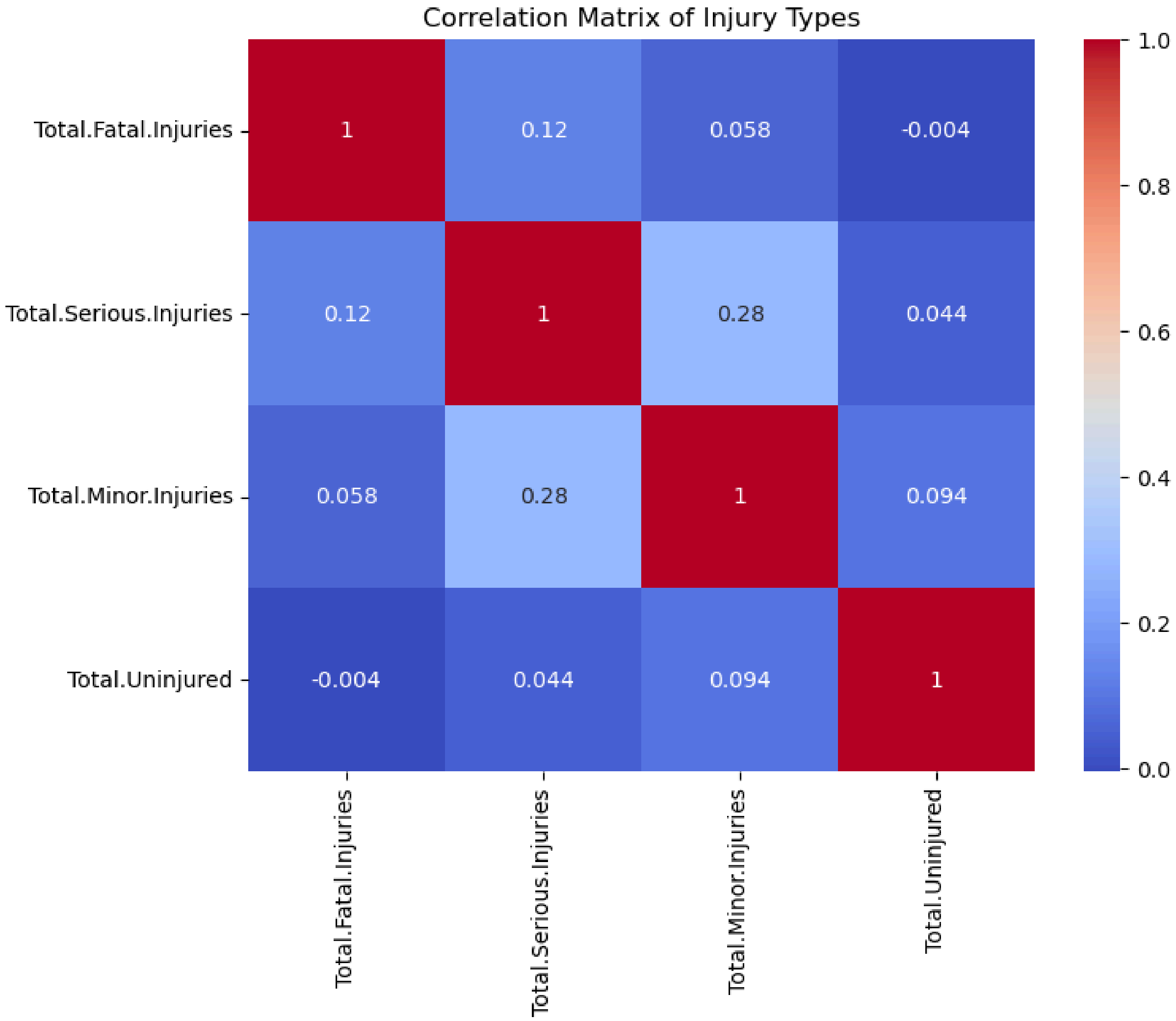
In [33]:

```
# prompt: Analyse for me this data. The analysis should yield three concrete busine

# Analyze injury severity distribution
```

```
injury_columns = ['Total.Fatal.Injuries', 'Total.Serious.Injuries', 'Total.Minor.In
df[injury_columns].describe()

plt.figure(figsize=(12, 6))
sns.histplot(df['Total.Fatal.Injuries'], kde=True)
plt.title('Distribution of Total Fatal Injuries')
plt.xlabel('Total Fatal Injuries')
plt.ylabel('Frequency')
plt.show()

# Investigate the relationship between aircraft make and fatal injuries
plt.figure(figsize=(12, 6))
sns.boxplot(x='Make', y='Total.Fatal.Injuries', data=df)
plt.xticks(rotation=90)
plt.title('Fatal Injuries by Aircraft Make')
plt.show()


# Example: Analyze the correlation between features
correlation_matrix = df[['Total.Fatal.Injuries', 'Total.Serious.Injuries', 'Total.M
plt.figure(figsize=(8, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
plt.title('Correlation Matrix of Injury Types')
plt.show()
```

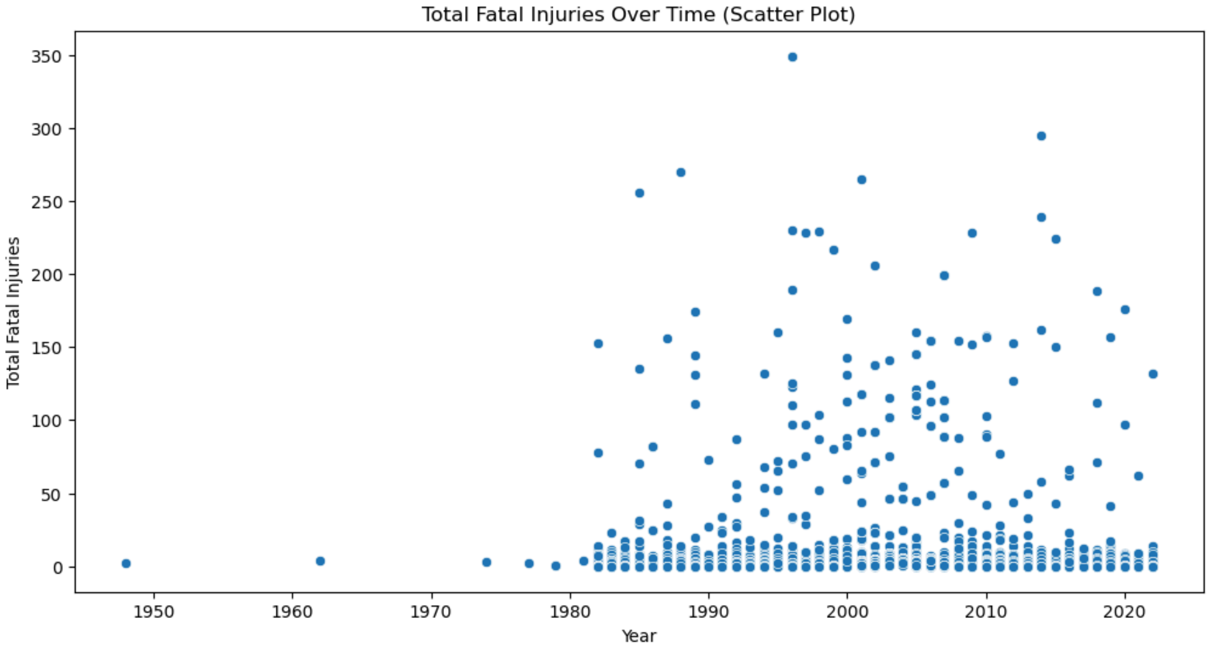



Fatal Injuries by Aircraft Make
Total.Fatal.Injuries
350
300
250
200
150
100
50
0
Make



In [35]:

```
# Analyze the relationship between the year of the event and total fatal injuries
df['Event.Year'] = df['Event.Date'].dt.year
plt.figure(figsize=(12, 6))
sns.scatterplot(x='Event.Year', y='Total.Fatal.Injuries', data=df)
plt.title('Total Fatal Injuries Over Time (Scatter Plot)')
plt.xlabel('Year')
plt.ylabel('Total Fatal Injuries')
plt.show()
```


Total Fatal Injuries Over Time (Scatter Plot)
Total Fatal Injuries
350
300
250
200
150
100
50
0
1950
1960
1970
1980
1990
2000
2010
2020
Year

```
In [ ]:
```