



# Composites Market Report 2020

## » The global CF-Production capacity «

Market Development,  
Trends, Outlook and  
Challenges

- published version -

Michael Sauer, Composites United e.V.

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### **Important note: Published version**

This report is a published version that is fully citable. The version is to be seen as a short report, which is intended to provide a summarized overview of a specific topic area in connection with the development of fiber composite technologies and their market environment. In the sense of a use as a public source of information it is the aim of Composites United e.V. to provide a consolidated summary as far as possible, whereas Composites United e.V. explicitly points out that there is no claim to completeness of the data situation.

Further information on other market reports, industry reports and studies can be requested from Composites United e.V. at:

<https://composites-united.com/branchen/>

## 1 General information

Now in its eleventh edition, the Composites Market Report has been published annually since 2010. This short report contains partially modified excerpts of a full-length version. This unpublished long version is reserved for members of Composites United e.V. free of charge, but can alternatively be purchased by non-members.

For this report, information and data were occasionally provided by CU-members or collected by the CU itself, as well as verified and supplemented with the help of external market data. Composites United e.V. explicitly points out that due to the complex and dynamic market development with individually differing data sources, the information shown here can never provide a completely closed overview of the real market conditions. The aim of Composites United e.V. is to provide an overview of current trends and overarching development directions based on the sources provided. All information is non-binding and without liability, so that no claims can be made against Composites United e.V. for its use in the commercial sense.

### **About Composites United e.V**

Composites United e.V. (CU) is one of the world's largest networks for fiber-based, multi-material lightweight design. Around 400 members have combined forces in this high-performance industry and research association to jointly develop lightweight engineering solutions of the future. Several regional clusters and specialist networks support the association's activities in the entire DACH region, as well as international representative offices in Belgium, Japan, South Korea, China and India.

Composites United e.V. (CU) was created with effect from January 1, 2019, from the merger of the two existing associations Carbon Composites e.V. and CFK Valley e.V. The headquarters of Composites United e.V. (CU) is Berlin (Germany), in addition Augsburg and Stade remain as established locations in Germany. Further information on the activities of Composites United can be found at:

<https://composites-united.com>

In order to enable a better comparability with other market reports and to assure a higher plausibility of the shown information, the two most common growth rates and their calculations are used as shown below:

- **Averaged Annual Growth Rate (AAGR)** = Arithmetic Mean Return (AMR) = Arithmetic Average from n annual growth rates (AGR):

$$AAGR(t_1, t_n) = \frac{AGR(t_1) + AGR(t_2) + \dots + AGR(t_n)}{n} = \frac{1}{n} \sum_{i=1}^n AGR(t_i)$$

- **Compound Annual Growth Rate (CAGR)** = annual growth rate over n years assuming a proportionally constant growth:

$$CAGR(t_1, t_n) = \left( \frac{A(t_n)}{A(t_1)} \right)^{\frac{1}{n}} - 1 \quad \leftrightarrow \quad A(t_n) = A(t_1)(1 + CAGR)^n$$

In all market reports of Composites United e.V., longer-term growth rates are calculated on the basis of the CAGR.

#### **Note on the current SARS-CoV-2 crisis situation:**

The exact extent and impact of the current crisis situation resulting from the SARS CoV-2 pandemic on the global CF market are subject to a volatile data basis at the current level. The very dynamic development of the crisis in combination with economic and political measures that are difficult to predict in the short term make a reliable forecast even more difficult. This applies in particular to the course of a subsequent recovery in the market environment and to the collection of sales data, which are currently distorted by numerous measures. In this respect, it must be pointed out that the figures, diagrams and data shown can only represent one possible scenario of future developments. The exact nature of the underlying influencing variables will have to be investigated further in future studies, especially as soon as a robust forecast of the end of the current crisis situation is foreseeable.

## 2 The global CF-Production capacity by manufacturer

Figure 1 shows the theoretical annual production capacity (name plate capacity) of the world's leading carbon fiber producers, which at the current level amounts to approx. 158.9 kt/a. In the reporting period, a total of approx. 13.9 kt/a of new production capacity was built or completed. However, additional adjustments due to updated market data and cutbacks due to changes in plant availability were also taken into account at several points, resulting in a total capacity increase of approx. 8.0 kt/a compared with the previous year. Overall, this corresponds to growth of approx. 5.3%.

The expansions are mainly due to the completion of programs already underway, but some further expansion measures have also been announced for the coming years or existing measures have been confirmed. The announcements are further subdivided in Figure 1 according to their implementation horizon into "short-term growth" (up to 2022), and "medium-term growth" (later than 2022). Individual announcements of particularly long-term growth targets are explained in more detail in the following comments, but are not shown in full in the figure due to given uncertainty factors. On this basis, a further increase of approx. 13.8 kt/a (+8.7% to 2020) compared to the current capacity can be expected for the short-term observation horizon. In the medium term, an additional approx. 48.9 kt/a (+30.8% to 2020) have already been announced. It should be noted that for this estimate, as in Figure 2, individual large-scale and long-term announcements were evaluated individually. In some cases, initial expansion stages of long-term expansion measures with a high probability of implementation have already been included in medium-term growth targets.

All in all, the expansion of plant capacity during the period covered by this market report is slightly above average compared with recent years (2017: +4.3%; 2018: +9.4%; 2019: +1.1%). However, it should be noted here that the growth shown is almost entirely the result of construction programs already underway due to the longer installation periods. Conclusions about the current investment behavior of manufacturers can therefore only be drawn on the basis of new announcements. On the one hand, it can be observed that some previously short-term expansion targets have been extended somewhat in terms of their completion and are thus shifting to the medium-term horizon. Overall, established manufacturers tended to be more cautious about such future forecasts during the period under review, which can be attributed to both short-term

changes in the overall economic situation and natural fluctuations between long-term investment cycles. On the other hand, several large-scale long-term measures have been announced, particularly in Asia, but their individual probability of implementation in the near future still needs to be further substantiated.

In principle, the long-term nature and capital commitment of such expansion measures is a challenge, especially in a dynamically changing overall economic situation that currently remains tense as a result of the SARS CoV-2 pandemic and ongoing trade conflicts. To date, however, there has been no active dismantling of hardware or resale of plant capacity. As will be described in more detail below, producers benefit greatly from their now highly diversified portfolio, which allows them to respond somewhat more flexibly to short-term changes in the demand market. Such transfer activities can currently be observed on a larger scale and already allow a slightly optimistic expectation of the overall market for the coming years with regard to new investments.

From the comparison with current demand quantity (forecast for 2020), a theoretical utilization rate of approx. 45.0% can be determined. However, it should be noted here that the theoretical capacities used do not take into account any restrictions occurring in reality, for example due to batch changes, rejects and unexpected downtimes. Over the past reporting years, this theoretical figure has risen continuously (2016: 46.5%, 2017: 51.6%, 2018: 51.9%, 2019: 56.0%) and is now falling back significantly in the present reporting year. The reason for this is this year's dynamic upheavals in the global economic situation, which took place very quickly in relative terms compared with the long-term capacity expansion programs. However, the capacity utilization rate determined in the current reporting year 2020 is still an acceptable outlier from a historical perspective (e.g. compared to 2016: 46.5%). Due to the above-mentioned effects, as well as on the basis of the continuous expansion projects in recent years prior to the current reporting year, it must be assumed that the actual utilization rates will be significantly higher. It remains to be seen to what extent the confidence of CF producers in future growth prospects will be maintained in the current crisis situation. The desire to secure shares at an early stage and in the long term in a highly concentrated market environment by means of costly expansion measures contrasts with the need to secure sufficient liquidity with the lowest possible capital commitment.

It should be noted that in the figures shown below, no distinction is made between the different fiber product groups (e.g. small tow/large tow) in terms of tonnage. Especially in the case of carbon fibers, there is a significant correlation between fiber product group, throughput quantity and the resulting price structure. Even though most manufacturers now offer a wide range of horizontally diversified product groups, some of them still have individual focal points in their portfolio. Therefore, no direct conclusions can be drawn from the shown numbers by tonnage with regard to a market distribution by turnover. This fact is particularly important in the current pandemic situation, as the various fields of application and sales markets and the corresponding product groups are affected to very different degrees.

In the year under review, world market leader Toray underscored its leading position as a result of a significant capacity expansion of large tow products (50K) by a total of 5 kt/a. This is based on the increase in capacity at the former Zoltek plant in Nyergesújfalu (Hungary). This brings the total capacity for large-tow products of the Toray Group to 25.4 kt/a, representing almost half of the portfolio by tonnage, with a total of 54.5 kt/a. The group thus represents almost about 34.3% of global production capacity and has steadily expanded its leadership position since 2017 (2017: 31.2%; 2018: 31.8%; 2019: 32.8%). In recent years, investments have been made in the large-tow product segment in particular, so that Toray now plays leading supplier roles across all application fields.

As a result of a capacity expansion and optimization measures at its site in Salt Lake City (Utah; USA), the manufacturer Hexcel has moved up to second place in this list (in terms of tonnage), although it is still quite far away from Toray. With this latest expansion of approx. 3.5 kt/a, the company exceeds its development target in terms of total capacity, which it has been communicating for years. For future expansions, Hexcel announces that the focus will be on the existing sites in Roussillon (France), Illescas (Spain) and Decatur (Alabama, USA). In line with a clear corporate strategy, the focus is on the establishment and expansion of co-location plants, i.e. sites that have their own PAN precursor production facilities for internal processing into CF. Accordingly, the next such measure is already planned to be an increase in capacity at the central PAN plant in Decatur, with the simultaneous establishment of a local CF

line. However, a qualification target initially planned for the short term had to be postponed to the medium development horizon for situational reasons.

The CF producers Mitsubishi Chemical Carbon Fiber and Composites (MCCFC) and SGL Carbon follow in third and fourth place in this list. Currently, no further announcements are known for either company after the completion of their last build-up programs in 2017 (MCCFC) and 2016 (SGL). The focus here is currently more on the further expansion of the vertical and horizontal value chains, with investments made flowing in particular into acquisitions and shareholdings. Accordingly, the company structures and portfolios are also being continuously adapted and expanded.

In the near future, CF producer Teijin will be able to catch up with these places. The company is currently in the middle of the construction phase for a new large site in Greenwood (South Carolina, USA), which from today's perspective should correspond to an additional capacity of approx. 6 kt/a. The first 1.5 kt/a will probably be completed and commissioned in the near future.

The manufacturer Formosa Plastics has generally been very cautious with announcements over the past reporting periods, and no capacity expansions are known for the current reporting year either. On the basis of the company's own recent publications, total capacity has even been revised downward somewhat compared with previous reports. In the meantime, however, there are increasing reports of various large-volume projects in the wind energy sector in which local material production capacities are to be utilized. The unique position in Taiwan makes a potential increase in capacity within the next few years seem possible.

As in previous reporting periods, special attention was again paid to Chinese CF producers in this year's reporting period. The largest national manufacturer is currently Zhongfu-Shenyang, a subsidiary of China Composite Group Ltd. (CCG) and thus ultimately part of the influential state-owned China National Building Material Group Corporation (CNBM). After significant capacity expansions during 2018, a commissioning of another approx. 4 kt/a is now imminent. In the Chinese provincial city of Jilin, too, activities are currently focusing on a large-scale CF capacity expansion with the participation of Jilin Jingong Carbon Fiber Co. Ltd. and other members of a superordinated group of companies. From the currently existing approx. 3 kt/a, a short-term increase by additional approx. 4 kt/a is expected. On the part of the Chinese market



participant Kangde Group, which already attracted a lot of attention in previous reporting periods, there are several news in the current review period. On the one hand, the completion of the first CF lines within the scope of the very high-volume planned site in Rongcheng (Shandong Province) has been reported, bringing the company's total capacity to a total of approx. 5.1 kt/y. On the other hand, the reports regarding the associated parent company about financial irregularities, financing problems or financing delays and legal disputes of comprehensive proportions have not yet been clarified further, so that the current activities are partly overshadowed by this. In summary, it appears that Chinese CF producers have now built up a high level of technological maturity with a high degree of in-house development capability. Existing producers are starting to diversify their portfolio significantly and face a high demand in their own country, especially in the field of (offshore) wind energy, as well as on the basis of national development programs (e.g. COMAC). Increasingly, new companies are also entering the market environment, directly triggering large individual investments.

A long-standing investment announcement by DowAksa for its site in Yalova (Turkey) was again confirmed in the reporting period, but for the moment only on a smaller scale. According to current reports, activities are to begin in the 2020 reporting period to increase the currently saturated CF plant capacities to a total of approx. 5.5 kt/a. This corresponds to an additional 2 kt/a with a realistic time frame until implementation by approx. 2023. Further information regarding the originally significantly larger announcement (approx. +9.9 kt/a; approx. US\$545 million investment) is currently not known.

For the manufacturer Solvay, there is new relevant information published by the company itself in the reporting period. These have necessitated a relatively significant correction of the available internal plant capacity. Nevertheless, Solvay continues to represent its strong market position in the field of CF high-performance products, especially for the aerospace sector. In this context, the existing extensive process know-how is an important core element for the placement in long-running program lines.

The South Korean manufacturer Hyosung continues to press ahead with its long-term expansion at the central production site in Jeonju (Jeollabuk-do Province) in the year under review. Thus, the completion of an additional production line has been announced, as well as the construction of a further line in the short-term time horizon. A

successive expansion up to the long-term target of approx. 24 kt/a seems to be feasible in the planned time horizons, e.g. because the corresponding area has already been almost completely developed in advance. The products are in particular demand in the field of wound CF tanks for hydrogen storage systems, e.g. in connection with fuel cell propulsion for next-generation automobiles.

“Other” fiber producers accounted for approx. 12.8 kt/a in the reporting period. In line with some major long-term announcements by some of the previously smaller manufacturers grouped under this heading, very interesting future potential is emerging, partly as a result of support from influential parent companies and partly as a result of local unique selling propositions. In various places, further approx. 2.3 kt/a in the short term and further approx. 8.4 kt/a in the medium term have already been announced with regard to these “other” producers.

In summary, the market will continue to be very concentrated in the 2020 reporting period, with a few large manufacturers dominating the market. However, from today's perspective, numerous previously smaller companies will move significantly closer to the leading manufacturers in the near future as a result of large-volume expansions announced and already launched. As a result, market concentration will probably decrease relatively.

Overall, the leading carbon fiber producers can therefore be grouped as follows in terms of their plant capacities:

- Top 10: approx. 137,1 kt/a; approx. 86,2% of total capacity  
(2018: 88,6%; 2019: 88,9%)
- Top 5: approx. 109,3 kt/a; approx. 68,8% of total capacity  
(2018: 68,3%; 2019: 68,9%)
- Top 3: approx. 84,8 kt/a; approx. 53,4% of total capacity  
(2018: 51,4%; 2019: 52,2%)
- Top 1 (Toray): approx. 54,5 kt/a; approx. 34,3% of total capacity  
(2018: 31,8%; 2019: 32,8%).

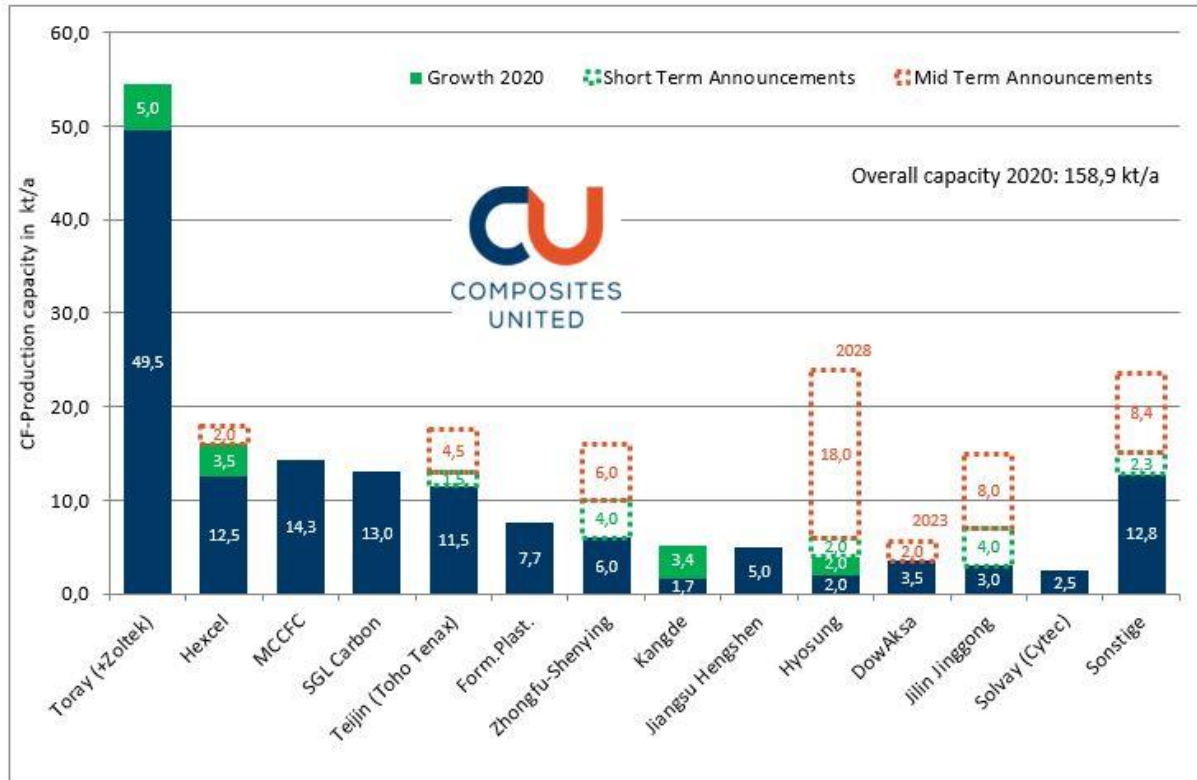


Figure 1: Theoretical, annual CF-Production capacity by manufacturer (01/2021).