A snapshot analysis from IC Design Houses Survey 2006 (China and Taiwan) report done by EE Times

A. Revenues

a. 2005 revenues (expected)
   Average 5.4 M$ in China, 9.2 M$ in Taiwan
   China
   15 M$ and above–19 %,1-2.9 M$ - 19%,less than 250 K$ and 3-6.9M-17%
   Broadly uniformly distributed
   Taiwan
   15 M$ and above – 37%, less than 250 K$ - 16%, 7-10.9 M$ and
   11 – 14.9 M$ - 11%
   Taiwan has extremes; 15M$ category followed by < 250k$ and the gap is expected to further widen in 2006.

b. 2006 revenues (forecasted)
   China
   15 M$ and above – 28% (a big jump from '05)
   Taiwan
   15 M$ and above – 53% (a big jump with a marginal increase in the lower categories)

Basically, there is a broad and uniform representation by design houses in China for all categories – small to big. This is a reflection of several design houses appearing on China's microelectronics landscape in the last few years. Taiwan, on the other hand, being more mature in this area has most of its design houses represented in the 15M$ category and then several smaller ones.

B. Applications

- Taiwan is predominantly desktop and Laptop computers followed by handhelds and other consumer electronics.
- China has a more even spread across handhelds/PDAs, wireless consumers, Cellular Wireless equipment & other telecom.
- Cellular/Wireless is more than LAN/WAN equipment in China; it's the reverse in Taiwan.
- China also has a higher percentage in Automotives which is a growing market there.

C. Main difficulties when contracting foundries

China: Cycle time (54%) and cost (49%)
Taiwan: Cost (68%) and cycle time (45%)
Taiwan's main application being Computing and Consumer Electronics which is a highly cost competitive market reflects this.

D. Design

a. Types

China

ASICs (66%), SoC (59%), Standard IC (29%), ASSP (8%) PLD/FPGA (17%)

Taiwan

ASICs (61%), SoC (53%), Standard IC (28%), ASSP (19%), PLD/FPGA (7%)

- Analog/Mixed signal designs to decrease in China while there is a slight increase in Taiwan.
- China & Taiwan – Percentage of Digital ASICs as well as DSPs to decrease, SoC will be more or less constant.
- Taiwan has more ASSPs, an indicator of the Consumer Electronics market with consumer focused system designs that can be rapidly configured.
- Fewer newer designs are expected in 2006 but as revenues are expected to increase, this may indicate more revenue/design in '06 as compared from '05

b. Technology/Process

Average of 10 (Taiwan) and 8 (China) design projects in '05 with

Digital design (Taiwan/China)

0.13um (11%/ 14%), 0.18um (48%/46%), 0.25u (11%/12%), 0.35u (15%/16%), 0.5-1.5u (15%/12%)

Analog design (Taiwan/China)

0.13um (2%/10%), 0.18um (32%/24%), 0.25u (11%/15%), 0.35u (22%/16%), 0.5-1.5u (24%/25%)

- ***0.18um is the most frequently used technology in both countries***.
- China has more designs in 0.13um both in analog and digital as compared to Taiwan.
- Digital designs have more or less jumped from 0.35um to 0.18um with not many in 0.25um. Analog/Mixed Signal designs are mostly in 0.5u and above and in 0.18um

c. Gate Count in ASIC designs

Taiwan: 3 major blocks – Less than 50K, 100k to 299k and 1 to 2.49M gates

China: More evenly spread. Bigger blocks are – 50k-99K, 500k to 999k, 1 to 2.49M gates

d. Challenges (Taiwan/China)
    i. Reduction of design cycle time (60% / 60%)
    Cycle time also figured highest for China under difficulties with foundries i.e. China's biggest challenge is cycle time for both foundries as well as design cycle time while Taiwan has cost of foundries and design cycle time
    ii. Reduction of design cost (51% / 46%)
    iii. IP availability (23% / 23%)
    iv. IP verification (18% / 16%)
    v. DFT (5%/11%)
    DFT figures higher in China. Can be attributed to higher gate complexity designs and types of designs (major applications - telecom equipment).
    vi. Power Management (19% / 11%)
    Power Management figures high in Taiwan after IP verification. This relates to the fact that Taiwan does a large chunk of designs for Consumer Electronics where power management is a major concern
    vii. DFM (4%/ 1 %)
    DFM figures higher in Taiwan. This may be attributed to the fact that the world's top 2 foundries are from Taiwan. However, DFM is gaining momentum in sub micron technologies. So China with more designs moving to 0.13um as compared to Taiwan should have an equal if not higher figure for DFM under design challenges
    viii. Design Iteration (5%/ 2%)
    ix. Timing closure (5% / 2%)

E. Regional perspectives

IC design houses offer mostly Full system design followed by IP services. IP services is slightly higher in Taiwan w.r.t China (IP protection in China is a major concern and this reflected in the IP services numbers)