Advantage of DC Motor

* Provide excellent speed control for acceleration and deceleration
* Easy to understand design
* Simple, cheap drive design

Disadvantage of DC Motor

* High Maintenance
* Not suitable in dirty environments

Brushed and Brushless are the two best options for DC motors

|  |  |  |
| --- | --- | --- |
| Pros/Cons | Brushless DC | Brushed DC |
| Maintenance | Low | High |
| Speed/Torque | All speeds | Low-Med speeds |
| Efficiency | High (85-90%) | Low (75-80%) |
| Output | High | Variable |
| Size | Large range of sizes (sm-lg) | Large range of sizes (sm-lg) |
| Noise | Low | High |
| Heat Dissipation | High | Poor |
| Control | Complex & expensive | Simple & Inexpensive |
| Environment needed | Clean | Doesn’t matter (extreme) |
| Life Span | Long | Short |
| Cost | High | Low |
| Other | Needs controller (doubles price) | Creates EMI/no controller |

* Homopolar Motor not a viable option
* Ball bearing also not a viable option

Advantage of AC Motor

* Low cost
* Speed variation
* High power factor
* Reliable operation

Disadvantage of AC Motor

* Inability to operate at low speeds
* Poor positioning control

|  |  |  |
| --- | --- | --- |
| Pros/Cons | Synchronous | Induction (squirrel cage) |
| Torque | High | Less than synchronous |
| Speed | Constant | Variable |
| Control | Required | Not Required |
| Cost | High | Low |
| Self-starting | No | Yes |
| Efficiency | High | Less than synchronous |
| Maintenance | Low | No maintenance |
| Life span | 10,000 hours (416 days’ worth) – 3 years | Avg: 15 Years |

Overall: Synchronous would not be a viable option due to the fact that it is not self-starting. As for the other options it depends on the conditions. All (Brushless, Brushed, and Induction) would make a good motor. Probably the best, for cost and reliability, would be a brushed DC motor however the problem with that is the EMI (electromagnetic interference) they can produce.