|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | F1 |  |  | F2 |  |  | F3 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 1.0000e+02 | 1.5913e-12 |  | 2.7461e+03 | 1.7545e+03 |  | 4.0403e+02 | 6.1125e+00 |
| SMA | 2.7791e+09 | 9.7558e+08 |  | 3.7144e+04 | 7.6776e+03 |  | 6.1241e+02 | 4.0826e+01 |
| HGS | 8.6441e+03 | 7.1827e+03 |  | 1.2895e+03 | 3.7168e+03 |  | 4.7573e+02 | 2.7079e+01 |
| WOA | 2.4939e+06 | 1.6903e+06 |  | 1.4288e+05 | 6.3171e+04 |  | 5.5245e+02 | 3.4208e+01 |
| GWO | 2.0084e+09 | 1.4951e+09 |  | 3.7349e+04 | 1.3122e+04 |  | 5.9171e+02 | 7.2082e+01 |
| MFO | 9.0487e+09 | 6.3668e+09 |  | 1.0700e+05 | 6.3388e+04 |  | 1.6032e+03 | 8.5896e+02 |
| BA | 5.2588e+05 | 3.0744e+05 |  | 3.0010e+02 | 7.0785e-02 |  | 4.7978e+02 | 3.8177e+01 |
| SCA | 1.2208e+10 | 1.8100e+09 |  | 3.6360e+04 | 6.0809e+03 |  | 1.4524e+03 | 3.0873e+02 |
| FA | 1.4609e+10 | 1.1033e+09 |  | 6.1021e+04 | 7.5424e+03 |  | 1.3504e+03 | 1.3082e+02 |
| PSO | 2.6216e+03 | 2.4781e+03 |  | 3.0000e+02 | 5.5120e-03 |  | 4.7017e+02 | 1.7487e+01 |
| DE | 2.2681e+03 | 3.9861e+03 |  | 1.9351e+04 | 4.1318e+03 |  | 4.8763e+02 | 4.0092e+00 |
|  | F4 |  |  | F5 |  |  | F6 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 5.6332e+02 | 1.3369e+01 |  | 6.0000e+02 | 9.0454e-06 |  | 7.9166e+02 | 1.1981e+01 |
| SMA | 7.2777e+02 | 3.4202e+01 |  | 6.3966e+02 | 7.0627e+00 |  | 1.0713e+03 | 6.3756e+01 |
| HGS | 6.2978e+02 | 3.2103e+01 |  | 6.0169e+02 | 1.8489e+00 |  | 8.9708e+02 | 3.7734e+01 |
| WOA | 7.7663e+02 | 6.2617e+01 |  | 6.7107e+02 | 1.0935e+01 |  | 1.2208e+03 | 9.3101e+01 |
| GWO | 6.0037e+02 | 3.0070e+01 |  | 6.0721e+02 | 4.6139e+00 |  | 8.5750e+02 | 4.8350e+01 |
| MFO | 6.9756e+02 | 4.9910e+01 |  | 6.4284e+02 | 1.5199e+01 |  | 1.2126e+03 | 2.2731e+02 |
| BA | 8.3674e+02 | 6.4569e+01 |  | 6.7083e+02 | 1.0540e+01 |  | 1.6920e+03 | 2.1085e+02 |
| SCA | 7.7586e+02 | 2.1362e+01 |  | 6.4921e+02 | 5.1030e+00 |  | 1.1174e+03 | 3.9997e+01 |
| FA | 7.5698e+02 | 1.4858e+01 |  | 6.4423e+02 | 2.6877e+00 |  | 1.3909e+03 | 4.9835e+01 |
| PSO | 7.0857e+02 | 3.4752e+01 |  | 6.4604e+02 | 7.9967e+00 |  | 9.9913e+02 | 5.4874e+01 |
| DE | 6.1004e+02 | 9.3191e+00 |  | 6.0000e+02 | 0.0000e+00 |  | 8.4421e+02 | 7.1946e+00 |
|  | F7 |  |  | F8 |  |  | F9 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 8.6716e+02 | 1.5138e+01 |  | 9.1371e+02 | 1.7786e+01 |  | 3.0397e+03 | 2.8676e+02 |
| SMA | 9.7477e+02 | 2.5965e+01 |  | 5.9509e+03 | 9.5781e+02 |  | 5.6127e+03 | 7.1730e+02 |
| HGS | 9.1317e+02 | 2.6497e+01 |  | 3.5067e+03 | 1.0138e+03 |  | 3.8145e+03 | 4.6165e+02 |
| WOA | 1.0017e+03 | 3.8476e+01 |  | 7.6413e+03 | 2.6702e+03 |  | 6.2162e+03 | 7.7034e+02 |
| GWO | 8.8200e+02 | 1.7727e+01 |  | 2.0149e+03 | 6.3927e+02 |  | 4.1912e+03 | 5.0897e+02 |
| MFO | 1.0303e+03 | 5.5614e+01 |  | 7.0666e+03 | 1.8614e+03 |  | 5.2030e+03 | 6.7950e+02 |
| BA | 1.0502e+03 | 5.2265e+01 |  | 1.2953e+04 | 3.8518e+03 |  | 5.6030e+03 | 6.8409e+02 |
| SCA | 1.0516e+03 | 2.1058e+01 |  | 5.5369e+03 | 1.0785e+03 |  | 8.0997e+03 | 3.5233e+02 |
| FA | 1.0486e+03 | 1.3247e+01 |  | 5.1596e+03 | 4.3930e+02 |  | 8.0274e+03 | 2.2585e+02 |
| PSO | 9.4390e+02 | 3.4907e+01 |  | 3.9434e+03 | 7.5435e+02 |  | 4.8535e+03 | 7.6029e+02 |
| DE | 9.1081e+02 | 8.9787e+00 |  | 9.0000e+02 | 1.0556e-13 |  | 5.8440e+03 | 3.1609e+02 |
|  | F10 |  |  | F11 |  |  | F12 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 1.1270e+03 | 1.3483e+01 |  | 8.8925e+03 | 4.0080e+03 |  | 1.3593e+03 | 3.3817e+01 |
| SMA | 1.5558e+03 | 1.2107e+02 |  | 1.1669e+08 | 8.1746e+07 |  | 2.3952e+06 | 2.7844e+06 |
| HGS | 1.2149e+03 | 3.4890e+01 |  | 9.3141e+05 | 7.7400e+05 |  | 3.5405e+04 | 2.6371e+04 |
| WOA | 1.4923e+03 | 9.6510e+01 |  | 4.1259e+07 | 2.9292e+07 |  | 1.5984e+05 | 1.0683e+05 |
| GWO | 1.8823e+03 | 7.7390e+02 |  | 6.3783e+07 | 8.4193e+07 |  | 4.4655e+06 | 2.2171e+07 |
| MFO | 5.0433e+03 | 4.6519e+03 |  | 3.7995e+08 | 7.0127e+08 |  | 3.6931e+08 | 1.0524e+09 |
| BA | 1.3014e+03 | 5.9936e+01 |  | 2.1761e+06 | 1.6006e+06 |  | 3.5719e+05 | 1.9196e+05 |
| SCA | 2.0311e+03 | 2.8877e+02 |  | 1.0668e+09 | 2.5568e+08 |  | 3.4437e+08 | 1.7009e+08 |
| FA | 3.6211e+03 | 4.0020e+02 |  | 1.5346e+09 | 2.7203e+08 |  | 6.0003e+08 | 2.2179e+08 |
| PSO | 1.2118e+03 | 3.2259e+01 |  | 3.7314e+04 | 2.2188e+04 |  | 1.3314e+04 | 9.7411e+03 |
| DE | 1.1609e+03 | 2.6685e+01 |  | 1.7175e+06 | 8.2128e+05 |  | 3.0915e+04 | 1.4964e+04 |
|  | F13 |  |  | F14 |  |  | F15 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 1.4425e+03 | 1.4469e+01 |  | 1.5397e+03 | 3.3290e+01 |  | 2.2142e+03 | 1.5765e+02 |
| SMA | 1.8055e+05 | 9.1771e+04 |  | 2.1872e+04 | 1.3535e+04 |  | 2.8305e+03 | 2.9201e+02 |
| HGS | 4.3045e+04 | 3.4017e+04 |  | 1.8437e+04 | 1.5621e+04 |  | 2.8025e+03 | 2.8494e+02 |
| WOA | 8.1749e+05 | 1.2572e+06 |  | 7.9364e+04 | 6.1567e+04 |  | 3.4162e+03 | 3.7138e+02 |
| GWO | 1.9002e+05 | 3.0825e+05 |  | 2.2711e+06 | 1.0905e+07 |  | 2.3775e+03 | 2.6045e+02 |
| MFO | 3.4834e+05 | 1.2153e+06 |  | 4.5044e+04 | 5.0205e+04 |  | 3.2200e+03 | 4.4465e+02 |
| BA | 6.5304e+03 | 4.0558e+03 |  | 1.2135e+05 | 7.3619e+04 |  | 3.4747e+03 | 3.7697e+02 |
| SCA | 1.4874e+05 | 9.7134e+04 |  | 1.1284e+07 | 1.0636e+07 |  | 3.5373e+03 | 2.0007e+02 |
| FA | 1.8941e+05 | 8.2832e+04 |  | 6.6340e+07 | 2.9919e+07 |  | 3.3895e+03 | 1.4846e+02 |
| PSO | 5.5910e+03 | 3.3722e+03 |  | 6.7429e+03 | 6.3845e+03 |  | 2.8190e+03 | 3.0956e+02 |
| DE | 5.7237e+04 | 3.4872e+04 |  | 7.2678e+03 | 4.9999e+03 |  | 2.0175e+03 | 1.2873e+02 |
|  | F16 |  |  | F17 |  |  | F18 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 1.8833e+03 | 8.2815e+01 |  | 1.8543e+03 | 2.1190e+01 |  | 1.9159e+03 | 4.8471e+00 |
| SMA | 2.2760e+03 | 1.8760e+02 |  | 6.4227e+05 | 4.2625e+05 |  | 6.4574e+05 | 6.7286e+05 |
| HGS | 2.2091e+03 | 1.8168e+02 |  | 2.3588e+05 | 1.9267e+05 |  | 1.8432e+04 | 2.1337e+04 |
| WOA | 2.6004e+03 | 2.7440e+02 |  | 2.5569e+06 | 2.8412e+06 |  | 2.5904e+06 | 1.6983e+06 |
| GWO | 1.9617e+03 | 1.2728e+02 |  | 6.0435e+05 | 5.5262e+05 |  | 2.5157e+06 | 7.7985e+06 |
| MFO | 2.4548e+03 | 2.2958e+02 |  | 2.2946e+06 | 5.4580e+06 |  | 1.0780e+07 | 3.6292e+07 |
| BA | 2.7944e+03 | 3.7619e+02 |  | 1.8689e+05 | 1.4521e+05 |  | 5.5445e+05 | 1.9576e+05 |
| SCA | 2.3845e+03 | 1.5700e+02 |  | 3.1947e+06 | 1.7532e+06 |  | 2.4141e+07 | 1.2622e+07 |
| FA | 2.4750e+03 | 1.2231e+02 |  | 4.0869e+06 | 1.6824e+06 |  | 9.5091e+07 | 3.2554e+07 |
| PSO | 2.4033e+03 | 3.0662e+02 |  | 1.4265e+05 | 9.9674e+04 |  | 8.9185e+03 | 1.0115e+04 |
| DE | 1.8225e+03 | 3.5064e+01 |  | 3.2485e+05 | 1.1503e+05 |  | 8.0227e+03 | 3.9370e+03 |
|  | F19 |  |  | F20 |  |  | F21 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 2.2338e+03 | 1.0420e+02 |  | 2.3330e+03 | 6.7383e+01 |  | 2.6536e+03 | 9.2146e+02 |
| SMA | 2.4580e+03 | 1.3108e+02 |  | 2.4766e+03 | 2.6761e+01 |  | 3.8633e+03 | 2.0120e+03 |
| HGS | 2.5425e+03 | 2.2843e+02 |  | 2.4234e+03 | 3.5711e+01 |  | 5.3776e+03 | 1.1666e+03 |
| WOA | 2.7202e+03 | 2.2269e+02 |  | 2.5823e+03 | 6.8897e+01 |  | 7.0074e+03 | 1.8306e+03 |
| GWO | 2.3628e+03 | 1.2328e+02 |  | 2.3816e+03 | 1.6586e+01 |  | 4.6306e+03 | 1.4898e+03 |
| MFO | 2.7650e+03 | 2.4527e+02 |  | 2.5007e+03 | 3.8354e+01 |  | 6.4977e+03 | 1.5976e+03 |
| BA | 2.9937e+03 | 1.8241e+02 |  | 2.6433e+03 | 8.3115e+01 |  | 7.2328e+03 | 7.4210e+02 |
| SCA | 2.6308e+03 | 1.4161e+02 |  | 2.5543e+03 | 1.9932e+01 |  | 8.0272e+03 | 2.6281e+03 |
| FA | 2.6060e+03 | 8.3496e+01 |  | 2.5366e+03 | 1.3459e+01 |  | 3.8360e+03 | 1.5012e+02 |
| PSO | 2.6938e+03 | 2.2679e+02 |  | 2.4662e+03 | 3.2444e+01 |  | 4.6249e+03 | 2.2462e+03 |
| DE | 2.1411e+03 | 5.8920e+01 |  | 2.4082e+03 | 8.3487e+00 |  | 3.5249e+03 | 1.5624e+03 |
|  | F22 |  |  | F23 |  |  | F24 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 2.5787e+03 | 1.5780e+02 |  | 2.8364e+03 | 1.4709e+02 |  | 2.8852e+03 | 1.7291e+00 |
| SMA | 2.8660e+03 | 2.9916e+01 |  | 3.0127e+03 | 3.0034e+01 |  | 3.0116e+03 | 4.7833e+01 |
| HGS | 2.7717e+03 | 2.4884e+01 |  | 3.0306e+03 | 4.9039e+01 |  | 2.8886e+03 | 8.5491e+00 |
| WOA | 3.0521e+03 | 1.1514e+02 |  | 3.1690e+03 | 8.2018e+01 |  | 2.9531e+03 | 2.6293e+01 |
| GWO | 2.7484e+03 | 3.9237e+01 |  | 2.9292e+03 | 5.7901e+01 |  | 2.9775e+03 | 4.0418e+01 |
| MFO | 2.8349e+03 | 3.4064e+01 |  | 2.9867e+03 | 3.9393e+01 |  | 3.3399e+03 | 4.8958e+02 |
| BA | 3.3319e+03 | 1.5425e+02 |  | 3.3725e+03 | 1.1278e+02 |  | 2.9113e+03 | 2.4731e+01 |
| SCA | 2.9843e+03 | 3.0439e+01 |  | 3.1557e+03 | 2.3680e+01 |  | 3.2128e+03 | 9.5873e+01 |
| FA | 2.9098e+03 | 1.0324e+01 |  | 3.0651e+03 | 1.2905e+01 |  | 3.5778e+03 | 1.1573e+02 |
| PSO | 3.2924e+03 | 1.8069e+02 |  | 3.3761e+03 | 1.1725e+02 |  | 2.8803e+03 | 6.5286e+00 |
| DE | 2.7554e+03 | 9.3325e+00 |  | 2.9506e+03 | 1.4253e+01 |  | 2.8874e+03 | 2.3445e-01 |
|  | F25 |  |  | F26 |  |  | F27 |  |
|  | Avg | Std |  | Avg | Std |  | Avg | Std |
| EWFO | 2.9134e+03 | 2.5186e+02 |  | 3.2091e+03 | 8.9069e+00 |  | 3.1182e+03 | 3.9218e+01 |
| SMA | 5.1423e+03 | 7.1756e+02 |  | 3.2538e+03 | 1.9912e+01 |  | 3.4139e+03 | 4.5128e+01 |
| HGS | 4.9811e+03 | 2.9290e+02 |  | 3.2241e+03 | 1.2498e+01 |  | 3.2031e+03 | 4.5423e+01 |
| WOA | 7.6261e+03 | 1.6261e+03 |  | 3.3507e+03 | 7.7715e+01 |  | 3.3080e+03 | 2.5902e+01 |
| GWO | 4.7877e+03 | 3.8604e+02 |  | 3.2547e+03 | 3.1523e+01 |  | 3.4245e+03 | 9.3197e+01 |
| MFO | 6.1156e+03 | 6.9057e+02 |  | 3.2504e+03 | 1.9128e+01 |  | 4.1649e+03 | 7.9047e+02 |
| BA | 8.9766e+03 | 2.4463e+03 |  | 3.4471e+03 | 1.4308e+02 |  | 3.1360e+03 | 6.6594e+01 |
| SCA | 6.8820e+03 | 3.4569e+02 |  | 3.4070e+03 | 3.6011e+01 |  | 3.8052e+03 | 1.4507e+02 |
| FA | 6.5500e+03 | 1.2444e+02 |  | 3.3308e+03 | 1.5435e+01 |  | 3.8783e+03 | 7.3798e+01 |
| PSO | 7.4817e+03 | 1.3973e+03 |  | 3.3015e+03 | 3.4547e+02 |  | 3.1453e+03 | 5.4827e+01 |
| DE | 4.6521e+03 | 1.0443e+02 |  | 3.2062e+03 | 2.9392e+00 |  | 3.1774e+03 | 5.6128e+01 |
|  | F28 |  |  | F29 |  |  |  |  |
|  | Avg | Std |  | Avg | Std |  |  |  |
| EWFO | 3.4958e+03 | 1.0487e+02 |  | 5.1279e+03 | 1.1831e+02 |  |  |  |
| SMA | 4.1146e+03 | 2.5665e+02 |  | 3.7511e+06 | 2.1567e+06 |  |  |  |
| HGS | 3.7719e+03 | 1.7532e+02 |  | 6.5582e+04 | 8.9070e+04 |  |  |  |
| WOA | 4.8371e+03 | 4.3579e+02 |  | 1.0083e+07 | 7.5148e+06 |  |  |  |
| GWO | 3.7014e+03 | 1.4801e+02 |  | 6.9404e+06 | 5.9397e+06 |  |  |  |
| MFO | 4.1056e+03 | 4.0999e+02 |  | 1.1566e+06 | 1.9804e+06 |  |  |  |
| BA | 5.0498e+03 | 3.7782e+02 |  | 1.1971e+06 | 5.4443e+05 |  |  |  |
| SCA | 4.6638e+03 | 2.6288e+02 |  | 7.3917e+07 | 2.6742e+07 |  |  |  |
| FA | 4.6414e+03 | 1.5603e+02 |  | 9.0480e+07 | 2.1251e+07 |  |  |  |
| PSO | 3.9949e+03 | 2.6626e+02 |  | 5.4562e+03 | 2.7886e+03 |  |  |  |
| DE | 3.5058e+03 | 7.8422e+01 |  | 1.3097e+04 | 3.3454e+03 |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Overall Rank** |  |  |  |  |  |  |
|  | **RANK** | **+/=-** | **AVG** |  |  |  |  |
| EWFO | 1 | ~ | 1.3448 |  |  |  |  |
| SMA | 6 | 29/0/0 | 6.3448 |  |  |  |  |
| HGS | 3 | 28/0/1 | 4.0 |  |  |  |  |
| WOA | 9 | 29/0/0 | 8.4828 |  |  |  |  |
| GWO | 5 | 29/0/0 | 5.1379 |  |  |  |  |
| MFO | 7 | 29/0/0 | 7.7586 |  |  |  |  |
| BA | 7 | 28/0/1 | 7.7586 |  |  |  |  |
| SCA | 11 | 29/0/0 | 8.931 |  |  |  |  |
| FA | 10 | 29/0/0 | 8.7931 |  |  |  |  |
| PSO | 4 | 25/2/2 | 4.5862 |  |  |  |  |
| DE | 2 | 22/2/5 | 2.8621 |  |  |  |  |